

Sub-Saharan
Africa Region

Data collection survey
on Smart City Development
in Sub-Saharan Africa

Final Report

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Site Survey Photos

Senegal



Despite some roads and government-related facilities are being constructed in certain sections of Diamnadio as part of smart development effort, it is noticeable that a significant portion of the area remains undeveloped and consists of huge vacant land.



The construction of ministry offices complex, residential areas and industrial areas (Chinese) is progressing in certain sections of Diamnadio City. In the future, there are plans to make Diamnadio as an administrative district of the central government.



Diamnadio Station located in the south side of Diamnadio City. This station connects major cities, such as Rufisque City and Dakar City, facilitating efficient travel and enhance regional connectivity. The train route is expected to be extended to the airport, contributing to the Dakar Metropolitan area development growth and accessibility.



Rufisque City where some historical buildings from French colonial era still remain along with daily life, the city administrative is exploring ways to utilize them. By preserving and promoting these historical sites and turning them into centers of culture and history, there is potential for regional economic growth through the revitalization of the tourism industry.



Dakar is facing urbanization due to population growth and it increased challenge in congestion in the bustling city. To tackle traffic issues, Dakar introduced the first electric Bus Rapid Transit (e-BRT) system.

Rwanda



Kigali's urban landscape is characterized by its hilly terrains. The growth of the city that adapted to the topography is having an impact on the planning and implementation of urban development and infrastructure development, and the government is also struggling to take countermeasures.



Kigali City is renowned for its lush greenery and cleanliness cities. Considering Rwanda's regional role and industrial structure, the government is actively promoting urban beautification, greening, and waste-free projects, which are leading to improved quality of life for residents.



Located close to the Kigali Airport, Kimironko Market is adjacent to the bus terminal and has huge parking spaces, providing efficient mobility with wide accessibility for market users.



Kigali City is a vibrant city where people can come and go safely even at night. It creates a sense of community among the residents in a well-maintained and safe town, and that spirit also contributes to the beautification of the town.



In contrast to urban areas, the surrounding area of Kigali City has large expanses of fertile farmland, and it can be seen that Rwanda's industry still relies heavily on primary industries. Even in the suburbs, the rural landscape remains beautifully preserved, showing that the government's aesthetic policy is not limited to urban areas.

Côte d'Ivoire



Ebrié Lagoon Port plays as an important maritime gateway for economic activities in the region. A newly constructed toll road near the port improves connectivity between the port area and Abidjan city area.



The Côte d'Ivoire government has decided to redevelop the coastal slum area of Ebrié Lagoon. This redevelopment effort is an important part of the infrastructure development plan, aimed at alleviating congestion in the northern part of Abidjan city.



The Plateau-Cocody Bridge in Abidjan City is connecting the central business district of Plateau with the residential and commercial district of Cocody. It also serves as a symbol of the commercial district along the riverbank.



Knowledge Sharing Seminar on Smart City Initiative in Asia and Africa was held in Abidjan City inviting eight African countries and two Asian countries. During the program, each country discussed and shared their smart city development efforts, current situation, and future direction. On the last day of the seminar, the seminar declaration was agreed among the participants.



As part of the activities of the Asia-Africa Knowledge Sharing Seminar, the participants visited a road where a traffic control system has been piloted in the Abidjan City. The project is designed to comprehensively monitor the traffic situation along the road and link it to real-time analysis and efficient traffic management measures. (Right: Group photo of seminar participants)

List of Survey Target Countries in Sub-Saharan Africa Region

Eastern Africa

Burundi
Comoros
Djibouti
Eritrea
Ethiopia
Kenya
Madagascar
Malawi
Mauritius
Mozambique
Rwanda
Seychelles
Somalia
South Sudan
Uganda
United Republic of Tanzania
Zambia
Zimbabwe

Western Africa

Benin
Burkina Faso
Cabo Verde
Côte d'Ivoire
Gambia
Ghana
Guinea
Guinea-Bissau
Liberia
Mali
Mauritania
Niger
Nigeria
Senegal
Sierra Leone
Togo

Middle Africa

Angola
Cameroon
Central African Republic
Chad
Republic of Congo
Democratic Republic of the Congo
Equatorial Guinea
Gabon
São Tomé and Príncipe

Northern Africa

Sudan

Southern Africa

Botswana
Eswatini
Lesotho
Namibia
South Africa

Note: This regional classification is based on "World Population Prospects 2018 Edition" issued by the United Nations.



The map illustrates countries of the JICA survey target in Sub-Saharan Africa region, and especially highlights countries participated for Asia-Africa Knowledge Sharing Seminar conducted by JICA, namely Côte d'Ivoire, Kenya, Nigeria, Rwanda, Senegal, Tanzania, Uganda, and Zambia.

Within the scope of this survey, interviews-in-person to government agencies have been conducted in countries of Senegal and Rwanda reflecting dedicated survey efforts to gather essential data and insights of their smart city implementation.

Above noted 8 countries are indicated in orange boundary lines.

Laos and Cambodia from Asian region have also participated to the knowledge seminar in Abidjan, Côte d'Ivoire.

Executive Summary

The Sub-Saharan Africa region, target of this survey, is facing rapid population growth and urbanization, and the lack of housing supply and basic infrastructure development is a serious problem. Smart City is recognized as initiatives to address the various urban problems mentioned above and to achieve more efficient and sustainable urban development through the use of the latest technologies. This survey was conducted to gather information on smart city development initiatives in various countries in Sub-Saharan Africa, and to understand and visualize the applicability and approaches to smart city development, borrowing from examples in Asia and other developed countries' smart city development initiatives.

The history, economy, and social conditions of the target region were reviewed, and the current status of smart city development in the target region was analyzed and understood through desktop research. Utilizing data from the World Bank and other sources, survey team also compared socioeconomic and other information for each country to gain an understanding of not only urban development issues, but also a broad range of current conditions. Many countries in the sub-Saharan Africa region are lagging behind in economic growth, with insufficient development of basic infrastructure and industry. It has also been pointed out that improving social well-being, such as education and health, is also an issue. In addition, many discussions are underway on urban development issues, and common development challenges were identified in many countries from the perspectives of land use, urban development, infrastructure development, environmental conservation, social and economic conditions, and governance.

Next, based on the urban development issues and initiatives related to smart city development in each country identified in the desktop analysis, the current status, plans, policies, and legal systems of smart city development and related organizations and actors in the study area were organized. This report summarizes the status of smart city development initiatives in the target regions, focusing on 1) background, history, and significance of smart cities, 2) overview of smart city initiatives in the target regions, 3) existing studies on smart city development, 4) related policies and legal systems for smart cities, and 5) overview of organizations and actors related to smart cities. The report summarizes the status of smart city development efforts in the target regions, focusing on (3) historical background, (4) policies and legislation related to smart city development, and (5) organizations and actors related to smart cities. Each country in the region has its own historical background and significance in promoting smart city development. At the same time, it is emphasized that smart cities are not just a technological innovation, but an effort to create multifaceted values, such as sustainable urban development, enhancement of citizens' well-being, and improvement of social public interest. An overview of the status of specific initiatives, existence of policies, relevant legal systems, and support from international organizations for smart city development in each country, based on information collected through the desktop survey, reveals significant differences in the depth and progress of smart city efforts in each country, as well as the current status of international cooperation. This survey also identified past studies and supports for development and how the results of such studies and supports might be utilized for future smart city development.

Information on the status of smart city development initiatives in 10 Asian countries and 10 developed countries was collected for the purpose of utilizing the information for future smart city development in the Sub-Saharan Africa region. By listing problem-solving and implementation organizations, implementation methods and technologies introduced, as well as newly identified problems in the initiatives after implementation, the possibility of applying the information to the initiatives in the countries in the target region was verified. The following points were confirmed through the study of precedents.

- The main benefits of smart city development are cost savings and added value. These are achieved through more efficient use of resources, improved convenience for citizens, and increased productivity.
- Successful smart city development requires clear policies and visions, effective organizational structures, viable systems, application of advanced technologies, and sustainable operations.
- Effective smart city realization depends on the use of tools and approaches, such as national-level data integration platforms, citizen participation platforms, and public-private partnerships.
- Realization of smart cities requires the participation of diverse actors, including governments, municipalities, private companies, research institutions, and citizens.
- Smart city development initiatives are strengthening cooperation between the public and private sectors with each sharing a role.
- The driving force varies from country to country and city to city, with local governments, professional organizations, private companies, and others playing their own roles.
- In smart city development initiatives, active participation of residents, reflection of their opinions, and consensus building are important.
- In promoting smart city development, appropriate legislation and corresponding policies are necessary.

Based on a survey of smart city development initiatives in Sub-Saharan Africa and other developed and Asian countries, a phased approach to JICA's support for the realization of smart cities in the target region was examined. In order to establish a roadmap for the realization of the smart city approach and a phased approach, a matrix of city role attributes in sub-Saharan Africa and the direction of smart city development was established, and a method to determine the status of each country or city was established based on this matrix. The matrix utilizes three categories of cities: "Economic and Commercial Center Cities," "Logistics and Transportation Center Cities," and "Production and Resource Producing Center Cities," as well as three economic levels of cities based on income level: "Stable Growth Level," "Progressing Level," and "Emerging Level. Levels" based on income levels (see Figure 1).

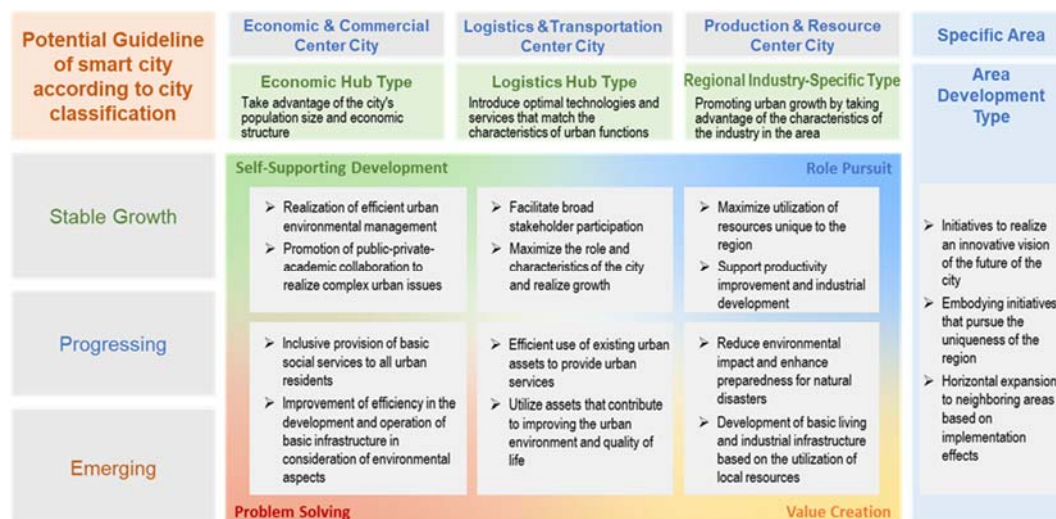


Figure 1: Potential Guideline of Smart City According to City Classification

Based on the results of the analysis of urban development issues in each country in the target region, a smart city approach was established as a standard for supporting initiatives, and the results were compiled as a phased approach toward the realization of a smart city. Five phased approaches were set as a framework for JICA's smart city support, and a roadmap of support activities was also set for each of them. The phased approaches are as follows (see Figure 2).

- Cities (or countries) where a framework is being put in place
- Cities (or countries) with frameworks in development
- Cities (or countries) that need to organize their framework in the future
- Cities (or countries) that need groundwork for smart city discussions
- Cities (or countries) that need to prioritize basic infrastructure development before smart city development

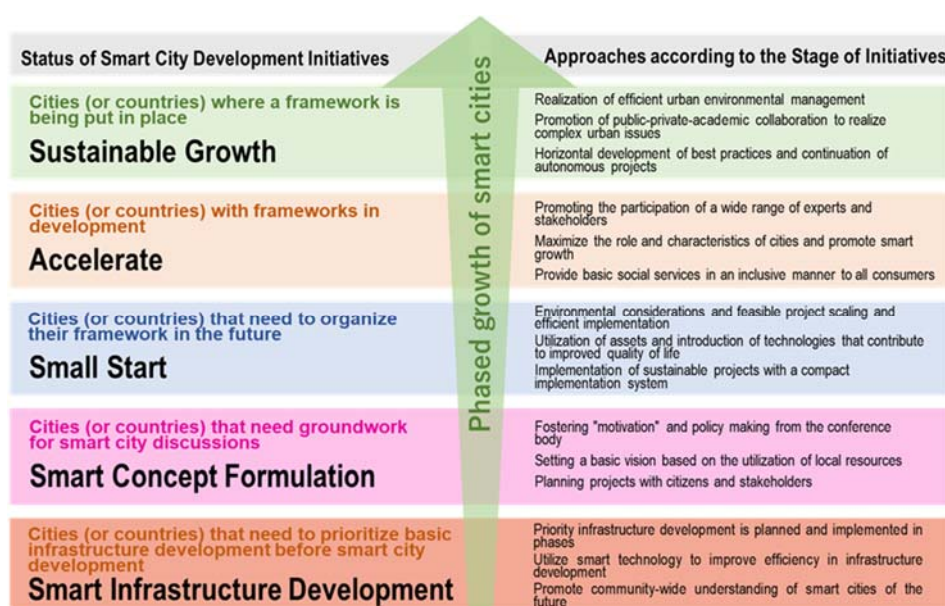


Figure 2: Overall View of Smart City Development Initiatives and Phased Approach

Each approach should be selected based on the situation of the target city (or country) and its initiatives in smart city development, and in some cases, several approaches may be applied simultaneously. It is important to evaluate the capabilities of the implementing agencies that promote the project and the relationships among stakeholders.

Next, the possibility of setting evaluation indicators for future smart city development support was examined based on input from UN-Habitat experts. The possibility of setting up indicators to evaluate urban development issues identified in many cities in sub-Saharan Africa was examined and linked to a framework and indicators to measure how smart cities contribute to the Sustainable Development Goals (SDGs). UN-Habitat and other UN agencies are currently attempting to link the SDGs to urban development effectiveness indicators. The urban development indicators should be designed to evaluate urban development issues and the effects of measures taken to address them, so it is necessary to set optimal indicators based on a wide range of perspectives and the opinions of experts and others. In future efforts, it is also important to measure the extent to which smart cities contribute to sustainable development economically, socially, and environmentally, and whether the evaluation axis is a human-centered development evaluation. The establishment of criteria based on these considerations will be promoted in future efforts.

There is a set of surveys of the actual conditions related to smart city development in Senegal and Rwanda as a hypothesis test for the smart city approach, and summarizes the results of the survey and analysis of the status of smart city development, urban development issues, and future prospects in both countries. The survey was conducted mainly by distributing questionnaires to government officials in the above two countries and collecting information through their responses and interviews with them, supplementing the information collected through desktop survey. Based on the survey results, several possibilities for supporting future smart city development in Senegal and Rwanda were also discussed, and are expected to be utilized in future efforts.

During the “Asia-Africa Knowledge Sharing Seminar” conducted by JICA during the survey period, eight African countries (Côte d’Ivoire, Kenya, Nigeria, Rwanda, Senegal, Tanzania, Uganda, and Zambia) and two ASEAN countries (Cambodia and Laos) participated in the seminar in Abidjan, the capital of Côte d’Ivoire. The seminar featured three sessions of presentations and group panel discussions by the 10 countries, where participants exchanged opinions and information on their respective initiatives. The seminar also featured site visit making is more attractive to participants, and opinions were exchanged during a site visit to the development locations in Abidjan City. In the final stage of the seminar, the contents obtained from the seminar activities were discussed and compiled into a declaration to be shared among the participating countries.

Based on the information on smart city development in sub-Saharan Africa that has been compiled and verified in the survey to this point, the survey team have identified urban issues common to each city and smart city initiatives as leading examples that could potentially address these issues. The report then provides examples of closely related precedent practices from the perspectives of five urban development

issues: land use and urban development, infrastructure development, environmental conservation, social and economic issues, and governance. By utilizing the essence of these leading precedent practices, it is expected that the effectiveness of future initiatives will be expanded.

Furthermore, a project model study was conducted for smart city development in the survey target region. This study is based on the business models established in the “Data Collection Survey on the Applicability of the Smart City Approach,” which was conducted earlier (four models: Government-completed model, Model in which the government provides infrastructure (taxes) and the private sector provides services, Model in which the government takes the initiative and the private sector provides services, and Model in which the private sector proposes smart city). By relating its applicability to the five smart city approaches described above, the survey team has tried to set a framework that is easily applicable to smart city development initiatives in sub-Saharan Africa. This enables to verify the affinity between the project and the Smart City Approach by applying the project in the target region to the project models commonly used in smart city projects, such as government-led projects and projects that utilize the private sector.

Based on the status of smart city development initiatives in the sub-Saharan Africa region reported above, the possibility of future cooperation by the Japanese government / JICA was examined. While taking advantage of Japan’s strengths in smart city development, it is summarized the applicability of the smart city approach to the target region and the possibilities for cooperation. Here, it summarizes the significance of the Smart City Approach for efficiently conducting urban development, including infrastructure development in association with smart city projects, while maximizing the expected population dividend in the African region, based on future growth and demographic trends.

At the end of the report, as recommendations for future cooperation, it was reaffirmed the need for an effective cooperation in “right time, right place” philosophy, based on the importance of a “people-centered approach” to smart city development in sub-Saharan Africa, while accurately understanding the progress of infrastructure development, strengthening organizational capacity, and establishing a common understanding of smart city issues.

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Abbreviation

Abbreviation	Description
ADM	Municipal Development Agency
AI	Artificial Intelligence
AFD	French Development Agency
AfDB	African Development Bank
API	Application Programming Interface
ASEAN	Association of Southeast Asian Nations
AU	African Union
BIM	Building Information Modeling
BPMIS	Building Permit Management Information System
BRT	Bus Rapid Transit System
CBD	Central Business District
CCTV	Closed-Circuit Television
CIF	The Climate Investment Funds
CIM	Construction Information Modeling/Management
DAC	Development Assistance Committee
DGPU	Délégation générale à la Promotion des Pôles urbains de Diamniadio et du Lac Rose
DGUA	Direction Générale de l'Urbanisme et de l'Architecture
DX	Digital Transformation
ECOWAS	Economic Community of West African States
ECA	United Nations Economic Commission for Africa
FDI	Foreign Direct Investment
GSMA	Global System for Mobile Communications Association
GDP	Gross Domestic Product
GIS	Geographic Information System
GNI	Gross National Income
GPS	Global Positioning System
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information and Communication Technology
IoT	Internet of Things
ITS	Intelligent Transportation Systems
ITU	International Telecommunication Union
JICA	Japan International Cooperation Agency
LED	Light Emitting Diode
MCLU	Ministry of Construction, Housing and Urbanism
MCTADT	Ministre des Collectivités territoriales, du Développement et de l'Aménagement des Territoires
MCTEN	Ministry of Communications, Telecommunications and Digital Economy
MINICT	Ministry of ICT & Innovation
OECD	Organization for Economic Cooperation and Development
OS	Operating System
PPP	Public-Private Partnership
RISA	Rwanda Information Society Authority
SC	Smart City
SDGs	Sustainable Development Goals
SDUGA	Urban Master Plan for Greater Abidjan
SEZ	Special Economic Zone
UN	United Nations
UNDP	United Nations Development Programme
UN-Habitat	UN (United Nations)-Habitat
WB	World Bank

Chapter 1 Background and Objectives of the Survey

1.1. Background of the Survey

In the current sub-Saharan Africa region, the industries that support economic growth have yet to grow, and job creation has not progressed, while the rapid urbanization of the region has led to a noticeable increase in the urban population due to population influx. The housing and basic infrastructure required for this population growth and urban expansion is not sufficient, and various adverse effects are occurring in terms of urban transportation, the environment, etc., causing serious problems. The New Urban Agenda, adopted at the Third United Nations Conference on Human Settlements (Habitat III) in October 2016, projects that the world's urban population will double by 2050 and the urbanization rate will also reach 68% according to the UN World Urbanization Prospects (2018).

Around 2010, smart city initiatives began to spread, albeit gradually, as a way to solve such regional urban problems through new technologies. The Japanese government, including the Ministry of Land, Infrastructure, Transport and Tourism, is now working to solve local “problems” using state-of-the-art Japanese technology, with the aim of bringing together local communities, businesses, and the national government¹.

Measures to realize a smart city must be approached, according to the characteristics of the target city or district. In addition, it cannot be assumed that advanced practices introduced in one city can be applied as is in another city. Each city has a different history, background, and environmental conditions. Therefore, even if a city has the same development issues as another city, copying or introducing initiatives from other cities may not lead to solutions. On the other hand, it is important to identify common urban issues and measures (solutions) to realize their challenges, and introduce technologies and measures that are increasingly being utilized. In developing countries, where there is a large gap between rapid urbanization and the speed of infrastructure development, it is expected that projects will be implemented that optimally coordinate and integrate the realization of smart cities and infrastructure development. It is necessary to consider the application of measures and approaches according to the development stage of cities and their individual situations as well as characteristics. In the sub-Saharan Africa region, the target of this survey, it is also necessary to consider the creation of concepts and implementation systems to realize smart cities, taking into account the gradual development of cities.

In response to this global situation, Japan International Cooperation Agency (hereinafter referred to as “JICA”) confirmed the need to examine multiple models for smart cities in developing countries and support measures for their realization, as well as approaches and tools that can be used by the Japanese

¹ In its Smart City Guidebook revised in 2021, the Ministry of Land, Infrastructure, Transport and Tourism defines a smart city as “a sustainable city or region that solves various urban and regional problems and continues to create new value through the advancement of urban and regional issues (planning, development, management, operation, etc.), and a place where Society 5.0 is realized in advance.” In addition, the guidebook setups the three basic pillars of smart city initiatives (citizen (user) centricity, vision and issue focus, emphasis on inter-sectoral and inter-city collaboration) as well as five basic principles (1. ensuring fairness and inclusion, 2. privacy, 3. interoperability, openness, and transparency, 4. ensuring security and resiliency, and 5. ensuring the environment). In October 2020, the “Revised National Strategic Special Zone Law,” which includes institutional arrangements for the realization of the “Super City” concept, came into effect. Through the “Super City” concept as the world's first solution, this aims to realize a “Whole Future City” as the goal.

government to promote and support smart city development. In 2021, JICA conducted the “Data Collection Survey on the Applicability of Smart City Approach²” to (1) summarize global trends, (2) identify approaches for promoting smart city initiatives in developing countries, (3) identify directions for building smart city business models that take into account the situation in developing countries and (4) JICA’s support menu and the concept of phased support. Based on this previous survey and its result, it is hypothetically considered that smart city initiatives can be utilized in the formulation and development of urban planning in sub-Saharan Africa borrowing lessons learnt from smart city projects in Asia as comparative material to understand the status of smart city initiatives in the African region taking into account regional differences and to formulate future projects. JICA then decided to gather basic information for understanding the status of smart city initiatives in the African region and for future project formulation.

In the sub-Saharan Africa region, smart city-related projects are progressing amidst a weak infrastructure (weak basic infrastructure), and this study will take these examples as test cases for their effectiveness, collaboration, and expansion, and will also include a study of urban planning based on data that supports people’s lives, creating urban liveliness through information provision and utilization, and introducing smart technologies and measures such as facilitating residents’ access to administrative services.

1.2. Objectives of the Survey

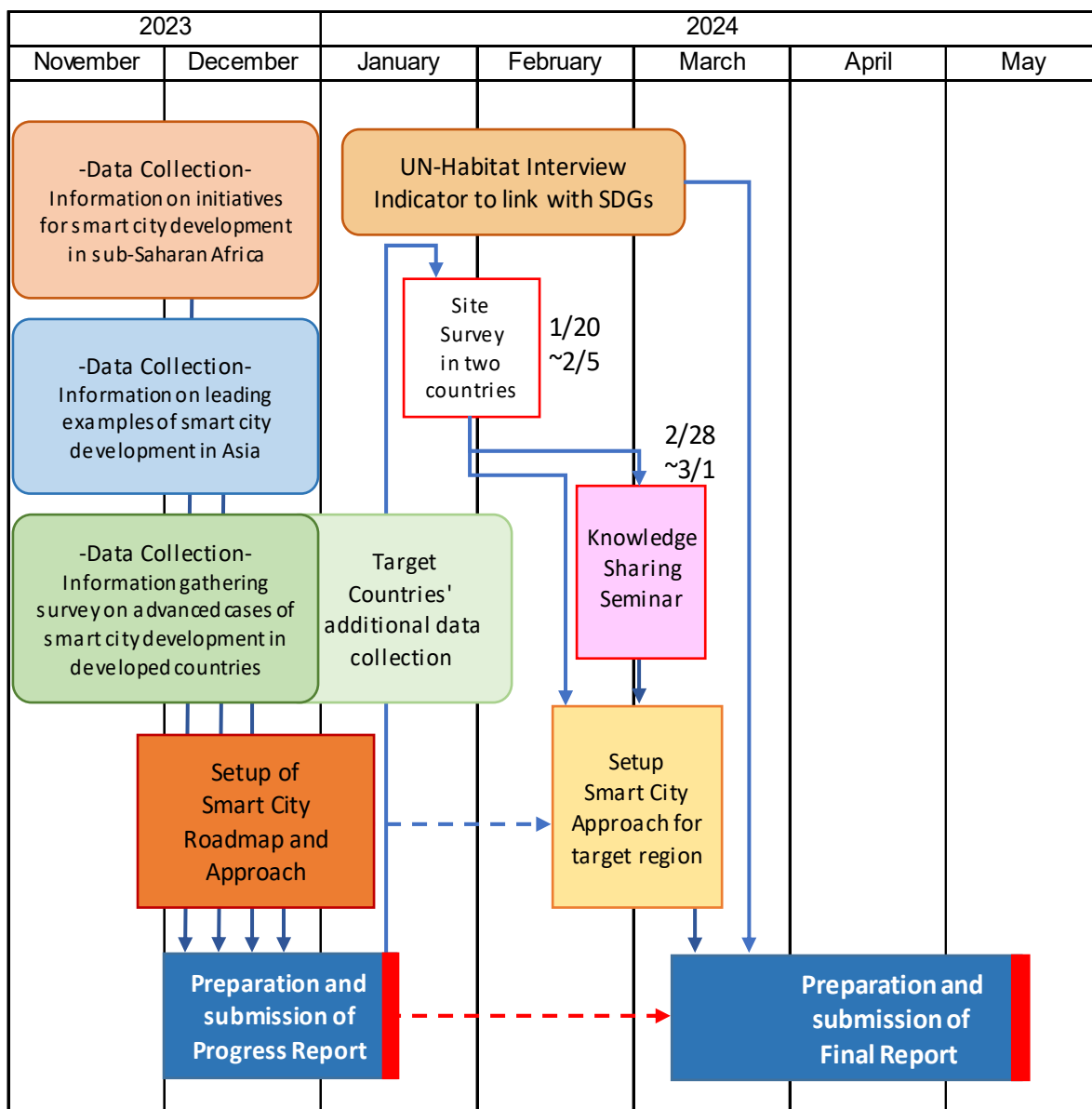
This survey was conducted to achieve the following objectives.

- (1) Understand the actual situation of cities in sub-Saharan Africa, the target region of the survey, based on precedents of smart cities
- (2) Study the framework for cooperation according to needs, including measures and approaches as well as implementation systems for cooperation to realize smart cities
- (3) Promote smart city initiatives in Asian and African regions, and share the knowledges in urban development in Asian and African regions

² Along with this report, suggested to also refer to the report “Data Collection Survey on the Applicability of Smart City Approach.”

1.3. Survey Implementation Process

The survey was conducted based on the process and schedule described hereafter.



Source: Survey Team

Figure 1-1: Survey Implementation Process

Chapter 2 Recognition of the Current Status in Sub-Saharan Africa

Before organizing information on smart city development in the target region, this chapter first outlines the economy and urban growth with the historical context of the region, and the status of derived urban, social, and economic activities.

2.1. Current Status of the Survey Target Region

The African continent has historically been blessed with abundant natural resources, and a socioeconomic structure based on the utilization of resources was established by the policies of Western countries in the past, and each region has grown within this framework. With the exception of a few metropolitan areas, many countries and regions have a population dispersed over a vast area, resulting in low-density cities. This has resulted in many regions lacking the basic infrastructure necessary to support socioeconomic activities, and in conjunction with the existence of the informal sector, many countries have not been able to grow their industries. Many cities have low population densities, and many areas can be developed from scratch. The common challenge for the region is how to transform low-growth economies and fragile local industries. On the other hand, the primary industries necessary for the social well-being required for industrial growth are also fragile, and it is important to improve education, which is essential for the development of human resources to support industrial activities. In undeveloped urban areas, demand for labor and social services has led to an influx of people from rural areas, and while industry has not grown, the urban population has continued to increase. In many African countries, employment rates and household incomes are low, and various urban problems have emerged due to the formation of slums and low infrastructure development rates, which hinder the growth of healthy living areas. Therefore, discussions are ongoing in many countries to resolve these problems.

As shown in Table 2-1, 18 of the countries surveyed have an urban population to total population ratio exceeding 50%, and another 18 countries have a slum-dwelling population to total urban population ratio exceeding 50%. Although a high ratio of urban population does not necessarily coincide with a high ratio of slum dwellers, urbanization and the deterioration of living environment are major issues for urban development policies. In terms of economic growth, several countries have GDP growth rates exceeding 5%, while GDP per capita is below \$1,000 in many countries. With regard to the economies of the target region, many countries will also need to revise their growth strategies.

Table 2-1: Demographic and GDP Comparison of the Target Countries

No	Country Name	Demography					GDP	
		Total Population (2022)	Urban Population Rate (%: to total population) (2022)	Urban Population Growth Rate (%) (2022)	Slum Dwelling Population (%: to total urban population)	Unemployment Rate (%: to employed population) (2022)	GDP per capita (current US\$)	GDP growth (annual %)
1	Angola	35,588,987	68	4.0	63 (2020)	10.2	2,998.5 (2022)	3.0 (2022)
2	Benin	13,352,864	50	3.8	68 (2020)	1.7	1,303.2 (2022)	6.3 (2022)
3	Botswana	2,630,296	72	2.5	40 (2020)	20.7	7,737.7 (2022)	5.8 (2022)
4	Burkina Faso	22,673,762	32	4.6	27 (2020)	5.2	832.9 (2022)	1.5 (2022)
5	Burundi	12,889,576	14	5.2	37 (2020)	1.0	238.4 (2022)	1.8 (2022)
6	Cameroon	27,914,536	59	3.6	33 (2020)	4.0	1,588.5 (2022)	3.5 (2022)
7	Cabo Verde	593,149	68	1.5	No data	13.6	3,902.6 (2022)	17.7 (2022)
8	Central African Republic	5,579,144	43	3.3	69 (2016)	6.4	427.1 (2022)	0.0 (2022)
9	Chad	17,723,315	24	4.3	82 (2020)	1.4	716.8 (2022)	2.2 (2022)
10	Comoros	836,774	30	2.7	69 (2018)	8.8	1,484.9 (2022)	2.4 (2022)
11	Democratic Republic of the Congo	99,010,212	47	4.5	78 (2020)	5.0	586.5 (2022)	8.9 (2022)
12	Republic of Congo	5,970,424	69	2.9	44 (2020)	21.8	2,448.0 (2022)	1.5 (2022)
13	Côte d'Ivoire	28,160,542	53	3.4	53 (2020)	2.6	2,486.4 (2022)	6.7 (2022)
14	Djibouti	1,120,849	78	1.6	No data	27.9	3,136.1 (2022)	3.0 (2022)
15	Eritrea	3,684,032	43	3.3	No data	6.6	643.8 (2011)	8.7 (2011)
16	Eswatini	1,201,670	25	1.6	11 (2020)	24.4	4,039.5 (2022)	3.9 (2022)
17	Ethiopia	123,379,924	23	4.7	64 (2020)	4.0	1,027.6 (2022)	5.3 (2022)
18	Gabon	2,388,992	91	2.4	44 (2018)	21.5	8,820.3 (2022)	3.0 (2022)
19	Gambia	2,705,992	64	3.5	39 (2020)	4.8	840.0 (2022)	4.9 (2022)
20	Ghana	33,475,870	59	3.0	33 (2020)	3.9	2,175.9 (2022)	3.2 (2022)
21	Guinea	13,859,341	38	3.5	49 (2020)	5.7	1,531.7 (2022)	4.7 (2022)
22	Equatorial Guinea	1,674,908	74	3.1	No data	8.7	7,053.5 (2022)	3.1 (2022)
23	Guinea-Bissau	2,105,566	45	3.1	61 (2020)	3.6	775.8 (2022)	3.5 (2022)
24	Kenya	54,027,487	29	3.7	51 (2020)	5.5	2,099.3 (2022)	4.8 (2022)
25	Lesotho	2,305,825	30	2.6	26 (2020)	18.0	1,107.4 (2022)	0.6 (2022)
26	Liberia	5,302,681	53	3.0	64 (2020)	3.6	754.5 (2022)	4.8 (2022)
27	Madagascar	29,611,714	40	4.1	67 (2020)	2.1	505.0 (2022)	3.8 (2022)
28	Malawi	20,405,317	18	4.2	50 (2020)	5.6	645.2 (2022)	0.9 (2022)
29	Mali	22,593,590	45	4.8	42 (2020)	2.8	833.3 (2022)	3.7 (2022)
30	Mauritania	4,736,139	57	4.0	56 (2020)	11.1	2,190.7 (2022)	5.2 (2022)
31	Mauritius	1,262,523	41	-0.2	No data	7.2	10,216.3 (2022)	8.7 (2022)
32	Mozambique	32,969,518	38	4.2	55 (2020)	3.9	541.5 (2022)	4.1 (2022)
33	Namibia	2,567,012	54	3.2	41 (2018)	20.8	4,911.3 (2022)	4.6 (2022)
34	Niger	26,207,977	17	4.6	70 (2018)	0.5	533.0 (2022)	11.5 (2022)
35	Nigeria	218,541,212	54	3.8	49 (2020)	5.8	2,184.4 (2022)	3.3 (2022)

No	Country Name	Demography					GDP	
		Total Population (2022)	Urban Population Rate (%: to total population) (2022)	Urban Population Growth Rate (%) (2022)	Slum Dwelling Population (%: to total urban population)	Unemployment Rate (%: to employed population) (2022)	GDP per capita (current US\$)	GDP growth (annual %)
36	Rwanda	13,776,698	18	3.2	38 (2020)	13.0	966.3 (2022)	8.2 (2022)
37	Sao Tome and Principe	227,380	76	2.8	53 (2020)	15.3	2,404.3 (2022)	0.9 (2022)
38	Senegal	17,316,449	49	3.6	32 (2020)	3.4	1,598.7 (2022)	4.2 (2022)
39	Seychelles	100,060	58	1.5	No data	No data	15,874.5 (2022)	8.8 (2022)
40	Sierra Leone	8,605,718	44	3.2	51 (2020)	3.6	461.4 (2022)	3.5 (2022)
41	Somalia	17,597,511	47	4.3	No data	20.0	461.8 (2022)	4.8 (2022)
42	South Africa	59,893,885	68	1.6	24 (2020)	29.8	6,776.5 (2022)	2.0 (2022)
43	South Sudan	10,913,164	21	3.1	94 (2016)	13.0	1,071.8 (2015)	-10.8 (2015)
44	Sudan	46,874,204	36	3.6	74 (2020)	18.7	1,102.1 (2022)	-1.0 (2022)
45	Tanzania	65,497,748	37	5.0	41 (2020)	2.8	1,192.4 (2022)	4.6 (2022)
46	Togo	8,848,699	44	3.6	39 (2020)	4.1	918.4 (2022)	5.8 (2022)
47	Uganda	47,249,585	26	5.3	54 (2020)	4.3	964.2 (2022)	4.7 (2022)
48	Zambia	20,017,675	46	4.0	48 (2020)	6.1	1,487.9 (2022)	4.7 (2022)
49	Zimbabwe	16,320,537	32	2.3	22 (2020)	7.9	1,267.0 (2022)	3.4 (2022)

Source: World Bank Data (Employment rate is prediction based on ILO Model.)

Note 1: Yellow coloring indicates countries with urban population ratio of 50% or more, slum-dwelling population ratio of 50% or more, and GDP per capita of less than USD1,000.

Note 2: Definition of “City” by World Bank is described in its World Bank Blogs: <https://blogs.worldbank.org/sustainablecities/how-do-we-define-cities-towns-and-rural-areas>

2.2. Status of Urban Development in the Target Region

(1) Urban Development

The official information on urban development from the governments of the Asia-Africa Knowledge Sharing Seminar target countries³ shows that, in addition to basic infrastructure improvement, there are various ongoing discussions on solutions to problems related to inclusive urban development and improvement of the social environment, such as housing supply, controlling sprawl, countermeasures against population inflow and growth, ensuring connectivity in rural areas, measures against climate change and disasters, improving unemployment rates, correcting low income and income inequality, gender issues, solving food problems, and strengthening the capacity of urban development administrations. Due to the situation where industrial development, including primary industry, is difficult to progress except for the development of some industrial parks, etc., many inland countries continue to have a dispersed population when major industries do not grow. In coastal countries with access to marine resources and extended port development, population tends to be concentrated in coastal cities where infrastructure is being developed. The United Nations population statistics for the target region as a whole show an urban population ratio of

³ Eight (8) countries are considered: Côte d'Ivoire, Kenya, Nigeria, Rwanda, Senegal, Tanzania Uganda and Zambia. Refer to Chapter 8 for seminar details.

about 47%. Comparing East and West Africa, the urban population ratio is about 28% in East Africa, 46% in West Africa and 64% in South Africa region (Reference: World Population Prospects 2018 Edition. See also Table 2-2).

In order to compare the state of basic infrastructure in each country, World Bank data was obtained to compare the state of infrastructure development as shown in Table 2-2 below. In consideration of transportation, since it is difficult to ensure the accuracy of information on the state of road maintenance due to multiple evaluation axes, such as paved/unpaved roads and whether they are within cities, a quantitative comparison was conducted to confirm the state of transportation infrastructure in general based on the number of vehicles owned, which is assumed to be used intensively, especially in large urban areas. In the African region, access to drinking water and sanitation indicators show large disparities between urban and rural areas, and quantitative data is limited even in the World Bank data⁴. Even in countries where numerical data are available, there is significant room for improvement in access to safe drinking water and sanitation. On the other hand, a similar quantitative comparison of the ratio of agricultural land area for primary industry development shows that many countries have more than 50% of land for primary industry. Looking at the current situation in many countries where industrialization is still difficult, there is a potential for investment and industrial strengthening in agricultural sector and other primary industries. In countries with relatively high rates of Internet access, there are high expectations for future smart development using ICT.

Table 2-2: Quantitative Evaluation of Infrastructure Development in the Target Countries

No	Country Name	Transport	Digital· ICT	Energy· Power	Sanitation· Water Supply		Agricultural and Forest Land	
		Car Ownership (2018)	Internet Access by individuals (%: to population)	Access to Electricity (%: to population) (2021)	Access to Safe Drinking Water (%: to population)	Access to Safe Sanitation (%: to population) (2022)	Agricultural Land (%: to national land area) (2021)	Value Added Agriculture, Forestry and Fishery (%: to GDP)
1	Angola	160,000	33 (2021)	48.2	No data	No data	36.8	13.6 (2022)
2	Benin	40,000	34 (2021)	42.0	No data	3	35.0	26.9 (2022)
3	Botswana	470,000	74 (2021)	73.7	No data	No data	45.6	1.8 (2022)
4	Burkina Faso	320,000	22 (2021)	19	No data	10	46.6	20.4 (2022)
5	Burundi	75,000	6 (2021)	10.2	No data	No data	81.9	27.6 (2022)
6	Cameroon	410,000	46 (2021)	65.4	No data	No data	20.6	17.0 (2022)
7	Cabo Verde	6,800	70 (2021)	95.5	No data	No data	19.6	3.7 (2022)
8	Central African Republic	5,700	11 (2021)	15.7	6 (2022)	13	7.9	29.3 (2022)
9	Chad	37,000	18 (2021)	11.3	6 (2022)	11	40.0	22.6 (2022)
10	Comoros	21,000	27 (2021)	87.9	No data	No data	71.5	36.4 (2022)
11	Democratic Republic of The Congo	2,110,000	23 (2021)	20.8	12 (2022)	13	15.0	17.4 (2022)
12	Republic of Congo	88,000	9 (2017)	49.7	46 (2021)	No data	31.3	8.5 (2022)
13	Côte d'Ivoire	650,000	35 (2022)	71.1	44 (2022)	17	73.9	16.7 (2022)
14	Djibouti	20,000	69 (2021)	65.4	No data	40	73.5	1.7 (2020)

⁴ Quantitative data on water supply rates is considered difficult to obtain because of the multiple supply patterns, such as piped supply by wells.

No	Country Name	Transport	Digital· ICT	Energy· Power	Sanitation· Water Supply		Agricultural and Forest Land	
		Car Ownership (2018)	Internet Access by individuals (%: to population)	Access to Electricity (%: to population) (2021)	Access to Safe Drinking Water (%: to population)	Access to Safe Sanitation (%: to population) (2022)	Agricultural Land (%: to national land area) (2021)	Value Added Agriculture, Forestry and Fishery (%: to GDP)
15	Eritrea	7,800	22 (2021)	52.5	No data	No data	62.7	14.1 (2009)
16	Eswatini	100,000	59 (2021)	82.9	No data	No data	69.5	8.1 (2021)
17	Ethiopia	180,000	17 (2021)	54.2	13 (2022)	7	34.2	37.6 (2022)
18	Gabon	58,000	72 (2021)	91.8	No data	No data	8.4	5.6 (2022)
19	Gambia	12,000	33 (2021)	63.7	48 (2022)	28	62.6	22.6 (2022)
20	Ghana	180,000	68 (2021)	86.3	44 (2022)	16	55.4	18.8 (2022)
21	Guinea	130,000	35 (2021)	46.8	No data	No data	59.6	27.3 (2022)
22	Equatorial Guinea	10,000	54 (2021)	66.8	No data	No data	3.7	2.6 (2022)
23	Guinea-Bissau	18,000	35 (2021)	35.8	24 (2022)	15	29.0	30.9 (2020)
24	Kenya	1,600,000	29 (2021)	76.5	No data	31	48.7	21.2 (2022)
25	Lesotho	45,000	48 (2021)	50.4	28 (2022)	48	80.1	3.5 (2022)
26	Liberia	70,000	34 (2021)	29.8	No data	No data	20.0	36.2 (2022)
27	Madagascar	330,000	20 (2021)	35.1	22 (2022)	12	70.3	22.4 (2022)
28	Malawi	39,000	24 (2021)	14.2	18 (2022)	46	64.2	21.8 (2022)
29	Mali	31,000	34 (2021)	53.4	No data	16	35.3	36.4 (2022)
30	Mauritania	30,000	59 (2021)	47.7	No data	No data	38.5	19.2 (2022)
31	Mauritius	260,000	68 (2021)	99.6	No data	No data	43.1	3.4 (2022)
32	Mozambique	94,000	17 (2021)	31.5	No data	No data	52.7	27.5 (2021)
33	Namibia	290,000	53 (2021)	55.2	No data	No data	47.1	8.6 (2022)
34	Niger	250,000	22 (2021)	18.6	No data	8	36.8	36.5 (2021)
35	Nigeria	1,630,000	55 (2021)	59.5	29 (2022)	32	75.4	23.7 (2022)
36	Rwanda	31,000	30 (2021)	48.7	No data	No data	81.3	24.9 (2022)
37	Sao Tome and Principe	8,000	51 (2021)	78.5	36 (2022)	34	43.8	13.1 (2022)
38	Senegal	160,000	58 (2021)	68.0	27 (2022)	14	49.4	15.7 (2022)
39	Seychelles	11,000	82 (2021)	100.0	No data	No data	3.4	2.9 (2022)
40	Sierra Leone	29,000	18 (2020)	27.5	10 (2022)	15	54.7	57.4 (2021)
41	Somalia	25,000	2 (2017)	49.3	No data	33	70.3	62.7 (1990)
42	South Africa	13,000,000	72 (2021)	89.3	No data	72	79.4	2.6 (2022)
43	South Sudan	No data	7 (2020)	7.7	No data	No data	44.7	10.4 (2015)
44	Sudan	120,000	28 (2020)	61.8	No data	No data	60.3	5.0 (2022)
45	Tanzania	100,000	32 (2021)	42.7	11 (2022)	25	44.6	24.3 (2022)
46	Togo	210,000	35 (2021)	55.7	19 (2022)	6	70.2	18.3 (2022)
47	Uganda	460,000	10 (2021)	45.2	19 (2022)	18	71.9	24.1 (2022)
48	Zambia	360,000	21 (2021)	46.7	No data	No data	32.1	3.4 (2022)
49	Zimbabwe	640,000	35 (2021)	49.0	27 (2022)	32	41.9	8.8 (2021)

Source: World Bank Data, Japan Automobile Manufacturers Association, Inc. (Car Ownership)

(2) Overview of Planning and Implementation of Smart City Development in the Target Area

A preliminary analysis of the information prior to this survey indicates that some countries in the target area have policies for urban development using some kind of technology, and some of them are described as “Smart Cities.” However, many of other countries have not yet taken further steps toward the development of smart cities or prepared substantial plans for such development, and many of these projects are being implemented as individual projects. In considering the introduction of smart technologies, there are high expectations for the use of ICT, AI, IoT and other technologies, especially for smarter administrative services to improve the quality of public administrative services (see Table 2-3).

Table 2-3: Examples of Smart Development Initiatives in African Region

Country	Initiatives
Côte d'Ivoire	Implementing the project with ICT digital technologies to enhance administrative services in Abidjan
Kenya	Technopolis development is underway in Konza, south of Nairobi, based on the use of ICT .
Nigeria	In Abuja, the goal is to make the city smarter through the use of ICT to unify the community.
Rwanda	Advancement of social services, including administrative services, centered on ICT technology at Kigali
Senegal	Dakar, Diamniadio Lake City, and other cities are using ICT technology to make government services smarter.
Tanzania	Innovation and modernization of SEZs and dry ports , mainly in Dar es Salaam and other areas
Uganda	Aiming to advance electronic currency, traffic management, medical systems, etc. using ICT technology in Kampala
Zambia	Kalulushi and other cities are looking to improve public services with the introduction of 5G and other telecommunications technologies
Benin	Sèmè City to create a smart digital city that contributes to governance, higher education, research and industry
Cameroon	The Mayor of Bafoussam City signed an ICT project with the Telecommunications Authority for the first smart city project
Democratic Republic of the Congo	Aiming to introduce AI, Cloud technologies , etc. that will enable smart and sustainable achievement of the SDGs in Kinshasa
Ethiopia	Advancing smart city business mainly based on DX utilization technology in Addis Ababa
Ghana	Ghana Open Data Initiative efforts, led by Accra city, aim to achieve ICT-driven urban growth
Mauritius	Master planning for the smart city development of Moka Smart City
Togo	Lomé and other cities for smart urban innovation through Digital, ICT , etc.
South Africa	Port Elizabeth aims to create a new port city with smart technology that is different from logistics and industrial ports.

Source: Compiled by the survey team based on publicly available web information from the governments of each country (see Appendix for details of sources). Orange boxes indicate countries participating in the Knowledge Sharing Seminar.

On the other hand, some countries are aiming to introduce some kind of smart technology to strengthen infrastructure and promote industry. While the development of basic infrastructure is essential for the growth of industrial sectors, there is a tendency to expect smart technology as a jump-start technology. On the other hand, the development of power and water supply infrastructure, as seen in the trend toward development assistance, will continue to be necessary in the future, and there is potential for collaboration between these development efforts and ICT technology, etc. In the introduction of smart technology, foreign investment by start-ups and other companies targeting specific technological fields is on the rise, and

leapfrogging is also becoming more pronounced. Therefore, it is highly likely that smart solutions utilizing easy-to-implement telecommunication-based technologies will continue to expand in urban areas with high population density. A comparison of foreign direct investment (FDI) shown in Table 2-4 indicates that foreign investment in coastal countries such as Senegal and Côte d'Ivoire is relatively large.

Table 2-4: 2021-2022 Foreign Direct Investment to GDP

	Côte d'Ivoire	Kenya	Nigeria	Rwanda	Senegal	Tanzania	Uganda	Zambia
FDI Net Inflow	1,392,435,143	463,348,936	-	398,599,355	2,231,904,247	921,826,558	1,100,458,611	115,899,184
FDI % of GDP	1.9	0.4	-	3.0	8.1	1.3	2.7	0.4

Source: World Bank Data

Note: Comparison for countries to the Asia-Africa Knowledge Sharing Seminar. Unit in USD. Nigeria is not shown due to negative 2022 data.

2.3. Urban Development Issues in the Target Region

(1) Urban Development Issues common to the Target Region

The development situation described above shows that each country shares certain common problems related to urban and smart city development. The commonality is also evident in the need to secure various resources and sound human resource development, etc., which are the foundation of industrial development where industrial development is not progressing. Africa as a whole need to improve educational services to maintain the health and food security of local people, who are the main drivers of economic activities, and to develop and strengthen human resources and capabilities including technical skills. In countries with large populations, such as Nigeria, the economic benefits of a population bonus can be assumed, however, it is possible that the population may begin to decline before cities and regions can grow. With overwhelming room for regional and urban development, development steps need to be planned with a long-term perspective, and a development framework that includes solutions to social problems is important. Looking at the situation in the target areas in this way, there are common development issues recognized throughout the following seven regions.

- Population dispersed across a wide range of underdeveloped areas, making it difficult to develop basic infrastructure
- Lack of progress in developing unique industries that will lead to regional economic development
- In coastal areas and large cities, urban and living environment improvements are not progressing amid the population influx
- Inadequate social services that contribute to social and human resource development, which are also the basis for infrastructure and industrial development
- A wide range of social issues, including gender, low employment rates, and educational disparities, remain untouched.
- Urban development planning and implementation are not in line with urban growth, and the capacity of government agencies needs to be strengthened.
- Smart cities are not being discussed and essential policies are not being promoted while urban development remains immature

(2) Current Status and Challenges of Urban Development in the Target Countries

Desktop research was conducted to identify issues and challenges related to urban development in each country in the Sub-Saharan Africa region. In the desktop research, information on urban development issues and challenges was collected based on the official websites of government agencies in the target countries. In particular, information on cities were analyzed where smart city (or similar) development is underway (or planned) on the official government websites shown in Table 2-3 above, and issues and challenges are organized by each country according to the following aspects.

Table 2-5: Urban Development Issues and Aspects mainly focused

Major Issue Points	Aspects considered for analysis
Urban and Land Use	Identification of development issues related to urban growth, such as population concentration, slum formation, sprawl, and institutional issues related to land use
Infrastructure Development	Development issues stemming from the development of various infrastructures required for urban growth and industrial promotion, and related resource use, etc.
Environmental Impact	Development issues stemming from urban development, environmental impacts that occur in the process of urban growth or continue over historical timeframes, and natural disasters
Social and Economical	Development issues stemming from discrimination, disparities, social services, and other customary issues related to urban life, communities, and economic activities
Governance	Development issues stemming from legal systems, organizational structures, and administrative capacity in planning, implementing, and promoting urban development, as well as issues related to the implementation of social services.

Source: Survey Team

A summary of the urban development issues listed above is attached as Appendix 1. Since the number of countries surveyed is 49, this section only outlines the development issues common to many of the countries surveyed that were identified as a result of the information compilation process. From the perspective of urban and land use, the increase in slums and urban sprawl caused by population influx, and inadequate legal systems related to land use are reasons for the lack of progress in the optimal use of land for development. From the viewpoint of infrastructure development, many countries and cities have not developed or provided adequate infrastructure services, and there is a need to improve and strengthen such services. There is also a need to address waste problems caused by urbanization, population growth, and slum areas, as well as air pollution caused by poorly planned urban transportation and the introduction of vehicles. On the social and economic points, there is a need to strengthen and expand education and medical services to support the labor force and knowledge needed for industrial development, as well as to address poverty and correct regional disparities, all of which are common issues across the region. In terms of governance, while cities are still unable to provide basic social and administrative services, there are moves toward achieving these goals from the perspective of how to improve services in a single leap. Table 2-6 summarizes these issues.

Table 2-6: Common Urban Development Issues in each Country in the Target Region

Issues	Description
Urban and Land Use	<ul style="list-style-type: none"> • Densification of individual properties and illegal settlements resulting from inadequate housing supply • Unregulated development by the private sector • Insufficient supply of affordable housing due to the customary land system • Increased risk of disasters due to housing development in inappropriate areas • Overconcentration in the CBD, resulting in severe traffic congestion in certain areas during commuting • Green space reduction due to inadequate land use planning
Infrastructure Development	<ul style="list-style-type: none"> • Delays in public transportation system development due to prioritization of road construction to accommodate motorization • Road development and intersection improvements not keeping pace with the pace of overall urban development • Widespread increase in traffic demand due to residential development in suburbs and along arterial roads, and gap between peak and off-peak traffic demand • Inefficient transportation services provided by the informal sector • Delays in expanding water supply, sewerage development, and waste management
Environmental Impact	<ul style="list-style-type: none"> • Deterioration of noise and air pollution due to increased traffic • Deterioration of the surrounding environment due to unaddressed increases in waste emissions and illegal dumping • Increase in urban flooding due to illegally dumped waste blocking drainage channels • Worsening of water pollution due to delays in the development of sewer systems
Social and Economical	<ul style="list-style-type: none"> • Deterioration in public safety due to the mix of various income groups • Insufficient employment opportunities (especially for young people), increase in informal employment • Increased traffic accidents due to increased traffic volume • Lack of public service facilities and inadequate maintenance
Governance	<ul style="list-style-type: none"> • Lack of capacity in urban planning and its implementation • Slow introduction of ICT in public service delivery

Source: Survey team organized data based on the official web information of each country's government, and extracted content common to multiple countries (see the attachment for details on sources).

When compared to the urban issues in ASEAN countries as organized in the “Data Collection Survey on the Applicability of the Smart City Approach,” no major sector differences in issues unique to the African region were found. However, the following differences were identified in terms of access to electricity, mobile phone registrations, and Internet usage rates, as issues related to smart city initiatives.

Regarding access to electricity as a percentage of the urban population, the ASEAN countries have almost 100%, while the Sub-Saharan Africa region has a large difference, ranging from 75-99% (average 91%) in the high- and middle-income country group, 67-100% (average 83%) in the low to middle income country group, and 16-98% (average 67%) in the low-income country group, with large differences. On the other hand, regarding the number of mobile phone registrations per 100 people, there is no significant difference between the high- and low to middle-income country groups in the Sub-Saharan Africa region and the ASEAN countries, although there are exceptions. The low-income country group is about 70% of the low to middle income country group. In terms of Internet use (as a percentage of the total population), the high- and middle-income country group in Sub-Saharan Africa averages 66%, which is relatively close to the

ASEAN countries (average 74%), while the low- and low-middle-income country group includes many countries with less than 50% (source of each indicator: World Bank, “World Development Indicators”: see Table 2-7). However, it is assumed that there is a large difference between urban and rural areas in the sub-Saharan African region in terms of Internet usage rates, and that the actual figures in urban areas are higher.

Table 2-7: Comparison of Electricity Access, Mobile Phone Registrations, and Internet Usage

	Sub-Saharan Africa Region	ASEAN Countries
Access to Electricity as a Percentage of Urban Population	High income countries: 100% Upper middle-income countries: 75-99% (average 91%) Low-middle income countries: 67-100% (average 83%) Low-income countries: 16-98% (average 67%)	Almost 100% (Cambodia, Myanmar) (About 80% for Cambodia and Myanmar) Urban areas
Mobile phone registrations per 100 people	High-income countries: 192 High- and middle-income countries: 53-167 (average 131) Highest: South Africa, Lowest: Equatorial Guinea Low-middle income countries: 46-174 (average 100) Most: Côte d’Ivoire Lowest: Djibouti Low-income countries: 30-126 (average 68) Most: Guinea-Bissau Lowest: South Sudan	65-176 (average 128) Highest: Thailand Lowest: Laos
Internet usage rate	High-income countries: 82 High- and middle-income countries: 29-74% (average 66%) Highest: Botswana, Lowest: Kenya Low-middle income countries: 21-70% (average 46%) Most: Cape Verde Lowest: Zambia Low-income countries: 2-35% (average 21%) Most: Togo Lowest: Somalia	44-98% (average 74) Highest: Brunei Smallest: Myanmar

Source: Prepared by Survey Team based on the data of World Development Indicators

Since many of the new services and leapfrog-type solutions offered by startups are ICT-based, the above indicators suggest that those utilizing mobile phones will have a wider diffusion range.

Chapter 3 Overview of Smart City Initiatives in the Target Area

This chapter summarizes the current status of smart city initiatives in the countries of the Sub-Saharan Africa region, outlines of plans, related surveys, policies and legal systems, as well as organizations and actors involved in the implementation of the plans. The information is compiled together with information that can be gathered from official government websites of the countries in the region. For countries where information on smart city development is scarce, it is aimed to supplement the information by using reports on development assistance provided by international organizations. Information from the World Bank (WB), African Development Bank (AfDB), UN-Habitat, French Development Agency (AFD) were used as target international organizations.

In the urban development of the target area, each country is required to realize and achieve the urban development issues of the target area outlined in the previous section 2.3 in the future. On the other hand, some of these urban development issues require a large budget and financial resources to accomplish. Since these issues also include legal and institutional challenges and differ in the stage of preparation for individual development, it is important to understand the appropriate level of project implementation in a phased approach and to implement actions with higher priority. Priority actions include the introduction of technologies and services related to smart city development and implementation, and it is necessary to organize and confirm information from the perspective of what kind of ideas and visions for smart cities the countries in the target region have and are planning and implementing.

3.1. Background, History and Significance of Smart City

(1) Historical Background and Context of the Target Region

In the target sub-Saharan African region, there are several levels of smart city initiatives. They are summarized below.

- Countries and cities that have historically experienced significant growth and whose governments are vigorously promoting projects and smart city initiatives.
- Smart city initiatives that are being led by the private sector, despite the difficulty for national and city government organizations to take the lead in promoting these projects.
- Where the economic foundation of the country or city is weak and the basic infrastructure is still underdeveloped, discussions on smart cities have started in order to solve future urban problems and stabilize social life.
- Smart city discussions have not yet started at the city level.

Based on the desktop-based information collection and data analysis conducted, the above can be broadly summarized. The following historical circumstances can be inferred as the background to this level of initiatives.

As indicated in the previous chapter, many of the countries in the target region have historically grown through the colonial policies of Western countries, with regional resource production and exports, including

human resources, at the core. Due in part to the mining of various mineral resources including diamonds, gold, and silver, the cultivation of cash crops, and historical slavery policies, core cities were formed in each country to produce and export these resources, and these urban activities have continued to the present day. On the other hand, the historical background of resource exports as the main industrial structure has prevented many cities from creating new key industries. While some cities are now on a growth path of private investment after colonial policies, there are also many countries where the framework supporting stable growth of cities and countries, including economic policies, is weak. The reality is that many cities have experienced the expansion of the informal sector, slums, urban sprawl, and related deterioration of the living environment.

One of the reasons for the lack of growth in cities and regions is the slow pace of industrial development due to the slow pace of basic infrastructure development. Although water supply and electricity development are progressing gradually with the help of many donors, most governments still have national-level development issues, such as accelerating infrastructure development. In many countries, capacity building for urban development at the administrative level is also an issue, and the absence of development plans in several cities has been noted. As mentioned above, historically, many countries were established within the policy and development framework of Western European countries, making it difficult for them to operate autonomously in terms of securing national financial resources.

Against this background, historically, countries and cities, where large development investments from Western countries have been promoted, have created a certain degree of industrial base, and some countries, such as the Republic of South Africa, for example, have formed several large cities. Within the historical context, in some cases, cities also have grown in political terms, where international organizations, regional communities, and other organizations have established their headquarters, and there has been a concentration of information and increased opportunities for active discussions and activities related to the African region. With such historically complex background, each country has begun to explore various urban development options, and it is thought by the survey team that smart cities are now being discussed due in part to contemporary international trends, according to the desktop survey conducted. Furthermore, in many countries, it could be considered that the enhancement of social services and the efficiency of administrative services as well as countermeasures against the deterioration of the social environment are issues to be solved through smart city initiatives.

(2) Significance of Smart City Initiatives

“Smart City” does not have a global standard definition, and each country and region have different directions to aim for and different forms to seek, apart from urban issues. However, there are some commonalities in general principles and functions. The Smart City Guidebook formulated by the Cabinet Office of Japan provides the following definitions of smart cities.

*“Smart City” is a city that aims to harmonize the natural environment and the lives of its citizens through urban management and a wide range of services that utilize digital technology and various data **Means/Methods**, based on common principles such as fair and transparent rules, respect for diversity, social inclusion, social utility, and the promotion of citizen happiness **Principle**. It is an initiative that aims to create new value in a sustainable manner **Function**, to realize the challenges and visions of individual cities, and to achieve the SDGs and citizen’s well-being **Purpose**.*

Based on this understanding of the definition, it is believed that the various benefits and effects of a smart city project can be achieved.

Table 3-1: Benefits and Effects of Smart City

Benefit	Beneficially	Effects (examples)
Improve Social Sustainability	Overall Society	<ul style="list-style-type: none"> • Creating a good urban environment • Providing inclusive urban services • Improving the vitality of city, encouraging interaction, and increasing land value • Improving public safety and security • Ensuring ecological diversity, preserving the natural environment • Reduce energy consumption and improve efficiency • Improved disaster preparedness and resilience to hazards
Increase Value	Citizens	<ul style="list-style-type: none"> • Increased convenience in daily life, improved quality of life • Expanded self-actualization potential and capabilities • Improved health status, increased and extended healthy longevity
	Business	<ul style="list-style-type: none"> • Creation of business opportunities through new technologies and services • Increased production and quality control to increase company sales • Facilitate marketing and sales
Reduce Cost	Citizens	<ul style="list-style-type: none"> • Saving time in daily life • Reduce or eliminate service usage fees
	Business	<ul style="list-style-type: none"> • Reduce cost of capital through sharing of assets and goods • Reduce R&D and market research costs through data sharing • Reduced costs through increased productivity

Source: Re-organized by the survey team based on the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.

Table 3-1 shows that various benefits and effects can be obtained through smart city development projects. On the other hand, there is also a concern that in many of the countries in the target region, the historical background of urban growth makes it difficult to obtain these development benefits immediately. An examination of urban development issues shows that many countries recognize the following issues as problems that need to be resolved.

- Rapid urban expansion and population growth
- Slum formation and its expansion and consequent deterioration of living conditions
- Delays in the development of basic infrastructure such as housing supply, transportation, water supply, and electricity
- Progressive environmental destruction due to increased waste and exhaust emissions associated with urban growth

- Vulnerability of cities to disasters associated with global warming
- Growing poverty and unemployment and widening inequality
- Inadequate social services, such as education and healthcare
- Low administrative capacity and inefficient administrative services

The above is a rough summary of problems based on information gathered from various countries, and while smart city development cannot solve all of these problems at once, some of the individual problems encompassed within these problems may be subject to the effects shown in Table 3-1. As an example, the effects of implementing smart cities on “rapid urban expansion and population growth” and “deterioration of the living environment due to slum conditions” are expected to include “creation of a favorable urban environment” (improvement of social sustainability) and “improvement of convenience and quality of life” (value-enhancing effects).

The introduction of smart technologies and services, such as E-Government for administrative services, for which efforts are being made in many countries, will not only improve service capabilities on the administrative side, but will also improve the infrastructure of citizens’ lives. Relatedly, the Smart City Guidebook mentioned earlier indicates the following possibilities in the direction of smart city development that utilize new technologies and various types of data, as they shed new light on society.

- ✓ Advancement of services based on individual characteristics in health, medical care, tourism, etc.
- ✓ Improved responsiveness based on real-time data in disaster prevention, etc.
- ✓ Improving efficiency of operations, processes, procedures, etc. in the government sector, etc.
- ✓ Optimization of operations in transportation, energy, etc.

Note: From the Smart City Guidebook produced by the Cabinet Office of Japan

Thus, “Smart city” is a city that contributes significantly to the realization of a wide range of social issues, such as the correction of regional disparities, by working to develop (or revitalize) a city where people can enjoy a high quality of life in a rich natural environment.

3.2. Outline of Smart City Initiatives in the Target Region

(1) Methods of Surveying the Status of Initiatives in each country

Information in this survey was compiled mainly from desktop data collection based on web information from government agencies in each country. In addition, information was supplemented with information sources such as support programs of international donor agencies (WB, AfDB, UN-Habitat and AFD). Information was collected and analyzed based on the five indicators and related 21 detailed points listed in the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022 (hereinafter referred to as the “Global SC Survey”). The five evaluation indicators are “policy and vision,” “organization,” “system,” “technology,” and “operation” of smart city initiatives, and these were summarized based on the level at which each country is promoting initiatives in each indicator.

(2) Survey results of Smart City Initiatives

As indicated in the previous section 3.1, many countries in the target region can be sorted into several levels depending on the status of their efforts and initiatives.

Table 3-2: Outline of Smart City Initiatives in the Target Region

Level of Initiatives	Outline of Initiatives
Vigorous Efforts being made	Countries, cities, and cities with international organizations concentrated that have historically experienced significant growth, and whose governments are vigorously promoting projects and smart city initiatives.
Private sector-led initiatives initiated	A country or city where the private sector is taking the lead in smart city initiatives, while it is difficult for the government organization of the country or city to take the lead in promoting the project.
Smart city discussions have begun.	Where the economic foundation of the country or city is weak and the basic infrastructure has not been well developed in the past, discussions on smart cities have started in order to solve future urban problems and stabilize social life.
Discussions on smart cities have not yet been conducted.	Smart city discussions have not yet started at the city level.

Source: Summarized by Survey Team based on the desktop collected data.

Next, Table 3-3 below summarizes the status of smart city development initiatives in each country identified through the desktop analysis. As the table shows, in several countries, discussions on full-scale smart city development have not yet begun, or even if there are discussions, something has not been decided and the next step has not yet been taken. Although there is a vague image of smart cities as a global trend, it is highly likely that this image has not yet been linked to the establishment of policies and visions.

Table 3-3: Status of Smart City Initiatives in each country in the Target Region

No	Country Name	Stage of Smart City Initiatives					
		There is A Master Plan	There is a Policy	Project Plan	Project Implemented	Initial Discussion Level	No Applicable Information
1	Angola						●
2	Benin			●			
3	Botswana						●
4	Burkina Faso					●	
5	Burundi					●	
6	Cameroon		●				
7	Cape Verde					●	
8	Central African Republic						●
9	Chad						●
10	Comoros						●
11	Democratic Republic of the Congo					●	
12	Republic of Congo						●
13	Côte d'Ivoire			●			

No	Country Name	Stage of Smart City Initiatives					
		There is A Master Plan	There is a Policy	Project Plan	Project Implemented	Initial Discussion Level	No Applicable Information
14	Djibouti					●	
15	Eritrea						●
16	Eswatini					●	
17	Ethiopia					●	
18	Gabon					●	
19	Gambia					●	
20	Ghana					●	
21	Guinea					●	
22	Guinea Equatorial						●
23	Guinea Bissau					●	
24	Kenya				●		
25	Lesotho					●	
26	Liberia					●	
27	Madagascar					●	
28	Malawi					●	
29	Mali					●	
30	Mauritania					●	
31	Mauritius		●				
32	Mozambique					●	
33	Namibia					●	
34	Niger					●	
35	Nigeria		● (City Level)				
36	Rwanda	●			●		
37	Sao Tome and Principe						●
38	Senegal				●		
39	Seychelles					●	
40	Sierra Leone					●	
41	Somalia					●	
42	South Africa				●		
43	South Sudan					●	
44	Sudan					●	
45	Tanzania					●	
46	Togo						●
47	Uganda					●	
48	Zambia	●					
49	Zimbabwe		●				

Source: Data from each country's official web information

Note: The definition of "Initial Discussion Level" considered a country (or city) and its government has stated some sort of discussions regarding smart city development (or continues discussions) based on the desktop data collection, however concrete policy, vision organization and/or legal system has not been established or not identified through the desktop survey.

The status of smart city initiatives in each country, the Country Profile, is summarized by country along with general national data and urban development issues. The country profile of all target countries is included as Appendix in the end of this report.

3.3. Existing and Previous Studies on Smart City Development

(1) Donors' Support for Smart City Development

Many of the official government web information in the target countries have limited information content related to smart city initiatives. Therefore, we have broadened the range of information collected and have also used some of the information contained in articles in newspapers, journals, and other media. On the other hand, some international donor support programs, etc. are also relevant to smart city development. This section lists relevant projects and their outlines from international donors (WB, AfDB, UN-Habitat and AFD), which are the public sources of the information cited in the desktop data collection activities. Information on smart city initiatives in each country by the donor agencies, etc. is compiled together with government information in each country profile set at the end of this report as Appendix.

Table 3-4: Overview of Smart City-related Projects by Donors

Project / Program Name	Abstract of the Project / Program
World Bank	
Global Smart City Partnership Program (GSCP)	The Global Smart City Partnership Program (GSCP) was launched in 2018 by the World Bank in partnership with the Republic of Korea's Ministry of Land, Infrastructure & Transport (MOLIT). The program aims to introduce and mainstream smart city approaches and solutions in the World Bank Group (WBG) engagement and investments by breaking sectoral silos and facilitating an integrated and innovative approach to urban development across sectors. As of 2023, GSCP2 (GSCP Phase 2) has backed 22 projects, predominantly in the urban and transport sectors, with Africa holding the most significant share at 32%.
UN-Habitat	
People-Centered Smart Cities	<p>UN-Habitat's "<i>People-Centered Smart Cities</i>" launched in 2020, flagship program acknowledges the transformative potential of digital technologies for sustainable urban development. The main objective is to leverage urban digital transformation for the benefit of all, driving sustainability, inclusivity and prosperity and the realization of human rights in cities and human settlements.</p> <p>The program introduces "People-Centered Smart Cities Playbooks," organized around five key pillars, providing practical guidance for developing inclusive and sustainable smart city strategies aligned with residents' needs. Each playbook includes case studies, sample policies, and concrete steps for building a foundation for people-centered smart cities.</p> <p>With a global perspective, potential rollout locations include various countries, including Côte d'Ivoire, Kenya, Nigeria, Rwanda, Senegal, South Africa, and Zimbabwe. UN-Habitat collaborates extensively through partnerships and alliances, with entities, such as the Global Smart Cities Alliance, Smart Africa, universities, research institutions, civil society organizations, and the private sector.</p> <p>The program, designed to operate from 2020 to 2027, encompasses pilot projects, coordination mechanisms, policy tools, technical advisory services, and financing facilities.</p>

Project / Program Name	Abstract of the Project / Program
French Development Agency	
Africa Smart Towns Network (ASToN)	ASToN is a network of 12 African local authorities using digital transformation to foster inclusive and sustainable cities. Funded by AFD, managed by the French National Urban Renovation Agency (ANRU) and inspired by URBACT knowledge and tools, this flagship initiative, running from September 2019 to December 2023, engages partners from Algeria, Mali, Morocco, Tunisia, Uganda, Rwanda, Ghana, Nigeria, Mozambique, Niger, Mauritania and Benin.
CICLIA (Cities and Climate in Africa)	CICLIA, an EUR 18.4 million project preparation facility, launched in 2017 by the European Union, SECO and AFD, aims to support 40 to 50 cities in launching urban low-carbon & resilient infrastructure projects in Africa by 2027. Managed by AFD, it consists of three components: preparing sectoral strategies, strengthening financial and asset management capacities of local authorities, and stocktaking case studies to disseminate lessons learned on sustainable development, especially in climate resilience and financing for African cities.
African Development Bank	
Towards a Climate-Smart Africa	The African Development Bank plays an important role as a Climate Investment Funds (CIF) implementing entity, advancing a growing portfolio of projects in renewable energy, forestry, and resilience solutions in Africa. With CIF support, the Bank currently finances 39 investment plans in 27 countries and 1 region focusing on transforming economy through renewables, sustainable transport, climate resilience and sustainable forest solutions. As of October 2022, AfDB had 34 CIF projects approved, totaling \$2.939 billion.
African Cities Program	The AfDB's flagship urban initiative, the African Cities Program, aims for climate-resilient, livable, and productive urban development in Africa. This program involves early and comprehensive engagement with cities, offering long-term mentorship for improved urban planning, governance, and investment project preparation. The Urban and Municipal Development Fund (UMDF) supports participating cities by financing City Action Plans, assessing development status, analyzing challenges (including climate risks), identifying key investment projects, and creating actionable plans for implementation. The UMDF Project Preparation Window (PPW) further provides financial or technical assistance for preparing urban low-carbon and climate-resilient infrastructure projects across African cities, backed by the AfDB or others partners.
Others	
Climate Investment Funds (CIF)	The CIF is a major multilateral fund addressing climate change in low- and middle-income countries since 2008. Operating across 72 countries, including 21 countries in Sub-Saharan Africa, it channels funds from government donors and the private sector to support over 370 projects. New programs that focus on accelerating coal transitions, renewable energy integration, industry decarbonization, and the development of climate-smart cities.
State of the African Diaspora (SOAD)	Designated as the 6 th region of Africa, SOAD has its own constitution, government, and parliament, established at the African Union Summit in 2018. With a population of 350 million, SOAD aims, among others, to build sustainable-eco cities in Africa and the Diaspora. Currently, 25 cooperation agreements have been signed for cities in countries, such as Democratic Republic of the Congo, Côte d'Ivoire, Madagascar, Nigeria, Tanzania, and Togo. These cities focus on new technologies, sustainable development aligned with the SDGs, and fostering a Pan-African identity.

Project / Program Name	Abstract of the Project / Program
Smart Africa	SMART Africa is a groundbreaking commitment by African Heads of State and Government to accelerate sustainable socio-economic development through affordable broadband access and ICTs. Originating from the Transform Africa Summit in 2013, the Smart Africa Manifesto was adopted by 7 African Heads of States, with the alliance now comprising 39 African countries and representing over 1 billion people. The Alliance serves as a framework for implementing, monitoring and evaluating the Manifesto, with partnerships including the African Union Commission (AUC), International Telecommunications Union (ITU), WB, AfDB, UN Economic Commission for Africa (UNECA), GSM Association (GSMA), Internet Corporation for Assigned Names and Numbers (ICANN) and the Private Sector.
Do4Africa	Digital Observer for Africa, initiated by TACTIS and SMART AFRICA, is a non-profit organization fostering digital innovation in Africa. This initiative, through a digital platform utilizing crowdsourcing, aims to showcase diverse innovative projects across the continent, involving startups, private groups, governments, and citizens. Do4Africa also provides an open data access platform, offering access to identified open data portals through collaborative efforts with teams and partners. The objective is to enhance exposure to digital projects and cultivate a collaborative community for innovation.

Source: Summarized based on donors' and other's information

Note: 1. URBACT is a European cooperation programme for cities. For 20 years, URBACT has worked with more than 1000 cities in Europe building city-to-city cooperation networks.

2. SECO is State Secretariat for Economic Affairs (Switzerland)

3. TACTIS is the leading French consulting firm for digital spatial planning. The firm supports public and private actors to deploy digital infrastructures and the development of "smart territories" (digital inclusion, citizen participation, ecosystem innovation, connected objects, data management, smart mobility, smart grid, security). <https://www.tactis.fr/who-we-are/?lang=en>

4. The target countries of GSCP program are South Africa, Madagascar, Tanzania, Burundi, Democratic Republic of the Congo, Uganda, Kenya, Ethiopia, Mozambique, Ghana and Benin.

(2) Result of Donors' and other Organizations' Project Case Analysis

International organizations and donors have increasingly recognized the potential for smart city initiatives in Sub-Saharan Africa to address urban challenges and promote sustainable development. Several programs have been recently initiated to support these efforts, although assessing their positive or negative impacts remains a complex task due to the recency of these projects, with many still in progress.

The World Bank (Global Smart City Partnership Program, 2018~), UN-Habitat (People-Centered Smart Cities, 2020~), and the AfDB (Africa Smart Towns Network, 2019~) play pivotal roles in supporting smart city initiatives in Sub-Saharan Africa. The significance of these international donors lies not only in their financial contributions but also in their ability to bring together expertise, best practices, and global networks. They work with local governments, non-governmental organizations, and other stakeholders to ensure the effective implementation of smart city initiatives.

A case which shows the importance of collaborating with international organizations and donors in the region is the Rwanda Smart City Masterplan, developed in 2017 by UN-Habitat in collaboration with the Rwanda Ministry for Youth and ICT and the Smart Africa Alliance. By working closely with UN-Habitat, Rwanda has not only transformed its urban landscape but has also emerged as a pioneer in smart city

initiatives in Africa. However, the true impact of the involvement of these international organizations and donors in these initiatives will unfold over time, as the projects progress mature and their outcomes become more apparent. Continuous monitoring and evaluation will be crucial to understanding the long-term effects and ensuring the sustainability of smart city developments in Sub-Saharan Africa.

3.4. Policies and Legislation related to Smart City Initiatives

(1) Readiness of Smart City related Policy

According to grasping data and analysis, many countries have not yet formulated policies and visions on smart city development. On the other hand, in national development plans and other documents, terms such as ICT and other digital technologies and E-Government can be found, and while these cannot all be said to have been derived from the context of smart city development, they seem to indicate a certain degree of smart city-related efforts or initiatives. Among them are Nigeria’s “Nigeria Smart City Initiatives (NSCI),” Rwanda’s “Smart Rwanda Master Plan,” South Africa’s “A South African Smart City Framework” and Cameroon’s “Cameroon Vision 2035” (which mainly outlines ICT-related areas), etc., some countries have policies and development plans in place that can serve as the basis for smart city initiatives.

On the other hand, even in countries where smart city initiatives have not been developed at the national level, project-based initiatives have been identified at the individual city level, such as the “International City of Innovation and Knowledge” in Sèmè City, Benin, “Eco2 Citizen Policy 2022” in Plateau City, Côte d’Ivoire, “Vision of Dodoma Master Plan” in Dodoma City, Tanzania, and other private sector-led projects. There are also projects led by private companies. As Table 3-3 above shows, few countries have smart city policies in place.

(2) Preparation Status of Relevant Legal Systems for Smart City Development

In countries where policies are not yet in place, there is little information available to confirm that the legal systems related to smart city development are sufficiently in place as well. In many cases, the current authorities in each country are in charge of project approval for the progress of the project, as it is implemented on a project basis. Because of the limited number of projects being implemented, it is difficult to see the issues in the legal system. Even in cases where legal systems are being developed, they are related to the legal systems for the development of ICT and digital fields, which are major targets of initiatives, and it is difficult to recognize that they are specific to the development of smart cities.

Table 3-5: Status of Preparation of Relevant Legal Systems for Smart City (excerpts)

Country Name	Status of Legal System Preparation
Benin	Preparations are underway to revise the legal system in line with the development project in Sèmè City. Preparations are also underway for the construction of an ecosystem related to resident participation and systems related to public-private-academic collaboration.
Cameroon	ICT-related legal systems are being developed (at the national level).
Democratic Republic of the Congo	The New Telecommunication Framework Law is a related legal system.

Country Name	Status of Legal System Preparation
Côte d'Ivoire	The Smart Citizen Platform is being prepared as an ecosystem for citizen participation at the municipal level in Plateau.
Ethiopia	Full-scale preparation of the relevant legislation has not yet started. In Addis Ababa, a framework for citizen participation is being developed.
Ghana	Full-scale preparation of the relevant legislation has not yet started. In the city of Accra, a framework for citizen participation is being developed.
Kenya	Related legal system is not yet fully prepared.
Mauritius	The Smart City Scheme (SCS) sets the basic framework.
Nigeria	There are related frameworks in the Nigeria Smart City Initiatives (NSCI) and the Nigeria Agenda 2050, among others. There is also a legal framework in place that is aligned with Lagos' development plans.
Rwanda	At both the national and city levels, clear legal institutionalization has not yet been achieved. A framework for citizen participation, public-private-academic partnerships, etc. is being developed.
Senegal	Full-scale preparation of the relevant legal framework is still in progress.
South Africa	A South African Smart Cities Framework (SCF) has established the legal framework.
Tanzania	Related legal framework is not yet fully prepared.
Togo	Law No. 2018-026 on Cybersecurity and other laws related to digital infrastructure development are being developed.
Uganda	Laws pertaining to development specific to the ICT sector and related areas have been approved by the government. In Kampala, institutions related to strengthening citizen participation are being developed.
Zambia	There is a legal framework related to the Smart Zambia ICT Master Development Plan.

Source: Data from each country's official web information

3.5. Overview of Organizations and Actors related to Smart City Initiatives

As explained so far, many of the countries in the survey target region have not yet begun full-fledged smart city initiatives at the government level. On the other hand, there are examples of project-based smart city initiatives at the city level. In some cases, alliances with third-party status have served as platforms for project implementation. As in the previous section, the results of desktop review of organizations and actors in several countries are summarized hereafter. Data for each country is summarized in the country profile at the end of this report as Appendix.

Table 3-6: Organizations and Actors related to Smart City Initiatives (Excerpts)

Country Name	Core Organization	Actor
Benin	Sèmè City initiatives: Ministry of Digital Affairs and Digitalization Ministry of the Living Environment and Sustainable Development)	Sèmè City Development Agency (ADSC) Partner: World Bank, UNICEF, French Universitie, etc.
Cameroon	ICT sector initiatives: Ministry of Housing and Urban Development (MINHDU), Ministry of Posts and Telecommunications (MINPOSTEL), etc.	National Delegation for National Security (DGSN), CAMTEL: Cameroon's State-owned Telecommunications Services Company, Huawei, etc. (Project Based)
Democratic Republic of the	Initiatives on Plan National Stratégique de Développement (PNSD) 2019-2023, Kitoko	Kitoko New Smart City: Government of DRC, Group ATEPA

Country Name	Core Organization	Actor
Congo	New Smart City: Ministry of Posts, Telecommunications and New Technologies	(Senegalese architect Pierre Goudiaby Atepa), etc. (Project based), State of the African Diaspora
Côte d'Ivoire	Initiatives on National Digital Development Strategy (NDDS) 2021-2025 and Eco2 Citizen Policy, Plateau : Universal Service of Telecommunications (ANSUT), Ministry of Construction, Housing and Urban Development	Municipality of Le Plateau (Project based)
Ethiopia	Ministry of Innovation and Technology	No entity identified. Promoting public participation.
Ghana	No information	Celltel Networks, Roberta Annan Consulting, etc. Project concept has been set as private project.
Kenya	Ministry of Information and Communications	Tetra Tech (KoTDA has selected for Konza Technopolis Project)
Mauritius	Initiatives for Smart City Scheme: Economic Development Board (EDB)	ENL Group (private company) has been selected as the Moka Smart City project implementation firm.
Nigeria	Initiatives for Nigeria's Vision 2020 and 2030 Lagos Smart City Vision: Federal Ministry of Communication Technology, National Information Technology Development Agency (NITDA)	Lagos State Government (LASG), (also, participation of citizens and private companies)
Rwanda	Kigali Innovation City Initiatives: Ministry of ICT&Innovation, Smart City National Coordination Committee	Ministry of ICT & Innovation; The Rwanda Development Board; Africa50-a pan-African infrastructure investment platform
Senegal	Approval process for the project on-going around Dakar city. Ministry of Communication, Telecommunications and Digital Economy (MCTEN)	Special purpose organization has been formulated for Urban Poles of Diamniadio and the Lake Retba (both private based)
South Africa	Initiatives for A South African Smart Cities Framework: Department of Cooperative Governance (DCoG)	Municipal Infrastructure Support Agent (MISA) as initiated the project of African Coastal Smart Cities
Tanzania	Dodoma City's smart city initiative: Ministry for Information and Communications Technology	No information
Togo	Lomé City project initiative in relation to 10 Climate Smart Municipalities: Ministry of Digital Economy and Transformation, Ministry of Environment and Forest Resources	No information
Uganda	Initiative for Kampala KCCA Smart City Strategic Plan 2020-2026:	Kampala Capital City Authority (KCCA),

Country Name	Core Organization	Actor
	Smart City Development Initiative Uganda (SCI-Ug), National Planning Authority (NPA), National Information Technology Authority (NITA-U) Ministry of ICT, Uganda National Council of Science & Technology	ICT Steering Committee, Public participation
Zambia	Initiative in relation to Smart Zambia ICT Master Development Plan: Ministry of Transport and Communications	For Kalulushi development, Smart City Limited has been working with Kalulushi City Council.

Source: Data from each country's official web information

As can be seen in Table 3-6 above, various countries are exploring initiatives that will lead to smart city in urban development. However, many countries have not established policies or visions even at the national level, and in these countries, relevant government agencies seem to have a role in promoting initiatives in areas such as ICT and digitalization as areas that are currently easy to tackle. However, there are very few countries that have a framework in which a specialized organization for smart city development is formed and personnel from various ministries and agencies are assigned to it. On the other hand, in cities where efforts are being made on a project basis, in many cases the government has selected private companies and others to play a core role in the effort. In some projects, there are moves to promote citizen participation and the involvement of a wide range of stakeholders.

Chapter 4 Review of Precedent Case Study

This chapter summarizes the results of a desktop survey of smart city development cases in developed countries and in Asia (especially Southeast and South Asia) as leading examples that can contribute to smart city development in Sub-Saharan Africa.

Many cities in Africa are still in the process of developing their basic infrastructure, and are not yet at the stage of solving and realizing urban issues that arise after seeing a certain level of infrastructure development and economic growth, as is the case in many ASEAN countries. Nor is it a step-by-step realization of the current smart city while back-casting a vision of the city and the nation several decades into the future, as is typical in Scandinavian countries. It is important to organize information in light of these differences in the state of urban development in the target region and the sense of stage of urban development in developed countries and the Asian region.

The Survey Team has collected information on precedents, taking into account the urban development issues common to the region as indicated in the previous section 2.3. The perspectives of the compilation include: (1) benefits required for smart city development, (2) basic components, (3) tools and approaches to realize smart cities, (4) major players in implemented projects and activities, (5) public-private sector sharing in project implementation, (6) project proponents, (7) organizational bodies (consultative bodies) and their consensus building and public participation frameworks, and (8) related legal systems and how to respond to them, among others. (7) Organizational bodies (consultative bodies) and their consensus building, framework for public participation, and (8) Related legal systems and their responses.

4.1. Smart City Impact

(1) Concept of Smart City Benefits

Desktop-based data collection and analysis of precedent case study indicates the following two expected benefits of smart city development in many cases.

- Cost reduction benefits: Benefits arising from the effective use of assets and resources
- Value-added effects: Effects, such as increased convenience in urban life for citizens, increased productivity in business activities, as well as increased tax revenue for the government and employment promotion

In many of the smart city initiatives in Japan, the initiatives and the benefits expected from them are presented in the project plans and other documents promoted by local governments. These are summarized in Table 4-1.

As shown in the table, looking at the benefits of smart cities and the technologies that have the effect of realizing these benefits in an integrated manner, they can be classified into three categories: (1) those that improve social sustainability, (2) those that aim to increase value, and (3) those that aim to reduce costs. Here, the benefits of initiatives that aim to improve social sustainability are difficult to convert into monetary terms. Therefore, it is difficult for the private sector to implement them in the pursuit of profit,

and it is important for governments and public institutions to take the initiative in their efforts and promotion. On the other hand, there are many initiatives where benefits are attributed to end-users of services (citizens) and businesses, which can be achieved through independent efforts by businesses and communities. Therefore, it is highly effective to support voluntary efforts by private organizations and companies.

Table 4-1: Smart City Benefits and Effects with Potential Technologies

Benefits	Beneficially	Effects (example)	Potential Technologies that give Effects (example)
Improve Social Sustainability	All Society	• Creating a positive urban environment	• Monitoring, sensor technology
		• Providing inclusive urban services	• Electronic Government (E-Government)
		• Improving the vitality of the city, encouraging interaction, and increasing the value of land	• Sidewalk and park improvement technology, mobility assistance technology
		• Improving public safety and security	• Face recognition, monitoring services (e.g., CCTV)
		• Ensuring ecological diversity, preserving the natural environment	• Green infrastructure, remote sensing
		• Reduce energy consumption and improve efficiency	• Smart grids, smart buildings, ZEB
		• Improving disaster preparedness and resilience to hazards	• Predictive warning systems, disaster forecasting technology
Increase Value	Citizens	• Increased convenience and quality of life in daily life	• Cashless services, mobility services
		• Expansion of self-fulfillment possibilities and capabilities	• Lifelong learning, educational services
		• Improved health status, increased and extended healthy longevity	• Telemedicine technology, health support apps
	Business	• Creation of business opportunities through new technologies and services	• Platform-based business matching
		• Increased production and quality control to increase company sales	• Smart agriculture, smart factories, smart logistics
		• Facilitate marketing and sales	• Online marketing using civic engagement data
Reduce Cost	Citizens	• Save time in life	• Mobility services, shopping and delivery services
		• Reduce service charges	• Remote services (medical, educational, etc.), matching
	Business	• Reduction of capital costs through asset/goods sharing	• Rental (co-working), subscriber services
		• Reduction in R&D and market research costs through data sharing	• Open data platforms
		• Reduced costs through increased productivity	• AI systems, robotics

Source: Re-organized by the survey team based on the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.

(2) Smart City Benefit confirmed by Prior Case Study

Table 4-2 lists the benefits that have been realized through smart city initiatives, as identified in the case study.

Table 4-2: Smart City Benefit appeared in Precedent Cases

Country / City	Smart City Benefit
Kuala Lumpur, Malaysia	Kuala Lumpur is building a data integration platform (Kuala Lumpur Urban Observatory, KLUO). By integrating systems that had been built individually by each department of the Kuala Lumpur City Hall (DBKL), service delivery is expected to be improved through increased efficiency.
Thailand	It is aimed to increase foreign direct investment and participation in industry through SC development, protect the environment, increase job opportunities for surrounding communities, and promote healthy life for all generations.

Country / City	Smart City Benefit
Jakarta, Indonesia	The Provincial Government of the Special Capital Region of Jakarta (DKI Jakarta) has developed “jaki,” a portal for SC services, to provide SC services to citizens. “jaki” allows citizens to access electronic applications and information managed by the provincial government, and conversely allows citizens to update information in jaki. Efficient public service delivery is expected through the use of this system.
Manila, Philippines	SC development efforts are expected to improve monitoring of traffic congestion and disasters, the serious urban issues of concern to Manila citizens, and improve e-education and e-health through advanced communication environments.
Ho Chi Minh, Vietnam	Ho Chi Minh City has developed a shared Data Center with the aim of improving public services, applying it to policy decision-making, ensuring transparency in public administration, and improving access to information through the SC. The Center makes data open and allows citizens and businesses to acquire data, monitor and manage the administration, and contribute their opinions to the administration. This contributes to the achievement of improved public services and more efficient policy decision-making.
Vientiane, Laos	Development of ICT-based “Smart Zones” and operations by private companies including foreign investment in the area will lead to increase in job opportunities in the surrounding communities. In addition, when internet-based services are improved in Vientiane, the quality of life of citizens will improve and the attractiveness of the city as a good place to live will improve.
Cambodia	Bakong, jointly developed by the National Bank of Cambodia and Solamitsu Corporation (a Japanese company), is a central bank digital currency system that enables instant and final transactions using the digitized currency Cambodian Riel (KHR) or USD. It enables instantaneous payments between individuals, corporations, and over-the-counter through personal computers or smartphones, contributing to the revitalization of the market in the country where currency risk is high.
India	India Stack is a nationwide public data platform (similar to City OS) that provides digital services to all citizens provided by the Indian central government. 5 systems are currently being offered, and APIs have been made publicly available for use by state and local governments as well as private businesses. It can be said that the benefits of this service will expand in the future, including the spread of the service to citizens and access to a wide range of government services by the public.
Barcelona, Spain	Barcelona is recognized as a leading example of SC development that uses IoT technology to efficiently manage energy, waste, and water consumption. By implementing smart meters, sensors, and IoT systems, the city has achieved significant cost savings, improved quality of life for citizens, and is thriving as a center of the IoT industry.
Copenhagen, Denmark	Through SC initiatives centered on Copenhagen Solution Laboratory (CSL), Gate 21 and business clusters, domestic industries have benefited from development projects, and corporate growth and community frameworks have been strengthened. Furthermore, the approach of citizen participation has strengthened the human-centered framework not only for SC development but also for other types of urban development, and the government’s policy, planning, and project implementation activities have shifted to more public-private-academic approaches. The SC projects and many other development projects are being implemented within the framework of social activities, and the participants can benefit from the projects.
Amsterdam, Netherlands	The Netherlands is a low-lying country, and dealing with flood damage is an important national issue. The city of Amsterdam conducts a demonstration experiment of a water level rise assessment and warning system by using sensors, simulation models, and BIGDATA’s AI analysis and other technologies, and develop systems to adjust the load on rivers and dams in the city as a whole. These efforts have also led to advanced watershed management utilizing IoT based on information

Country / City	Smart City Benefit
	provided by citizens through apps, with citizens becoming actors in keeping the city safe.
Chicago, United States	Chicago's Smart Lighting Program is one of the largest outdoor LED lighting replacement projects in the U.S. It is estimated to save \$10 million annually by improving energy efficiency, extending the life of lighting fixtures, and improving maintenance and management efficiency, and has actually cut electricity costs in half. In addition to the replacement with LEDs, the project simultaneously installed a management system with Wi-Fi lighting control and remote monitoring. In addition, routing optimization, GIS, and various automations optimized work procedures, eliminated paper forms, reduced outage times, and significantly improved reliability and service levels, including maintenance.
Oslo, Norway	In Oslo's SC project, a roadmap has been developed and is intended to be comprehensive for the SC initiatives. The roadmap can also be used as a basis for discussions on the development of new strategies, policies, business plans and services. It can also be used as a starting point for a co-creation process with citizens, business people, and academics, and can serve as a strategic tool for communicating project goals and values, both externally and within local and regional governments. Norway's SC model provides citizens with a high level of service and living environment and a sustainable social environment through Green business activities.
Berlin, Germany	There is a growing awareness among a wide range of stakeholders, including citizens, that balancing the benefits of the SC Application, such as better informing citizens, with the potential risks of data collection, and misuse of personal data, is a complex challenge in the digital age.
Zurich, Switzerland	Switzerland's SC strategy pursues on using technology to optimize infrastructure, improve mobility, and enhance public services while maintaining a high quality of life. Integrated smart systems incorporate IoT devices, data analytics, and connectivity to efficiently manage resources, enhance urban services, and return technology as a benefit to citizens.

Source: Survey Team based on data collected from each country and "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022 (SC = Smart City)

4.2. Basic Components of Smart City

(1) Evaluation and components in line with JICA's SMART CITY APPROACH

In the "Global SC Survey" conducted by JICA in 2022 prior to this study, the evaluation of "success" of precedents was based on the six criteria of Relevance, Effectiveness, Impact, Coherence, Efficiency and Sustainability, referring to items from the OECD DAC development framework.

Table 4-3: Smart City Success Evaluation Axis

Criteria	Basic Meaning	Meaning in the context of Smart City Initiatives
Relevance	Objectives are in the right direction	Objectives (motivations) of smart city initiatives are appropriate
Effectiveness	Measures contribute to the achievement of the objectives	Measures contribute to the achievement of the objectives (KPIs, etc.)
Impact	Measures create positive effects beyond the objectives	Positive effects can be expected in many areas
Coherence	Measures are consistent	Smart city measures at various levels are consistent
Efficiency	Resources are invested efficiently	Existing infrastructure and resources in each city are effectively utilized
Sustainability	Long-term effects are expected	Sustainable and autonomous city management

Source: “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.

In the identification of success factors in precedent case study based on the framework of the “Global SC Survey” described above, five domains (components of Smart City Initiative) were set: “Policy and Vision,” “Organization,” “System,” “Technology,” and “Operation.” Each of the five domains with elements is described below.

Table 4-4: Smart City Domain

Domain	Summary	Important elements that make up the Domain
Policy and Vision	The policy, vision, process, etc. related to smart city development are clearly and concretely presented. Participation and smooth collaboration of government agencies, private companies, research institutes, and citizens are ensured for smart city-related efforts and initiatives at the policy level. The policy and vision have credibility in the process.	1. Establishment of policy and vision of smart city 2. Comprehensiveness of policy and vision 3. Specifics of policy and vision 4. Policy alignment 5. Sustainability of the policy and vision
Organization	In the realization of smart cities, national and local government agencies, private companies, universities and research institutes, as well as citizens and community organizations are participating.	6. Sharing and promotion of visions and concepts 7. Promotion body 8. Triple / Quadruple helix partnership 9. Organizational effectiveness and capacity
System	There is an organizational structure for collaboration involving many related entities across industry, government, academia and the private sector.	10. Building ecosystem 11. Creating trust 12. Setting laws, regulations and systems 13. Citizen participation and co-creation 14. Cross disciplinary
Technology	The report also indicates that physical technologies, including urban infrastructure, as well as ICT and digital technologies, should be targeted for smart city initiatives.	15. Urban infrastructure platform 16. Data utilization 17. Digital security 18. Social system design and implementation

Domain	Summary	Important elements that make up the Domain
	(It is important that efforts are not technology-oriented, but rather aimed at realizing visions and issues.)	
Operation	Smart city initiatives are not temporary measures, but ongoing efforts within urban management. It constitutes a framework in which the parties involved mutually function to ensure sustainability.	19. Flexibility of promotion system 20. Strengthening collaboration and partnerships 21. Ensuring sustainability

Source: Re-organized by the survey team based on the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.

In the “Global SC Survey,” the above success factors and components are linked and organized. By following this framework in this survey, the direction of JICA SMART CITY APPROACH will be maintained. The matrix of success factors and components of smart cities is shown in the next page.

Factor	Relevance	Effectiveness	Impact	Coherence	Efficiency	Sustainability
Policy and Vision	<ul style="list-style-type: none"> The objectives of the smart city are consistent with the challenges of the country or city and, by extension, with international social issues, and are appropriate from the perspective of the SDGs. The philosophy is consistent with a focus on citizens (people), and the smart city is positioned as a means and tool to achieve this goal. 	<ul style="list-style-type: none"> Realistic and concrete measures and projects to achieve the vision as well as a roadmap are defined. A mechanism to promote smart cities is institutionalized. Appropriate targets (KPI, etc.) are set. 	<ul style="list-style-type: none"> It is positioned not only as a field-specific initiative, but also as a comprehensive effort encompassing cities, industry, the environment, welfare, and other areas. It aims not only to solve problems, but also to create innovation and new value through co-creation. 	<ul style="list-style-type: none"> Policies and visions are consistent across the hierarchy of countries, cities, districts, etc., and institutions are aligned. Consistency of development themes and initiatives in each sector is ensured. 	<ul style="list-style-type: none"> Based on the status of the city's resources: people (organizations), goods, money, and information assets, rational strategies and priorities are established with respect to policies and projects. 	<ul style="list-style-type: none"> A concrete action plan is in place for mid- to long-term initiatives and development efforts. The financial flow of the budget and business model has been institutionalized or materialized.
Organization	<ul style="list-style-type: none"> Each entity involved in smart city development and projects shares values and principles. 	<ul style="list-style-type: none"> There is a cross-disciplinary and cross-organizational coordination and cooperation system centered on a competent and authorized and precise promoting entity. 	<ul style="list-style-type: none"> The missions and roles of each entity working on smart city development and projects are clear and consistent. 	<ul style="list-style-type: none"> A public-private partnership system based on appropriate and equitable sharing of resources, capacity, and risk is established. 	<ul style="list-style-type: none"> Mechanisms for operating and maintaining the organization and structure are incorporated into the plan, and budgetary measures and business models are defined. 	
System	<ul style="list-style-type: none"> Communication with citizens fosters understanding of smart city initiatives. 	<ul style="list-style-type: none"> There are mechanisms for incorporating citizens' voices into the administrative process or for citizen participation in the co-creation process. 	<ul style="list-style-type: none"> Open mechanisms and space (platforms) have been established to enable diverse actors in industry, government, academia, and the private sector to collaborate with each other. 	<ul style="list-style-type: none"> A mechanism or environment is in place to disclose and share information, knowledge, or technology to other cities and organizations. 	<ul style="list-style-type: none"> An ecosystem has been established to support autonomous development, including the development of new technologies and support for start-ups. 	
Technology	<ul style="list-style-type: none"> Efforts are not technology-oriented, but rather aimed at vision, problem solving, and challenge accomplishment. 		<ul style="list-style-type: none"> Data is shared and utilized across disciplines and organizations, and technology and services are provided from a multi-solution perspective. 	<ul style="list-style-type: none"> Personal information, privacy, and data security are secured by appropriate and transparent rules and regulations. 	<ul style="list-style-type: none"> Smart initiatives are being developed while making effective use of existing infrastructure, services, and other resources. 	<ul style="list-style-type: none"> New technologies, including ICT technologies, are integrated in harmony with existing infrastructure and services, as well as with the local natural environment and culture.
Operation		<ul style="list-style-type: none"> The status of goal achievement is continuously monitored, and improvements and measures are taken in a timely and appropriate manner through feedback on the measures. 	<ul style="list-style-type: none"> Promoting support for demonstrations, knowledge sharing, matchmaking, etc. for scale-up of development. 	<ul style="list-style-type: none"> Appropriate technologies and services are introduced to urban issues through appropriate processes. 		<ul style="list-style-type: none"> It involves companies (including start-ups) that resonate with the city's vision and are committed to the development of the area.

Source: Re-organized by the survey team based on the "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022.

Figure 4-1: Matrix of Success Factors and Components of Smart City

(2) Components identified in Precedent Case Study

Table 4-5 lists the most notable components of smart city initiatives identified in the case study.

Table 4-5: Notable Components of Smart Cities in Precedent Examples

Country / City	Notable Smart City Components
Malaysia	In 2018, the Ministry of Local Government Development (KPKT) formulated “MALAYSIA SMART CITY FRAMEWORK” (Malaysia Smart City Promotion Plan), which designates local governments in charge of urban management as the main implementer of SC promotion, responsible for budget management and implementation of SC promotion measures. Since the resources of local governments are insufficient to provide the communication infrastructure and SC services that form the basis of SC, a system of public-private partnerships led by the government has been established in collaboration with private companies, including communication infrastructure development companies, as well as local governments, which are the main actors in urban management.
Thailand	SC is one of the key policies in Thailand 4.0, the country’s top-level plan, and the goal is to overcome the middle-income trap, a situation in which economic growth is stagnant, by continuously increasing added value through “value enhancement in innovation, productivity, and trade” as the keywords. The Smart City Committee, a cross-sectoral government organization chaired by the Vice Minister of Transportation, has been established to promote and manage smart city initiatives in each city, and will be responsible for (1) policy coordination with relevant government agencies, (2) examination and coordination of deregulation measures related to SC, and (3) examination and evaluation of individual SC initiatives.
Indonesia	The national government implements the Movement Towards Smart Cities (2017), a program that provides experts and budgetary assistance for the development of SC for each city to carry out the plans, and is a SC initiative led by the Ministry of Communications and Information. The Ministry of Communications and Information implements the “Quick-Win Program” as part of the “Movement Towards Smart Cities.” Each city can launch a program within one year of the creation of a master plan, and support is provided to those that achieve results in a short period of time. There is no country-wide regulation or platform for SC development, and each city develops its own.
Philippines	In the Philippine’s National Development Plan (PDP) 2017-2022, there is a policy to introduce the idea of SC in the areas of “urban mobility, green city, and sustainable energy,” but there is no specific national plan, policy, or local city plan for SC, and implementation is basically on a project basis. In the capital city, the Metropolitan Manila Development Authority (MMDA), the local government units (LGUs), and related government organizations are working together, with the MMDA responsible for planning development projects and supervising the LGUs that provide services, etc. Plans are underway to reduce public costs through PPP and to implement systems through private sector joint ventures. As a specific example of the use of technology, the E-Tricycle demonstration project is being tested in Quezon City, Metro Manila. Although concrete benefits have not yet materialized due to the demonstration stage, the SC is being promoted through industry-government-academia collaboration, with the private sector responsible for the construction of the depot facilities associated with the introduction of the E-Tricycle, the study of optimum fares and technical guidance, the university institutions analyzing the degree of environmental impact reduction, and the LGU coordinating with the existing Tricycle operators.
Vietnam	SC development initiatives apply the latest technologies based on advanced scientific and technological achievements and ensure synchronization between

Country / City	Notable Smart City Components
	technology and non-technical solutions. Organizations implementing sustainable smart urban development combine both top-down and bottom-up approaches, with the central government creating a system of legal regulations and support policies, and local governments taking an active role. ICT technical standards and regulations applicable to smart city developments are created, and a legal and regulatory framework is developed at the national level.
Laos	SC policy and vision have not been defined as a nation, but there is a description of SC: SC is recognized as one of the key projects to attract more foreign investment and strengthen economic competitiveness by making Laos an open country connecting Indochina from a landlocked country through the use of IT-based logistics facilities and other means. The Eighth Socio-Economic Development Plan includes “strengthening ICT technology as a key to sustainable growth by facilitating the structural transformation of the economy and increasing productivity.”
Cambodia	In the Cambodia Sustainable Development Goals (CSDGs), “Strengthening Urban Planning and Urban Management” and one of the approaches is set as the SC Policy. The SC Coordination Committee, which promotes “ensuring quality, safety, beauty, and efficiency, and strengthening the development and implementation of SC rules, laws, regulations, and building standards,” was approved by the Prime Minister and established in February 2021. The Ministry of Interior has jurisdiction as Secretary. SC development in the capital city of Phnom Penh is under implementation with support for SMEs utilizing Blockchain technology.
India	In India, 100 cities promoting SC were selected through the Smart City Challenge Competition. Selected cities will receive budgetary subsidies and monitoring of SC measures. In the area of technology for the introduction of SC initiatives, the Government of India in collaboration with the U.S. Agency for International Development (USAID), has been developing a City OS introduction project since 2015, which is also an initiative led by UN-Habitat. This is the City OS targeting areas where there are many financial challenges and where technology is underdeveloped, and it is a GIS-based administrative efficiency system that has been implemented in nine Indian cities, including East Delhi.
Bangladesh	To make public services more inclusive, affordable, reliable, and accessible, a2i (Aspire to Innovate) was organized to introduce a citizen-centered innovation culture into the public service. In addition, a2i has organized events where people who contribute to SC (decision makers in cities, experts, young people who promote SC, NGOs, etc.) can participate in SC initiatives, share precedents, and connect with other human resources. The private sector also exhibits its technologies and services, and promotes matching activities.
Barcelona, Spain	The “Digital City Plan” established in 2015 set the direction that digital technology should be used to improve the quality of life of citizens and to realize a citizen-centered society, aiming to improve public services, support digital businesses and entrepreneurs, and empower citizens. The goal was to improve public services, support digital businesses and entrepreneurs, and promote citizen empowerment and social inclusion. Poblenou, a former industrial district, was designated as a redevelopment project area to create new industries and implement new technologies, and under the policy of the City of Barcelona, data from private companies is open-sourced and shared by citizens as a bottom-up SC initiative. In addition, by utilizing Decidim’s platform, they are building a project ecosystem that facilitates citizen participation in urban policies.
Copenhagen, Denmark	Copenhagen has declared its intention to become the world’s first carbon neutral capital by 2025. The specific plan for SC is described in the “CPH2025 Climate Plan,” with the four major goals of “energy consumption,” “energy production,”

Country / City	Notable Smart City Components
	<p>“green mobility,” and “municipal initiatives” as its four approaches to carbon neutrality. The city is working to become carbon neutral. In the process of developing new technologies and services, a “Living Lab” has been established as a center of activity for government, business, and citizens to co-create and proactively engage in the process of developing new technologies and services, and to explore avenues for solving problems. Partnerships have been established to share case studies and know-how from overseas SCs. The project aims for social implementation through a “human-centered approach” involving citizens, rather than one led by industry or local governments.</p>
Helsinki, Finland	<p>Helsinki’s SC initiative is linked to the 6Aika (Six Cities) Strategy, Finland’s national strategy, and is building a platform for creating new technologies and services through innovation in collaboration with local businesses, citizens, communities, universities, research institutions, and other diverse actors. The 6Aika (Six City) Strategy and Co-Creation are positioned as important elements. In creating new technologies and services, agile social experiments and pilot projects are conducted with the participation of industry, government, academia, and the private sector, leading to effective implementation. In addition, the user-oriented SC approach promotes the participation of users and citizens in the conception, planning, implementation, and evaluation phases of pilot projects, aiming to improve the quality of technologies and services through Open Innovation.</p>
Amsterdam, Netherlands	<p>The SC development in the Netherlands has positioned the transformation to a knowledge-based city and the response to industrial transformation through innovation centered on ICT as a key national and regional strategy, and the city of Amsterdam, the economic hub of the Netherlands, shares this vision. The Amsterdam SC concept considers the use of ICT innovation as an indispensable tool for solving urban issues, such as decarbonization, urban resilience improvement and revitalization, etc. The innovation system is developed through a cycle of planning, demonstration, monitoring and evaluation, with the participation of citizens in the industry-government-academic community, and the experience is widely disclosed and shared with the public. The process of sharing and publicizing the experience has been established. The project also aims to 1) promote efforts to realize a recycling-oriented society, 2) promote digital technology and data-driven innovation, 3) improve energy efficiency, 4) realize a healthy and long-lived society, 5) promote sustainable mobility, and 6) create a resilient and attractive labor market.</p>
Chicago, United States	<p>Developing the City of Chicago’s vision for growth, the Global Hub for Innovation and Technology, in 2015, a comprehensive vision for the future created by advanced technology, the “Advanced City Accelerating Opportunity, Inclusivity, Civic Engagement, and Innovation through Technology” strategy, the Chicago City Tech Plan was formulated, and policies continue to emphasize diversity and Inclusive SC and promote the attraction of tech companies and the creation of Start-up companies. The plan also aims to use technology to reduce costs, improve services, increase civic engagement, improve service and economic access, enhance skills, increase job opportunities, and increase the workforce. By connecting Chicago citizens and businesses, the city is forming a foundation of technological strength, on which an effective, efficient, and open executive branch, Civic Innovation, and Technology Center are growing while the city is growing.</p>
Oslo, Norway	<p>SC aims to improve people’s urban lives through new technologies, innovative practices, collaboration, and co-creation to increase sustainability, attractiveness, productivity, and resilience. To provide a comprehensive guide for local governments to realize SC, the Roadmap for Smart and Sustainable City and Community in Norway was published in August 2019, setting out the vision and</p>

Country / City	Notable Smart City Components
	principles of SC. Its overarching objective is to promote the development of sustainable, productive, and adaptive cities and communities in Oslo with a wide range of Smart City Project, from piloting electric buses to zero-emission construction, retrofitting existing buildings, and developing circle-based waste management and Green Energy Systems. The needs of the citizens are guiding the development of the project, including the digitization of all services for citizens that can be digitized.
Berlin, Germany	In 2015, the German government launched a nationwide SC Dialogue, developed an SC Charter, promoted a common public understanding of the SC concept, and established guidelines for the digital transformation of cities. This effort aimed to align SC development with European and international development goals, such as urban development policies, sustainability goals, the Leipzig Charter on Sustainable European Cities, and the European Union and UN urban agendas, etc. The SC Charter is operationalized by federal ministries and has broad support from politics, administration, business, research, civil society, and other sectors. The guidelines also prioritize citizen well-being, livability, diversity, open democracy, participation and inclusion, climate neutrality and resource efficiency, economic competitiveness and prosperity, innovation, responsiveness, and protection of private and public digital spaces.
London, United Kingdom	The SC vision for London is a collaborative, connected, and responsive city, integrating digital technologies to meet citizen needs from citywide data use, improving the quality and performance of city services such as Energy, Mobility, and Utility, and reducing resource consumption, waste, and overall costs. Smarter London Together - The Smart City Roadmap has been developed as a flexible digital master plan for the city, drawing on ideas from citizens, the technology community, and those working in public services. The Smart London committee is responsible for the development and implementation of the Smart City Roadmap in all urban policy.
Milan, Italy	The City of Milan's SC concept is not technology-driven, but citizen-oriented, with a bold agenda that includes smart mobility, environment, inclusion and citizenship, reorientation of demand for transportation services, standardization of payment technology, and efficiency measures. In terms of adaptation strategies, the city is focusing on efforts to improve the rhythm of life in the city by making transportation infrastructure more efficient and transforming the use of time and other aspects of social life in an integrated and smart manner. The city is promoting smart time reform in various areas ranging from urban services and corporate activities to cultural events by decentralizing urban time.
Zurich, Switzerland	The Smart City Zurich Strategy aims to bundle the future needs of Zurich's citizens, promote innovation, and position Zurich as a SC. The strategy is linked to the implementation of the "Zurich Strategy 2035" and a number of specific strategies. Zurich is focused on achieving sustainable urban development through a comprehensive and collaborative approach that leverages the latest technology and data to enhance the quality of life for its citizens while promoting economic growth and environmental sustainability, and is focused on achieving urban development.

Source: Survey Team based on data collected from each country and "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022 (SC = Smart City)

4.3. Consideration of Tools and Approaches to realize Smart Cities

Table 4-6 lists the effective tools identified in the case studies that are noteworthy for smart city initiatives, as well as the process for considering the approach.

Table 4-6: Examination of Effective Tools and Approaches in Precedent Cases

Country / City	Outline of Effective Tools	Approaches
Malaysia	Government considers followings: <ul style="list-style-type: none"> • MUO (Malaysia Urban Observatory), a national data integration platform (urban OS), • Kuala Lumpur Integrated Waste Management System, • City Planning System (CPS), and others. 	Kuala Lumpur is promoting the use of IoT technology in transportation, solid waste management, and urban planning, using sensors and GIS. At the same time, Kuala Lumpur is building a data integration platform (Kuala Lumpur Urban Observatory, KLUO) to utilize IoT technologies in each of the above areas.
Thailand	Smart City Criteria (Certification Criteria)	An evaluation index for granting incentives (tax benefits, etc.) and deregulation to cities and projects that meet the certification criteria.
	Establishment of an operating company for SC promotion (Phuket)	Creation of an implementation platform by private organizations to promote smart city development with participation of various private companies.
Indonesia	Introduction of “Quick-win Program”	The evaluation is conducted by the Review Committee, which evaluates projects to take advantage of tax incentives and deregulation related to the implementation of smart cities. The review committee members include researchers from private companies and universities. If the project receives a high evaluation, the government budget may be applied to expand the project.
	Smart City Portal (jaki) developed SC services that residents can use (e-government)	Through the portal, residents can access data managed by the government, and information can be shared by residents to the government. It is characterized by its use as a data-driven system that analyzes information provided by residents and utilizes it in policy and application development.
Philippines	Reduce public cost burden by utilizing PPP	Project management is planned to be carried out by the public (Philippine Base Conversion and Development Authority (BCDA)) and system implementation by a private joint venture.
Vietnam	Public Participation through Data Access	Programs that share data for people and businesses through shared data centers and encourage people to participate in monitoring and managing the activities of government and society.
Laos	Promote economic policies and SC development in an integrated manner	SC project is considered as one of the key projects to attract more foreign investment and strengthen economic competitiveness.
Cambodia	Blockchain utilization	Aiming to ensure data transparency through blockchain technology, promote information and resource sharing between public and private stakeholders, and promote collaboration in development and improvement and area management. Also pursuing to build a

Country / City	Outline of Effective Tools	Approaches
		platform for SMEs to develop transparent business practices and aiming to establish a platform for SMEs to develop transparent business practices.
Chennai, India	Information Platform for Citizen Participation	It increases the efficiency of citizen participation, makes urban systems more transparent, and serves as an Interactive Forum between citizens and government.
	Introduction of technologies to improve urban traffic environment	<ul style="list-style-type: none"> • Implementation of PAN-City Metro-Network (under construction) to increase sidewalk coverage to help reduce accidents • Installation of LED street lighting to enhance pedestrian safety, and video crime surveillance
Bangladesh	Introduction of technologies to improve urban traffic environment	Promote the introduction of Smart Mobility technologies, such as ridesharing, car sharing, variable traffic management, traffic monitoring, traffic control, public transportation applications, public transportation cards (payment system), self-driving cars, electric cars, etc.
Barcelona, Spain	Innovation District 22@Barcelona Smart Retrofit Initiatives for redevelopment of industrial districts	In redevelopment projects that reuse former industrial districts to create new industries and implement new technologies, new technologies are being retrofitted to existing infrastructure. The private sector, government, citizens, and various other entities are collaborating to implement the project, and bottom-up SC developments are being devised to open up the data held by private companies and share data with citizens.
	Citizen participation through the use of Decidim	On-Line Platform for Participatory Democracy with functions to gather diverse citizens' opinions, promote and aggregate discussions, and link them to policies.
Copenhagen, Denmark	<ul style="list-style-type: none"> • Copenhagen Solution Laboratory (CSL) • Gate 21 • Business Cluster 	<p>Strengthening of initiatives through Triple Helix and Quadruple Helix</p> <p>In the process of developing new technologies and services, the "Living Lab" has been established as a place for Open Innovation, a base of activities where government, business, and citizens can co-create and proactively engage in exploring paths to solving problems, and partnerships are being built to share experiences and know-how from overseas cities. Representative organizations include the Copenhagen Solutions Laboratory (CSL) and Gate 21.</p>
Helsinki, Finland	Linkage of SC with 6 Aika (Six City) Strategy (National Strategy)	Collaboration with local businesses, citizens, communities, universities, research institutions, and other diverse actors

Country / City	Outline of Effective Tools	Approaches
Amsterdam, Netherlands	Cooperation with: Amsterdam Smart City (ASC) Amsterdam Innovation Motor (AIM) City Innovation Exchange Lab (CITIXL)	ASC, a sub-organization of the Amsterdam Economic Council, and CITIXL, a private sector-led organization, will collaborate to create a living lab that connects the city and its partners with citizens, and Cloud Sourcing Solution will be responsible for activities that will speed up the process of design, prototyping, testing, implementation, and sharing of results. It also provides services to other cities and partners by sharing and exchanging information through workshops.
Chicago, United States	Collaboration between City Tech Collaborative and city initiatives	The City Tech Collaborative was formed through the merger of the Smart Chicago Collaborative and City Digital. A consortium of partners from the private sector, municipalities, startups, civic organizations, research institutions, and community organizations, the Collaborative combines tools and ideas and facilitates collaboration to develop inclusive technology city solutions with significant market impact.
Oslo, Norway	The Norwegian government, together with Design and Architecture Norway (DOGA), the Nordic Edge Smart City Innovation Cluster, and the Norwegian Smart City Network, has developed a National Smart City Roadmap, on which SC initiatives will be based.	The roadmap developed by Norway is intended to comprehensively address SC initiatives, and will be used to develop new strategies, policy documents, project and service plans, and as a co-creation process with citizens, business people, academic experts, and others. Norway's Roadmap includes Guidebook, Bridge Builder, Value Creator, Platform, etc., and a variety of stakeholders are participating in the process.
Berlin, Germany	Together Digital for a Smart City: Forward-thinking design and specific development plans and SC strategies	It incorporates a combination of Digital City and Smart City strategies to help establish new operational methods, agile methods, capacity building, and systematic knowledge transfer between government and citizens. By aligning technologies, methods, and cultural processes, the supporting strategies enable existing strategies to reach their respective goals.
London, United Kingdom	Implementation of SC projects that comprehensively incorporate the strategy and plan implementation framework, such as followings: • Smarter London Together (Roadmap) • London Infrastructure Plan 2050	The roadmap was formulated from the ideas of a diverse group of citizens, the technical community, and government officials, and is designed to enhance the Smart London Committee work with the city government to develop and implement strategies for applying technology to all sectors (transportation, energy, social, and infrastructure policies). This will be complemented by London Infrastructure 2050, a strategy for the future design and efficient management of the city's assets. In addition, the London Data Store has been developed as an Ecosystem Hub and data

Country / City	Outline of Effective Tools	Approaches
		operations have been launched to manage and plan city operations.
Milan, Italy	Implementation of initiatives that contribute to making social life and urban time more efficient from the introduction of smart technologies related to the transportation sector.	Milan's SC Strategy sets comprehensive actions to reduce travel demand (e.g., promote Smart Work and Remote Work), improve and diversify mobility options, etc. Strengthening the efficiency and safety of public transportation by integrating public transportation with other Mobility Systems and automating transit and parking tickets and passes. Investing in the development of short-term parking spaces and encouraging flexible school curricula and work schedule settings to diversify the mobile population.
Zurich, Switzerland	<p>Four guidelines for SC initiatives are established and implemented.</p> <p>Supporting the implementation of the Smart City Zurich Strategy, Zurich Strategy 2035, and a number of other specific strategies.</p>	<ol style="list-style-type: none"> 1. Focus on user-oriented development and people's needs by aligning the needs of target groups with the city's agenda. 2. Promote people's participation and shared use of infrastructure through networking and cooperation among people, organizations, and infrastructure. 3. Establish availability, self-determination, and protection for data handling, and develop a reliable Open Data Platform. Data protection and information self-determination will be given top priority when handling personal data. 4. Accelerate technological innovation through innovation and agile development. The experimental Open Space, Pilot Project, and Living Lab will be tested and implemented.

Source: Survey Team based on data collected from each country and "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022 (SC = Smart City)

4.4. Main Players in Smart City Realization

The players identified in the case study that are noteworthy for special mention in the smart city initiatives, their roles and effects are shown in Table 4-7.

Table 4-7: Players in Precedent Cases and their Roles and Effects

Country / City	Player	Notable roles and effects
Kuala Lumpur, Malaysia	<ul style="list-style-type: none"> • Kuala Lumpur City Hall (DBKL) Smart City Unit • Private Sector Participation 	The DBKL Smart City Unit has been organized within DBKL as the SC promotion entity, and is responsible for overall management of the SC initiatives, including management of the SC development progress. The unit collaborates with private companies and research institutes for the introduction of smart technologies, and with Alibaba for the introduction of the Urban Data Platform.
Thailand	<ul style="list-style-type: none"> • Smart City Committee • Universities, major real estate companies • Private Sector Alliances 	Under the Smart City Committee, a cross-sectoral government organization chaired by the Deputy Minister of Transportation, a framework has been established to promote and manage SC initiatives in each city, with various organizations from industry, academia, and the private sector and taking lead the efforts.
Jakarta, Indonesia	<ul style="list-style-type: none"> • Communication, Informatics and Statistics Department, DKI Jakarta • Citizen Participation 	The Communication, Informatics and Statistics Department of DKI Jakarta is positioned as the driving body of the SC Master Plan developed by the provincial government. The development of a data portal enables resident participation by opening up data to citizens.
Manila, Philippines	<ul style="list-style-type: none"> • Metropolitan Manila Development Authority (MMDA), local government units (LGUs) in Metro Manila, government-related organizations • Diverse participation from industry, government, and the private sector 	MMDA supervises the LGUs in planning and service delivery, including development planning, and the LGUs are responsible for cross-sectoral service delivery. The Quezon City E-Tricycle Demonstration Project was planned to be implemented by a joint venture between the government (Base Conversion and Development Authority of the Philippines (BCDA)) for project management and the private sector for system implementation, thus planning an implementation structure that makes maximum use of the resources possessed by the government and private sectors.
Ho Chi Minh, Vietnam	<ul style="list-style-type: none"> • Ho Chi Minh City Information Security Center Joint Stock Company • Diverse actors from industry, government, and academia participate in the project 	Ho Chi Minh City Information Security Center Joint Stock Company was established, which operates the Smart City Information Security Center. Through the shared Data Center, the company promotes the participation of citizens and businesses in government.
Vientiane, Laos	Foreign and local companies	As the city administration promotes private-sector-led development through

Country / City	Player	Notable roles and effects
		public-private partnerships, introduction of IT systems and other improvements will be promoted through development by private companies in the “Smart Zone,” a specific economic zone.
Bangladesh	<ul style="list-style-type: none"> • a2i (Aspire to Innovate) 	“a2i” was organized within the Government of Bangladesh in 2020 as the SC promotion entity with the cooperation of UNDP. The program aims to introduce a citizen-centered innovation culture into the civil service to make public services more inclusive, affordable, reliable, and accessible.
Barcelona, Spain	<ul style="list-style-type: none"> • Public Participation by Decidim • Red.es: One of the pioneering public entities in Spain in the promotion and implementation of the SC concept, working with the Spain Smart City Network (RECI) and the Spanish Federation of Municipalities and Provinces (FEMP) to promote SC development. • Diverse participation from industry, government, and academia 	The city is actively introducing online citizen participation meetings in conjunction with the release of Decidim, in order to encourage broad citizen participation and realize a society with citizen participation. The content of the discussions includes matters related to the daily lives of citizens, such as the use of public space and public budgets, and the collected opinions of citizens are reflected in the city government, including the SC’s initiatives.
Copenhagen, Denmark	<ul style="list-style-type: none"> • Gate 21: Membership organization of municipalities, companies, academic and research institutions, etc. • Business Clusters 	Denmark has national clusters composed of companies, research institutes, public institutions, end-users, etc. to create development and innovation and accelerate growth and value creation. It is the driving force behind the adaptation of corporate products to sustainable solutions and new technologies, and contributes to the SC development.
Helsinki, Finland	<ul style="list-style-type: none"> • Folum Virium Helsinki (FVH): Central role in bridging and coordinating industry, government, academia, and private sector entities • Helsinki Partners • Smart & Clean Foundation • Jätkäsaari Mobility Lab • Business Finland • VTT Technical Research Center of Finland 	Helsinki City is aiming for a user-oriented SC, and is promoting the participation of users and citizens in the conception, planning, implementation, and evaluation phases of pilot projects, aiming to improve the quality of technology and services through Open Innovation. The city aims to realize SC through industry-government-private-academia collaboration, involving the various organizations listed on the left, as well as a framework for citizen participation.
Amsterdam, Netherlands	<p>With the policy support of the City of Amsterdam, the following organizations will lead the effort</p> <ul style="list-style-type: none"> • Amsterdam Smart City (ASC) • City Innovation Exchange Lab 	The ASC’s mission is to work for a smart, green, and healthy future, utilizing information and technology to improve the quality of life for citizens. Currently, the ASC has shifted its focus

Country / City	Player	Notable roles and effects
	(CITIXL) • Amsterdam Economic Board (AEB)	to a facilitator role, with 22 permanent members paying annual membership dues and being granted decision-making and other rights related to its operations.
Chicago, United States	The City of Chicago's Department of Innovation and Technology will take the lead in promoting the initiative, with the following partnership organizations playing various roles: • City Tech Collaborative • World Business Chicago • City Digital • University of Chicago • Northwestern University, and others	The city has positioned the promotion of ICT infrastructure as one of its policies, and is promoting the installation of a Broadband Network and the introduction of Free Wi-Fi throughout the city. In addition, the city has created an environment that enables the development of various applications based on the use of Open Data. A system of initiatives here has been established to promote the utilization of knowledge and technology from various industries, government, and academia.
Oslo, Norway	• Design and Architecture Norway (DOGA) • Nordic Edge Smart City Innovation Cluster • Norwegian Smart City Network	Oslo's SC efforts are based on the roadmap, and the city's environmental and climate work is led by the Department of Environment and Transportation (Climate Bureau, Waste Management Bureau, and Urban Environment Bureau). The city of Oslo has 15 boroughs that implement environmental work at the local level each with its own initiatives.
Germany	Federal, state, and local governments and their respective relevant departments work together.	City administrations are usually divided into departments responsible for different aspects of urban management (e.g., transportation, environment, public services), and these departments often collaborate on SC initiatives.
London, United Kingdom	• Smart London Board • Department for Energy Security and Net Zero (DESNZ) • Department for Environment and Rural Affairs (Defra) • Promoting SC initiatives in collaboration with the Smart Cities Council, an international consultative body.	The Smart London Board is the highest advisory body to the Mayor of London and consists of academics, business representatives, infrastructure providers, and ICT and energy companies. It will develop strategies for the application of smart technologies and assist in implementation.
Milan, Italy	In Italy, many government agencies, private companies, and research institutes promote cooperative and collaborative efforts. • Ministry of Economic Development, (Digital Transformation Department) • Ministry of Economic Development • Ministry of Ecological Transition • Ministry of Infrastructure and Sustainable Mobility • Smart City Association	The SC initiative is being promoted with the involvement of various government agencies, and GREEN (Research Center for Science, Resources, Environment, Energy, and Networks) is involved as an organization that monitors policy and institutional issues. In addition, various government research institutes and external organizations are also involved.

Country / City	Player	Notable roles and effects
Zurich, Switzerland	In the Swiss approach, government agencies, private companies, and research institutes cooperate and collaborate to promote the initiative. <ul style="list-style-type: none"> • Swiss Smart City • eSmart Switzerland • Innosuisse • ICT Switzerland 	In addition to the SC entities listed on the left, the Federal Office of Spatial Department (ARE), Swiss Federal Railways (SBB), local governments, universities, and research institutes are also participating in this comprehensive effort.

Source: Survey Team based on data collected from each country and “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022 (SC = Smart City)

4.5. Public-Private Partnership in Smart City Realization

Table 4-8 shows the status of public-private partnership and sector sharing in efforts to realize smart cities as confirmed through the case study.

Table 4-8: Public-Private Partnerships in Precedent Cases

Country / City	Public Private Partnership Program and others
Malaysia	As a basic policy for SC promotion, the main implementing body for SC promotion is positioned as the local government with jurisdiction over urban management, which is responsible for budget management and implementation of SC promotion measures. On the other hand, since local governments' resources are insufficient for the development of telecommunication infrastructure facilities and the introduction of IoT technologies, that form the basis of SC development, they are promoting collaboration with the private sector, including telecommunication infrastructure development companies. The Malaysia Smart Cities Alliance (MSCA), a platform for industry, government, and academia, has been established to strengthen networking among related parties.
Phuket, Thailand	Phuket City Development Co., Ltd. (PCKD), a company established by private companies and organizations operating in Phuket, is the main private sector partner in the SC development, and is involved not only in the development and introduction of IoT products and application development but also in the SC planning stage by the municipal government.
Indonesia	In Indonesia, with the exception of some SC initiatives in Jakarta, most initiatives are still being planned and implemented by the regional governments. On the other hand, there is a growing trend toward greater involvement of citizens in these efforts. The Quick-Win Program involves the private sector in the screening process, and it is expected that more accurate evaluation of private sector proposals will be made in the future. In Jakarta, the provincial government is promoting SC policy while outsourcing the introduction of IoT devices and application development to private companies.
Manila, Philippine	In Metro Manila, the SC development plan is formulated mainly by the Metropolitan Manila Development Authority, and the LGUs monitors the provision of SC services. The actual service development, implementation, operation and maintenance are outsourced to private companies. In addition to the private sector, the University of the Philippines, a research institute, participates in the analysis of the benefits associated with the implementation of services, promoting development by industry, government, academia, and the private sector.
Ho Chi Minh, Vietnam	The Ho Chi Minh City Information Security Center Joint Stock Company is the entity that maintains and manages the Information Security Center, a function of the Shared Data Center, a data integration infrastructure. The company is 75% owned

Country / City	Public Private Partnership Program and others
	by Saigon Industrial Corporation, a private company, and utilizes the financial resources of the private company as well as technical resources.
Phnom Penh, Cambodia	In the Green Field development project (Creatanium Blockchain Smart City) located in the agricultural and industrial SEZ being promoted by the Chinese and Cambodian governments as part of the “One Belt, One Road” initiative, Singapore startup PLMP Fintech and its affiliate Creatanium Development are implementing the project and are attracting foreign capital to promote the SC.
Bangladesh	In some cases, such as smart and digitalization projects in industrial parks, the private sector is promoting efforts together with the Bangladesh Special Economic Zone Authority based on development investments in the SEZs.
Barcelona, Spain	The mission of the Instituto Municipal de Informática de Barcelona (Barcelona Information Bureau: IMI) is to provide comprehensive and concrete ICT solutions to all government agencies involved in municipal administration, to provide advisory services to government agencies and citizens with priority given to the public interest and to market and network using ICT. IMI plays a leading role in the conception and specification of digital technologies and services, and is responsible for monitoring and managing services. On the other hand, IMI actively utilizes outsourcing to the private sector for the development and implementation of actual services.
Copenhagen, Denmark	In Denmark, policies are being promoted based on a human-centered approach, in which citizens play a leading role, and in SC development, while the national government sets the policy, industry-academia-government collaboration or industry-academia-government-private collaboration is the basis for social implementation, with industry, academia, and the public each taking the initiative and participating in the process. In order to work on technological innovation such as SC, organizations have been established at the national and city levels as a foundation for participation by industry, academia, government and the private sector.
Helsinki, Finland	Forum Virium Helsinki, a non-profit corporation that promotes digital services and innovation and is positioned as the Innovation Unit of the City of Helsinki, plays a central role in coordinating industry, government, academia, and private entities. Other key players in the collaboration include Helsinki Partners, Smart & Clean Foundation, and Uusimaa Regional Council.
Amsterdam, Netherlands	In Amsterdam, the private sector (companies and organizations), research institutions, and citizens are working together to promote programs and individual projects under the city’s policy support. Universities, community organizations, incubators, and others are also participating in the project, planning, designing, testing, and demonstrating through the Living Lab, and sharing the results.
Chicago, United States	In the City of Chicago’s SC initiative, the Department of Innovation and Technology (DoIT) is playing a central role in promoting the project across the city’s administrative departments. A framework has been established in which projects are promoted with various inputs and technical assistance from private organizations, partnerships, and other organizations. In particular, the City Tech Collaborative is a consortium of partners, including private companies, local governments, start-ups, civic organizations, research institutions, and community organizations, which combines the tools and ideas provided by the partners to promote the development of urban solutions through technology.
Oslo, Norway	In the SC initiative in Norway, the Ministry of Climate and Environment, the Norwegian Digitalization Agency, and the Norwegian Public Roads Administration are playing a central role, while DOGA (Design and Architecture Norway), the Norwegian Smart City Network, the Nordic Edge Smart City Innovation Cluster, and other organizations are collaborating to develop the roadmap and to promote its

Country / City	Public Private Partnership Program and others
	operation. A cooperative framework has been established.
Berlin, Germany	In SC efforts, government agencies at various levels, including federal, state, and local governments, often work together with private sector partners and research institutions.
London, United Kingdom	The Smart London Board helps the city authorities develop and implement strategies on how to apply technology to all areas of urban policy (transport, energy, social, and infrastructure). It also continues to work with Scotland, Wales, and Northern Ireland.
Milan, Italy	The Ministry of Economic Development is the center of SC promotion at the government level, with the Ministry of Ecological Transition, the Ministry of Infrastructure and Sustainable Mobility, and the Smart City Association playing a central role in the initiatives, and the Smart City Association will play a central role. In addition, the private sector is working in collaboration with various organizations, including the Smart City Observatory, TIM Group, Smart City Italy, and Istituto Superiore Mario Boella (ISMB).
Zurich, Switzerland	Government agencies, private companies, and research institutes cooperate and promote coordinated initiatives, and organizations and associations are involved and play an important role in SC development and individual projects. There are many organizations working on SC development at the government level, and they are collaborating with private organizations and other groups that are involved in city-level initiatives (e.g., Zurich University of Applied Science (ZHAW), Smart City Zurich, and Private Sector Partners)

Source: Survey Team based on data collected from each country and “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022 (SC = Smart City)

4.6. Differences in the Driving Organizations for Smart City Initiatives

Table 4-9 shows the entities and their roles in promoting smart city initiatives identified in the case study.

Table 4-9: Entities Promoting Smart City Initiatives and their Main Roles

Country / City	Smart City Promoting Entity	Roles
Kuala Lumpur, Malaysia	DBKL Smart City Unit	It is planned in MALAYSIA SMART CITY FRAMEWORK (2018) to organize DBKL Smart City Unit as an implementing body for SC promotion. DBKL Smart City Unit is mainly responsible for progress management of SC promotion activities and public relations activities.
Phuket, Thailand	Digital Economy Promotion Agency of Thailand (DEPA)	DEPA is the flagship of Thailand’s SC policy and evaluates each city’s SC; in Phuket City, DEPA developed the SC Plan Smart Phuket (2017) together with the city.
	Software Industry Promotion Agency of Thailand (SIPA)	Support the development of digital human resources to promote digitalization.
	National Science and Technology Development Agency (NSTDA)	Support the provision of IoT equipment (CCTV system, traffic management system) implemented in the SC of Phuket.
	Phuket City Development Co., Ltd.	Develop and implement IoT devices, develop applications as well as work with the government to develop SC plans.

Country / City	Smart City Promoting Entity	Roles
Jakarta, Indonesia	Communication, Information and Statistics Department, DKI Jakarta	As part of Jakarta City 4.0 initiative, Jakarta Smart City aims to solve Jakarta's urban issues and to develop Jakarta into a productive, comfortable, safe, sustainable, and globally competitive city.
Manila, Philippine	Metro Manila Development Authority (MMDA)	Responsible for development planning, monitoring of LGUs responsible for SC service delivery, and overseeing SC development.
	Local Government Units (LGUs) in Metro Manila	They proactively promote SCs to solve common urban issues in each LGU, and plays a role in providing cross-disciplinary and cross-regional services.
Ho Chi Minh, Vietnam	Ho Chi Minh City Information Security Center Joint Stock Company	Maintain and operate one function of the shared Data Center being promoted in SC Phase 1 in Ho Chi Minh City.
Laos	Ministry of Technology and Communication E-Government Center	Responsible for the centralized management of government IT services and the management and development of service software. The E-Government Center also manages services for businesses and citizens, and promotes training for administrative services.
Phnom Penh, Cambodia	PLMP Fintech Creatanium Development	Singapore startup PLMP Fintech and its subsidiary company Creatanium Development are providing comprehensive support for SC development using blockchain technology in Phnom Penh, not only providing technology but also financial support.
New Delhi, India	New Delhi City Council Smart City Ltd.	New Delhi has established a special purpose company, New Delhi Municipal Council Smart City Limited, as the implementing entity for the SC development. The said organization is funded by New Delhi's local government and broadly oversees the operation of the SC development.
Bangladesh	a2i (Aspire to Innovate)	An organization established to make public services comprehensive, affordable, reliable, and accessible, and also serves as the driving body for SC development.
Barcelona, Spain	Instituto Municipal de Informática de Barcelona (Barcelona Information Bureau: IMI)	The central organization of Barcelona's SC ecosystem. It is a public benefit corporation under the jurisdiction of the Barcelona City Hall with an independent legal entity, its own assets and budget, and is responsible for the development, provision and management of cross-sectoral digital solutions for various departments and public benefit companies.

Country / City	Smart City Promoting Entity	Roles
	<p>BCN Ecologia Urbana (Barcelona Urban Ecology Agency)</p> <p>Note: Currently transferred to Regional Agencia de Desenvolupament Urba (Regional Urban Development Agency)</p>	<p>A public benefit corporation under the jurisdiction of Barcelona City Hall, the Metropolitan Region and the Council, with its own assets and budget. It is responsible for the simulation, planning, and implementation of urban policies. Through digitalization, it systematically captures diverse fields such as mobility, energy, urban planning, and multiculturalism, and makes policy proposals for the creation of sustainable cities.</p>
Copenhagen, Denmark	<p>Copenhagen Solutions Laboratory (CSL)</p> <p>Gate 21</p>	<p>Established in 2014, it is an incubator for SC concepts, an organization that develops and coordinates citywide SC developments and serves as a hub for industry-government-academia collaboration. It identifies SC needs in each sector of the municipality and matches them with existing knowledge and technologies in order to propose new ideas, technologies, and solutions to urban challenges.</p> <p>A non-profit organization established to bring together municipalities, businesses, academia, and research institutions to develop, demonstrate, and promote energy and resource efficient solutions that promote the Green Transition and Green Economy. 38 municipalities and 90 businesses and research institutions are members (as of 2018). Denmark's largest Green Transition and Green Economy promotion body, which also participates in SC initiatives.</p>
Helsinki, Finland	<p>Helsinki City Economic Development Division</p> <p>Forum Virium Helsinki (FVH)</p>	<p>It has jurisdiction over efforts related to the 6Aika Strategy, a strategy at the national level in Finland.</p> <p>In Helsinki's SC efforts, FVH plays a central role in bridging and coordinating the various actors in industry, government, academia, and the private sector.</p>
Amsterdam, Netherlands	Amsterdam Smart City (ASC)	<p>Established in 2009 as a partnership between Amsterdam Innovation Motor (AIM), a foundation working to promote the knowledge industry in Amsterdam, Liander, a power transmission company and the city, and currently focuses on the role of facilitator and is a model for innovation. As of October 2021, there were 22 permanent members, 652 organizations, and approximately 8,800 individuals registered. Permanent members pay an annual membership fee and are granted decision-making and other rights related to the operation of the ASC.</p>

Country / City	Smart City Promoting Entity	Roles
Chicago, United States	Chicago DOIT (Department of Innovation and Technology) Citi Tech Collaborative (CTC)	It formed the City of Chicago's technology leadership with a Chief Technology Officer (CTO), Chief Information Officer (CIO), and Chief Data Officer (CDO) to oversee the City's Open Data Portal, Advanced Analytics. The City's Open Data Portal, Advanced Analytics Team, and Information and Business Intelligence Team were overseen to form a structure to lead the city's strategic use of data. Cross-sector leadership has provided the resources necessary for the City of Chicago's digital transformation, benefiting its citizens and paving the way for the city's digital transformation by developing digital infrastructure investments, programs and applications.
Oslo, Norway	Norwegian Smart City Network	Leading the Roadmap-based SC effort together with organizations such as the Ministry of Local Government and Modernization (KMD), the Ministry of Climate and Environment (KLD), the Norwegian Local Government Association, the Public Management and e-Government Authority, Innovation Norway, and the Research Council of Norway.
	Norwegian Digitalization Agency (Digdir)	Digdir's role includes contributing to the formulation and implementation of government ICT policies and setting the agenda for digitization and comprehensive information management. It also has the specific responsibility of promoting innovation in the public sector and facilitating effective cooperation among stakeholders in this area. This includes participation in international projects.
Berlin, Germany	Federal Government	In SC initiatives, various levels of government, such as federal, state, and local, work together with private sector partners and research institutions.
London, United Kingdom	Department for Energy Security and Net Zero (DESNZ) Department for Environment and Rural Affairs (Defra)	The government has various policies aimed at reducing greenhouse gas emissions, and SC efforts are closely related to these policies. Based on the government's main climate change policy, the Net Zero Strategy (Build Back Greener: updated in April 2022), and the government's 10-point plan for a green industrial revolution announced on November 18, 2020. Hence, the government agencies listed on the left are heavily involved in SC development.

Country / City	Smart City Promoting Entity	Roles
Milan, Italy	Digital Transformation Department (Ministry of Economic Development)	In SC development, the Ministry of Economic Development, through its Digital Transformation Department, plays an important role in promoting digital innovation and smart city initiatives. In addition, individual municipalities and regions often have their own initiatives and strategies for SC development.
Zurich, Switzerland	Swiss Smart City	An organization that promotes collaboration among cities, industry, academia, and other interested parties to advance SC initiatives.
	eSmart Switzerland	Focuses on implementation and promotion of smart technologies to enhance sustainability, efficiency, and quality of life in cities.
	Innosuisse (Swiss Innovation Agency)	Supports and funds innovation projects, including SC development.

Source: Survey Team based on data collected from each country and “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022 (SC = Smart City)

4.7. Organizational Bodies (councils) in realizing Smart Cities, Framework for Consensus Building and Public Participation

The framework of organizational bodies (councils), consensus building, and resident participation in efforts to realize smart cities, as identified in the case study, is summarized in Table 4-10.

Table 4-10: Organizational Bodies (councils) for Smart City Initiatives, Framework for Consensus Building and Public Participation

Country / City	Organizational Body (Councils)	Framework for Consensus Building and Public Participation
Malaysia	Malaysia Smart Cities Alliance (MSCA)	It was established as a national-level SC Platform involving industry, government, and academia to study SC development concepts and plans, and to strengthen networking among related parties.
Bangkok, Thailand	Smart City Committee	A cross-sectoral government organization chaired by the Deputy Minister of Transportation to promote and manage SC initiatives in each city
	Private companies and educational institutions, such as Chulalongkorn University and major real estate companies	There is a framework for studying and planning, mainly through State Railway of Thailand (SRT), to promote consensus building among existing residents and neighborhood residents in the Bang Sue area, Bangkok, and their participation in the urban formation and development process.
Jakarta, Indonesian	Jaki: Data Portal	Through the data portal (jaki), citizens can access data managed by the public administration. Conversely, citizens provide data to the administration, and the information provided is analyzed and used for

Country / City	Organizational Body (Councils)	Framework for Consensus Building and Public Participation
		policy and application development, thereby achieving indirect citizen participation.
Ho Chi Minh, Vietnam	Shared Data Center	Through the Shared Data Center, Ho Chi Minh City encourages citizens and businesses to share government-controlled data and participate in the monitoring and management of government and social activities.
Chennai, India	Chennai Smart City Ltd. (CSCL)	It is a special project organization jointly owned by the Tamil Nadu State Government and the Chennai Corporation, the implementing agency for the Chennai SC project, and functions as a forum connecting citizens and the government using an information communication platform to enhance the efficiency of citizen participation.
Bangladesh	Smart City Innovation Hub	It is a mechanism to bring together people who contribute to the development of Bangladesh's SC (urban decision makers, young professionals promoting SC, NGOs, etc.), share case studies of various initiatives, and connect people with each other.
Barcelona, Spain	<ul style="list-style-type: none"> • Instituto Municipal de Informàtica de Barcelona (IMI) • Decidim (Public participation platform) 	IMI plays a central role in consensus building for policies and plans, etc., and bottom-up SC initiatives based on citizen participation using Decidim have been promoted.
Copenhagen, Denmark	Copenhagen Solutions Laboratory (CSL)	In the process of building consensus on policies and plans, CSL takes the initiative in establishing a "living laboratory" as a base for co-creation and activities by the government, companies, and citizens, and in building a system for sharing experience and know-how from precedents and other sources to promote citizen participation.
Helsinki, Finland	Forum Virium Helsinki	A non-profit corporation that promotes digital services and innovation and is positioned as an Innovation Unit, plays a central role in bridging and coordinating between industry, government, academia, and private sector entities.
	Open Participation and Customership	Promote innovation, create new services and improve public services by building open and accessible channels and systems in cooperation with users and consumers, and conduct demonstrations and social experiments of new technologies, create standards for full-scale implementation, horizontal deployment, and shared knowledge and best practices.

Country / City	Organizational Body (Councils)	Framework for Consensus Building and Public Participation
Amsterdam, Netherlands	Amsterdam Smart City (ASC)	Under the policy support of the city, ASC is promoting programs and various individual projects in collaboration with various entities, including the private sector, research institutions, and citizens. The Open Platform promotes collaboration among organizations in various fields and at various levels, and aims to share ideas and resources on a peer-to-peer basis to solve problems and promote the co-creation of new value.
Chicago, United States	City Tech Collaborative, World Business Chicago (Nonprofit partnership organization)	City Tech is a consortium of members that combines and collaborates on tools and ideas provided by partners, such as private companies, municipalities, start-ups, civic organizations, research institutions, and community organizations. This organization also works with various organizations to strengthen the framework for community participation.
Berlin, Germany	Internal organizations such as federal, state, and local governments	The Smart City Dialog and Smart City Charter are run by federal ministries, but have the support of a wide range of organizations from politics, administration, business, research, and civil society. The Platform has established guidelines for SC development in Germany and also promotes consensus building and a strengthened framework for citizen participation.
London, United Kingdom	Smart London Board and municipal government	The Smart City Roadmap ensures to have mechanisms to incorporate the city's flexible approaches and ideas from citizens, civil society, the technical community, and those engaged in public service, and will also lead the promotion of citizen participation and consensus building for the initiatives.
Milan, Italy	Ministry of Economic Development (Digital Transformation Department), Milan municipal government	The city of Milan has developed a sustainable city plan together with the SC initiative, which includes a mechanism for public agencies, transportation companies, and civil society to participate in decision-making and consensus building through community participation.
Zurich, Switzerland	Smart City Zurich, Zurich municipality	In Switzerland, various organizations from government to municipalities are participating in the SC initiative, and citizens and the private sector are also being encouraged to participate. In Zurich, in particular, the city administration is effectively using inter-organizational cooperation and other measures to strongly promote SC initiatives.

Source: Survey Team based on data collected from each country and "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022 (SC = Smart City)

4.8. Institutional Systems as well as Necessary Actions for Smart City Initiatives

Table 4-11 shows the institutional systems related to smart city initiatives, as well as measures required for such initiatives, as identified in the case study.

Table 4-11: Institutional Systems related to Smart City Initiatives, and Necessary Actions

Country / City	Related Institutional Systems and Necessary Actions for Smart City Initiatives
Malaysia	MALAYSIA SMART CITY FRAMEWORK (Malaysia Smart City Promotion Plan) has been formulated, which outlines 16 policies, 36 strategies, 112 measures, and 92 indicators to improve urban living, correct regional disparities, strengthen competitiveness, and achieve the SDGs and other goals through the promotion of SC development.
Phuket, Thailand	Thailand has established Smart City Criteria and provides tax incentives, deregulation, and support from the central government to cities and projects that meet the criteria. Phuket has been certified as a city that meets the criteria for Smart City Criteria and is implementing information and digital infrastructure development at the expense of the central government.
Chonburi, Thailand	For SC development in the Eastern Economic Corridor (EEC), which is a coastal area including Chonburi Province, tax incentives and deregulation systems are applied based on the EEC Law. <ul style="list-style-type: none"> • Corporate income tax exemptions and incentives • Preferential tariff treatment • Deregulation of land ownership • Deregulation measures related to entry and stay visas EECO (EEC Secretariat) is able to grant operating rights and concession rights for projects, and the promotion of projects is executed more quickly and smoothly than procedures based on conventional laws and regulations.
Indonesia	Under the Movement Towards Smart Cities, a program launched as part of the government's SC initiative, the Ministry of Communications and Information Technology has established a framework to dispatch experts and provide budgetary subsidies for the implementation of the SC Master Plan by each city. The plan is rigorously administered, with subsidies cut off if the plan does not meet standards after biannual assessments.
Vietnam	The Ministry of Information and Communications prepares regulations for the management of databases in rural areas and ICT technical standards and regulations applicable to SCs, and the legal and regulatory framework is developed and operated at the national level. Private sector involvement and investment is based on appropriate planning, and projects that are mutually beneficial for both government and business are encouraged.
Cambodia	The New Investment Law promulgated in 2021 establishes 18 preferential investment sectors (innovative high-tech industries and R&D, etc.) and has a framework for applying business income tax exemptions and other preferential measures for a certain period to investment activities in related sectors, and a system design is being considered for incorporation in SC development as well.
New Delhi, India	India has formulated the Smart City Mission (2015) as its SC plan, and in order to achieve this plan, it held a "Smart City Challenge" competition and select a total of 100 cities as SC promotion cities. New Delhi was selected as one of the cities and is receiving budgetary support from the Ministry of Urban Development (MoUD) and assistance in managing the progress of SC measures.

Country / City	Related Institutional Systems and Necessary Actions for Smart City Initiatives
Barcelona, Spain	<p>The industrial district of Poblenou has been designated as an Innovation District (22@Barcelona) to create new industries and implement new technologies in conjunction with redevelopment projects, while at the same time establishing a legal system that facilitates the introduction of methods to retrofit new technologies to existing infrastructure, such as Sentilo, which improves urban management efficiency, and Superblock, which makes smart use of existing urban space. The city of Barcelona has established a legal system that facilitates the introduction of methods to retrofit new technologies to existing infrastructure.</p> <p>As SC initiatives are implemented in collaboration with various actors, including the private sector, government, and citizens under the policies of the City of Barcelona, the legal system has been developed to be compatible with bottom-up SC initiatives, in which data held by the private sector is made open and data held by citizens is shared.</p>
Copenhagen, Denmark	<p>Cluster organizations have been established in each field, such as mobility, energy, and the built environment, and as the central organization of the SC ecosystem, they are designed to act as intermediaries between local governments, private companies, research institutions, and other stakeholders to provide matching, business development, financial support, and human resource mediation services.</p>
Amsterdam, Netherland	<p>The City of Amsterdam created the position of Chief Technology Officer (CTO) in 2014, and the Innovation Team led by the CTO works with businesses, research institutions, startups, social organizations, citizens and communities to quickly evaluate new initiatives, and to translate them into practical applications. A system has been established to promote collaboration among various fields and organizations at different levels of hierarchy on an open platform to facilitate problem solving and the co-creation of new value.</p>
Chicago, United States	<p>The SC Ecosystem is formed from a framework that supports the active activities of organizations that support urban innovation. In terms of business industry support, a plan has been formulated with the goal of developing Chicago into a world-class tech hub by 2033, and a support organization has been established to achieve this goal, establishing a framework for organizational management and collaboration for a wide range of SC initiatives.</p>
Berlin, Germany	<p>The following laws have been enacted and implemented in SC initiatives.</p> <ol style="list-style-type: none"> 1. Digitalization Law: This law was enacted to establish a legal framework for the development and implementation of SC technology, and to promote the development and implementation of technology based on this law in SC efforts in urban development. 2. Data Protection Act: This Act guarantees the protection and privacy of citizens' data in the SC initiative, including the General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG).
London, United Kingdom	<p>The Climate Change Act 2008 requires the UK government to legally reduce greenhouse gas emissions by 100% below 1990 levels by 2050, and the government has a range of policies aimed at reducing greenhouse gas emissions that contribute to climate change. The Net Zero Strategy (Build Back Greener), published in October 2021 (updated April 2022), sets out policies and measures to decarbonize all sectors of the UK economy in order to achieve the Net Zero goal. The strategy aligns with the Green Industrial Revolution 10-Point Plan published in November 2020.</p>
Milan, Italy	<p>Italian Digital Agenda: the main objective is to bring about a digital revolution in the country and to reverse years of slow national growth. In terms of institutional and inter-institutional cooperation among national, regional, and local agencies, it aims to promote and lead the broad diffusion of new technologies, the</p>

Country / City	Related Institutional Systems and Necessary Actions for Smart City Initiatives
	modernization of administrative management and services, and the creation of a digital single market for content and services, so that citizens, families, and businesses can access and use the potential of ICTs. The SC's initiatives also follow this.
Zurich, Switzerland	The Smart City Zurich strategy bundles the future needs of its citizens, promotes innovation, and positions the city as a place for SC implementation. It also guides SC efforts in conjunction with the "Zurich Strategy 2035" and a number of specific strategies. The strategy focuses on three main areas: (1) The future of integrated public mobility, (2) Digital cities, and (3) Smart participation. A number of Smart Projects are being implemented based on this strategy in these key areas.

Source: Survey Team based on data collected from each country and "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022 (SC = Smart City)

4.9. Lessons learnt from the Precedent Case Study

Among the precedents, we can identify notable efforts that led to the success of the smart city initiatives, as well as new problems that were faced during the course of initiatives and secondary issues that were challenged in order to solve them. Not only smart cities, but all development projects are affected by various conditions and factors, such as regional characteristics, history, culture, and social structure, and it is not certain that learning from the preceding cases will necessarily be effective for countries and cities that will be involved in smart city development. However, it is possible to assume that new problems, challenges, and innovations that have emerged in these precedents could also occur in the future activities of the country or city where the project is to be implemented, and to incorporate them into the preventive process of formulating countermeasures in advance. Therefore, the innovations and secondary problem-solving measures in these precedents are summarized in Table 4-12 as reference information (knowledge) for countries and organizations that will be involved in smart city development in the future.

Table 4-12: Innovations in Approaches and Solutions to Secondary Challenges in Preceding Cases

Country / City	Innovations in Approaches and Solutions to secondary challenges
Kuala Lumpur, Malaysia	It is noteworthy that Kuala Lumpur City is promoting SC development using IoT technology to solve urban issues, as well as building a data integration infrastructure and attempting to develop SC development across sectors. The SC development in Malaysia is planned to build a data integration infrastructure not only in the city of Kuala Lumpur, but also at the municipal and national levels, with plans to link data integration infrastructures vertically and horizontally. On the other hand, the format of the data managed by the integration of infrastructure differs for each organization and municipality, which is the entity in charge, and there is a need to unify the data format when integrating data.
Phuket, Thailand	Thailand has established Smart City Criteria and provides financial support for digital infrastructure development to cities like Phuket that have achieved the criteria. While progress is being made on the hardware side, there is insufficient progress on the software side, such as mechanisms and systems for integrated data collection and utilization for policy analysis and evaluation. Balanced development from both infrastructure and institutional framework.

Country / City	Innovations in Approaches and Solutions to secondary challenges
Jakarta, Indonesia	A data portal, jaki, has been developed to disclose data to the public and allow citizens to upload their own data to be reflected in the policy. The provincial government also encourages citizen participation through data disclosure, and is working to develop SCs through industry-government-private sector collaboration. On the other hand, the provincial government has not been able to dispel the sense of distrust among citizens regarding the way data is used, and one of its future challenges is to ensure transparency in data use.
Manila, Philippine	Although the SC development in Metro Manila is still in the demonstration stage, private companies and research institutes are participating in the project, and the industry-government-academia-industry collaboration is progressing. The E-Tricycle demonstration project in Quezon City is an advanced example of SC development in ASEAN in that a research institute participated in the project and was responsible for analyzing the degree of environmental impact reduction resulting from the introduction of the E-Tricycle, and even quantitatively measuring the effects of SC development. In addition, PPP and donor funds (JICA, etc.) are being utilized to secure the costs associated with the development.
Ho Chi Minh, Vietnam	Ho Chi Minh City has an urgent need to address the rapid urbanization and population influx and the resulting urban issues, and to improve public services and achieve greater efficiency in policy decision making. Priority was given to building a shared data center for urban and housing infrastructure, public investment management, and land management to analyze urban issues and use them for policy making. The data accumulated in the shared Data Center in Ho Chi Minh City is provided to the central ministries and agencies to solve urban issues in a bottom-up manner from the city to the national government.
Vientiane, Laos	The city government is encouraging private companies to participate in development projects through public-private partnerships, and has designated several areas in Vientiane as "Smart Zones" for ICT utilization. The targeted areas are to be developed as specific economic zones, with the aim of creating special zones with high business entry advantages for not only domestic private companies but also foreign companies through tax exemptions, relaxed procedures, etc.
Phnom Penh, Cambodia	Phnom Penh is implementing SC development using blockchain technology, including support for SMEs. The project aims to promote information and resource sharing among public and private stakeholders by utilizing data transparency through blockchain technology, and to promote collaboration in development and maintenance and area management. In order to achieve its objectives, Phnom Penh is actively attracting not only domestic private companies but also private companies with foreign capital and incorporating technical and financial support.
New Delhi, India	New Delhi's SC, which focuses on mobility, logistics, housing, environment, and worker assistance, has established a special purpose company as the driving entity. The central government, New Delhi municipalities, and the private sector are then involved at all levels in monitoring consistency with central government policy, project operation and maintenance, and technology implementation. The institutional design also incorporates measures aimed at ensuring transparency so that all stakeholders and citizens can effectively participate in key decision-making processes.
Bangladesh	Bangladesh has introduced a program to improve the convenience of public services and to establish a citizen-centered innovation culture in government, and as part of this program, the Smart City Innovation Hub is being held. The Innovation Hub is designed to create the groundwork to enable a wide range of resources to be utilized through the sharing of leading examples of SC development, networking of human resources and the matching of private sector technologies and services.

Country / City	Innovations in Approaches and Solutions to secondary challenges
Barcelona, Spain	Barcelona is a thriving center of the IoT industry, where the city has achieved significant cost savings and improved quality of life through the implementation of advanced technologies. However, new challenges have emerged, such as security loopholes, energy consumption, and lack of standardization. It is critical that the city continues to address these challenges in order to maximize the potential of SC and create a future where technology and urban living are in harmony.
Helsinki, Finland	<p>The Kalasatama area is a test bed in Helsinki, where a Smart Grid is in place and AI is used to forecast electricity loads, enabling peak shaving and peak shifting through demand response. A 3D model (Digital Twin) has been constructed and released as open data, which is expected to be utilized as a platform for information sharing and communication with residents, in addition to the development of services using the model and the implementation of simulations and hydraulic analysis. The release of Digital Twin is expected to be used as a platform for information sharing and communication with residents.</p> <p>The Jätkäsaari Mobility Lab's SC project provides the Jätkäsaari district as a test bed for smart mobility technology demonstrations and pilot projects, and supports tech companies and start-ups in scaling up their operations. The district provides an environment where pilot and demonstration projects can be conducted with the participation of actual users and residents, providing opportunities for local residents to participate and promoting their understanding of SC.</p>
Amsterdam, Netherlands	The city of Amsterdam is conducting a demonstration experiment of a system that assesses the risk of rising water levels and issues warnings by using sensors, simulation models, and AI BIGDATA analysis technology. In the Rainproof project, rainwater is stored on rooftops and underground instead of being directly discharged, and is used for gardening and other purposes. These efforts have realized advanced watershed management including water storage and drainage by remote control using IoT.
Chicago, United States	<p>The City of Chicago conducted the Smart Lighting Program in collaboration with Pacific Northwest National Laboratory and received U.S. federal funds to implement this project.</p> <p>The city installed new streetlights in 275 blocks, replacing them with LEDs and simultaneously installing a management system with Wi-Fi lighting control and remote monitoring. The project also optimized wiring and work procedures through the use of GIS and various automations, eliminated paper forms, reduced outage times, and significantly improved reliability and maintenance service levels.</p>
Oslo, Norway	More than 75% of Norway's municipalities cited difficulty in devoting resources to development efforts as a barrier to developing digital services in 2021, and as in 2020, this is the most common challenge facing municipalities and a challenge that needs to be addressed. The second barrier is a lack of skills within the participating companies, followed by higher-than-expected implementation costs.
Berlin, Germany	SC progress in Germany has faced the challenge of widespread public opposition due to concerns about the collection and use of personal data. Although the European General Data Protection Regulation (GDPR) sets strict standards for the handling of personal data, the German public is skeptical about the privacy-related security of the Smart City Application. A challenge is to balance the benefits of providing information to citizens with the potential risks of misuse of personal data.
London, United Kingdom	The government's Net Zero Strategy includes academics, business representatives, infrastructure providers, and ICT and energy companies, and the London City government has developed a strategy for how to apply technology to transportation, energy, social, and infrastructure in urban policy, and the SC initiative is being developed within this framework.

Country / City	Innovations in Approaches and Solutions to secondary challenges
Milan, Italy	<p>The City of Milan has developed a sustainable urban plan to reduce traffic in the city center and provide space for pedestrians and shared mobility. The initiative targets the city's high rate of private car ownership and aims to improve local air quality. The plan, which involves public agencies, transportation companies, and citizens in decision-making, features a new service delivery model and a number of interrelated elements. These include mobility sharing, congestion pricing, and pedestrian zones.</p> <p>Numerous experiments have been initiated, but the integration of projects is still insufficient and some do not have a clear regional development strategy; obstacles to the development of SC projects have emerged as the lack of sufficient budget and implementation capacity, and the existence of unclear governance models. To solve these problems, a shared national strategy is needed, and the challenges of establishing commitments and priorities for municipalities, avoiding centralization, and promoting future SC projects have been identified.</p>
Zurich, Switzerland	<p>The City of Zurich has adopted a unique collaborative governance model that includes public-private partnerships and citizen engagement. It has also implemented a Smart City Lab to test and develop new solutions and technologies in collaboration with stakeholders. In terms of environmental conservation, the city has introduced a management system for more than 500 parks, which account for more than 50% of the total green space, and a comprehensive waste management system to reduce waste emissions and improve recycling rates. The city continues to collaborate with ETH (Swiss Federal Institute of Technology) Zurich, the Swiss Federal Institute of Technology, and the University of Applied Sciences Zurich in order to realize various SCs.</p>

Source: Survey Team based on data collected from each country and "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022 (SC = Smart City)

Chapter 5 Roadmap and Phased Approach for Realization of Smart City Approach in Sub-Saharan Africa

This chapter discusses the roadmap for implementing smart city development in the target cities in sub-Saharan Africa and the approach to implementing smart city development to ensure that development is implemented effectively and efficiently and that cities and their citizens benefit from the anticipated development effects and benefits, and examines a possible multi-phased approach.

In considering and setting approaches, cities in the target region will be at first comprehensively examined of the current status of urban development, the historical origins and current roles of the city and its region, as presented in the previous chapters, and the cities will be classified into attributes (types). Furthermore, based on the progress (maturity) of smart city development and urban development issues, a number of smart city development directions will be organized as approaches, and a system will be established to classify cities and select approaches according to the situation. There is a need to set up a new approach that matches the target region, based on the framework shown in the “JICA SMART CITY APPROACH” compiled by JICA, and taking into account the regional characteristics and development status of the sub-Saharan Africa region. Furthermore, by setting up a roadmap for optimal development implementation based on an approach that matches the development status of each city, a framework will be established that will enable each city to more effectively engage in smart city development. At the same time, while various possibilities can be envisioned in the setting of players and implementing entities, it is necessary to devise ways to ensure that the hurdles to implementation do not become too high for any of the approaches. It is also important to consider the possibility of development assistance by the Japanese government and its implementation, as well as smart city development as a measure to maximize its effectiveness. The study, which also takes these perspectives into account, is discussed in detail hereafter.

5.1. Attributes of Sub-Saharan African Cities and Directions for Smart Cities

(1) Characteristics of Cities in Sub-Saharan Africa and Classification of Urban Issues

In order for cities in the target region to promote smart city development projects in the future, it is first necessary to understand the attributes of each city. There is no clear demarcation or classification of the attributes of cities, nor is there a firm division of urban growth stages, as these stages are not like a staircase, but rather a gradual transition. On the other hand, as analyzing cities⁵ based on their historical background and the process of their emergence and growth, a certain degree of patterns can be recognized. As indicated in Chapter 2 of this report, the African continent including the target region has a historical background that is very different from that of other continents. Looking at several cities in each country with this in mind, it is possible to understand that there are several gradual characteristics in the emergence and growth of African cities (see Table 5-1). Bearing in mind that there are examples of smart city development being

⁵ A quick desktop analysis of urban history and conditions was conducted for the top three cities of target countries in terms of population size.

established as a development project for a limited number of districts or lands, other than as a unit of local government, a classification of “specific areas” could be set as well.

The classification is made with the following condition. ASEAN countries, which were the main target of the “Global SC Survey,” have many differences from Sub-Saharan Africa, including historical backgrounds, although they are also developing countries. In this survey, cities are not classified by size (population, population density, area, etc.), but by their functions and roles.

Table 5-1: Characteristics of Cities in the Target Region

City Classification	Basis of Classification
Economic and Commercial Center City	Many cities have historically played a central role in the nation’s economy and commerce (business) as a result of the growth of cities that played a central role in resource production and agro-production. As a result of new industries (manufacturing and services), these cities have emerged there. In some cases, they became the center for European immigration, and in some cities, they became the center of political functions. Many often grew to become the largest city or capital of the country. A city has grown when multiple functions for urban growth existed, such as a center of production or a transition for logistics.
Logistics and Transportation Center City	In the history of Africa, many regions were developed by European immigrants for the purpose of exporting existing resources (mineral resources, cash crops, etc.). Some trading ports were also established as hubs for slave exports. Many are port cities that grew up in coastal areas along oceans, lakes, and rivers. Even inland, cities have grown as logistics relay centers when commerce and other activities with neighboring countries have expanded. Large-scale port facilities, railroad stations, and crossroad points with international road networks are often key factors in the growth of these cities.
Production and Resource Center City	Cities were formed to consolidate products as the center cities in areas where mineral resources and high-value agricultural products (cash crops) were produced, which were exported by European countries. Some of these cities have also formed industries that process these resources and agricultural products as raw materials. These cities have not grown in terms of commerce and other industries, but have mostly played the role of aggregators and transporters of resources. Therefore, in many cases, there has been no large-scale population growth or urban growth, and the cities have taken on the role of regional cities.

Source: Survey Team

One of the differences between the Asian (especially ASEAN) countries analyzed in the “Global SC Survey,” to which this survey refers, and the regions covered by this survey is that, as mentioned above, there are differences in the historical background and related colonial policies, such as the British and French colonial policies, and the legal systems that emerged as a result of these policies. On the other hand, the resources produced in the areas where the colonial policies were based were important. In the African region, the major requirements for the formation of cities were the location of the area where resources could be obtained and the location of a coastal area (with a port) where they could be exported. In regions where resources are scarce, slaves were important export resource, and this historical background cannot be ignored. In resource-poor countries and regions, national and urban growth was generally slow. On the

other hand, in coastal port cities, the immature industrial structure related to the export of goods prevented the proper distribution of wealth and widened inequality became a problem.

In the ASEAN region, although some countries are blessed with underground resources, such as Indonesia and Brunei, the major difference from the sub-Saharan Africa region is that basically, industrialized regions have grown due to the heavy use of cheap labor in each country as a result of industrial transfers from the countries where economic growth progressed after World War II. Furthermore, unlike the growth of cities in Africa, where cities and regions have been assigned roles and have grown over the course of their long histories, many ASEAN countries are characterized by cities that have grown in population over time and established new roles as regional centers, rather than cities growing with roles and responsibilities in African region.

Next, in conjunction with the above three characteristics, each city will be examined using “urban maturity” as another indicator, which is used as a standard in the JICA SMART CITY APPROACH. Urban maturity is a criterion for determining the economic level of each city, which is divided into a certain level of economic level. However, since the evaluation is complicated by various factors, such as GDP level, population size, and industrial structure, a classification based on the level of GNI per capita in each country should be applied. The cities will be classified into “Stable Level,” “Progressing Level,” and “Emerging Level,” and each city will be assigned to one of these levels. As an evaluation of the expected growth of cities, countries with a GDP growth rate of 5% or higher will be included in the “Progressing Level” even if they are classified in the “Emerging Level” based on GNI per capita. The following table, based on desktop data collection, provides a rough idea of the levels and assigns some cities to each level for reference.

Table 5-2: Urban Maturity (approximate economic level)

Economic Level	Base Value (GNI per Capita of Country)	Countries categorized (provisional)
Stable Growth Level (Stable growth phase)	More than USD 4,466	Botswana, Guinea Equatorial, Gabon, Mauritius, Namibia, Seychelles, South Africa
Progressing Level (Growth and expansion phase)	USD 1,136~4,465 (Including GDP growth of 5% or higher)	Angola, Benin, Cameroon, Cape Verde, Democratic Republic of the Congo, Comoros, Republic of Congo, Côte d’Ivoire, Djibouti, Eritrea, Eswatini, Ethiopia, Ghana, Guinea, Kenya, Mauritania, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Tanzania, Togo, Zimbabwe
Emerging Level (Stage of growth expectations)	USD 1,135 and below	Burkina Faso, Burundi, Central African Republic, Chad, Gambia, Guinea Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Sierra Leone, Somalia, South Sudan, Sudan, Uganda, Zambia

Source: Analysis based on information collected in each country

Note: GNI categories adopted in the base values follow the WB’s classification of World Bank Group member countries by income level (FY2024).

These “urban characteristics” and “urban maturity” are used as the horizontal and vertical axes to form a matrix, and the matrix can be organized as shown in Figure 5-1. By systematizing the major urban

development issues in each country organized through desktop analysis by city classification and economic level (GNI-based), the city classification, maturity level, and urban development issues can be systematized. By indicating representative urban development issues based on the information of the example cities as well, it is possible to understand what issues are mainly faced by the cities that fit into the matrix of city types and income levels. Urban development in general, including smart cities in cities that are in the process of growing and have been developed to a certain degree (without considering quality level), is classified as “brownfield” development. On the other hand, if a district or area is not developed to a certain degree or has a low development density, it is classified as “greenfield” development. In case of aiming for growth in the tourism industry, etc., which is highly related to the utilization of natural resources, etc., these are also defined as greenfield development from the perspective of aiming for smart development based on coexistence with natural resources.

In comparative evaluation of urban growth, in addition to comparisons at the economic level, comparisons may also be made based on criteria, such as population size and rate of expansion in urban area. However, in many countries in the African region, cities have been developed in a disorderly manner to cope with population growth without sufficient urban planning. Many countries also show this in their urban development challenges, and it is difficult to say that such a development is designed to promote healthy urban growth. Accordingly, in the overwhelming majority of cases where the size of the population is large, it is the case that the urban population has grown in a situation where the migration of people cannot be controlled, and unregulated informal settlements (slums) have formed. Furthermore, urban area growth is often caused by weak planning and continued sprawl on the periphery of cities due to population inflows. Therefore, it is necessary to recognize that the comparison of the level of urban growth in many cities in the African region is difficult in terms of population size or urban area. Based on this perspective, it was decided to follow the process of the “Global SC Survey” in this study, which uses the level of economic growth as an evaluation indicator.

In cities that are growing based on development plans, such as Abuja in Nigeria, for example, it is possible to compare and verify current urban problems and their development plans, revise urban development plans to match the actual situation, and promote the demonstration of smart development.

Matrix of city classification, economic level and typical urban development issues		Urban Classification (Brownfield Development)			Specific Area (Greenfield Development)
		Economic & Commercial Center City	Logistics & Transportation Center City	Production & Resource Center City	District & Area
		Cities that play a central role in the economic and commercial activities of the target country	Cities that serve as logistics and transportation hubs in the target countries	Cities that play a central role in the resource-producing regions of the target countries	Tourism Historical
		Common Challenges ➤ Urban Environmental Improvement ➤ Infrastructure Enhancement ➤ Administrative service enhancement	Common Challenges ➤ Urban Environmental Improvement ➤ Infrastructure Enhancement ➤ Strengthening social services	Common Challenges ➤ Reduce of regional disparities ➤ Land management improvement	
Income Level High	Stable Growth Level (GNI / Capita: USD 4,466+)	Challenges ➤ Urbanization and housing supply improvement ➤ Traffic congestion improvement ➤ Water supply and sanitation improvement ➤ Government service enhancement ➤ Crime control Pretoria, Windhoek, etc.	Challenges ➤ Urbanization and housing supply improvement ➤ Traffic congestion improvement ➤ Transportation Infrastructure Enhancement ➤ Social service enhancement ➤ Crime control Cape Town, Port Louis, etc.	Challenges ➤ Reduction of regional disparities ➤ Employment creation/enlargement ➤ Control in population outflow ➤ Improvement of land management Bata, Franceville, etc.	Challenges ➤ Climate change action ➤ Reducing regional disparities ➤ Local Industry Promotion
	Progressing Level (GNI / Capita: USD 1,136+)	Challenges ➤ Population growth and slum countermeasures ➤ Living Environment Improvement ➤ Infrastructure Development ➤ Poverty alleviation ➤ Food Supply Abuja, Addis Ababa, Kigali, Nairobi, etc.	Challenges ➤ Population growth and slum countermeasures ➤ Living Environment Improvement ➤ Infrastructure Development ➤ Poverty alleviation ➤ Land Management Improvement Abidjan, Dakar, Lagos, etc.	Challenges ➤ Reduction of regional disparities ➤ Extension of agricultural production ➤ Improvement of land management Bouake, Dal es Salaam, Lubango, Mwanza, etc.	
	Emerging Level (GNI / Capita: Below USD 1,136)	Challenges ➤ Living Environment Improvement ➤ Slum countermeasures ➤ Water, electricity and waste management ➤ Governance Strengthening ➤ Poverty alleviation Khartoum, Lusaka, Maputo, etc.	Challenges ➤ Living Environment Improvement ➤ Slum countermeasures ➤ Basic Infrastructure Development ➤ Governance Strengthening ➤ Poverty alleviation Freetown, Kampala, Nampula, etc.	Challenges ➤ Reduction of regional disparities ➤ Poverty alleviation Bo, Juba, Kitwe, etc.	

Source: Survey Team

Note 1: "Urbanization" here indicates a situation in which population concentration is increasing, urban growth is rapid, and sprawl is progressing.

Note 2: Urban Challenges indicated in the figure are typologically summarized based on the issues and challenges listed in Table 2-6.

Figure 5-1: City Characteristics and Development Issues

(2) Direction of Smart City according to City Classification

Figure 5-1 can be applied to identify which characteristics each city has. It is important to indicate which development efforts and initiatives are most likely to be undertaken depending on where the target city is located in the matrix, and this will make the direction of smart city development for each city clearer.

Based on the integral analysis of city characteristics and urban development issues, the direction that should be aimed for smart city development in the target region can be organized as follows.

Groups by City Characteristics

➤ Economic and Commercial Center City

The goal is to create a smart city that can respond to the diverse needs of society by improving urban functions and the living environment, and revitalizing the lives of citizens and economic activities.

➤ Logistics and Transportation Center City / Production and Resource Center City

Through clarifying the role of cities, reducing regional disparities, and promoting further revitalization of local industries, a smart city that can respond to the individual needs of the region shall be pursued.

Groups by Economic Level

➤ Stable Growth

The goal is to provide infrastructure and urban services that contribute to stable urban growth and reduce negative environmental impact and inefficient activities in economic and social life.

➤ Progressing / Emerging

The goal is to improve the living environment of cities through planned urban development and to provide basic infrastructure and social services that contribute to the stabilization of social life.

Based on the above grouping framework and the four directional frameworks presented in the JICA SMART CITY APPROACH, and taking into account the regional characteristics of the Sub-Saharan Africa region and other factors, the smart city directions were set as shown in Table 5-3 below.

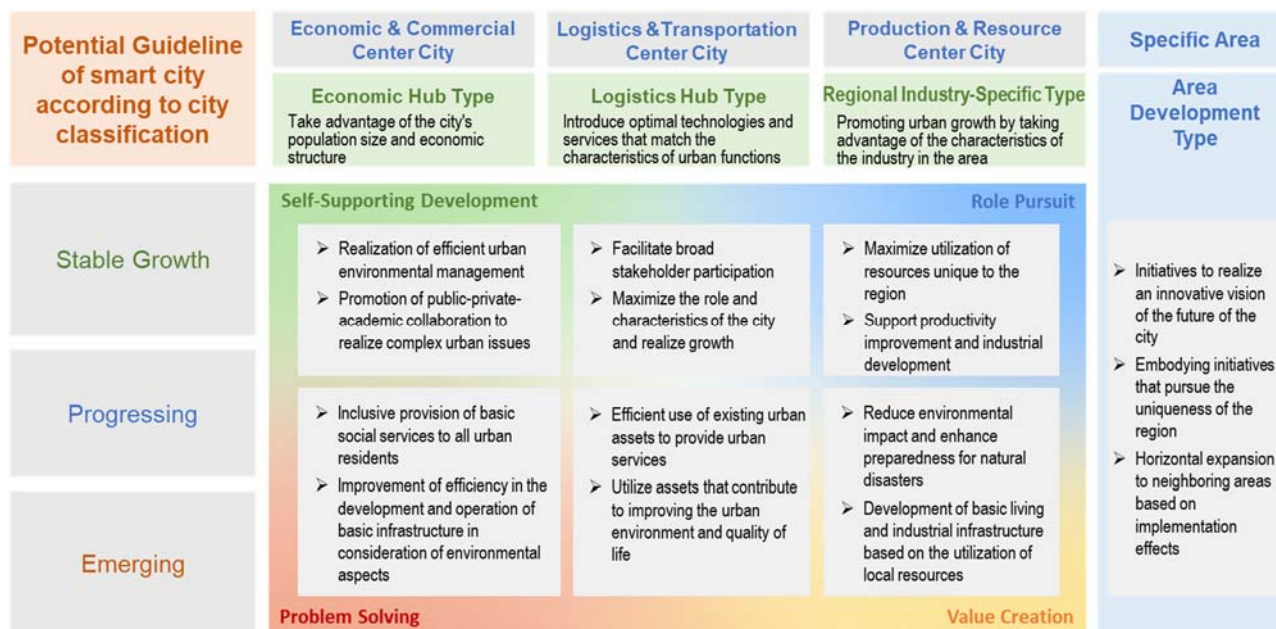
Table 5-3: Direction of Smart City according to City Classification and Economic Level

	Groups by City Characteristics	Economic and Commercial Center City	Logistics and Transportation Center City / Production and Resource Center City
Groups by Economic Level	Direction	The goal is to create a smart city that can respond to the diverse needs of society by improving urban functions and the living environment, and revitalizing the lives of citizens and economic activities.	Through clarifying the role of cities, reducing regional disparities, and promoting further revitalization of local industries, a smart city that can respond to the <u>individual needs</u> of the region shall be pursued.
Stable Growth	The goal is to provide infrastructure and urban services that contribute to stable urban growth and reduce negative environmental impact and inefficient activities in economic and social life.	<u>Self-Supporting Development-Oriented</u> Promote efforts to introduce private sector and citizen vitality in public-private partnerships	<u>Role Pursuit Oriented</u> Promoting initiatives to realize the role that cities have with the vision of their future
Progressing / Emerging	The goal is to improve the living environment of cities through planned urban development and to provide basic infrastructure and social services that contribute to the stabilization of social life.	<u>Problem-Solving Oriented</u> Promote more effective and feasible initiatives to solve urban problems	<u>Value Creation Oriented</u> Promote initiatives to effectively utilize the unique characteristics and resources of the region and to realize the potential of the city.

Source: Survey Team

Note: The term “individual local needs” assumes needs generated by the role and function of the city.

Based on the above-described studies, the following diagram summarizes the direction of smart cities for each category, including economic and commercial center cities, logistics and transportation center cities, production and resource center cities, and specific area development types. It should be noted that the guideline shown in the figure are only general guideline, and that the actual direction of smart cities for each city should be considered in light of the conditions of individual cities and external factors.



Source: Survey Team

Figure 5-2: Potential Guideline of Smart City According to City Classification

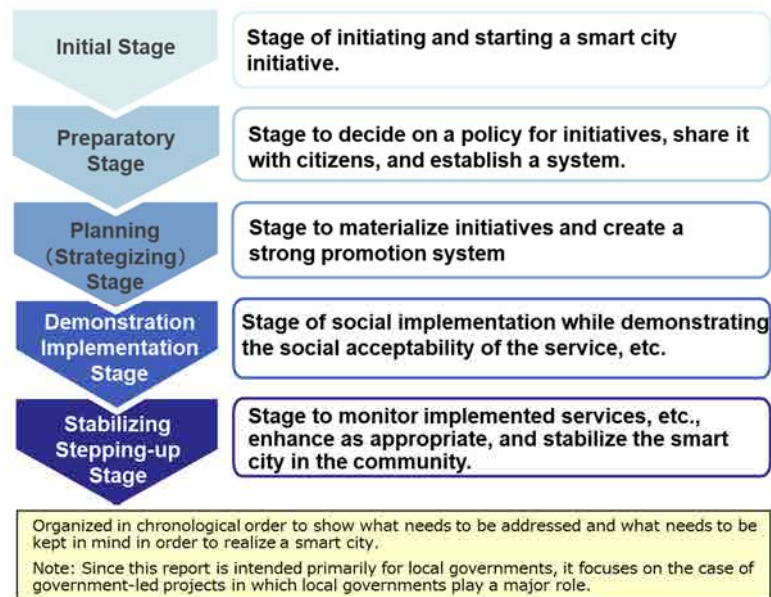
5.2. Smart City approach in Sub-Saharan Africa

In considering the smart city approach in the target region, first brief review of the initiatives of the Japanese government is made. Based on this process, the current status and issues of urban development in sub-Saharan Africa will be summarized, and a comprehensive approach for the target region will be established together with the smart city directions presented in the previous section 5.1.

(1) Reaffirmation of the Smart City Approach promoted by the Japanese Government

The Japanese government prepared and released the Smart City Guidebook in April 2021 (the second edition was released in August 2023), which outlines how to proceed with smart city development. The guidebook was developed by the Cabinet Office, Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry, and Ministry of Land, Infrastructure, Transport, and Tourism, and is organized as an easy-to-use resource for local governments, regional councils, and area management organizations to support the development and operation of smart cities nationwide. This guidebook was compiled as an introduction to share knowledge and learning on smart city initiatives, especially for local government officials. It is also intended to share a unified smart city concept and approach to development and implementation with private sector businesses and companies that provide technology and products that participate in smart cities in various regions. Figure 5-3 shows the five basic stages of how to proceed

with a smart city, as outlined in the Smart City Guidebook. The guidebook also provides activity policies and player participation according to the various stages of implementation. Since it is a compilation of knowledge from previous cases and initiatives, the guidebook can be used as a basis for considering the smart city approach in the target region, based on the guidelines and development possibilities.



Source: Summarized by Survey Team based on the Smart City Guidebook information.

Figure 5-3: “Smart City Way Forward” as presented in the Smart City Guidebook

(2) Stages of Urban Development as identified from the Development Problems of African Cities

As indicated in the previous Chapter 2, looking at common issues related to urban development in the target region, it can be said that there is a basic pattern in the current status of the subject cities that are introducing or aiming to introduce smart city development, as listed below.

- Cities that do not have (or are not growing) a major industry that supports the local economy
- Cities with a growing population due to increasing migration from surrounding areas
- Underdeveloped cities where major basic infrastructure has not yet been developed
- Cities with a certain level of basic infrastructure in place but without basic social services
- Cities where basic infrastructure and social services are being provided to a certain extent, but there are disparities in service benefits
- Cities with increasing social problems such as poverty and discrimination
- Cities with inadequate government capacity to provide basic services
- Cities with inadequate or non-compliant legal systems for urban development, including land use
- Cities where urban growth is impeded by natural disasters
- Cities where housing supply is not keeping up with demand, leading to settlement in areas with high disaster risk.

- Cities where economic activity and job opportunities are concentrated in central business districts, exacerbating traffic congestion in these districts.
- Cities where environmental impact factors (garbage, exhaust gas, sewage, etc.) have increased due to urban growth, leading to environmental pollution and destruction.

The third point raised here, the delay in the development of basic infrastructure is evident in a wide range of services in many countries, including roads and transportation facilities, water supply facilities, sanitation facilities (sewage and sewer water treatment facilities, etc.), electricity supply, and housing supply for a growing population. In light of this, many cities need to first improve their living environment by promoting the development of basic infrastructure in order to promote urban development.

(3) Evaluation of Smart City Development Stages

The following stages (readiness) can be identified as the “stages of city development” for future smart city initiatives, especially when it is assumed that the government will take the initiative, based on the fact that in some cases it is important to address delays in basic infrastructure development, and in other cases the government has yet to proceed with full-scale discussions on smart cities, as seen in the status of smart city initiatives and urban development issues in the countries listed in Table 3-3 above.

1. Cities (or countries) where a framework is being put in place
2. Cities (or countries) with frameworks in development
3. Cities (or countries) that need to organize their framework in the future
4. Cities (or countries) that need groundwork for smart city discussions
5. Cities (or countries) that need to prioritize basic infrastructure development before smart city development

In this section, the five evaluation components (Policy/Vision, Organization, Systems, Technology, and Operations) will be used as well as these were also employed in the review of smart city initiatives and development to assess where cities are at in the process. The evaluation levels for each stage are listed below.

Cities (or countries) where a framework is being put in place

- ✓ Policy, vision, and organization are in place at the national level to a certain extent.
- ✓ Efforts are being implemented in target cities based on the framework established at the national level.
- ✓ Some cities have already started development including projects led by the private sector.

Table 5-4: Image of Evaluation Result (1)
- Cities (or countries) where a framework is being put in place -

Evaluation Components	Evaluation Result National Level Initiatives	Evaluation Result City Level Initiatives	Evaluation Pie-Chart
Policy & Vision	Fully Established	Fully Established	
Organization	Fully Established	Fully Established	
System	Partially Established	Partially Established	
Technology	Partially Established	Partially Established	
Operation	Partially Established	Partially Established	

Source: Survey Team

Cities (or countries) with frameworks in development

- ✓ Policy and vision formulation and organization at the national level are underway to a certain extent, but not yet fully operationalized.
- ✓ Pilot projects based on the framework established at the national level have begun.
- ✓ Efforts targeting major cities have begun, but local cities have not yet been targeted, or have been targeted but have not yet begun actual activities.

Table 5-5: Image of Evaluation Result (2)
- Cities (or countries) with frameworks in development -

Evaluation Components	Evaluation Result National Level Initiatives	Evaluation Result City Level Initiatives	Evaluation Pie-Chart
Policy & Vision	Partially Established	Partially Established	
Organization	Partially Established	Partially Established	
System	Partially Established	Partially Established	
Technology	Partially Established	Partially Established	
Operation	Partially Established	Partially Established	

Source: Survey Team

Cities (or countries) that need to organize their framework in the future

- ✓ No policy, vision, or organization has been established at the national level, and there are plans to study the issue in the future.
- ✓ There is a plan to study it in the future.
- ✓ Most cities, including major cities, have not yet developed a sense of commitment.

Table 5-6: Image of Evaluation Result (3)
- Cities (or countries) that need to organize their framework in the future -

Evaluation Components	Evaluation Result National Level Initiatives	Evaluation Result City Level Initiatives	Evaluation Pie-Chart
Policy & Vision	Partially Established	Partially Established	
Organization	Not Established	Partially Established	
System	Not Established	Partially Established	
Technology	Not Established	Partially Established	
Operation	Not Established	Partially Established	

Source: Survey Team

Cities (or countries) that need groundwork for smart city discussions

- ✓ There has been little discussion of smart city issues at the national level.
- ✓ There is no awareness of the importance of smart city initiatives at the city and municipal level.

Table 5-7: Image of Evaluation Result (4)
- Cities (or countries) that need groundwork for smart city discussions -

Evaluation Components	Evaluation Result National Level Initiatives	Evaluation Result City Level Initiatives	Evaluation Pie-Chart
Policy & Vision	Partially Established	Not Established	
Organization	Not Established	Not Established	
System	Not Established	Not Established	
Technology	Not Established	Not Established	
Operation	Not Established	Not Established	

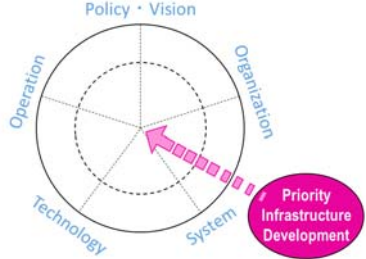
Source: Survey Team

Cities (or countries) that need to prioritize basic infrastructure development before smart city development

- ✓ At the national level, priority is given to implementing policies to improve basic infrastructure and social services.
- ✓ At the city level, priority is also given to implementing policies to address delays in the development of basic infrastructure before smart cities.

Table 5-8: Image of Evaluation Result (5)

- Cities (or countries) need to prioritize basic infrastructure development before smart city development -

Evaluation Components	Evaluation Result National Level Initiatives	Evaluation Result City Level Initiatives	Evaluation Pie-Chart
Policy & Vision	Not Established	Not Established	
Organization	Not Established	Not Established	
System	Not Established	Not Established	
Technology	Not Established	Not Established	
Operation	Not Established	Not Established	

Source: Survey Team

(4) Smart City Elements to be identified for smart city development initiatives in each city

JICA has compiled the “SMART CITY APPROACH (An approach for transforming the emerging cities into smart cities)” as part of their efforts for smart city development assistance, including the Global SC Survey. In order to promote smart city development initiatives, it is necessary to confirm the actual status of each city’s initiatives based on these 21 elements set under the 5 domains⁶ (also refer to Table 4-4). By evaluating the level of each element from the perspective of, for instance, which elements are ready and which elements need to be strengthened, each city may be able to grasp the stage of initiatives, which will lead to the establishment of the stage of approaches to be applied, as described hereafter.

(5) Smart City Development Initiatives in relation to Basic Infrastructure Development

The question of how to assess the level of development of a city’s basic infrastructure becomes a matter of debate here. There is a gap between the government’s (administration’s) viewpoint and the citizen’s viewpoint when it comes to the development of basic infrastructure. When the government takes a citizen participation approach to infrastructure development, it will reflect the needs of the citizens. On the other hand, there are several levels of for basic infrastructure development. For example, in case of road maintenance, if the number of vehicles in a city is small, the development or pavement rates of roads do not have a significant impact on the evaluation. As the number of vehicles owned increases, the need for pavement increases as the high percentage of unpaved roads becomes a major problem for dust and air pollution related to fuel efficiency. Then, as the number of paved roads increases and vehicle speed increases, the number of accidents increases, and without an efficient network, traffic congestion becomes more pronounced. As the speed of economic activity increases from the movement of large numbers of vehicles, the efficiency of work and commuting becomes a greater issue, requiring public transportation needs and a safer pedestrian travel environment. As shown in the above, the problems and issues of road development alone change case by case, so it is necessary to verify the status of basic infrastructure

⁶ 5 Domains: Policy and Vision, Organization, System, Technology and Operation (as also described above as “Components” in this Chapter.)

development and what the next steps to be taken for each city, and it is hardly possible to grasp the status of basic infrastructure development in each city through mere quantitative evaluation. Therefore, from the perspective of this study, quantitatively defining the level of basic infrastructure development is not taken in the survey procedure. However, from the perspective of smart city initiatives, and in the context of aiming to solve urban problems through technology and other means, the following perspectives will be introduced for the possible analysis of each city. Where the levels shown in Table 5-9 are confirmed with a city, the city may decide whether to give priority to the development of basic infrastructure or to choose an approach as a smart city initiative.

Table 5-9: Level of Infrastructure Development to be linked to Smart City Initiatives (e.g.)

Basic Infrastructure Sector	Development Level for Evaluation
Road and Transportation	In cities where traffic congestion has been eliminated, expectations for public transportation, and urban environmental degradation due to exhaust emissions are becoming more pronounced, smart problem solution is expected in new urban traffic control, introduction of public transportation, and efficiency improvement in transportation, etc., and the level of urban administration can verify whether the road and transportation infrastructure is advanced enough to consider introducing such measures.
Water Supply and Sanitation (Sewer) System	In cities where water supply and drainage infrastructure has been planned to a certain extent, and where negative environmental impacts due to sewage degradation and water charges have become apparent, there are high expectations for city administrations to work smartly to solve these problems.
Power Supply	In cases where urban rezoning, etc. has been planned to a certain degree and the electricity supply to the district (area) has been achieved at the same level, and the city administration recognizes the need for smart power development and proper management of urban electricity consumption in the expectation that electricity demand will further increase in the future, and efforts toward this end can be expected.
Telecommunication	In areas (regions) where the above electricity supply is achieved to a certain degree and at the same level, and where mobile phones and other devices have a high penetration rate and are used to a certain extent even in low-income neighborhoods, urban administrations can provide new social services based on telecommunications technology.

Source: Survey Team

Note: The summary indicated in the category “Telecommunication” includes the aspects shown in Table 2-7.

Examples of smart implementation of this approach when basic infrastructure development is a priority.

Here are some examples of how cities can take this approach (where basic infrastructure development needs to be prioritized before smart city development) and smartly promote that development as well, leading to more full-scale smart city development initiatives in the future.

Table 5-10: Potential for Smart Promotion of Basic Infrastructure Development (e.g.)

Target Stage	Potential Initiative (example)
Preparatory Stage of Infrastructure Development	<ul style="list-style-type: none"> ➤ Introduce BIM, CIM, and other design tools at the design stage of maintenance infrastructure to streamline the entire construction process. This will eliminate design errors and contribute to cost reduction. ➤ Introduction of GIS that contributes to phased development planning by appropriately mapping developed and undeveloped infrastructure. It also contributes to more efficient maintenance and management. ➤ Preliminary introduction of road design for future installation of public transportation services, such as BRT.
Implementation Stage of Infrastructure Development	<ul style="list-style-type: none"> ➤ Preparation and introduction of communication facilities, etc. that enable the provision of images that can be used for image analysis technology in the future, to traffic signal facilities, etc. to be introduced for traffic jam mitigation, etc. ➤ Enhancement of the communication environment to introduce a simple information provision system for citizens using cell phones, aiming for a synergistic effect with future disaster countermeasure technology.

Source: Survey Team

(6) Guiding actions for approaches and initiatives tailored to the results of the evaluation

The following is a guiding action for the approaches and initiatives at each stage set by the evaluation of smart city development efforts by the government and cities. These actions were compiled based on the key points of the approaches presented in the Smart City Guidebook prepared by the Japanese Cabinet Office.

Cities (or countries) where a framework is being put in place

- Strengthen the project promotion system (consortium) necessary to accelerate or sustain the current smart city initiatives, and implement specific plans in line with the policy and vision.
- Based on the concrete plans, social implementation will be carried out sequentially while demonstrating the social acceptability of services, etc., and the implemented services, etc., will be monitored as appropriate to firmly establish the smart city in the region.
- Build a framework for sharing knowledge in Japan in order to form a successful model and horizontally expand the model to other cities in Japan.
- Establish a system and framework for autonomously working on a higher level of smart city by strengthening cooperation among the public, private, and academic (institutions with expertise) sectors to promote more self-motivated smart city development.

Cities (or countries) with frameworks in development

- Establish a mechanism (system) and core structure to drive smart city development projects.
- Build a tripartite relationship with advisors and others for project initiatives, eliminate the adverse effects of stove-piping within the government, and work toward citizen-participatory initiatives based on shared visions with citizens.
- Formulate a plan, conduct a series of demonstrations of smart technologies and services, verify and improve the mechanism and organizational structure, and enhance the functionality of the system.
- Identify feasible areas and regions for implementation, and focus on implementing projects in a reasonable manner to achieve gradual scale-up.

Cities (or countries) that need to organize their framework in the future

- Clarify awareness of the issues and objectives by working from the creation of a vision and concept of the objectives and initiatives to achieve a smart city.
- Establish an organizational structure that will serve as the basis for the realization of smart cities among the national government and cities. In addition, promote the participation of diverse entities involved in the initiatives and establish a foundation, including a system for project promotion.
- Establish a foothold for long-term smart city development by starting with small-scale smart city initiatives that are easy to introduce (e.g., ICT infrastructure utilization and DX initiatives) rather than complex and large-scale initiatives, based on priority needs and problems faced by cities.

Cities (or countries) that need groundwork for smart city discussions

- Organize urban issues, resources, strengths and weaknesses, create a forum to discuss how future development can be realized in a smart way, and take action to make smart cities a national policy.
- As an initial step in the effort, form a conference body, etc., which can be organized, and involve academics and experts to share knowledge using precedents, etc., and study the possibility of smart cities and their introduction.
- With the conference body at the center, establish a national-level smart city policy and development vision, make it widely available to the public, and clearly state that the policy will be implemented under government initiative.

Cities (or countries) that need to prioritize basic infrastructure development before smart city development

- Given the current situation where priority should be given to the development of basic infrastructure, an initial effort will be made to take a smart approach to effectively and efficiently implement and operate such infrastructure development projects.
- Establish an initial organization to drive future smart city development within the government, while the main focus is on the entities that will develop the target infrastructure.
- Utilize knowledge from prior cases to introduce technologies and services to improve the efficiency of infrastructure development.

Smart city development in specific areas

- Clarify the entities involved in smart city initiatives in a specific area and their organizational bodies, and clarify which level the target area is positioned for the city (or country).
- Establish effective relationships between local groups and municipal organizations to jointly share awareness of the issues and problems in the target area and the objectives of the project.
- In promoting the implementation of smart technologies and services, promote understanding of the benefits and challenges of implementation among relevant parties and stakeholders.

5.3. Phased Approach to Smart City Realization

(1) Phased Approach

Figure 5-4 shows a summary of the approaches and guiding actions for each stage that have been organized in the previous sections. Based on the unique issues and conditions of each country and city, it is

important to select the most appropriate approach and build the project after evaluating the status of each smart city development initiative and its preparation stage from the five components of “policy and vision,” “organization,” “system,” “technology,” and “operation,” which are the elements of smart city development. It is important to select the most appropriate approach and build the project based on an assessment of the status of each smart city development effort and its preparatory stage. Then, more effective implementation of projects and realization of development initiatives can be achieved by strengthening elements of smart city development that are evaluated as inadequate, while understanding which stage and approach the country or city should take and at which stage of the phased approach it is positioned. Figure 5-5 and Figure 5-6 show the details of the phased approach and actions for each development status.

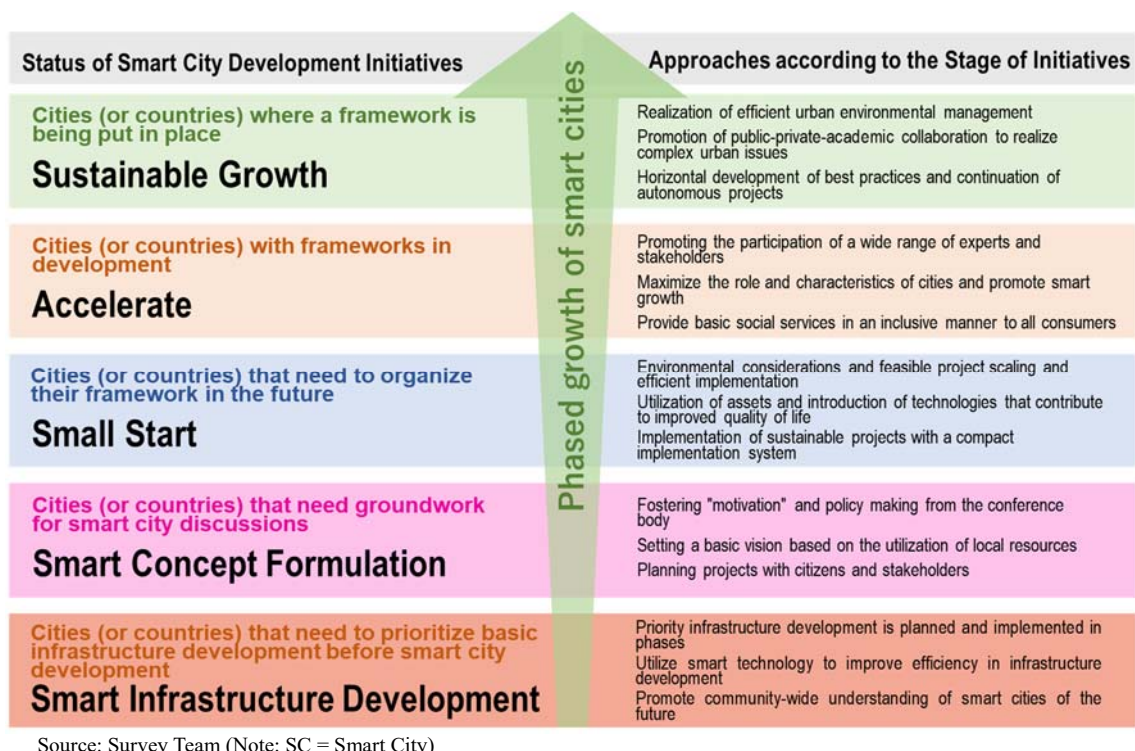
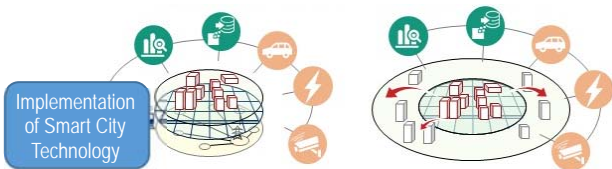



Figure 5-4: Overall View of Smart City Development Initiatives and Phased Approach

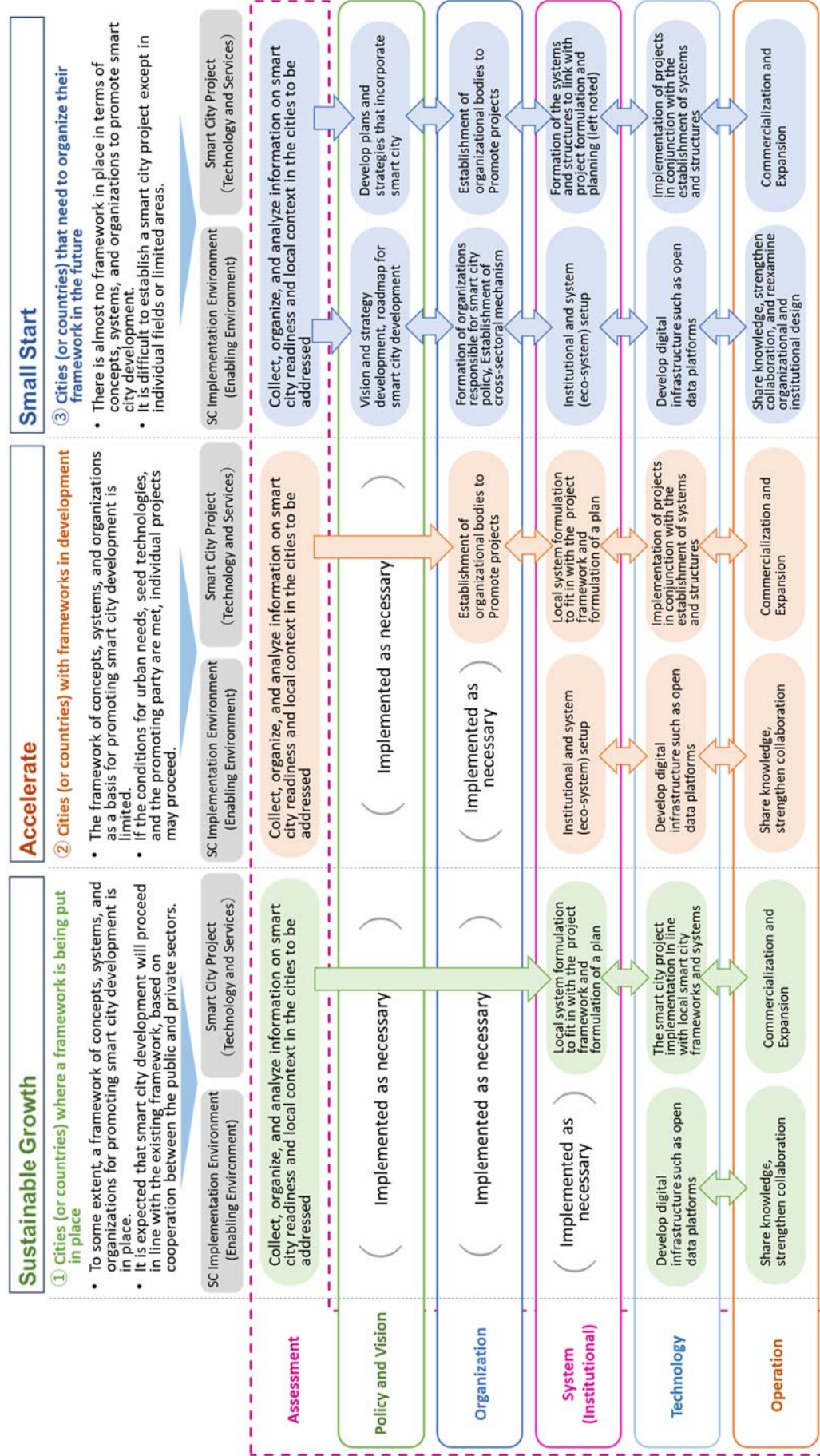
(2) Specific Smart City Developments within Phased Approach

The “Global SC Survey” conducted by JICA in 2022, prior to the implementation of this study, also indicates that the initiatives of each country and city will be promoted using processes that are similar to the approach presented in this section. In addition, the following two specific deployment methods are shown to be the standard deployment methods worldwide. Smart city deployment methods can be categorized as either introducing technologies and services in specific districts (areas) or expanding services by introducing specific services and linking them to other services as the core.

Table5-11: Specific Smart City Deployment Methods

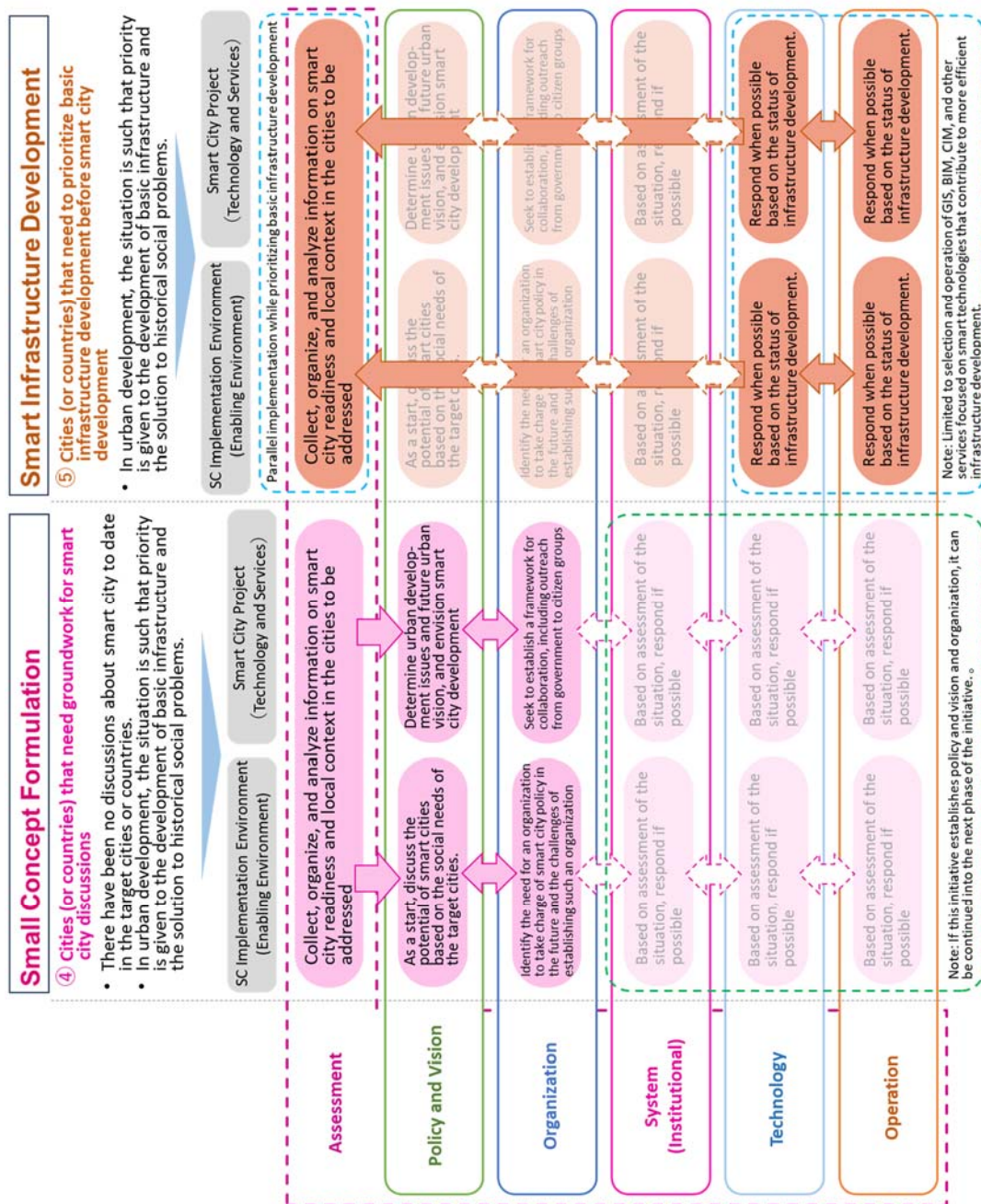
Method to introduce the system from a specific area and expand then deploy it to other regions and country levels	Method to introduce a specific sector and expand across related sectors
<ul style="list-style-type: none"> • A method to develop an integrated smart city in conjunction with the development of a specific district, along with the development of its basic infrastructure • The target district is positioned as a living laboratory where advanced technologies and services can be demonstrated, with the possibility of later expanding to the entire city. • Effective in promoting the application of a land value capture business model such as a deregulation system targeting the district, utilization of incentives such as investment preferential treatment, and BID system 	<ul style="list-style-type: none"> • A pattern in which various services and systems are linked in stages around a specific technology or service, and an integrated system is eventually built • Along with the installation of sensors in existing facilities and the digitization of services, open APIs and data linkage can be introduced in stages over the long term. • The digitalization of administrative services and e-government initiatives, which are in high demand in Africa, make it effective to build a data platform centered on administrative data.
	

Source: Re-organized based on the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.



Source: Re-organized by the survey team based on the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.

Figure 5-5: Approaches and Processes for Smart City Development Initiatives by Status (1)



Source: Set by the survey team based on the “Data Collection Survey on the Applicability of the Smart City Approach” conducted by JICA in 2022.

Figure 5-6: Approaches and Processes for Smart City Development Initiatives by Status (2)

5.4. Roadmap for Smart City Realization

Based on the approaches and the process of approaches for each smart city development initiative status presented in the previous section 5.2, a set of roadmaps for promoting individual approaches is prepared. Differences in the current status and essential problems of each country and city will affect the project period when implementing development projects. Therefore, in examining the roadmap for project implementation, short-, medium-, mid-to-long-term time frames are separately considered for each individual approach. In the process of the phased approach, the five evaluation components of “Policy and Vision,” “Organization,” “System,” “Technology,” and “Operation” are shown to be prepared, strengthened, and implemented in phases. The roadmap is based on these five evaluation components, and considers the

“Initial Stage,” “Preparatory Stage,” “Planning (Strategy) Stage,” “Demonstration Implementation Stage,” and “Stabilizing Stepping-up Stage” as time axis, as indicated in the Smart City Guidebook (prepared by the Japanese Cabinet Office), in order to make the roadmap more in line with the status of implementation.

A: Cities (or countries) where a framework is being put in place

Stage-1:	<ul style="list-style-type: none"> Re-confirm the status of smart city development efforts in their own country and in the target cities, evaluate them, and ascertain the content of the 5 evaluation axes and 21 items that are not yet in place or are partially in place. Re-confirm the policies and visions related to smart city development underway, and understand the challenges of project implementation.
Stage-2:	<ul style="list-style-type: none"> Establish a framework for projects to be addressed with an eye to strengthening the weaknesses identified in Stage-1. To strengthen the current organizational structure, advisors will be brought in and participation from the private sector will be promoted. If there are systemic problems, consider enactment of city ordinances or relaxation of systems as necessary.
Stage-3:	<ul style="list-style-type: none"> Develop strategies and plans to effectively introduce and demonstrate specific technologies and services. Utilize input from stakeholders in strategy formulation and the benefits of industry-government-academia collaboration in the planning stage as well. Strengthen the organization and human resources of the departments in charge of securing financial resources for the project and managing expenditures.
Stage-4:	<ul style="list-style-type: none"> Establish a system to implement and manage the plan created in Stage-3 throughout the organization. In introducing and demonstrating products, technologies, and services, promote the use of sufficient knowledge, including that of the private sector. When introducing advanced digital infrastructure (e.g., urban OS), promote collaboration with experts.
Stage-5:	<ul style="list-style-type: none"> Continuously monitor the operation and effectiveness of the implemented smart technologies and services. Immediately address any problems identified through operation, and improve and enhance the project to make it a success story. Utilize the experience and knowledge gained from the implementation of the project to expand the project effect by horizontally developing similar projects in other cities and regions.

Expected Target Cities: (Kigali)

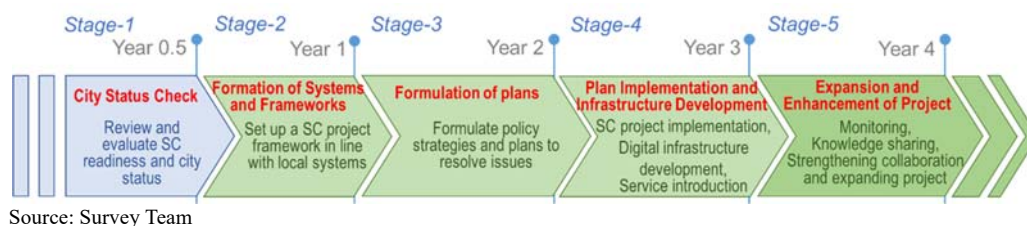


Figure 5-7: Roadmap A (Cities where a framework is being put in place)

B: Cities (or countries) with frameworks in development

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|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stage-1: | <ul style="list-style-type: none"> Review existing policies and visions for current initiatives and understand the challenges of project implementation. Review and assess the status of smart city development efforts in Japan. |
| Stage-2: | <ul style="list-style-type: none"> Discuss with the government, local governments, stakeholders, experts, and others the organizational bodies necessary to realize policies and visions through smart city development, and establish the optimal project implementation organization and system. |
| Stage-3: | <ul style="list-style-type: none"> Re-confirm the status of smart city development efforts in their own countries and target cities, evaluate them, and ascertain the contents of the 5 evaluation axes and 21 items that have not yet been developed or are only partially developed. Establish a framework of laws, organizational systems, etc. for the projects to be addressed, with an eye to strengthening weak points in related systems, etc. Promote the introduction of advisors and participation from the private sector to strengthen the current system. Establish a business ecosystem necessary for stable and effective implementation and continuation of the project. |
| Stage-4: | <ul style="list-style-type: none"> Develop strategies and plans to effectively introduce and demonstrate specific technologies and services. Utilize input from stakeholders in strategy formulation and the benefits of industry-government-academia collaboration in the planning stage as well. Strengthen the organization and human resources of the departments in charge of securing financial resources for the project and managing expenditures. Establish a system to implement and manage the prepared plan under the leadership of the central and local government. |
| Stage-5: | <ul style="list-style-type: none"> In introducing and demonstrating products, technologies, and services, promote the use of sufficient knowledge, including that of the private sector. Promote collaboration with experts to maximize the operational effectiveness of introduced technologies, services, etc. |
| Stage-6: | <ul style="list-style-type: none"> Continuously monitor the operation and effectiveness of the implemented smart technologies and services. Immediately address Problems identified through the operation to improve the project and utilize them in the next project development. |

Expected Target Cities: Abidjan, Abuja, Kigali, Lagos, Nairobi, etc.

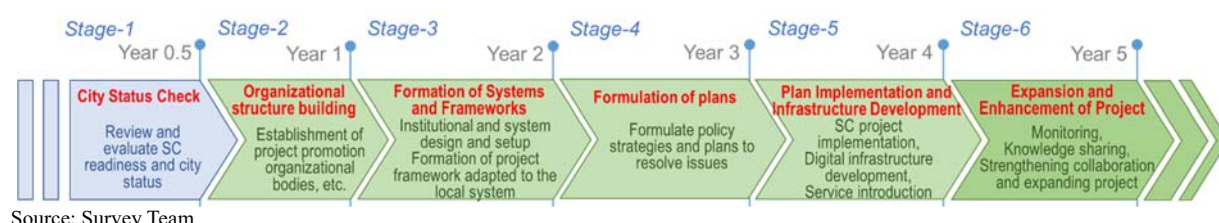
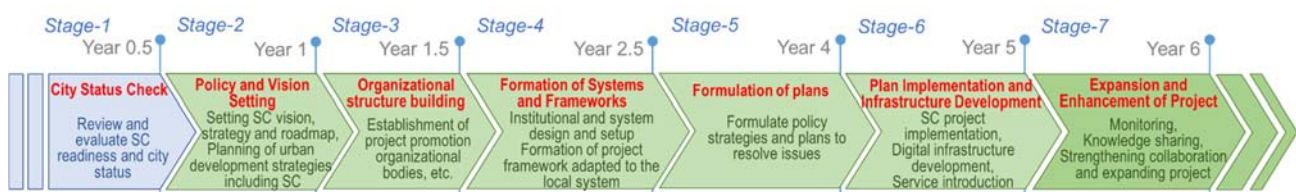


Figure 5-8: Roadmap B (Cities with frameworks in development)

C: Cities (or countries) that need to organize their framework in the future

Stage-1:	<ul style="list-style-type: none"> Reconfirm the current domestic and urban development status and identify and evaluate issues related to urban development. Confirm the status of smart city initiatives in their own country and in the target cities.
Stage-2:	<ul style="list-style-type: none"> Review the development status of the target cities and the national development policy and vision, and understand the challenges of implementing smart city projects. Establish a conference body to formulate policy and vision for smart city development in the target cities.
Stage-3:	<ul style="list-style-type: none"> Re-confirm the status of smart city development efforts in their own country and in the target cities, evaluate them, and ascertain the contents of the 5 evaluation axes and 21 items that are underdeveloped or partially developed. Establish an organizational structure for project implementation based on the Smart City Policy and Vision. Promote the participation of advisors and experts as well as citizen participation to strengthen the implementation system.
Stage-4:	<ul style="list-style-type: none"> Establish legal, organizational, and other frameworks for the projects to be addressed, based on the Smart City Policy and Vision. Establish the business ecosystem necessary for stable and effective implementation and continuation of projects.
Stage-5:	<ul style="list-style-type: none"> Develop strategies and plans to effectively introduce and demonstrate specific technologies and services. Utilize input from stakeholders in strategy formulation and the benefits of industry-government-academia collaboration in the planning stage as well. Establish a system to implement and manage the prepared plan under the leadership of the central and local government.
Stage-6:	<ul style="list-style-type: none"> In introducing and demonstrating products, technologies, and services, promote the use of sufficient knowledge, including that of the private sector. Promote collaboration with experts to maximize the operational effectiveness of introduced technologies, services, etc.
Stage-7:	<ul style="list-style-type: none"> Continuously monitor the operation and effectiveness of the implemented smart technologies and services. Immediately address Problems identified through the operation to improve the project and utilize them in the next project development.

Expected Target Cities: Abidjan, Abuja, Kampala, Lusaka, Nairobi, Dakar, Dar es Salaam, etc.



Source: Survey Team

Figure 5-9: Roadmap C (Cities that need to organize their framework in the future)

D: Cities (or countries) that need groundwork for smart city discussions

Stage-1:	<ul style="list-style-type: none"> Review the development status of the target cities and the national development policy and vision, and reorganize urban development issues. Establish a conference body to discuss and share the image of smart city for the development.
Stage-2:	<ul style="list-style-type: none"> Establish policy and vision for smart city development based on smart city discussions at the conference body. Organize future activity policies, basic actions, etc. for the realization of the above policies and vision.
Stage-3:	<ul style="list-style-type: none"> Establish an organizational structure for efforts to realize smart cities Establish a framework of laws, organizational systems, etc. necessary to promote the efforts of the organizational body. Initiate information disclosure, citizen participation, and collaboration with stakeholders in a phased manner.
Stage-4:	<ul style="list-style-type: none"> Create a business ecosystem to promote smart city initiatives that also involves citizens. To incorporate policies, visions, etc. into national development plans and strengthen organizational bodies in order to implement projects at the national level.

Note: In this approach, the progress of activities may establish policies and visions sufficient to serve as the basis for future smart city development initiatives, and may further establish the entities to be involved in these initiatives. In such case, there is an option to continue with the next stage. In that case, the action would start from Stage-3 for “Cities (or countries) with framework development.”

Expected Target Cities: Bouake (Côte d’Ivoire), Touba (Senegal), Mwanza (Tanzania), Nansana (Uganda), etc.

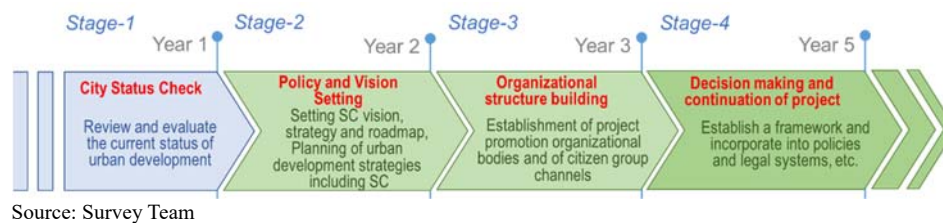


Figure 5-10: Roadmap D (Cities that need groundwork for smart city discussions)

E: Cities (or countries) that need to prioritize basic infrastructure development before smart city development

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|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stage-1: | <ul style="list-style-type: none"> • Review the status of infrastructure development and development plans in the target cities and reorganize development issues. • Review infrastructure development strategies, development policies, etc., based on the understanding of development issues. |
| Stage-2: | <ul style="list-style-type: none"> • Consider introduction of smart technologies and services that contribute to more efficient infrastructure development. • Determine the optimal utilization policy by utilizing the know-how of the private sector, including case studies of the introduction of technologies under consideration. |
| Stage-3: | <ul style="list-style-type: none"> • Advance planning and design using efficiency-enhancing technologies and services for infrastructure development. • Utilize private sector expertise as appropriate during the sequential implementation of infrastructure development in line with the planning and design. |
| Stage-4: | <ul style="list-style-type: none"> • Based on the results of smart infrastructure development, the project will be horizontally expanded to other cities and regions at the central government level. • On an ongoing basis, transition to smart city project initiatives and establish an initial conference body to initiate activities. |

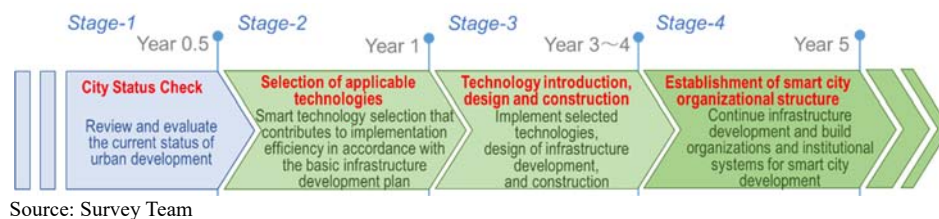


Figure 5-11: Roadmap E (Cities that need to prioritize basic infrastructure development before smart city development)

In the roadmap presented in this section, “A” indicates the most advanced stage of initiatives, and “D” illustrates the situation where the most basic smart city development efforts or actions need to be started. “E” indicates that basic infrastructure development is prioritized ahead of smart city development initiatives. Cities (or countries) that are better prepared for smart city development initiatives will move forward with actions at or near the “A” level. On the other hand, if the development needed by a city focuses on basic infrastructure, it should start from the “E” stage. Cities (or countries) that have developed a certain degree of basic infrastructure but have not yet discussed or started smart city initiatives will need to start at stage “D.” If a city (or country) starts at or near Stage “E,” it will move to a higher level of initiatives and continue when the effort has been properly accomplished. It is also assumed that the efficiency and acceleration of initiatives will increase as efforts continue at higher levels. In this case, there is a possibility that some cities (or countries) will be able to skip any of the steps. Even for cities that should give priority to the development of basic infrastructure, there is no strict rule to start with “E” in the approach and roadmap, and flexibly approaches and roadmaps can be applied according to each city’s development goals and actual smart city development initiative level.

The decision on “which stage to start from” should be made based on discussions with the government of the target city (or country) after fully understanding its development status, and is not necessarily a fixed condition for starting from the above-mentioned stage.

Chapter 6 Consideration of Smart City Development Indicator Setup

6.1. Identification of existing evaluation frameworks and indicators

In the course of this study, existing evaluation frameworks and indicators were reviewed in order for JICA to consider the establishment and introduction of indicators and other measures that will contribute to the achievement of the SDGs in its smart city efforts. The documents referred to are as follows.

- Collection Methodology for Key Performance Indicators for Smart Sustainable Cities 2017
- New Urban Agenda 2017
- New Urban Agenda Handbook 2020
- Global Urban Monitoring Framework 2022
- The Sustainable Development Goals Report Special Edition 2023
- SDGs-UMF-NUA Alignment (preliminary raw data provided by UN-Habitat VLR)

6.2. Interviews to UN-Habitat

In order to obtain advice from UN-Habitat (hereinafter referred to as "UNH"), which provides a global framework for solving urban issues, many indicators, etc., and is working to help countries achieve the SDGs, three web interviews were conducted in late January 2024 with UNH officials regarding evaluation methods and indicator setting for urban development. The schedule and subjects of the interviews are as follows.

Table 6-1: UN-Habitat Interview Schedule

Date	Groups/Department in Charge	Name of Officials
2024-Jan-17	Voluntary Local Reviews (VLRs)	Martino Miraglia (Mr.) Caroline Kienast-Von Einem (Ms.) Claudia Garcia Zaragoza (Ms.)
2024-Jan-23	Knowledge and Innovation Branch	Edlam Yemeru (Chief, Ms.) Isabel Wetzel (Program Management, Ms.) Hazel Kuria (Ms.)
2024-Jan-31	Quality of Life Initiative	Agata Aleksandra Krause (Ms.)

(1) From Voluntary Local Reviews

■ Focus on Urban Challenges in Voluntary Local Reviews

UNH discusses how the challenges faced by different cities are a crucial consideration for the activities, especially in the context of Voluntary Local Reviews (VLRs) assessing urban development challenges and solutions, and notes that these challenges form the core of the assessment, aligning with the focus of various indicator frameworks.

UNH mentions attempts to compile trends and insights from the numerous published VLRs worldwide, highlighting urban development challenges due to varying publication years. They also express the intention to delve deeper into data analysis to draw more comprehensive conclusions from the wealth of data collected through VLRs.

■ Connecting Frameworks to SDGs for Global Urban Development

UNH outlines the overarching goal of connecting various frameworks, such as smart cities, the Global Urban monitoring Framework, and quality of life, to SDGs, and emphasizes the importance of the SDGs as a global agenda, providing a common language for cities worldwide. The objective is not just for comparison but to facilitate communication and exchange of experiences among cities across regions like Sub-Saharan Africa, Asia Pacific, and Europe. By linking different frameworks back to the SDGs, the aim is to assess how territories or cities are performing against these global development goals.

■ Guidance on Sustainable Development Goals, Smart Cities, and Global Frameworks

UNH emphasizes the global adoption of the Sustainable Development Goals (SDGs) and suggests that it is beneficial to align the assessment with the SDGs when evaluating smart cities, and recommends linking the performance of a smart city to specific SDGs to enhance the evaluation process. The officials also highlighted the importance of Agenda 2063 in consideration, the African Union's roadmap for African countries, when focusing on sub-Saharan Africa. UNH clarifies that they don't have a single framework dedicated solely to smart cities but incorporates smart and digital aspects into various existing frameworks, noting the limitations of the Global Urban Monitoring Framework capturing all dimensions of city development comprehensively.

JICA's work could be considered (by UNH) as a spin-off from the Global Urban Monitoring Framework and to pick up possible indicators, as the dimension of smart cities is relatively weak within the framework.

UNH highlights another set of indicators "Collection Methodology for Key Performance Indicators for Smart Sustainable Cities" released by the United Nations Economic Commission for Europe (UNECE), as they recommend looking into and cross-referencing these indicators.

Furthermore, UNH points out the importance of understanding how different countries in African region have customized or nationalized global agendas and frameworks, then suggests to JICA survey team checking if countries have developed their own smart cities guidelines or frameworks, as many nations tend to adapt global frameworks to their local contexts.

■ Insights on Community Engagement and Sustainable Development Reporting

UNH discusses their approach to transparency exercises as a means of engaging communities in sustainable development, and describes the success of the voluntary local reviews, citing the case of Mwanza, a city in Tanzania. In this example, two months of community consultations were conducted to gather perceptions on the city's progress toward SDGs, awareness levels and priorities. The gathered information was then translated into recommendations for future actions in Mwanza. According to UNH, there are two key takeaways from the Mwanza case study.

- Communities play a vital role in collecting data when there are gaps.
- Community perceptions sometimes differ from official data, and their priorities may not align with those identified by city authorities.

While UNH indicates that communities actively contribute to the definition and localization of sustainable development, it also indicates the importance of ongoing communication and education. UNH also strongly encourages community participation to achieve higher results, but acknowledges that community participation is not always essential, as some cities may face constraints or already have efficient data collection systems in place. There are two approaches to community engagement in the preparation of sustainable development reports

- Sometimes leverage existing consultation mechanisms within cities, capitalizing on established ways of engaging with communities.
- When such mechanisms are weak or unresponsive, new consultation channels need to be established.

UNH states that establishing new consultation channels can be more challenging, as it involves reaching out and engaging with communities without the benefit of pre-existing networks and knowledge.

■ Approach to Measuring Community Participation Levels as Conclusion

UNH explains that there isn't a consolidated framework for measuring community participation levels, however they use two indicators. The first set of indicators focuses on the existence of structural mechanisms for community consultation at the city level. The second set involves a quantitative analysis of community participation in decision-making processes, combining measurable quantitative indicators with qualitative insights.

(2) From Knowledge and Innovation Branch

■ Approach to Smart City Development and General Remarks

UNH has adopted a people-centered approach (People-centered Smart Cities Flagship Programme), which argues that smart city development should prioritize people over technology. This philosophy is consistent with the SDGs and the New Urban Agenda (NUA). This approach has five pillars:

- Community empowerment: Focusing on empowering and targeting communities
- Accessibility and equity: Addressing the growing digital divide in cities and communities
- Responsible data management: Emphasizing accountability and governance for smart city development
- Trust: Safeguarding public trust in smart city development
- Capacity: Enhancing the capacity of the public sector and users

Governance is highlighted as crucial for ensuring that people remain the primary priorities in smart city development with a focus on empowerment and engagement to avoid leaving anyone behind. UNH actively participates in global advocacy, capacity building, and projects worldwide to assist

local and national governments in smart city development. This involves the development of strategies, capacity building through training, and advocacy for “people-centered approaches.”

In June 2023, during the second session of the UNH Assembly, 193 countries requested the development of international guidelines on people-centered smart cities. A global working group, including a representative from JICA, is actively working on defining core principles and values for people-centered smart city development, establishing a crucial framework for smart city development indicators and KPIs.

As UNH works to measure the positive impacts of smart city development, it emphasizes the interconnectedness of job creation, skills enhancement, and economic improvement. Data collection on impact and evaluation indicators is important to understand the urgency and benefits of low-income countries embracing smart city initiatives. In the absence of sufficient data on smart city activities, a phased approach to data collection is needed. UNH has identified the lack of integrated data recognizing the lack of integrated data and the early stages of smart city development in many regions, UNH is committed to developing guidance that can be adapted to cities around the world, such as the Global Urban Monitoring Framework and the Playbook of the People-centered Smart Cities Flagship Programme. The committee recognizes the importance of developing guidance that can be adapted to cities around the world.

■ UNH's Insights on KPIs and Indicators

It is recognized there is the need for developing indicators and KPIs for smart city development, globally and in Africa, and UNH summarizes their people-centered smart cities approach, emphasizing that their KPIs and indicators are specifically aligned with the five pillars of this approach. They note the forthcoming release of a global assessment, the World Smart Cities Outlook⁷, emphasizing the significance of regionally tailored indicators and KPIs.

■ Insights on the Global Urban Monitoring Framework

The Global Urban Monitoring Framework is developed by UNH branch, while the framework includes some indicators on smart city development. UNH clarifies that they use the framework as a core starting point for their data work. When there are needs to explore smart city indicators more comprehensively, UNH incorporates additional indicators both within and outside the urban monitoring framework.

⁷ The World Smart Cities Outlook will seek to dive deep into the current landscape of smart cities and digitalization across the globe. From exploring prevailing trends, challenges, regional diversity, to uncovering untapped opportunities, the study aspires to be a factual bedrock for the development of the guidelines on smart cities. The aim is to identify key drivers and enablers to build cities that are not only technologically advanced but also sustainable, inclusive, and respectful of human rights: <https://unhabitat.org/join-us/calls/call-for-proposals-for-the-world-smart-cities-outlook>

(3) From Quality Life Initiatives

■ Connecting Smart Cities and Quality of Life

UNH describes the evolution of smart cities from technology-driven to “people-centered approaches,” focusing on improving quality of life, and emphasizes the need to understand, conceptualize, and measure quality of life, considering both subjective and objective aspects. They have reviewed 50 quality of life indices, finding few related to cities and even fewer encompassing subjective experiences. UNH seeks to connect their methodology with smart city frameworks for a more comprehensive approach that addresses both people and infrastructure aspects, as they see potential in combining this with smart city evaluation metrics, as many already include human-centric and quality of life considerations.

■ Quality of Life Index

A research and innovation project for a quality-of-life index is ongoing and currently in the finalization stage. The structure of the quality-of-life index is consisting of a global layer with 21 indicators applied universally and a local layer with up to 35 indicators chosen by the city. It is believed that the application of quality-of-life index will provide valuable insights into the strengths, weaknesses, challenges, and opportunities of cities. The ultimate goal is to support measurement and monitoring of the SDGs and to bridge the gap between data and policy (how to obtain the data needed to assess the indicators). 21 global layer indicators include health (communicable and non-communicable disease burden, life expectancy, etc.), safety, housing environment, air quality (P.M.2.5 concentrations), and access to basic services, such as electricity, water, sewer, and high-speed broadband.

■ Insights on Indicator Selection Methodology

UNH suggests that cities should ideally choose around 10-12 indicators from the local layer for feasibility during the testing phase of the index. The goal is to empower local governments in a city-centered process, providing guidelines and examples while leaving the final decision on indicators to the cities. They also emphasize the specificity and flexibility of the local layer, allowing cities to tailor the index to their unique contexts.

UNH outlines their method for selecting indicators, developed in collaboration with cities through workshop-style sessions, and employs a theory of trend approach, starting with understanding the challenges that cities face and working backward to select indicators related to those challenges. This method ensures quality assurance and encourages openness about challenges making discussions more fruitful. The collaborative nature of the decision-making process involves various city departments to mitigate the risk of a single-decision-making approach, and UNH notes that city commitment to the process, including allocating resources, signals an honest engagement in building on the indicators, avoiding a false investment.

■ Connecting SDGs and Quality of Life

SDG targets and indicators are designed for countries and sectors, making it challenging to directly apply them to cities. Instead, UNH uses Global Urban Monitoring Frameworks as a city-level mirror of SDGs.

UNH acknowledges the monitoring limitations of SDGs at the city level and aims to improve measuring and monitoring by testing new ways to collect data, addressing data gaps in SDG 11 related to cities.

6.3. Result toward Consideration of Indicators for Smart City in Relation to SDGs

According to the interview to several officials of UN-Habitat programs, a few possible bases to set up indicators to evaluate and/or monitor smart city development have been recognized as to fuse with Sustainable Development Goals in global aspect. However, some are still under formulation process and may need to consider adjustment for each city's smart city initiatives as they are unique from each other.

(1) Key Performance Indicators for Smart Sustainable Cities (by UNECE)

The "Collection Methodology for Key Performance Indicators for Smart Sustainable Cities" published by UNECE provides a standardized methodology for data collection, development effectiveness and progress measurement, which was developed to achieve the following three goals:

1. Achieve the Sustainable Development Goals (SDGs),
2. Achieve smarter cities, and
3. Achieve more sustainable cities.

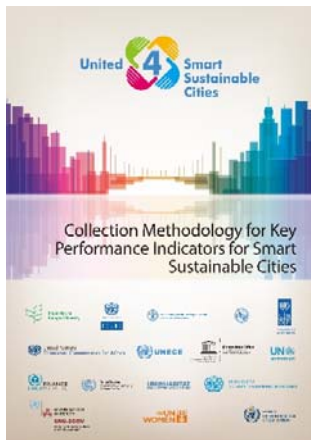
The indicators allow cities to measure their long-term development progress, compare themselves with other cities, disseminate best practices through analysis and sharing, and set standards for progress toward achieving the Sustainable Development Goals (SDGs) at the city level. Each indicator is a comprehensive assessment of a city's performance in three dimensions, "economic," "environmental," and "social and cultural." Each of these provides an individual measure of progress, and when reported together, they provide an overall picture of a sustainable smart city. Within the assessment dimension, there is a second assessment dimension that focuses on more specific areas of performance and progress. For example, the second evaluation dimension for ICT infrastructure provides a more detailed view of how ICT is deployed and used within the city.

(2) SDG-GUMF-NUA Alignment by Voluntary Local Reviews of UN-Habitat

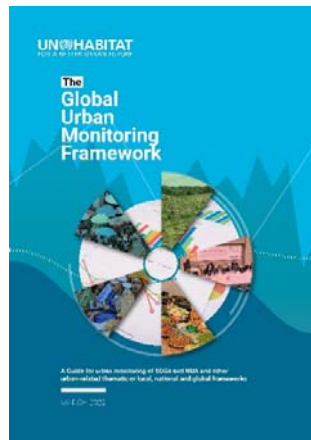
The officials of VLRs shared their on-going research data as a sample example to see how UNH is trying to align Global Urban Monitoring Framework (GUMF) and New Urban Agenda (NUA) with SDGs. This alignment aims to set indicators for GUMF with domain and for NUA with transformative commitments / effective implementation, domain, category and subcategory to meet SDGs with its targets and indicators. Indicators are set in quantitative in general, however some are considered in qualitative.

Besides, "Global Urban Monitoring Framework" itself also has an alignment mechanism with SDGs in

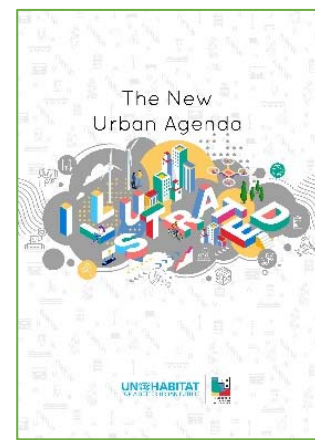
the document published by UN-Habitat. The VLRs' alignment study aims to add the GUMF's alignment with a new set of alignment of NUA.



Collection Methodology for Key Performance Indicators for Smart Sustainable Cities (Document Cover)



Global Monitoring Framework (Document Cover)



The New Urban Agenda (Document Cover)

6.4. Way Forward to Setup JICA's Smart City Development Indicators

(1) Approach to setting JICA's Smart City Indicators

It is recognized that the status of UN-Habitat's key performance indicator (KPI) setup is on-going and needed to wait for some more time for their release to public. During this JICA survey period, a possible existing KPIs in UNECE's "Collection Methodology for Key Performance indicators for Smart Sustainable Cities" are recommended, and could be the one that could be referred to formulate JICA's KPIs for Sub-Saharan Africa region smart city development.

It is important that the indicators may need to be set with a package of global layer indicators and local layer indicators from which each city who is going to implement their SC development could chose, according to the input by the UN-Habitat Quality of Life Initiatives. For formulating new KPIs for JICA program, it is also important to borrow the essences of GUMF and NUA indicators, domain and category, as the UN-Habitat Knowledge and Innovation Branch suggested. Additionally, finding the best effective citizen participation and involvement program along with KPIs formulation is indispensable. This has strong link to the importance of realizing "human-centered" smart cities.

Furthermore, all groups of UN-Habitat that the survey team had communicated expressed their interests in JICA's study and survey report sharing to them, emphasizing the relevance of clear KPIs and indicators and importance of their alignment for the African continent.

(2) Relationship between urbanization and the achievement of SDGs through Smart City Development Initiatives

The issues of urban development summarized in Chapter 2 are manifestations of the negative impacts of urbanization. On the other hand, urbanization can also have a positive impact by stimulating economic activities. The benefits of urbanization may include the following:

- ✓ By concentrating urban functions in a certain area, it becomes easier to develop infrastructure, such as road transportation networks, water supply, sewerage, electricity and gas pipelines, and distribution networks in a coherent manner, thereby increasing the efficiency of public investment.
- ✓ Similarly, the provision of education, medical care, and other administrative services will also become more efficient, leading to lower administrative costs.
- ✓ Gathering of people will create various needs, and businesses that provide services to those needs will arise, leading to the creation of employment opportunities and economic revitalization.
- ✓ Population agglomeration attracts more people, which leads to more efficient and sophisticated land use, and generates further efficiency gains through sharing and other means.
- ✓ Increased comfort of living in urban areas through more efficient administrative services, increased employment opportunities, and better quality of life infrastructure will be felt.

As urbanization progresses, the pressure of population growth will accelerate, and urban development challenges will emerge as a negative impact. By applying solutions to these challenges that were not previously available, it is conceivable that new urbanization benefits can be created. For example, car-dispatch services using smartphone applications are spreading globally as a new solution to address mobility needs and provide employment opportunities in countries and regions where public transportation systems are lagging behind. While such solutions are effective in meeting the mobility needs of countries with underdeveloped public transportation systems, it is undeniable that the increase in individual mobility may lead to issues, such as traffic congestion and air pollution caused by increased traffic, and further delays in the development of public transportation systems. Taking this perspective into account, it is necessary to consider how the contribution to the achievement of the SDGs through smart city development can be realized.

(3) Relevant SDGs Indicators to the Assessment of Smart City Development

The SDGs indicators set for some of the goals need to be considered as they are relevant for setting indicators to evaluate future smart city development. In particular, the indicators for SGD-6, SDG-9, SGD-11, and SDG-13, which are considered relevant to urban development, are listed below for reference.

Table 6-2: SDGs Indicators (SDG-6 and SDG-9: example)

Goal 6	Ensure access to water and sanitation for all	
6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all	
6.1.1	Proportion of population using safely managed drinking water services	
6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	
6.2.1	Proportion of population using (a)safely managed sanitation services and (b) a hand-washing facility with soap and water	
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	
6.3.1	Proportion of domestic and industrial wastewater flows safely treated	
6.3.2	Proportion of bodies of water with good ambient water quality	
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	
6.4.1	Change in water-use efficiency over time	
6.4.2	Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	
6.5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	
6.5.1	Degree of integrated water resources management	
6.5.2	Proportion of transboundary basin area with an operational arrangement for water cooperation	
6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	
6.6.1	Change in the extent of water-related ecosystems over time	
6.a	By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse	
6.a.1	Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan	
6.b	Support and strengthen the participation of local communities in improving water and sanitation management	
6.b.1	Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	
Goal 9	Build resilient infrastructure, promote sustainable industrialization and foster innovation	
9.1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	
9.1.1	Proportion of the rural population who live within 2 km of an all-season road	
9.1.2	Passenger and freight volumes, by mode of transport	
9.2	Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	
9.2.1	Manufacturing value added as a proportion of GDP and per capita	
9.2.2	Manufacturing employment as a proportion of total employment	
9.3	Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	
	Proportion of small-scale industries in total industry value added	
9.3.2	Proportion of small-scale industries with a loan or line of credit	
9.4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	
9.4.1	CO2 emission per unit of value added	
9.5	Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	
9.5.1	Research and development expenditure as a proportion of GDP	
9.5.2	Researchers (in full-time equivalent) per million inhabitants	
9.a	Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States	
9.a.1	Total official international support (official development assistance plus other official flows) to infrastructure	
9.b	Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition	
9.b.1	Proportion of medium and high-tech industry value added in total value added	
9.c	Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020	
9.c.1	Proportion of population covered by a mobile network, by technology	

Source: Official Website of Ministry of Foreign Affairs of Japan (<https://www.mofa.go.jp/mofaj/gaiko/oda/sdgs/statistics/goal11.html>)

Table 6-3: SDGs Indicators (SDG-6 and SDG-9: example)

Goal 11	Make cities inclusive, safe, resilient and sustainable		Goal 13	Take urgent action to combat climate change and its impacts	
11.1	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums		13.1	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	
11.1.1	Proportion of urban population living in slums, informal settlements or inadequate housing		13.1.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population (repeat of 1.5.1 and 11.5.1)	
11.2	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons		13.1.2	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030 (repeat of 1.5.3 and 11.b.1)	
11.2.1	Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities		13.1.3	Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (repeat of 1.5.4 and 11.b.2)	
11.3	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries		13.2	Integrate climate change measures into national policies, strategies and planning	
11.3.1	Ratio of land consumption rate to population growth rate		13.2.1	Number of countries with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported as reported to the secretariat of the United Nations Framework Convention on Climate Change (repeat of 13.b.1)	
11.3.2	Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically		13.2.2	Total greenhouse gas emissions per year	
11.4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage		13.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	
11.4.1	Total per capita expenditure on the preservation, protection and conservation of all cultural and natural heritage, by source of funding (public, private), type of heritage (cultural, natural) and level of government (national, regional, and local/municipal)		13.3.1	Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment	
11.5	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations		13.a	Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	
11.5.1	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population (repeat of 1.5.1 and 13.1.1)		13.a.1	Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the \$100 billion commitment through to 2025	
11.5.2	Direct economic loss attributed to disasters in relation to global gross domestic product (GDP)(repeat of 1.5.2)		13.b	Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	
11.5.3	Damage to critical infrastructure and number of disruptions to basic services, attributed to disasters		13.b.1	Number of least developed countries and small island developing States with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change (repeat of 13.2.1)	
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management		Source: Official Website of Ministry of Foreign Affairs of Japan (https://www.mofa.go.jp/mofaj/gaiko/oda/sdgs/statistics/goal11.html)		
11.6.1	Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities				
11.6.2	Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)				
11.7	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities				
11.7.1	Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities				
11.7.2	Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months				
11.a	Number of countries that have national urban policies or regional development plans that: (a) respond to population dynamics, (b) ensure balanced territorial development; and (c) increase local fiscal space				
11.b	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels				
11.b.1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030 (repeat of 1.5.3 and 13.1.2)				
11.b.2	Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (repeat of 1.5.4 and 13.1.3)				

(4) Possible Indicators for Smart City Development

The following table illustrates a set of possible development evaluation indicators for JICA's smart city approach with concerned Sustainable Development Goal links that the survey team has compiled based on the information and suggestions provided by UN-Habitat officials. The shown indicator in the table is only preliminary and indicative as the actual JICA's Smart City Indicator shall be thoroughly studied and formulated with more technical inputs and advices from wide range of specialists and professionals as well as academia concerned about Sub-Saharan Africa region smart city development and initiatives. In setting indicators, it is important to use the degree of improvement in the state of human life and urban development issues as the basis for evaluation, rather than evaluating the effectiveness of smart technologies.

Table 6-4: Preliminarily arranged Indicator to evaluate Smart City Development

Urban Development Issues and Challenges		Perspectives for Evaluation	Indicator (example)	Evaluation Aspect	Target SDGs
Urban Development and Land Use	Densification of individual properties and illegal settlements resulting from inadequate housing supply	It is necessary to indicate the level of improvement of the living environment of citizens in a city by evaluating the population density, quality of housing, and the standard of living environment at the community level. In addition, the land use in the city should be well-planned and operated accordingly, and the existence of land ownership rights should be evaluated as well to understand the measures to improve the housing supply.	Proportion of urban population living in slums, informal settlements or inadequate housing	Society Sustainable	SDG-11 (11.1.1)
			Population density	Implementation Inclusive	SDG-11 (11.1.1) (11.3)
			Land Use Mix		
	Unregulated development by the private sector	By comparing the land use plan with actual development, the land use operation should be evaluated whether the land use plan is ensured to be properly applied, thereby curtailing inappropriate development.	Ratio of consistency or divergence between land use plans and actual development	Implementation Inclusive	SDG-11 (11.3)
	Insufficient supply of affordable housing due to the customary land system	By assessing whether urban land use is planned and operated accordingly and properly, and furthermore, whether the existence and status of land ownership tenure rights are properly reflected in land use planning, the potential for housing development and supply without the adverse effects of the land system will be ascertained.	Ratio of consistency or divergence between the existence of land use plans (residential use) and residential development based on customary land tenure, etc.	Society Sustainable	SDG-11 (11.3)
	Increased risk of disasters due to housing development in inappropriate areas	By evaluating the existence of land use plans that take disaster risk into account and the operation of land use plans based on hazard maps, etc., effective restrictions could be set on the development of residential districts in higher disaster-prone areas.	Ratio of consistency or deviation between the existence of land use plans (residential use) based on disaster risk (hazard maps, etc.) and actual development conditions	Implementation Inclusive	SDG-11 (11.5.1) (11.b.1)
	Overconcentration in the CBD, resulting in severe traffic congestion in certain areas during commuting	By evaluating the level of infrastructure development and its services in relation to reducing the concentration of daytime population in the central city and properly managing the population inflow, it could lead to measures to alleviate traffic congestion.	Travel time required during commuting hours	Society Sustainable	SDG-11 (11.2.1)
	Green space reduction due to inadequate land use planning	Evaluate whether proper operation of the land use plan is ensured by comparing the land use plan with actual development. The required level of healthy green (natural) environment to the city could be assessed by evaluating the ratio of green space to urban area and the ratio of green space to population.	Ratio of land consumption to population growth rate	Environment Sustainable	SDG-11 (11.7.1)
			Protected Natural Areas		SDG-15 (15.1) (SDG-14.5)
			Ratio of Protected Natural Areas		

Urban Development Issues and Challenges		Perspectives for Evaluation	Indicator (example)	Evaluation Aspect	Target SDGs
Infrastructure Development	Delays in public transportation system development due to prioritization of road construction to accommodate motorization	To promote the development of infrastructure to meet the growing demand for public transportation use in urban life, the number of public transportation users and the capacity of existing infrastructure or the implementation status of plans will be assessed to improve the development plans of transportation infrastructure and the operational effectiveness of existing facilities needed by cities.	Population that has convenient access to public transport disaggregated	Society Inclusive	SDG-9 (9.1.1) SDG-11 (11.2.1)
			Percentage of commuters using public transport	Society Safe	
			Percentage of public transportation systems realized relative to planned extensions or routes	Society Sustainable	SDG-11 (11.2.1)
	Road development and intersection improvements not keeping pace with the pace of overall urban development	The function of intersections and roads in a city is evaluated in terms of their effectiveness in reducing traffic congestion and ensuring pedestrian safety, as well as the status of their implementation.	Traffic fatalities, Traffic jam duration	Society Safe	SDG-3 (3.6.1) SDG-11 (11.2.1)
	Widespread increase in traffic demand due to residential development in suburbs and along arterial roads, and gap between peak and off-peak traffic demand	In order to understand whether public transportation infrastructure, including roads, is adequately responding to population growth and public transportation demand due to the progress of residential development, the number of public transportation users, accessibility to multi-modal public transportation, and whether infrastructure development plans and their implementation are properly based on regional transportation demand forecasts, are comprehensively evaluated to determine the balance between supply and demand.	Proportion of the population that has convenient access to public transport disaggregated	Society Inclusive	SDG-11 (11.2.1)
			Number of commuters using public transport		
			Percentage of public transportation systems realized relative to planned extensions or routes	Society Safe	SDG-11 (11.2.1)
	Inefficient transportation services provided by the informal sector	Urban public transportation services are stabilized when they are introduced and operated based on public planning and funding by the government. In order to ensure more efficient transportation services, the level of use and demand for urban public transportation should be evaluated, and measures to improve the efficiency of urban public transportation operations could be identified.	Percentage of commuters using public transport	Society Inclusive	SDG-11 (11.2.1) (11.3.2)
	Delays in expanding water supply, sewerage development, and waste management (see Environmental Impact for waste management)	By evaluating the status of introduction and management of sewerage facilities, safe drinking water supply, and good sanitation for the maintenance of citizens' health, the contribution of infrastructure to the safety and health of citizens' lives could be recognized, and effective measures for service improvement could be identified.	Proportion of population using safely managed drinking water services	Environment / Society Safe	SDG-6 (6.a)
			Proportion of population using safely managed sanitation services		
	Unstable energy supply	In the daily lives of citizens supported by a stable electricity supply, the environmental impact reduction rate is evaluated based on the percentage of energy use with less environmental impact and the reduction of electricity consumption in the city, thereby ascertaining the level of improvement in the living environment of citizens.	Renewable energy share in the total final energy consumption	Environment Resilient	SDG-7 (7.2.1)
			Percentage reduction in annual final energy consumption in homes		
Environmental Impact	Deterioration of noise and air pollution due to increased traffic	Since an increase in urban population usually increases the demand for urban transportation and accelerates the expansion of environmental degradation, the impact on human health could be estimated and improved by assessing the level of noise and air pollution related to the transportation sector. These pollution levels could be evaluated based on disease rates, comparisons with pollution standards, and greenhouse gas emissions.	Disease rates attributable to household and ambient air pollution	Society Safe	SDG-3 (3.9.1)
			Number of days exceeding standard value		
			Total annual greenhouse gas emissions per capita	Environment Resilient	SDG-13 (13.2.2)

Urban Development Issues and Challenges		Perspectives for Evaluation	Indicator (example)	Evaluation Aspect	Target SDGs
Environmental Impact	Deterioration of the surrounding environment due to unaddressed increases in waste emissions and illegal dumping	Since wastes, including solid, liquid, and gaseous wastes, cause environmental pollution and degradation, the control of these emissions and the recycling rate of wastes are evaluated to determine the level of environmental impact caused by the wastes and to make improvements.	Hazardous Waste Emissions	Environment Resilient	SDG-3 (3.9)
			Recycling rate, tons of material recycled		SDG-12 (12.5.1)
	Increase in urban flooding due to illegally dumped waste blocking drainage channels	Uncollected and unmanaged domestic waste and litter in waterways, storm drainage systems, etc. can cause blockages in waterways, etc., resulting in urban disaster, such as flooding, in the event of rainfall, etc. Since health hazards can also increase due to this urban flooding, the waste collection rate and management level should be evaluated to determine the negative impact of waste on the urban environment.	Collection rate (number of households and establishments covered)	Society Resilient	SDG-11 (11.5.1) (11.6.1)
			Proportion of municipal solid waste collected and managed in controlled facilities out of total Municipal Solid Waste generated by cities	Environment Safe	
	Worsening of water pollution due to delays in the development of sewer systems	Delayed sewerage system development leads to stagnation and retention of wastewater, which in turn leads to foul odors and further water pollution in the area (including groundwater). In order to measure the need for sewerage system maintenance, the impact of unmanaged wastewater on the community may be evaluated and integrated to remedial measures.	Number of complaints in affected areas	Society Resilient & Environment Resilient	SDG-3 (3.9) SDG-6 (6.1.1) (6.2.1)
	Food supply gaps, food supply vulnerability	The supply of food, a benefit from nature, is also an important factor in the stability of citizens' lives, so that the actual situation regarding food supply will be evaluated.	Food insecurity	Society Resilient	SDG-2 (2.1.2)
Social and Economical	Vulnerability to natural disaster	Assessing the impact level of natural disasters specific to cities and regions to determine the level of urban disaster vulnerability.	Population affected by hazardous events	Environment Resilient	SDG-15 (15.9.1)
	Deterioration in public safety due to the mix of various income groups	In urban life, citizens of various income levels and living standards are mixed together, and income disparity and other disparities often manifest themselves. In such an environment, there are many situations in which income disparity and differences in living standards can induce crime. Therefore, in a city that is growing, it is important to understand the income and living standards of its citizens, and to measure discrimination and disparity among them based on crime rates, etc., in order to understand the need for improvement in living standards and to develop measures to improve the social environment.	Gini coefficient at national/ city /urban levels	Society Inclusive, Society Sustainable	SDG-1 (1.1.1) SDG-10 (10.3) (10.7)
			Reporting of Violence		SDG-16 (16.3.1)
	Insufficient employment opportunities (especially for young people), increase in informal employment	While the influx of people seeking better social services and job opportunities has led to an increase in urban population and urban growth, employment opportunities have not increased proportionally. In order to realize healthy employment opportunities in society, it is important to evaluate the employment situation and its environment, income levels, and other factors in cities, and determine the need for industrial development and other necessary measures.	Proportion of population below the international poverty line	Society Inclusive	SDG-1 (1.1.1)
			Unemployment rate by sex, age, persons with disabilities and by city	Economy Inclusive	SDG-8 (8.5.2)
	Increased traffic accidents due to increased traffic volume	Evaluate the transportation environment in a city to understand the measures that can be taken to enhance urban safety from needed transportation infrastructure improvements.	Traffic fatalities	Society Safe	SDG-3 (3.6.1)
	Lack of public service facilities and inadequate maintenance	Since improving the quality of life of citizens requires a variety of services and their facilities, including administrative services, medical care, education, welfare, etc.,	Annual number of vocational and technical education individuals trained	Society Inclusive	SDG-4 (4.1.1) (4.1.2) (4.4)

Urban Development Issues and Challenges		Perspectives for Evaluation	Indicator (example)	Evaluation Aspect	Target SDGs
Social and Economical		evaluating the services a city can provide to its citizens may contribute to measures to improve or enhance them.	Education completion rate		
	Deteriorating health status of citizens and lack of social services for health maintenance	The basis for maintaining the health of citizens in a city is to ensure a stable food supply and medical care level, etc. In order to measure the stability of these services, the health status of citizens is evaluated, leading to countermeasures.	Prevalence of malnutrition in children	Society Inclusive	SDG-2 (2.2.2)
	Few urban job opportunities and lack of income growth	Stable employment opportunities are essential to improve the income of citizens, households, and other groups. By assessing the level of income and industry in the city, it could contribute to identify measures and possibilities for improving employment opportunities and income.	Annual growth rate of real GDP per employed person	Economy Inclusive	SDG-8 (8.3.1) (8.5.2)
	Fewer entrepreneurial opportunities and fewer small businesses	To identify measures to establish or strengthen the foundation for the development of urban and regional industries, the structure of small-scale industries and the number and percentage of small and medium-sized enterprises (SMEs) should be determined to assess the potential for regional industrial growth.	Small and medium-sized enterprises percentage share of GDP Small-scale industries in total industry value added	Economy Safe	SDG-9 (9.3.1)
	Women are not making progress in society, and gender disparities are widening.	Since women's social advancement is closely related to their engagement in domestic labor, the evaluation of women's hours and content of domestic labor as well as their employment status in public institutions may lead to the possibility of women's social advancement.	Time spent in unpaid household and care work Number of staff engaged in city planning in public institutions, percentage of positions held (male/female)	Governance and Implementation Inclusive	SDG-5 (5.4.1) (5.5.1)
Governance	Lack of capacity in urban planning and its implementation	Identify existing urban development plans, land use plans, etc. and their implementation status to ascertain the implementation capacity of the government agencies responsible for their implementation, and to link this to measures that will contribute to their strengthening.	Existence of a development plan and/or land management plan in force in the city Availability of city multi-hazard mapping	Governance and Implementation Inclusive Environment and Society Safe	SDG-11 (11.3) SDG-11 (11.3)
	Slow introduction of ICT in public service delivery	To assess the digitization of public service provision in cities, the status of efforts to utilize various technologies such as ICT, AI, DX, IoT, etc. and data utilization, as well as the status of expansion of citizen services. In particular, the status of information networking will be evaluated and measures to improve it could be identified.	Percentage of utilizing e-governance and citizen-centric digital governance tools Fixed Internet broadband subscriptions, Internet Usage Mobile Phone Ownership and App Usage Rates	Economy Inclusive Governance and Implementation Economy Inclusive	SDG-16 (16.5) SDG-17 (17.6.1) SDG-16 (16.5)
	Equal opportunity regarding government employment is not realized.	In order to realize equal employment opportunities within the government, proper operation of the legal system is necessary. Through the confirmation of legal system and the evaluation of its operation, management, etc. measures for improvement may be recognized.	Existence of national laws prohibiting discrimination in the use of housing, public facilities, and social services	Society Sustainable	SDG-10 (10.3)
	Citizen participation in urban and regional development is not progressing and citizens' needs are not reflected in development	In urban development, citizen participation (or the introduction of citizen opinions) in a wide range of processes from development visioning and planning to implementation, operation, and management is likely to ensure development based on citizen needs rather than government dictated development. Therefore, the status of citizen participation at each stage of development will be evaluated to promote efforts to strengthen participatory approaches.	Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratic	Governance and Implementation Inclusive	SDG-11 (11.3.2)

Source: Prepared by Survey Team based on the information, data and advices given by UN-Habitat (This table also refers to urban development issues indicated in Table 2-6.)

Note: The blue colored box information in the table refer to ideas that are included in UN-Habitat's consideration as other than urban development issues described in Chapter 2.

Chapter 7 Result of On-Site Survey in Senegal and Rwanda

7.1. Objectives and Activities

(1) Objectives of On-Site Survey

As described in the Chapter 3, the survey team conducted a desktop survey in the survey target region. After analyzing the information obtained from the desktop study and taking into account JICA's consideration, Senegal and Rwanda were selected as target countries for the site survey. The objectives of the survey are to investigate the urban issues faced by the target countries and the status of urban and smart city development, as well as to exchange opinions on the smart city development approaches considered by the survey team based on the information collected through the desktop survey. The survey team visited government agencies and organizations associated with the smart city development initiatives in these countries. The gathered information and data were then integrated into the desktop survey results for updated information. This chapter presents an overview of the information obtained from the site survey. Prior to the on-site survey activities, the survey team distributed a questionnaire containing related questions to each organization in advance and requested them to respond to the questions. The information collected from the questionnaire and interviews to the organizations are incorporated into the survey results.

(2) Survey Activities

The survey team conducted the on-site survey in Senegal and Rwanda from January 21st to February 5th, as detailed in the Table 7-1 and Table 7-2 below. While the total on-site travel duration spanned from January 20th to February 7th 2024, the tables Table 7-1 and Table 7-2 below specify the actual on-site work periods, excluding air travel periods between the countries. The primary activities during the on-site survey were mainly meetings and interviews with the target organizations, including government agencies and government-affiliated companies.

Table 7-1: Site Survey Program in Senegal

Date & Time	Organization/Activity	Name of Officials
2024-Jan-22	Délégation générale à la Promotion des Pôles urbains de Diamniadio et du Lac Rose (DGPU)	Dieynaba Diop
	La Societe d' Amenagement et de Promotion des Cote et Zones Touristiques du Senegal (SAPCO)	Mouhamadou Moustapha
2024-Jan-23	Site visit in Diamniadio	-
2024-Jan-24	Société de Gestion des Infrastructures publiques dans les Pôles Urbains de Diamniadio et du Lac Rose (SOGIP)	Mamadou Faye Safietou Seye Sall
2024-Jan-25	Dakar City Municipality	Ngouda Sall
	Ministre des Collectivités territoriales, du Développement et de l'Aménagement des Territoires (MCTADT)	Pape Ngorthiad Modou Ndoeye Balla Diop Ngom

Date & Time	Organization/Activity	Name of Officials
2024-Jan-26		Abdurrahman Sene Momor Gueye Binetou Ly
	Ministère de L'Urbanisme du Logement et de L'Hygiène Publique (DGUA)	Youssofpha Mane
	Ministry of Communications, Telecommunications and Digital Economy (MCTEN)	Aissatou J. Ndiaye Sy Diot Anadou Nalick Falou Thiam
2024-Jan-26	Rufisque City Municipality	Sidy Mbaye Isseu Toure Diene Saliou Bineta Gueye Aly Diagne Ngom
	JICA Senegal	Takayuki Muraoka Hiroshi Yoshikawa Caroline Diouf

Table 7-2: Site Survey Program in Rwanda

Date & Time	Organization/Activity	Name of Officials
2024-Jan-29	JICA Rwanda	Ken Ozawa
2024-Jan-30	Ministry of ICT & Innovation (MINICT), Rwanda Information Society Authority (RISA), National Cyber Security Authority (NCSA)	Antoine Sebera Alice Higiyo Alain Kamanzi Sosthene Bwigenge
	Ministry of Infrastructure	Eric Hakizimana
2024-Jan-31	JICA Rwanda (Expert)	Satoshi Shonai Ken Ozawa
	Site visit at KLab/FabLab	-
2024-Feb-1	Rwanda Information Society Authority (RISA)	Dr. Rene Kabalisa
	Kigali city survey	-
2024-Feb-2	Site visit at a local market	-
2024-Feb-3	Site survey in periphery city	-
2024-Feb-4	Data/information management	-
2024-Feb-5	JICA Rwanda	Ken Ozawa

7.2. Understanding the Information obtained from the Survey

Although the desktop survey data collection could obtain fair amount of information to understand the target countries' status of smart city initiatives, the information and data collected were still limited to fully understand the countries' initiatives. Therefore, the survey team sent questionnaire to each nominated organization prior to the visit to let the counterpart officials to understand the background objective of the study. Through actual interviews and discussions following the general explanation of the survey background and objective, the team thoroughly obtained about their smart city initiatives taking into account urban development issues, smart city policies and visions, organizational structure, institutional and legal frameworks, technologies and implementation methods that have been introduced and considered. Additionally, the survey team outlined JICA's draft strategy for smart city approach in the Sub-Saharan

Africa region, showcased possibility for smart city development assistance in the target survey, and obtained opinions and insights from the interviewees on the matter. The survey findings are detailed in the following pages. The records of the discussions and the questionnaire responses are included as the appendix for reference.

7.2.1 Result from On-Site Survey in Senegal

(1) General Information Obtained

The survey team comprehensively gathered information on various aspects of the smart city initiative. Initially, the survey team tried to understand the responsibilities of the relevant organization, outlining its role and commitments in implementing smart city initiatives. Additionally, the survey team collected information on the priority issues, current status of policies and visions, legal and institutional frameworks, technologies to be introduced, and implementation methods that should be addressed to solve urban issues and promote effective urban development.

(2) Responsibility of the Organization in Smart City Development

Responsibility and roles related to smart city development are distributed across multiple organizations.

- The Ministry of Communications, Telecommunications and Digital Economy (MCTEN) holds a role in driving national-level smart city initiatives.
- The General Delegation for Urban Poles of Diamniadio and Lac Rose (DGPU) plays a role with a specific mandate for the management of the implementation of smart city in Diamniadio.
- Several state entities at the national level are also entrusted with mandates related to smart city development include: the General Directorate of Urban Planning and Architecture (DGUA), the National Agency for Territorial Planning (ANAT), the Municipal Development Agency (ADM), the Senegal Digital Agency (SDA), and the Senegalese Space Studies Agency (ASES). These organizations collectively contribute to shaping the vision and strategy for smart city development in Senegal.

At the sub-national level, the responsibility lies with local authorities. Local governments play a role in the implementation and execution of smart city initiatives, ensuring that the principles and strategies devised at the national level are applied within specific urban areas.

(3) Status of Policy and Vision Setup for Smart City Development Initiatives National Level

National Level

The National Strategy for the Development of Smart Cities and Communities (*Strategie Nationale de Developpement des Villes et Communautés Intelligentes et Durables au Senegal*), adopted in Senegal in 2022, serves as a cornerstone for navigating the smart city development. The strategy is implemented by the MCTEN in collaboration with the Smart Africa Alliance. The smart city vision in the strategy states that “A smart city or community in Senegal is the one that is connected to ICT, improving the quality of life for

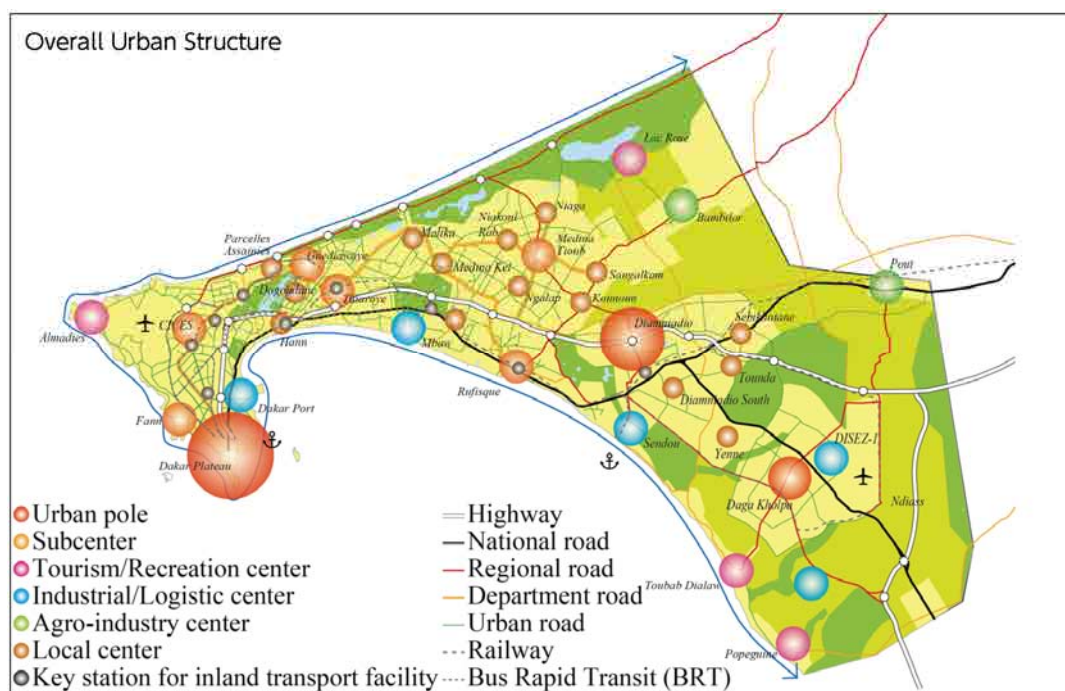
its citizens by organizing and optimizing urban services that meet the needs of citizens in an affordable, accessible, and sustainable manner.”

Aligned with various national plans as shown below, this document reflects an approach to smart city development, emphasizing sustainability, inclusivity, and technological innovation.

- Emerging Senegal Plan (*Plan Senegal Emergent*)
- Senegal Digital Strategy SN2025 (*Stratégie Sénégal Numérique SN2025*)
- National Data Strategy (*Stratégie Nationales des Données*)
- National Strategy on Artificial Intelligence (*Stratégie Nationale sur l'Intelligence Artificielle*)

City Level

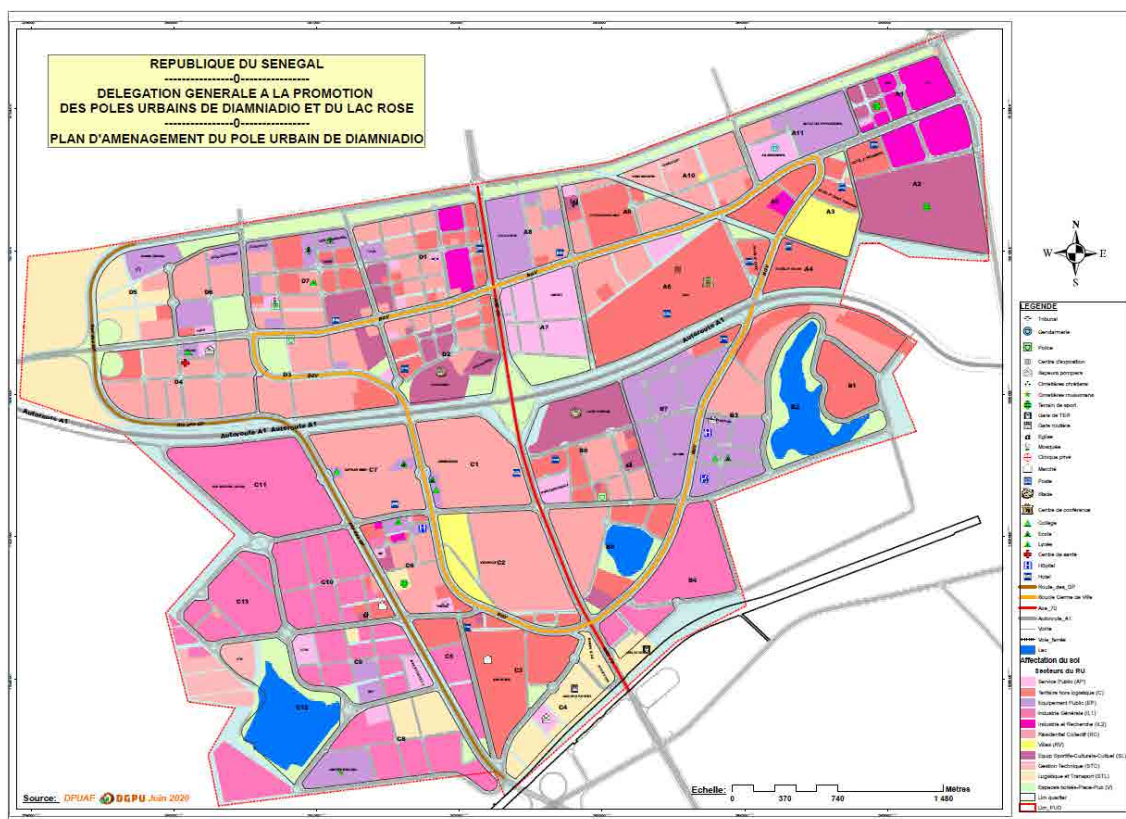
For Dakar City, an Urban Development Plan (PDU) has been formulated in 2016 under JICA’s assistance to address urban development challenges, with a strategic vision aiming to make Dakar as “A city of hospitality characterized by a comfortable living environment, easy communication, and innovative creation that will be inclusive, sustainable, competitive, and supportive.” PDU aligns with Sustainable Development Goal (SDG) 11, emphasizing inclusivity, safety, resilience, and sustainability. The city emphasizes considerations for disaster risks, security, environmental aspects, and intelligent transportation systems for sustainable smart city development. DGUA has adopted its Sectoral Policy and Development Letter (LPSD), which is “inclusive, resilient, and sustainable urban development for an emerging Senegal by 2035” in coherence with the Emerging Senegal Plan (PSE) outlining the vision for the urban development. The urban structure for Dakar and neighboring areas for 2035 is shown in the following figure.



Source: Project for Urban Master Plan of Dakar and Neighboring Area for 2035, JICA

Figure 7-1: Overall Dakar Urban Structure for 2035

Furthermore, DGPU is actively driving smart city demonstration activities in Diamniadio City. The strategies include creation of a comfortable environment, promotion of innovation, urban development management, environmental management, and enhancement of inclusivity. The vision of the smart city incorporates the aspect of sustainability, and defines to strengthen the quality of life for the citizens and reduce environmental impact, hence a sustainable smart city realizes. The land use plan of Diamniadio City is shown in Figure 7-2 below.



Source: DGPU

Figure 7-2: Land Use Plan of Diamniadio City

(4) Urban Development Issues

The survey on urban development issues in Dakar City consists of five aspects, namely 1) urban/land use, 2) infrastructure development, 3) environmental situation, 4) social context and economic situation, and 5) governance. These aspects provide an overview on understanding of the interconnected challenges faced by the city of Dakar, serving as a foundation for informed decision-making and the formulation of comprehensive strategies to foster sustainable and equitable urban development in the city. The survey results are summarized in Table 7-3.

Table 7-3: Urban Development Issues in Dakar

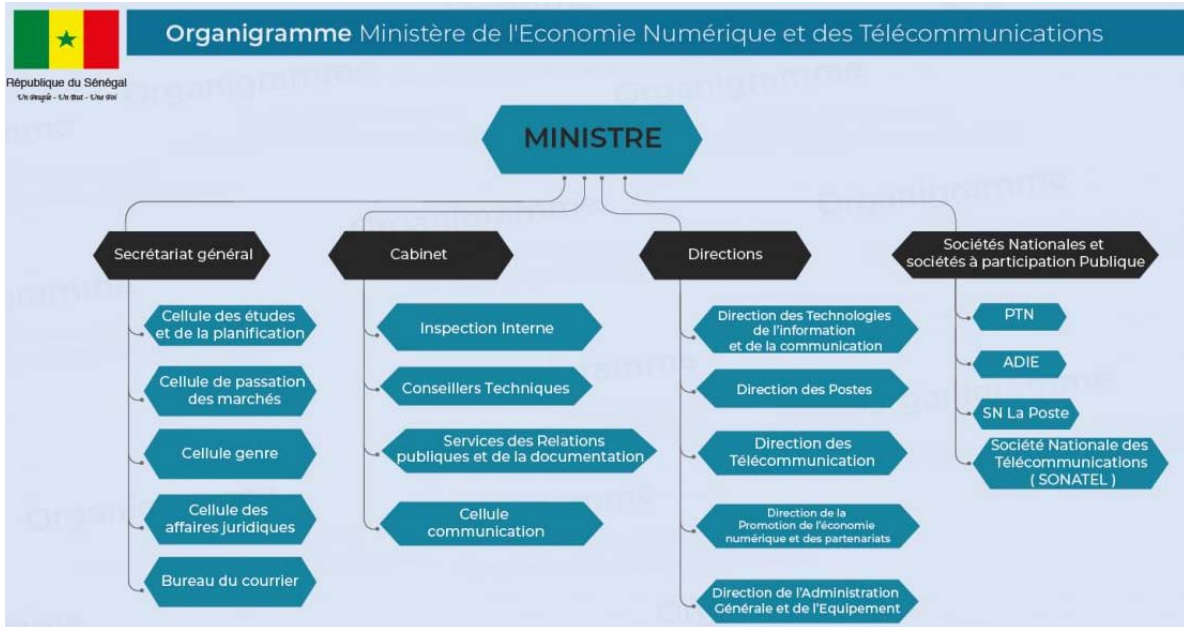
Aspect	Issues
Urban/land use	Dakar's urban and land use challenges range from rapid urbanization, urban sprawl, leading to unplanned growth and irregular settlement and anarchic land occupation. These are indicative of the challenges in maintaining organized and sustainable urban development in Dakar.
Infrastructure development	Dakar experiences insufficient basic infrastructure, hampering the city's overall development. Ineffective urban transport exacerbates connectivity issues and traffic congestion, highlighting the urgent need for strategic improvements in the city's infrastructure framework. The pressing need for improvements in infrastructure development is underscored by the challenges posed by an growing population and rapid urbanization, requiring strategic investments to enhance the city's functionality.
Environmental situation	The environmental challenges include floods, posing a threat to the city's resilience; air pollution, posing health risks to residents; and degrading the overall urban environment, posing vulnerable to the adverse effects of climate change. Addressing these environmental concerns is crucial for ensuring a sustainable and resilient urban future.
Social context and economic situation	The social context reflects disparities in access to essential services, such as healthcare and social amenities, revealing underlying socio-economic inequalities. Unemployment rate add to the social challenges, necessitating targeted interventions to enhance economic opportunities and improve overall well-being of population in the city.
Governance	Dakar faces governance challenges, with ineffective urban policy implementation and a lack of coordination among various stakeholders. Corruption and mismanagement further exacerbate the challenges. Developing a more coordinated and responsive governance structure is essential to overcoming obstacles and ensuring sustainable urban development in Dakar.

Source: The Survey Team based on the hearing and questionnaire

(5) Organization Structure

The main organizational framework for smart city implementation in Senegal involves key agencies namely MCTEN and DGPU. MCTEN plays a role in driving national-level smart city development, shaping the vision and strategy for development. As shown in the Figure 7-3, there are four divisions, which are secretariat general, cabinet, direction, and national company and company with public participation under the ministry. Under each division there are several sub-divisions assigned.

DGPU holds a specific mandate for management of the implementation of a smart city in Diamniadio. The physical constructions, including infrastructure development, have been currently undertaken by a state-owned company. Subsequently, the same entities will take responsibilities for operating and managing the facilities post-construction. The organization structure of MCTEN is as shown in the Figure 7-3 hereafter.



Source: MCTEN Home Page

Figure 7-3: Organization chart of MCTEN

(6) Legal and Institutional Framework

In Senegal, creating an enabling environment for smart city development involves plans to update the legal framework for Information and Communication Technology (ICT). This forward-looking approach aims to accommodate the evolution of the ICT sector and regulate new technologies, ensuring that legal structures align with the dynamic nature of smart city initiatives. In tandem with these updated legal frameworks, Senegal has established a national strategy for development of smart cities, serving as a strategic roadmap for the implementation of smart city initiatives. This overarching strategy provides a cohesive and guiding framework, aligning legal, regulatory, and developmental efforts to ensure a synchronized and effective approach to implementation of smart city development.

Further contributing to the legal foundation for smart city development, the current urban planning and construction codes are providing a legal foundation that incorporates aspects related to climate change and energy efficiency, while incorporating related legal systems, such as telecommunication code, law on cybersecurity, and law on the protection of personal data, forming a comprehensive institutional framework for smart city development. The private sector's role in advancing smart city initiatives is supported by various enabling factors in Senegal as follow.

- Territorial Development Strategic Frameworks (PNADT)
- Creation of Urban Hubs
- Establishment of Special Economic Zones
- Digital infrastructure and the Public-Private Partnership (PPP) law
- National Urbanization Policy (PUN) (currently in the formulation stage)

(7) Technologies applied or considered

In Senegal, technology is recognized as indispensable in reshaping urban spaces and addressing urban challenges. ICT plays a central role, particularly in urban planning, where Geographic Information Systems (GIS), *TéléDemande d'Acte Administratif* (TeleDAC: an online platform introduced by the Senegalese government to facilitate the process of requesting administrative documents electronically), and Intelligent Transportation Systems (ITS) are being used. These technologies aim to enhance urban mobility through technologically advanced infrastructure, including the Regional Express Train (TER) and Bus Rapid Transit (BRT). Senegal boasts a robust technology infrastructure with existing fiber optic networks, upcoming satellite launches, and the technological advancement from 4G to soon-to-be-implemented 5G networks. These advancements reflect a commitment to leveraging technology to address urban challenges and improve the overall quality of life in Senegal's urban areas. Smart solutions also have been implemented in essential fields, such as water, sanitation, lighting, mobility and environment. Furthermore, the technology is enriched by the integration of cutting-edge innovations. Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, and Data Analysis and Exploitation are among the advanced technologies contributing to the implementation of smart city.

(8) Implementation Method

Smart city development in Senegal involves collaboration between key national entities, including MCTEN and DGPU. The strategic vision emphasizes aligning with national development priorities, integrating technology into urban planning, transportation and infrastructure. The Ministry of Urban Planning, Housing, and Public Hygiene plays a central role in driving urban development plan, engaging with academia and the private sector. While there are various platforms for interaction with stakeholders from academia and the private sector, these collaborations are not always formalized. The ministry receives private sector solutions, fostering partnerships through evolving frameworks defined by the government. The existence of laws governing PPP and public procurement opens up opportunities for private sector engagement allowing for spontaneous offers and partnership agreements that are crucial for the implementation of innovative technological programs essential for sustainable urban development.

Collaborative frameworks exist between government agencies, such as the collaboration between ADM and DGUA. In Senegal's national strategy for smart city development, collaboration with the private sector and academia is important, recognizing them as key stakeholders. Academic involvement is essential with joint initiatives and reliance on academia in formulating public policies. Citizen participation is gradually gaining recognition with ongoing experimental initiatives in infrastructure and urban transport. While citizen engagement potential is significant, formalized cooperation frameworks are essential to ensure inclusivity and ownership in smart city development, aligning with the goals of National Urban Planning Program.

(9) Issues and Challenges the Country / City is facing that hinder the smart city initiative

The implementation of smart city development faces multiple challenges and obstacles in Senegal. Some of primary bottlenecks are as follow. The government is recognized that addressing these challenges is important.

- Lack of dedicated funding for smart city development plans and implementation
- Non-application of existing plans, leading to a gap in translating strategic visions into actions
- Lack of ownership of smart city plans by the Dakar citizens
- Absence of a formal coordination mechanism and implementation framework for the smart city Program
- Complexity of the legal framework and a lack of understanding by stakeholders
- Delays in realizing essential infrastructure and development networks (*Voirie et Réseaux Divers: VRD*)

(10) Remarkable Points learnt from the survey

The smart city development in Senegal focused on the Diamniadio City with key organizations, for instance, MCTEN and DGPU are playing important roles. The Diamniadio smart city initiative emphasizing ICT connectivity and improving citizens' quality of life through organized and optimized urban services. The main purpose of the development is to reduce urban challenges faced by Dakar City. There are a total of 6 urban poles near Dakar, with Diamniadio and Daga Kholpa being the main target to be developed to decongest Dakar. Challenges in the implementation include funding gaps and the absence of formal coordination mechanisms, impacting the full realization of smart city initiatives in Diamniadio.

7.2.2 Result from On-Site Survey in Rwanda

(1) General Information obtained

Similar to the information collected from the Senegal site survey, the information on management and operation of smart city development, policies and visions, urban development issues, organizational structure, laws and regulations/systems, technologies that are being considered for application or introduction, implementation methods, issue on the smart city development, was collected.

(2) Responsibility of the Organization in Smart City Development

At the national level, the Ministry of ICT and Innovation (MINICT) is the main agency of driving the development of smart cities. The main role involves creating a policy for smart cities, formulating and monitoring the implementation of the national policies to promote development of ICT and innovation fields, managing the implementation of strategies, programs, and disseminating these technologies. The functions of the ministry are divided between two key departments, namely (1) Digital Government Transformation and (2) Innovation and Business Development. The Ministry is actively engaged in the innovation and ICT private sector development program. It's worth noting that the Ministry of

Infrastructure holds the responsibility for promoting urbanization and infrastructure development. At the sub-national level, the Rwanda Information Society Authority (RISA) is in charge of implementing and coordinating smart city initiatives.

(3) Status of Policy and Vision Setup for smart city Initiatives

The existing vision/strategy/plan for smart city development in Kigali is written in the Smart Rwanda 2020 Masterplan, and currently undergoing of revision. The overall vision of this master plan is to transform Rwanda from an agrarian economy to a knowledge-based society. The master plan is structured in three key pillars:

1. Smart Governance and Planning

It is emphasizing inclusive data-led management and planning to enhance the efficiency and effectiveness of urban development.

2. Smart and Efficient Services and Utilities

It is focusing on the establishment of efficient, community-based infrastructure and services to meet the evolving needs of the residents.

3. Localization Innovation for Socio-economic Development

It is aiming to foster the local innovation community by enhancing their skills, capacity, financing, and market expansion opportunities.

The realization of these pillars is facilitated through various models, including:

- Technological Model

This model formulates a framework for new economic opportunities, enhancing the startup ecosystem, testing new technologies in “urban beta-sites⁸,” and positioning the city as a hub of knowledge and experience. Global companies are encouraged to pilot their solutions within the city.

- Collaborative Model

This model involves small-scale solutions that engage communities, neighborhoods, innovative municipal workers, and motivated citizens. Initiatives, such as publishing challenges and policy labs, exemplify collaborative efforts that contribute to mutual ownership and development.

(4) Urban Development Issues

The survey on urban development issues in Kigali City focuses on five aspects, namely 1) urban/land use, 2) infrastructure development, 3) environmental situation, 4) social context and economic situation, and 5) governance. The survey results are summarized in the Table 7-4.

⁸ The terminology used in the Smart City Rwanda Master Plan

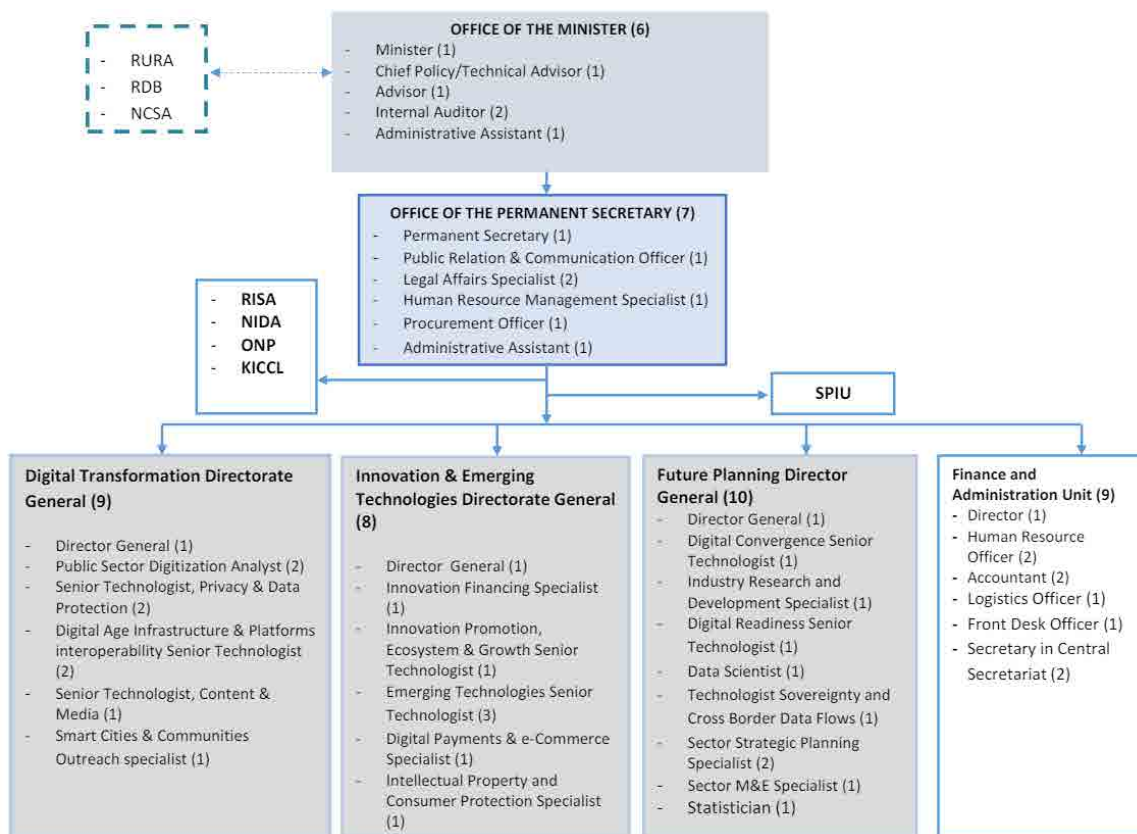
Table 7-4: Urban Development Issues in Kigali

Aspect	Issues
Urban/land use	The current situation in Kigali City is characterized by uncontrolled urban expansion and a high gross density, presenting substantial challenges to sustainable land use planning, provision of affordable housing to accommodate its growing population, and maintaining city cleanliness.
Infrastructure development	Kigali City faces issue concerning the vulnerability of its infrastructure to the impacts of climate change and a lack of comprehensive information on the locations of the infrastructure.
Environmental situation	In the environmental context of Kigali City, effective stormwater management and the mitigation of flooding risks emerge as significant challenges. In addition, a report from Rwanda Environment Management Authority (REMA) in 2020 underscores that the transportation sector, particularly within the city, stands out as the primary source of emissions. This highlights the urgent need for sustainable urban planning and transportation solutions to address environmental concerns.
Social context and economic situation	Kigali City characterized by the existence of informal settlements and a heavy dependence on agriculture for employment. Furthermore, the limited availability of public parks within the city decreases recreational spaces and communal areas, impacting the well-being and social cohesion of its population.
Governance	Governance challenges in Kigali emphasize the importance of coordination among stakeholders, the enforcement of laws and regulations, and the establishment of a robust legal framework. The way governance works in Kigali City shows that the existing institutional structures are more focused on rural development. Adding to the challenge, the city lacks accurate and up-to-date data, making it difficult to make well-informed decisions.

Source: The Survey Team based on the hearing and questionnaire

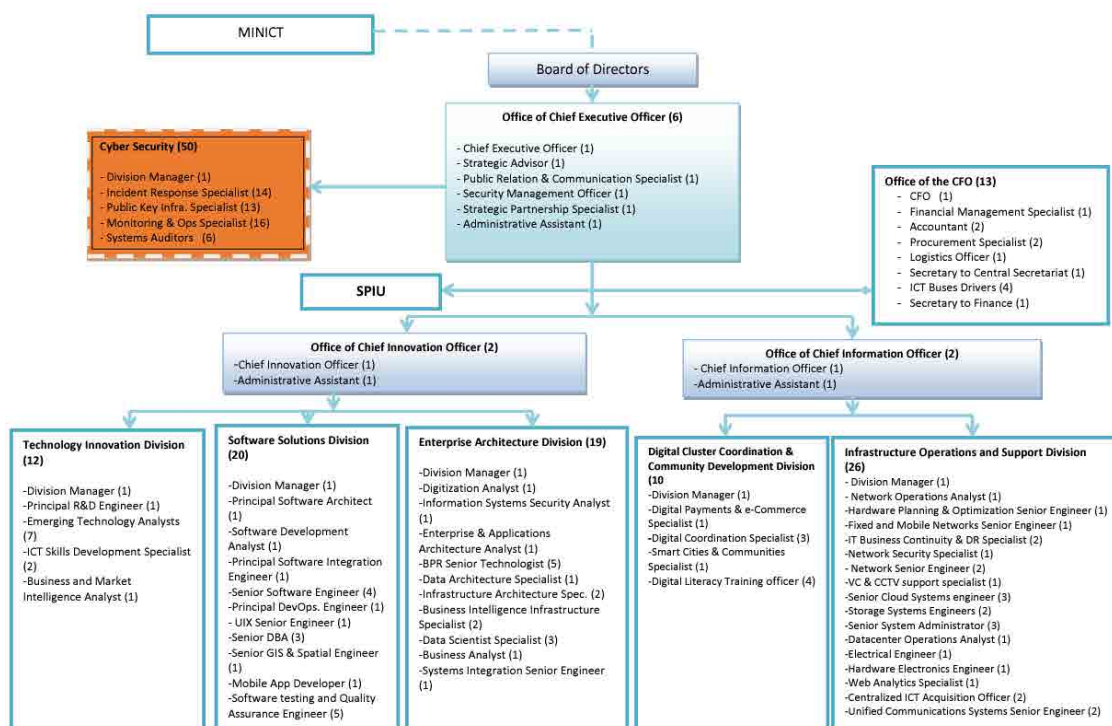
(5) Organization Structure

The organization for smart city implementation in Rwanda involves key agencies playing main roles at both national and sub-national levels. The MINICT takes a lead role at the national level, driving the development of smart cities by creating policies, overseeing implementation, and actively engaging in innovation and private sector development. The RISA is for coordinating and executing smart city development initiatives at the sub-national level, focusing on practical implementation efforts within the country. The organization structure of these agencies is as shown in the Figure 7-4 and Figure 7-5 hereafter.



Source: MINICT Home Page

Figure 7-4: Organization chart of MINICT



Source: RISA Home Page

Figure 7-5: Organization chart of RISA

(6) Legal and Institutional Framework

The enabling environment for accelerating smart city development in Kigali is supported by a legal framework, primarily governed by Law No. 24/2016 (18/06/2016) governing Information and Communication Technologies. Another framework initiatives worth highlighting are as follow.

- Regulatory Sandbox by the Rwanda Utilities Regulatory Authority (RURA): This serves as frameworks that encourage the use of new technologies across regulated sectors, such as financial services and mobility. By leveraging analytics and cloud computing, this approach aims to enhance operational efficiency and citizens' engagement capabilities. RURA has established a Regulatory Sandbox, a regulatory framework that offers a controlled space for companies or startups to design and experiment with innovative technology solutions without immediately being subject to all the regulatory requirements applicable to licensed or authorized entities. This framework is applied in two key scenarios:
 1. For companies or startups introducing tech-based solutions that have not been tested on the market, allowing application developers or owners to live-test the solution or product in a controlled environment, determining its feasibility, scope, and scale without having to comply with the full set of regulatory requirements.
 2. For those with technology products already in the market, who wish to continue research and development. The Regulatory Sandbox provides an opportunity to live-test and introduce any product enhancements, variations, or new features on a limited roll-out basis within the confines of the regulatory sandbox.

Public Procurement for Innovation serves as a new instrument to promote the innovation ecosystem and government acquisition of technology solutions from the private sector to fast attract digitization of public services. This tool aims to curb barriers to participation in public procurement for startups to enable them to compete fairly with larger companies.

(7) Technologies applied or considered

Various technologies have been introduced to contribute to addressing urban issues and enhancing the quality of life in Kigali as follow.

- In the administrative area, platforms like IREMBO offer access to over 100 government services, streamlining citizen-government interactions.
- The Building Permit Management Information System (BPMIS) facilitates the efficient issuance of building permits.
- In urban development monitoring, innovations, such as the Urban Dynamic Map, play a crucial role. These technologies aid in tracking urban development activities and are particularly valuable for monitoring ongoing efforts to eradicate informal settlements.

- Technology providing accurate weather information in mitigating problems arising from climate change and heavy rains is considered.
- Internet of Things (IoT) technology is being leveraged in waste management, environmental monitoring, and mobility solutions.
- Blockchain technology is projected.
- Geo-fencing integrated with CCTV enhances security measures in the urban area.
- Artificial Intelligence is beneficial in the city's response to challenges like the Covid-19 pandemic.
- In the mobility sector, technologies, such as GPS, contribute to efficient transportation solutions.

Geographic Information System (GIS) is utilized for accessible online master plans.

(8) Implementation Methodologies

In Kigali's implementation of smart city development, one of the initiatives is the establishment of the Smart City Hub. This collaborative space brings citizens, the private sector, research institutions and the government together to collectively identify challenges, fostering the co-creation for the solutions. The Smart City Hub is driven by a consortium comprising three institutions: MINICT, RISA, and the ICT Chamber. The objectives of the Smart City Hub encompass (1) creating a demand-driven agenda, (2) serving as a place for research, knowledge, and connections, and (3) providing smart city solutions to identified challenges.

Under the umbrella of the Smart City Hub, the "Smart City Connect" initiative serves as a platform to promote knowledge sharing and co-creation among various smart city stakeholders. This includes citizens, leaders, and institutions who share common interests. Through this initiative, participants not only share knowledge and experiences but also engage in co-designing new solutions and innovations. The goal is to foster networking opportunities, allowing the development of interpersonal relationships that extend beyond the realm of smart city development. Additionally, a citizen engagement portal is in the development process, aiming to enhance local government's governance structures for public service delivery. This new portal seeks to further facilitate citizen involvement in the smart city development process, complementing the existing e-government portal, IREMBO.

Furthermore, in the implementation of the smart city Master Plan, private sector leadership, adapting to identified challenges is necessary. Ongoing initiatives are developed through a stakeholder process that includes active participation from the private sector, academia, and civil society. The citizen-centric approach is acknowledged, ensuring that digital solutions are developed to address the genuine needs and preferences of the citizens. This multifaceted collaboration emphasizes a holistic and inclusive strategy for advancing smart city development in Kigali.

(9) Issues and Challenges the Country / City is facing that hinder the smart city initiative

There are several challenges of smart city development initiatives in Kigali City, and they are consisting of financial, capacity, and infrastructural aspects.

- Financial Challenges

A challenge arises from the absence of a dedicated budget for smart city development. Implementing smart city solutions often requires significant investment in infrastructure, technology deployment, and maintenance, which can strain municipal budgets.

- Lack of Smart City Digital Infrastructure

This refers to a digital infrastructure equipped with multi-layer technology, facilitating the straightforward provisioning, management, and automation of connected devices. It is essential for seamless integration and efficient utilization of big data analytics in the smart city.

- Capacity and Integration Challenges

Insufficient capacity in areas, such as the education system, innovation, digital literacy, and career skills, gives impact to the successful implementation of smart city initiatives. Additionally, integration and interoperability issues also become a challenge, making it complex to integrate various smart technologies and systems from different institutions. This complexity leads to mismanagement of resources and duplication, undermining the efficiency and effectiveness of smart city development efforts.

(10) Remarkable Points learnt from the survey

Rwanda has made progress in its smart city initiatives, as highlighted in the survey results. The MINICT is leading the implementation nationally along with RISA. The Smart Rwanda 2020 Masterplan serves as a comprehensive vision, aiming to transform Rwanda from an agrarian economy to a knowledge-based society. The master plan is structured around pillars like smart governance, efficient services, and fostering local innovation. Kigali is actively implementing this plan, leveraging technologies, such as IREMBO, BPMIS, GIS, and IoT for urban development.

The city's smart city development includes models encouraging startups, community collaborations, and legal frameworks like regulatory sandboxes. Despite challenges, Kigali's commitment to inclusive strategies, citizen engagement, and technological adoption makes it a standout success in the smart city implementation. The well-defined master plan and proactive implementation will bring Rwanda for future smart city advancements.

Chapter 8 Asia-Africa Knowledge Sharing Seminar

During the study period, JICA conducted a knowledge-sharing seminar on smart city development featuring participation from 10 countries, comprised of 8 selected countries from the Sub-Saharan Africa region and 2 invited countries from Asia. The seminar was held in Abidjan, the capital of Côte d'Ivoire, on February 28, 29, and March 1. This chapter summarizes the activities and lessons learned from the seminar.

8.1. Purpose of Seminar

As mentioned above in the previous section 1.1, smart city development efforts have been initiated and attracted attention. In the areas covered by this study as a viable solution to urban challenges faced by each city. While the realization of smart city requires an approach tailored to the characteristics of each city and region, it is also important to utilize each city's knowledge, initiatives, and applicable technologies to solve common problems and their solutions. Therefore, the Asia-Africa Knowledge Sharing Seminar was held with the following objectives in order to provide opportunities for knowledge sharing initiatives toward solving urban challenges through smart city development.

- To deepen understanding of the intended direction of smart city development in each country by sharing knowledge, initiatives, and implementation issues related to smart city development, and to identify organizations and government support necessary for the realization of smart city development.
- To engaged in discussion that deepen the understanding on the effectiveness of smart city as one of the solutions to solve urban challenges in each country.

8.2. Seminar Participating Countries

The Asia-Africa Knowledge Sharing Seminar featured active participation of the countries and international organization as shown in Table 8-1:

Table 8-1: Countries and International Organizations Participating in the Asia-Africa Knowledge Sharing Seminar

	Participating Countries and Institutions	Overview of Smart City Initiatives
Africa	Côte d'Ivoire Bruno Nabagné Koné , Minister of Construction, Housing and Urbanism (MCLU) Kouman Kra , General Director of Urbanism and Land of MCLU Hubert Yomafou , Director of Urbanism of MCLU Fory Jacques Koko , Project coordinator of MCLU ※Other participants is attached as Appendix	Implementing ICT digital technologies to enhance administrative services in Abidjan
	Kenya Shariff Ali Abdulrahman , County Chief Officer-Lands, Urban Housing	Technopolis development is underway in Konza, south of Nairobi, driven by the use of ICT .

	Participating Countries and Institutions	Overview of Smart City Initiatives
	& Planning of Mombasa County Government	
	<u>Nigeria</u> Modibbo Mohammed Nasir, Assistant Director in the Urban and Regional Planning Department of the Federal Capital Development Authority	Abuja is aiming to make the city smarter through the use of ICT to unify the community.
	<u>Rwanda</u> Hakizimana Eric, Spatial Development Framework Specialist, Urbanization, Human Settlement and Housing Development Department of Ministry of Infrastructure	Advancement of social services, including administrative services, centered on ICT technology in Kigali
	<u>Senegal</u> Mane Youssouph, Director of Sustainable Urban Development, Urban Planning and Regulation of Ministry of Urbanism, Buildings and Public Hygiene	Dakar, Diamniadio Lake City, and other cities are using ICT technology to make government services smarter.
	<u>Tanzania</u> Kalugendo Fanuel Osbert Shio, System Planning and Design Manager of Dar es Salaam Rapid Transit	Innovation and modernization of SEZs and dry ports, mainly in Dar es Salaam and other areas.
	<u>Uganda</u> Mugarura Martha Nyakato, Assistant Commissioner for Urban Development of Ministry of Lands, Housing and Urban Development	Kampala is aiming to advance electronic currency, traffic management, medical systems, etc. using ICT technology.
	<u>Zambia</u> Musonda Mildor, Environmental Planner of Chibombo Town Council	Kalulushi and other cities are looking to improve public services with the introduction of 5G and other telecommunications technologies
Asian	<u>Cambodia</u> Yun Linne, Deputy Governor of Siem Reap Province	Based on the long-term vision of the Cambodia Digital Socio-Economic Policy Framework 2021-2035, national and local governments are initiating projects to improve basic infrastructure such as transportation, waste, and sewage treatment.
	<u>Laos</u> Phommathat Khamphonemisay, Director of Housing and Urban Planning Department of Ministry of Public Work and Transport	Aligned with the National Digital Economy Development Plan as the basis for smart city development, national and local government are actively promoting e-government and digitalization.
International organization	World Bank	
	Africa Development Bank	
	French Development Agency	
	JICA	

Source: Compiled by the survey team based on data from surveys of initiatives in each country.

8.3. Seminar Schedule

The seminar schedule is shown below.

■ Seminar Day 1

Hours.	Program Contents
09:00-09:30	Reception
09:30-09:50	Opening Remarks Minister Bruno Nabagné Koné, MCLU Mr. Wakabayashi, Director, JICA Côte d'Ivoire Office
09:50-10:00	Photography
10:00-10:20	Break
10:20-10:40	Introduction Akiba, JICA
10:40-11:40	Presentation (Section 1); Uganda, Zambia, Nigeria
11:40-12:00	Break
12:00-12:30	Panel Discussion (Section 1)
12:30-14:00	Lunch
14:00-14:40	Presentation (Section 2); Côte d'Ivoire, Senegal
14:40-15:00	Break
15:00-15:40	Presentation (Section 2); Laos, Cambodia
15:40-16:10	Panel Discussion (Section 2)
16:10-16:15	Seminar Day 1 Summary

■ Seminar Day 2

Hours.	Program Contents
08:30-09:00	Reception
09:00-09:10	Introduction
09:10-10:10	Presentation (Section 3); Tanzania, Kenya, Rwanda
10:10-10:30	Break
10:30-11:00	Panel Discussion (Section 3)
11:00-11:05	Seminar Day 2 Summary
11:05-12:30	Lunch
12:30-17:00	Site visit
17:00-17:30	Preliminary discussions for Declaration
19:00-20:30	Standing buffet party

■ Seminar Day 3

Hours.	Program Contents
09:30-10:30	Seminar Summary Comments from presenters
10:30-10:50	Break
10:50-11:20	Declaration Goto, Senior Advisor, JICA

Hours.	Program Contents
	Closing Remarks Kra Kouamé Kouman Director General of Urban Planning and Land Development, MCLU Chief Tanaka, JICA
11:20-11:50	Photography
11:50-12:50	Lunch
12:50-	Dissolution

8.4. Seminar Activity Record

To facilitate the sharing of each country's knowledge, initiatives, and implementation challenges related to smart city development, the seminar is designed with mainly three sessions, each session consists of presentations from three or four countries and followed by a panel discussion. The following themes were set for each session.

- Session 1: Master Planning for Smart City Development
Countries: Uganda, Zambia, Nigeria
- Session 2: Promoting the Implementation of Master Plans for Smart City Development
Countries in charge: Côte d'Ivoire, Senegal, Laos, Cambodia
- Session 3: Implementation of Measures Focusing on the Transportation Sector in Smart City Development
Countries: Tanzania, Kenya, Rwanda

On the second day of the seminar, the participants engaged in site visits to smart city and urban development sites in Abidjan. One notable visit was a smart camera installation site, which is being implemented as part of the transportation pilot project of the Master Plan for Urban Development of Greater Abidjan (SDUGA) 2040, which is being implemented with the support of JICA.

The findings and initiatives shared during the presentations and panel discussions in each session were synthesized into a Declaration (summary of the Declaration is mentioned in section 8.6):

8.5. Panel Discussion Overview

The panel discussions focused on the themes mentioned above for each session. A summary of each panel discussion is as follows.

Panel Discussion 1 Master Planning for Smart City Development

Panelists from Uganda, Zambia, and Nigeria, moderated by Mr. Bile from the JICA Côte d'Ivoire office, discussed on how smart city development can be linked to existing or future urban plans, and how Smart City can be utilized in the urban planning. In addition, there was a discussion on what initiatives should be prioritized after the master plan is formulated.

- Nigeria highlighted efforts to enhance the linkage between urban planning and smart city development, emphasizing the importance of soliciting citizens' opinions and reflect them in the master plan.

- Zambia commented that it is important to collect urban data for the purpose of accurately grasping the current status of urban issues and improving the accuracy of future projections, and to reflect the data in the master plan formulation.
- In addition, some participations emphasized the importance of local governments' role in integrating smart city development into the master plan.
- Uganda emphasized the importance of quick assessment and digitalization of all government process as actions after masterplan is developed. These actions' object is evaluating how smart city development plan aligns with existing plans and visions.
- It was confirmed that the integration of smart city development into the master plan requires data collection and reflection of citizens' needs toward sustainable urban development, involvement of local administration, verification and evaluation of the plans' effectiveness and measures, and the use of technology for the computerization of administration.

Panel Discussion 2 Promoting the Implementation of Master Plans for Smart City Development

Panelists from Côte d'Ivoire, Senegal, Laos, and Cambodia, moderated by Mr. Ivan from JICA Uganda office, focused on exchanged views on the implementation of Master Plan, challenges faced in smart city development, and capacity building.

- Côte d'Ivoire has developed Abidjan Master Plan for 16 municipalities. On the other hand, a management committee responsible for the implementing the master plan has not been established and the implementation system is facing challenges.
- Both Cambodia and Senegal identified insufficient funding as a challenge to implement the master plan. Cambodia indicated that it takes time to allocate the budget, making it difficult to ensure project implementation, although the local government requests a budget to the central government. Therefore, Cambodia mentioned the necessity of an organizational structure to ensure the necessary efforts for project implementation by clarifying the stakeholders involved in project implementation and clarifying the roles of each stakeholder.
- Senegal recognized that financing remains as a major challenge, although it has the technical and human capacity to develop a master plan. Strengthening financial capacity emerged as crucial focus alongside enhancing human capacity.
- Laos identified the lack of available data for smart city development as a challenge, and also indicated that the lack of data prevents proper decision making for smart city development while some technologies contribute to solving urban issues.
- ASEAN has established the ASEAN Smart City Network as an smart city network for cities in member countries, and is promoting smart city development in each city. Laos, which participates in the ASEAN Smart City Network, explained one of the merits of the Network including easier to attract the interest of international organizations to receive greater support by promoting development under a unified framework.

- Since the Economic Community of West African States (ECOWAS) has not established an organization like the ASEAN Smart City Network, the advantage of an organization integrating the surrounding regions for smart city development was pointed out in discussion.

Panel Discussion 3 Implementation of Measures Focusing on the Transportation Sector in Smart City Development

Panelists from Tanzania, Kenya, and Rwanda, moderated by Mr. Kouman Kra, General Director of Urbanism and Land of MCLU, Côte d'Ivoire, exchanged views on implementation systems and initiatives that enable comprehensive smart mobility approaches and technology-enabled smart solutions initiatives.

- Tanzania promotes smart mobility development in individual projects at the central ministry level rather than at the municipal level. Tanzania emphasized the importance of coordination, especially at the national level, for collaboration and synergy in the implementation of projects such as rural development and eco-cities, which is a good example of a systematized governance approach in the country.
- Konza Technopolis is governed by the Ministry of ICT for smart city development.
- Rwanda, with the Ministry of ICT leading smart city development, has adopted a bottom-up approach that drives smart city development from citizen needs and government priorities.
- Although financing was mentioned as a common implementation issue, Tanzania and Rwanda are exploring the possibility of private financing programs, such as PPP financing.
- Tanzania developed a transportation plan that integrated land use planning and demand studies for consistency with existing plans. In the development of the Bus Rapid Transit (BRT) development plan, Tanzania formulated the operation plan for operating routes and bus maintenance in accordance with the transportation plan.

8.6. Overview of Declaration

The knowledges and initiatives shared through the presentations and panel discussions during the seminar were summarized in a Declaration during the final program on the second day. (The Declaration note is attached as an Appendix)

- The seminar has dual objectives: 1) to exchange knowledge and issues related to smart city in each country and deepen understanding of the future vision to be achieved through smart city, and necessary organizational and administrative support, and 2) to share urban challenges in each country and deepen discussion on the effectiveness of smart city as one of solution to solve urban challenges in each country.
- Through the presentations and panel discussions, it was shared that smart city development measures are being promoting in the areas of urban planning and development, mobility and transportation, environment, safety and security, and governance. On the other hand, common and important issues in smart city development were also shared. Opinions were exchanged on the following three topics:

1) Urban Master Plan, 2) Urban Master Plan and Smart City implementation, 3) Smart Mobility/Transportation

8.7. Seminar Summary

The seminar activities reached the following conclusions.

- In smart city development, the following areas of interest were identified
Transportation/Mobility, Planning, Governance/Finance, Social/Education/Health, Safety/Security, information
- While smart city development is effective in solving urban issues, it requires a comprehensive and cross-sectoral approaches. To promote the approaches, master plans and mechanisms for coordination and cooperation among stakeholders are important, as well as the promotion of capacity building necessary for project implementation.
- A major challenge for the future revolves around integrating and coordinating traditional master planning methods with innovative Smart City methods.
- Smart city development needs an integration of sustainable approaches to address urban issues, taking into account resilience, inclusiveness, identification of citizen needs, climate change, land use planning and urban development.

Chapter 9 Consideration of Project Models for Smart City Development in Sub-Saharan Africa

This chapter examines a program to support smart city development as a JICA ODA project, not from the perspective of implementing smart city as a business, but as a project model to show how smart city can be introduced by a government initiative. The four (4) models examined in the report of "Global SC Survey" are considered to utilize in the target regions: 1) government-completed model, 2) model in which the government provides infrastructure (taxes) and the private sector provides services, 3) model in which the government takes the initiative and the private sector provides services, and 4) model in which the private sector proposes smart city.

9.1. Understanding of Definitions in “Global SC Survey”

The report of the “Global SC Survey” provided several perspectives and definitions in terms of mechanisms and project models related to smart cities. Brief summary of these is as follows:

(1) Potential Factors for establishment of Project Models related to smart Cities

➤ Implementation system to learn from leading smart cities

In order to realize social issues in which “people” are at the center, it is important for smart cities to have a mechanism to listen to the voices of citizens in the city, pick up on them carefully, and respond to them. It is also necessary to have a process to reflect the voices of citizens in policies, and to have a system to promote policies through cooperation between the public and private sectors and academia. When all of these elements are in place, it will become the basis for realizing a continuous and consistent approach from policy to project implementation.

➤ Differences in project continuity based on the implementation speed of project models

In developing countries, there are large regional disparities in income and access to social services, as well as significant differences in satisfaction with services. In this current situation, the implementation speed of projects related to smart cities in developed countries differs greatly from the speed of services and businesses to spread in developing countries, especially those with low incomes. Therefore, the implementation speed should be viewed as a risk, and a framework of support and other measures to ensure the continuity of projects is necessary. At the time of planning, it is important to consider the future exit strategy, diffusion speed, and profitability of the business.

➤ Easiness of creating project models related to smart solutions

When looking at a country’s economic growth, there is a positive correlation between GDP growth rate and the rate of business start-ups. When considering businesses in the smart city sector, if there are high expectations for the use of IoT technology, etc. and many new business start-ups, an increase in the number of businesses will lead to the creation of many businesses in related

fields. On the other hand, in countries with insufficient legal systems for entrepreneurship, it is possible (and easy) to establish business models that are difficult in countries such as Japan, and this can be a blue ocean where leapfrogging can be achieved. It can be considered that businesses in the smart city field are more likely to be born in such regions and countries.

➤ **Smart City Business and Profitability**

Marketing and demonstration experiments are also important to determine the feasibility of the smart city project model. If the business field to be targeted has ability to have a social impact and has a large public component, the participation of public organizations, including local governments, will be essential. In the process of assessing the feasibility of introducing the service on a trial basis from the perspective of both the government and citizens, it is important to determine the demand for the service, determine profitability, and set the level of the service as a public service. By setting a revenue break-even point that does not generate excessive profits on the part of the private sector, the smart city project will not become extremely expensive and public control will be sustainable.

(2) Support for social implementation of smart cities (public-private sector role-sharing)

In many developing countries in general, including the regions covered by this survey, administrative support in terms of funding is also insufficient in many cases. From this perspective, it is difficult to focus on as many demonstration projects as in the developed country cases regarding the sharing of public-private partnerships. On the other hand, when commercialization is conducted by local companies, including start-ups, it is effective to narrow down the demand in the target cities and start with what can be done.

A private-sector approach, such as incorporating the effectiveness of smart city projects as a public service to be evaluated by specific users (private sector), is effective and can be easily handled by governments that lack human resources.

On the administrative side, it is essential to gradually promote open APIs, public-private partnerships, and administrative support service collaboration, anticipating the future introduction of City OSs, and to outsource specific services to the private sector, with the government taking the role of controlling the entire project.

Based on the information compiled, the following table lists the roles of the public (government) side in social implementation (Table 9-1) and the types of business models and their funding sources (Table 9-2), as indicated in the "Global SC Survey" report.

Table 9-1: Role of Public (government) Side in Smart City Social Implementation

	Developing Countries	Developed Countries
Service Providers	Private initiative and proposal type (Government is understaffed and still lacks knowledge)	Public operation by the national government/city, PPP and other private sector activities
Finance (Source of funds)	Appropriate public-private partnerships that rely on the private sector, but do not only enclose specific companies in an appropriate manner as a public entity	Funds to support the promotion of demonstration experiments, etc. and to contribute to a broad project model, such as deployment in other countries, in addition to having criteria for judging initiatives toward appropriate practical application.
Specification Review	Adoption by public after private proposal	Determination of private service level through issue identification and analysis by the public
Data Integration	Respond quickly to demand by prioritizing individualized initiatives	New business development is required on top of data integration (with some demand for City OS)
Demonstration Experiment	Piloting in areas with large scale and potential demand, such as private land owned by private developers	Implementation through deregulation of public space by government or third sector, etc.

Source: "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022

Table 9-2: Project Model Types and Potential Funding Sources

Project Model	Outline	Fund Source
1. Government-completed model	A model promoted solely by the government without the involvement of the private sector. Basically, it is operated with tax and other government funds.	Taxes, Grants & Contributions
2. Model in which the government provides infrastructure (taxes) and the private sector provides services	The government covers the initial investment and basic services that should be handled by the public sector. Based on the infrastructure established, the private sector adds attractive services and secures revenue from those services. This is a public-private system in the broad sense.	Taxes, Grants & Contributions + PPPs including Private Investment, Project Contracting Fees, and SIBs, Smart City Funds
3. Model in which the government takes the initiative and the private sector provides services	A private company, which is granted exclusive business rights by the government, develops and provides the infrastructure and secures revenue from operating costs. BOO (Build Own Operate) or BOT (Build Operate Transfer) is assumed.	PPP, Project Outsourcing Fees, SIB, Smart City Funds, Real Estate Revenue
4. Model in which the private sector proposes smart city	Under the basic policy formulated by the government, the private sector will cooperate with area management BID (Business Improvement District), TIF (Tax Increment Financing), etc., to attract other businesses as data providers with complex solutions and enrich services. Through the synergistic effects of services, the value of land itself will be increased in addition to direct service revenues, and revenues will be generated indirectly through an additional model based on rising land prices and other factors. This may become a mainstream model in the future when new revenue sources are available through the creation of data distribution services and urban data exchange markets.	BID, TIF, Real Estate Revenue

Source: "Data Collection Survey on the Applicability of the Smart City Approach" conducted by JICA in 2022

Note: SIB (Social Impact Bond) is a system under which private investors provide project funds to a business, and the local government pays the business a performance fee based on the results of the project.

(3) Study on the introduction of four project models in the Sub-Saharan Africa region

When the four project models described above are examined in relation to the five approaches illustrated in Chapter 5 (refer to Figure 5-4), the following possibilities emerge.

Table 9-3: Relevance of the Project Model and the Five Approaches

Project Model	Project Model Characteristics	Potential Targeted Approaches
Government-completed model	This is a method in which the government takes the lead in operating and managing smart city initiatives at all stages, and the participation of industry, academia, and government in the capacity of advisors, etc., complements the capabilities of the government side. The government needs to have the know-how to manage the entire process from planning and design to demonstration, implementation, and monitoring.	<ul style="list-style-type: none"> ➤ <u>Sustainable Growth</u> The case for individual projects to promote stable urban growth ➤ <u>Smart Concept Formulation</u> The case for starting an initiative within the government to discuss smart cities <i>(not limited to these)</i>
Model in which the government provides infrastructure (taxes) and the private sector provides services	Establish a framework for smart city development at the national level by having the government take the lead in developing policies and visions at the national level and building a governing body for project promotion. The government will take the lead in completing institutional development, securing financial resources, and planning and design. In the demonstration and implementation phases, the private sector will promote the projects, and some projects may become PFI projects, such as BOT projects.	<ul style="list-style-type: none"> ➤ <u>Sustainable Growth</u> Cases in which the introduction of large-scale technologies and services, such as the introduction of a City OS, is financed by the government, and private sector technologies and services are introduced. ➤ <u>Accelerate</u> A case of a large-scale government-led initiative to smartly solve new urban issues in a city with basic services <i>(not limited to these)</i>
Model in which the government takes the initiative and the private sector provides services	The private sector can participate in the design and introduction of smart technologies and the provision of services, and the private sector can be contracted to improve the efficiency of design and construction and to provide specific administrative services. The safety of concessions to the private sector can be assured by having the administration (local government) promote initiatives at the policy level and establishing an organizational body to manage the entire project.	<ul style="list-style-type: none"> ➤ <u>Accelerate</u> A case study of an initiative to introduce individual smart technologies and services in a city with core services in place ➤ <u>Small Start</u> Cases where small-scale smart development is introduced as a private service in parallel with basic infrastructure development, etc. ➤ <u>Smart Infrastructure Development</u> Cases in which the government plans to introduce smart technologies, etc. for the effective development of basic infrastructure, while the private sector carries out the implementation. <i>(not limited to these)</i>
Model in which the private sector proposes smart city	This can be used when a consistent policy and vision have been established at the national and city levels and a high-level initiative management system is in place.	<ul style="list-style-type: none"> ➤ <u>Sustainable Growth</u> Cases in which the private sector implements services targeting specific areas, etc.

Project Model	Project Model Characteristics	Potential Targeted Approaches
	If the scale of the project is compact, it can be implemented as a concession-based project led by a private company. If the project is an individual project of a city, the private sector can promote the project from the establishment of a specific policy and vision to its implementation and management.	<ul style="list-style-type: none"> ➤ <u>Smart Concept Formulation</u> Cases in which private-sector initiatives, such as area management, are being promoted ➤ <u>Small Start</u> Cases in which the realization of urban issues is at a level that can be tackled by private companies ➤ <u>Smart Infrastructure Development</u> Cases of projects that can be undertaken by the private sector in concession projects that are also relevant to PPP <i>(not limited to these)</i>

Source: Survey Team

Note: The approaches are presented only as a range of possibilities. Individual verification and selection of approaches that can actually be applied will be necessary, depending on the development issues and status of initiatives in the target country or city.

9.2. Verification based on JICA ODA scheme for introduction of each approach

JICA's Official Development Assistance (ODA) mainly targets government-led development projects in target countries. In terms of providing development assistance for development projects promoted by the central or local governments of each country, ODA mainly targets government-led SC development projects, rather than private sector-led projects. From this perspective, the ODA schemes that JICA is promoting are summarized here.

Table 9-4: Major ODA Schemes implemented by JICA

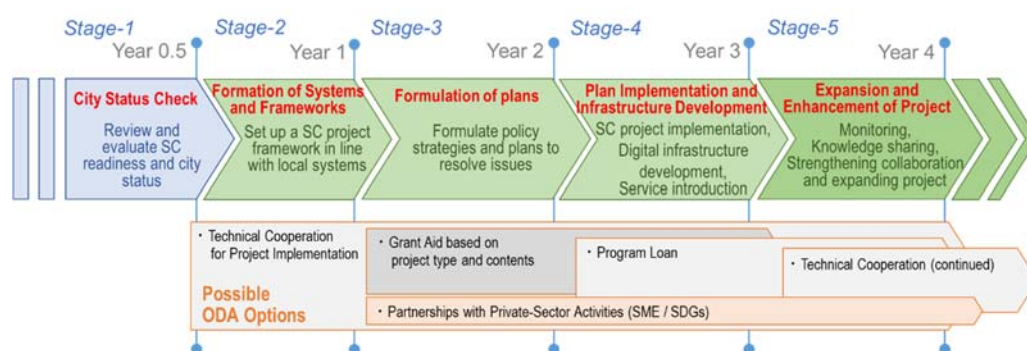
JICA Schemes	Summary of Schemes
Dispatch of Experts	Japanese experts are dispatched to the locations for cooperation in developing countries to convey necessary technologies and knowledge to administrative officials and technicians (counterparts) in the counterpart countries, and to work with them to develop locally adapted technologies and systems, as well as to raise awareness and disseminate information.
Technical Cooperation Projects	It is implemented through an optimal combination of various menu items, including dispatch of experts, acceptance of trainees, provision of equipment, etc. The project is operated and implemented in a systematic and integrated manner, from planning to implementation and evaluation. In order to enhance the ownership of developing countries, a "participatory" approach is adopted in planning and operational management and evaluation together with local residents of the project area.
Official Development Assistance Grants	The funds are donated to developing countries to support the construction of facilities and procurement of materials and equipment necessary for economic and social development in developing countries. It supports activities that form the basis for nation-building in developing countries, such as the development of social infrastructure, facilities to promote environmental conservation, and human resource development.
Official Development Assistance Loans (Yen-Loans)	By lending development funds to developing countries at low interest rates and on long-term the JICA supports the development efforts of developing countries. Yen loans that require repayment of funds encourage ownership by developing countries by encouraging efficient use of borrowed funds with appropriate project management.

JICA Schemes	Summary of Schemes
Grants through Budget Support	This is a form of grant assistance that provides financial support to developing countries to promote comprehensive economic and social development, etc. It can be provided in three ways: 1) general financial assistance that does not specify the use of funds or expenditure items, 2) sectoral financial assistance that limits the use of funds or expenditure items to specific sectors, and 3) common fund financial assistance that provides financial support for special accounts established by the partner government or aid organization.

Source: Compiled by the Survey Team based on information from JICA's official website

As shown in Table 9-4, the applicable JICA ODA scheme will differ depending on the economic level (income) and project content of the target country. While taking this into account, the five approaches shown in the previous Chapter 5 and their possible introduction in the flow of the roadmap are shown below with the roadmap hereafter.

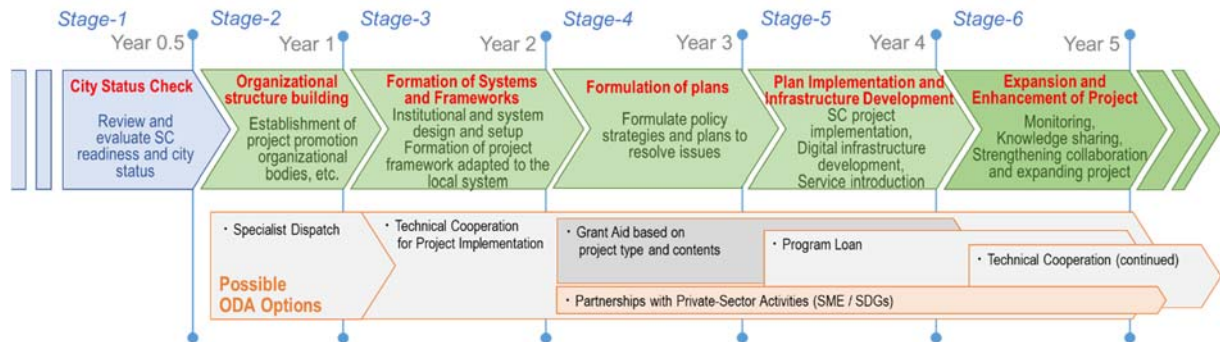
Cities (or countries) where a framework is being put in place



Source: Survey Team

Figure 9-1: Roadmap and Possible ODA Schemes (1)
< Cities (or countries) where a framework is being put in place >

Cities (or countries) with frameworks in development

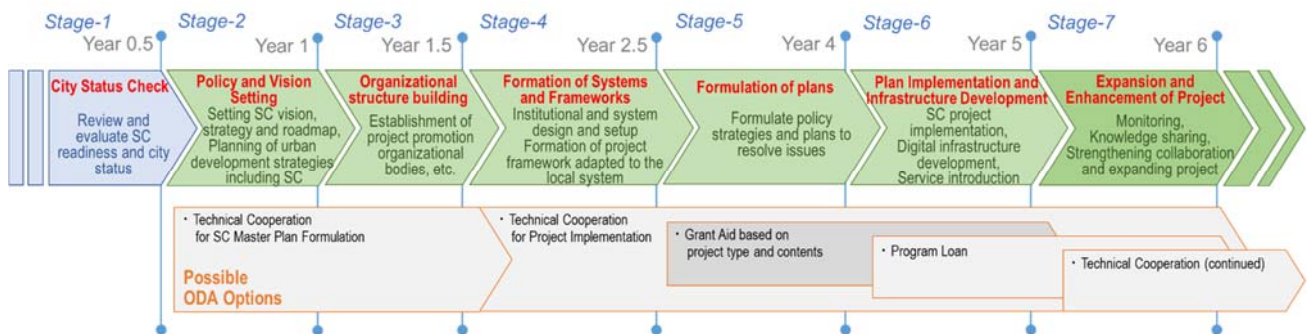


Source: Survey Team

Figure 9-2: Roadmap and Possible ODA Schemes (2)

< Cities with frameworks in development >

Cities (or countries) that need to organize their framework in the future

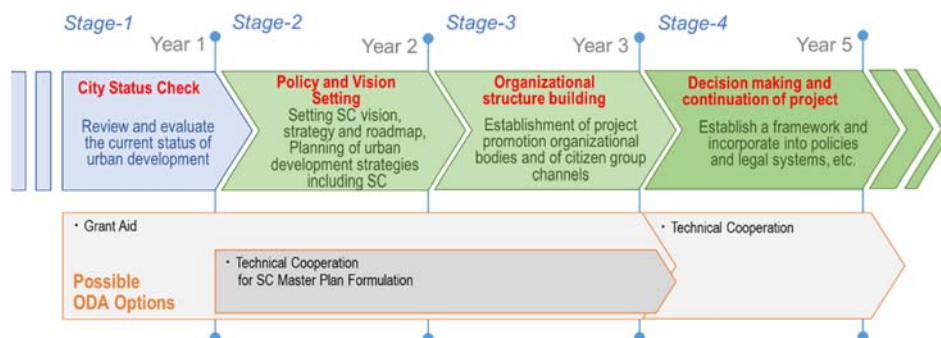


Source: Survey Team

Figure 9-3: Roadmap and Possible ODA Schemes (3)

< Cities (or countries) that need to organize their framework in the future >

Cities (or countries) that need groundwork for smart city discussions

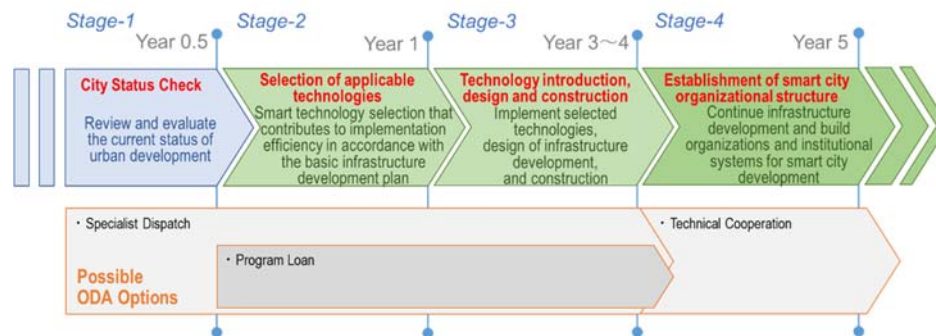


Source: Survey Team

Figure 9-4: Roadmap and Possible ODA Schemes (4)

< Cities that need groundwork for smart city discussions >

Cities (or countries) that need to prioritize basic infrastructure development before smart city development



Source: Survey Team

Figure 9-5: Roadmap and Possible ODA Schemes (5)

< Cities that need to prioritize basic infrastructure development before smart city development >

9.3. Common challenges in Sub-Saharan Africa region regarding introduction of project models

Based on the information obtained from the desktop analysis, field surveys in Senegal and Rwanda, and learning from the Asia-Africa Knowledge Sharing Seminar, it is clear that there are common issues that need to be recognized in the African region prior to the application of JICA's ODA schemes and introduction of project models in order to promote smart city development. How these issues are addressed will be critical to the success of future smart city development in the Sub-Saharan Africa region. These issues may not be applicable to all cities, and each city needs to be assessed on a case-by-case basis.

- ✓ Basic urban development, including the development of basic infrastructure, is immature (or in progress) and priority efforts are needed to establish (or strengthen) the basic urban structure.
- ✓ Development plans and legal systems may be inadequate, and there is a need to establish a legal framework and consistency with higher-level plans to promote smart city development initiatives.
- ✓ Based on the confirmation and objective evaluation of the implementation organization, system, and organizational capacity for smart city project promotion, it is necessary to establish the organization with appropriate scale and capacity needed to implement the project and promote its start-up.
- ✓ Need to secure financial resources (or develop a plan to secure funds) from central government, local government, and/or implementing agencies to implement the project.
- ✓ Basic urban and social problems, such as extreme population growth, high unemployment, serious regional disparities, and human rights and discrimination issues, are too great and require establishment of solutions and priority implementation of measures
- ✓ Since current smart city development initiatives are private-sector-oriented and highly dependent on private business, there is much room for a shift to initiatives that start with the needs of citizens, and strong promotion of human-centered smart city policies is needed.

Chapter 10 Consideration of Japan's / JICA Cooperation

10.1. Study on Applicability of Japan's Advantages and Smart City Approach

(1) Japan's Advantages in smart city development cooperation in the target region

A document prepared by the Prime Minister's Offices', the Management Council for Infrastructure Strategy, states there are three pillars of Japan's urban infrastructure development: Eco-city (environmentally-friendly city), Transit oriented development (public transport-oriented urban development) and Disaster-resistant city development (resilient city). DX will then lead to progress towards building a people-centered society that combines the solution of social problems with economic development. In addition, as an originality of Japanese smart cities, the information coordination infrastructure (platform) that collects and manages all kinds of data in the city must be thoroughly resident-oriented, provide complex and personalized services, and have data interoperability and distribution capabilities that enable deployment in other cities.

Development cooperation based on the Japan's advantages has been implemented in India and Indonesia, for example, for TOD in combination with support of railway development, and disaster-resilient urban development including support for the formulation of flood control master plans to reduce flood damage in urban areas.

(2) Applicability of smart city approach in the target area

In Chapter 5, based on the status of smart city initiatives, the cities in the target area are classified into the following five stages, with approaches of smart city development in line with the evaluation result of initiatives to develop smart cities, guiding principles and process for initiatives, and roadmap for the realization of smart city development.

1. Cities (or countries) where a framework is being put in place
2. Cities (or countries) with frameworks in development
3. Cities (or countries) that need to organize their framework in the future
4. Cities (or countries) that need groundwork for smart city discussions
5. Cities (or countries) that need to prioritize basic infrastructure development before smart city development

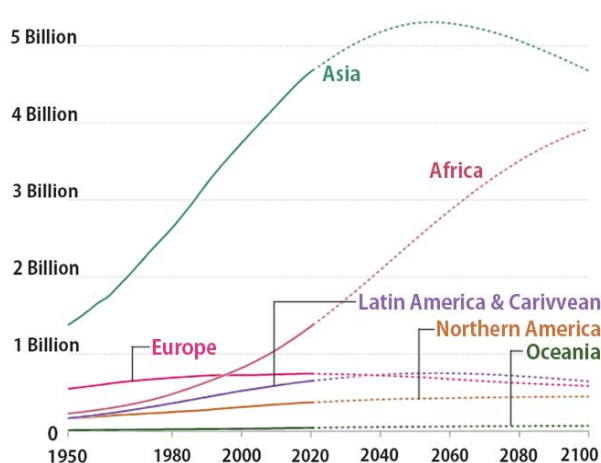
In some cities, it may be suitable to follow each step of the process in sequence, while in others, the relevant step may be skipped if the intermediate steps are somewhat advanced. It may also be possible to combine several approaches from a review of the strategy for smart city development (e.g. a change in direction from technology-oriented to people-centered, or a shift in the implementation system from public-led to more private-partnership-oriented). When considering the actual application of an approach, it is necessary to assess the level of basic infrastructure development in each city, to identify the problem to be solved (whether it is a problem caused by urbanization or a social problem unrelated to urban structure),

and to consider which approach is than applicable.

Unlike the cities in ASEAN countries, where the application of the approach was considered in the Global SC Survey, the cities in sub-Saharan African countries are characterized by rapid population growth and its continuity. As shown in Figure 10-1, the total population of Africa (Africa here includes five North African countries) will increase by approximately 2.8 times between 2021 and 2100. This projection shows that only Africa will still be growing in 2100 while the population in all other regions will be declining. Figure 10-2 indicates that the population of the African region will increase by approximately 150,000 people per year in 2100, based on the difference between the number of births and deaths. Furthermore, Figure 10-3 illustrates that the urban population ratio is projected continuously increasing from 43.93% in 2021 to 58.91% in 2050, and it can easily be assumed that the urban population will continue to increase thereafter. The projected increase in the overall population of just over 2.8 times between 2021 and 2100 is expected to be more than three times the level seen in terms of urban population growth.

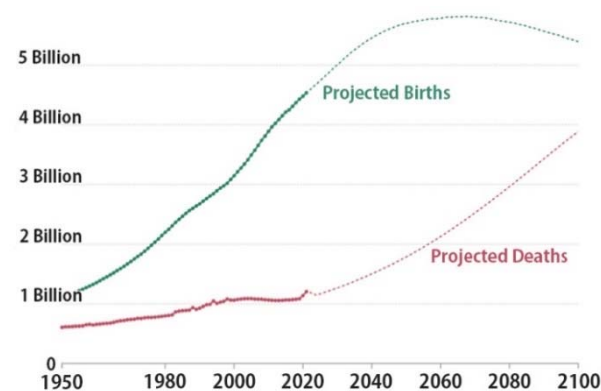
Similarly, the working population can be seen to be increasing even in 2100, with the Our World in Data statistical projections showing a more than three times of increase. This means that there are many countries in the African region that will still be in a demographic dividend period in 2100. Looking at the urban picture of Africa from the demographic perspective, the region is entering a demographic dividend period, when the population will increase significantly, providing an opportunity for economic growth. Therefore, it is important to take advantage of this opportunity to achieve economic growth and enrich the country.

This calls for initiatives to realize smart urban living by properly developing the basic infrastructure to support the expected population growth and continued urbanization, and by making effective and maximum



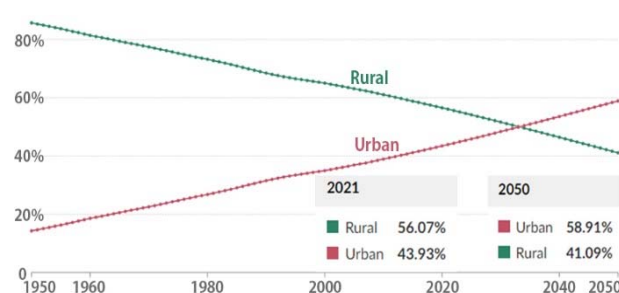
Source: Our World in Data

Figure 10-1: World Population Trends and Projections



Source: Our World in Data

Figure 10-2: Trends and Projections of Births and Deaths in Africa



Source: Our World in Data

Figure 10-3: Projection of Urban/Rural Population Ratio in the African Region

use of the new smart technologies that continue to be developed. In addition, strengthening administrative capacity and human resource development to ensure optimal operation of the expanding city and its functions will continue to be important. On the other hand, urban development, as a matter of individual issues, depends on various factors such as location, size of the city, industrial potential, relations with neighboring countries, stability of the country, etc., and there is a strong need to aim to introduce smart initiatives and technologies from these perspectives as well. Considering the further population growth in urban areas in sub-Saharan Africa and the resulting expansion of urban areas or promotion of intensive land use in urban areas, it is practical to apply not only a single approach on a continuous basis, but also to work on smart city development by combining multiple approaches in an agile manner, depending on the city's growth, stage of economic development and the emergence of new challenges/needs and solutions to them.

It should be noted that in Senegal and Rwanda, where field survey was conducted during this study, the JICA Study Team visited institutions related to smart city development and explained the classification of cities in sub-Saharan Africa, the direction of smart city development according to the urban classifications and the phased approaches. In both countries, the central government agencies interviewed were generally supportive of the smart city approaches and the applicability of the concept.

(3) Potential for Future Cooperation by the Government of Japan based on the Survey Result

The Global SC Survey points out that support measures for the implementation of the Smart City Approach need to include governance, management, communication, co-creation and trust-building as the foundation (Enabling Environment) as well as the provision of technology and solutions, to ensure effective and high-quality support. The study report also provides examples of support measures at national and city levels for the five smart city elements of, “policy and vision,” “organizational structure,” “systems (institutions),” “technology” and “operation,” as well as comprehensive analysis and evaluation of future plans and roadmaps as “assessment” to identify the status of initiatives and preparations. These examples are given as general examples of possible support by Japan, and actual consideration of the possibility of support should be based on the applicability of the Smart City Approach in individual countries and cities. In addition to the urgency of support, consistency with higher-level and national plans for development, maturity of the legal system and organizational structure (capacity of execution) for project implementation, and the possibility of securing financial resources for executing the projects, the stage of urban development (level of basic infrastructure) and the level of regional industrial growth which is essential for urban growth, should be considered as evaluation axes in such evaluation.

Other possibilities for cooperation include those that bring synergies to smart city development efforts by linking with and utilizing the results of projects that have been implemented, are being implemented or will be implemented, and those that lead to the formation of the enabling environment. For example, JICA has provided cooperation for the creation and maintenance of digital topographic maps in several countries in the African region. Developing basic maps of countries and cities as electronic geographical information will lead to data processing in the form of a GIS using the electronic data and utilization for service delivery. The development of electronic geographic information falls under the “technology” of the smart city

elements, and its use as database and GIS will support the construction of smart city architecture in the country concerned. On the other hand, it should be noted that as the use of electronic information advances and efforts are made to link various types of data, it will also become necessary to address issues such as personal data protection and cyber security.

10.2. Potential JICA Cooperation based on Urban Development Issues along with the Smart City Approach

This section examines how JICA's cooperation based on the smart city approach can be implemented as a project that contributes to solving and achieving realistic urban development issues. This section shows what kind of smart measures and/or solutions are possible as JICA's development assistance for the common urban development issues in the target regions indicated in Section 2.3. This study also verified the current status of urban development issues and smart city development initiatives in all 49 target countries from the information on the official government Web pages of each country, which could be used as a basis for verification of potential target countries. Given the limited information available, the survey team has limited the countries to be examined to those with cities with populations of more than 1 million and those that participated in the Asia-Africa Knowledge Sharing Seminar, where JICA support is available. There are 16 countries studied: Angola, Burkina Faso, Côte d'Ivoire, Cameroon, Ethiopia, Ghana, Kenya, Madagascar, Mozambique, Nigeria, Rwanda, Senegal, Sudan, Tanzania, Uganda, Zambia.

(1) Potential JICA Assistance for Smart City Initiatives based on Urban Development Issues

In light of the development status and smart city development initiatives in each country obtained from the desktop research, possible assistances applicable in several countries were considered for the 21 urban development issues presented in the previous Section 2.3 (see Table 10-1). The potential assistance programs shown in the table are considered taking into account the information provided by each country related to each urban development issue, and it is necessary to continue to evaluate future changes in the situation, etc., and to respond flexibly to changes in the situation (considering changes in views of the issues).

Table 10-1: Potential JICA Assistance for Smart City Initiatives Based on Urban Development Issues

Urban Development Issues		Potential JICA's Assistance for Smart City Development Initiatives	Potential Smart City Technologies for Implementation	Type ID
Urban and Land Use	Densification of individual properties and illegal settlements resulting from inadequate housing supply	Uncontrolled residential land development, including urban sprawl, must be regulated, and appropriate land use and development plans must be formulated. Furthermore, development projects must be implemented and managed based on these plans. The actual status of land use and development needs to be made datable and visible. In this regard, there is potential for support such as the introduction of a data management system (to be updated to an City-OS in the future) specialized for land use, development, and management, such as up-to-date development mapping based on land registry management and satellite images, to	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology, etc. 	UL-1
	Unregulated development by the private sector			

Urban Development Issues		Potential JICA's Assistance for Smart City Development Initiatives	Potential Smart City Technologies for Implementation	Type ID
Urban and Land Use	Insufficient supply of affordable housing due to the customary land system	improve management and monitoring accuracy, and to manage and operate penalties for illegal development, etc. on a common platform. There is potential for support, such as the introduction of Revision (or formulation) of land use plans, would also be eligible for support, and it is essential to support a wide range of activities in a phased manner. In addition, mapping areas at high risk of disasters and controlling development in high-risk areas are also important initiatives to fulfill government responsibilities, such as protecting human lives. Here too, support for efforts to introduce land data management systems such as those described above and link GIS data for land use planning is envisioned to contribute to more efficient data use and disaster risk management.		
	Increased risk of disasters due to housing development in inappropriate areas	Since customary land ownership is complicated by the absence of owners, community ownership, etc., it is necessary to ensure that land and landowners are tied together, and provide incentives to owners while establishing a framework for government management of that land (e.g., fixed-term land lease). By enabling land data management and integrally supporting the introduction of GIS technology, ICT tools, etc. that can remotely realize lease payments, it may be possible to achieve effective use of customary land and housing supply there. On the other hand, to reduce the cost of housing development, supply can be promoted from the development side perspective, starting with the introduction of a data management system in terms of logistics and material management. Support for such efforts includes the possibility as technical cooperation, including data collection.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology, etc. 	UL-2
	Over-concentration in the CBD, resulting in severe traffic congestion in certain areas during commuting	In supporting the implementation of smart solutions for traffic congestion mitigation in urban areas, it is necessary to improve the efficiency of public transportation. Reviewing the existing master plan and taking into account that population growth due to urbanization is expected to continue, the introduction of smart technologies for transportation systems (smart signal systems, traffic control systems, information management technologies linked to BRT systems, etc.) to solve the various traffic-related problems caused by this trend is an early solution to traffic problems. Smart technology is a smart way to solve traffic problems at an early stage, and there is potential for development assistance.	<ul style="list-style-type: none"> • Signal and Intersection Control System • Traffic Control and Management System • DX with Data Management Tool • ICT Technologies, etc. 	UL-3
	Green space reduction due to inadequate land use planning	There are measures, such as, mapping urban greening in conjunction with land use and disaster risk assessments and identifying areas with declining green space based on data monitoring, in order to control development. In addition, the development of parks and green spaces will be strengthened as part of plans to promote redevelopment along with land use optimization. There is potential in supporting the introduction of a land use/development-specific data management system (to be updated to a City-OS in the future). Even in the use of private land, support for data management of land leased and developed by the government to be implemented as an administrative service to make effective use of idle land (including setting and operating incentives for landowners).	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology • Digital Currency System, etc. 	UL-4
Infrastructure Development	Delays in public transportation system development due to prioritization of road construction to accommodate motorization	While large-scale projects, such as BRT and LRT, are possible, the introduction of technology for shared-ride systems and operation monitoring and management systems for current bus systems, as well as public transportation fare collection systems using mobile terminals, and in conjunction with this, the granting of points for public transportation use and the ability to use these points, could be effective. This could also be integrated with the introduction of a digital currency system and other more compact technologies to support the introduction of means to increase demand for public transportation, thereby increasing the effectiveness of the use of existing	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • Integrated Operation Management Technologies • ICT Technologies • AI Analysis Technology • Digital Currency System, etc. 	ID-1

Urban Development Issues		Potential JICA's Assistance for Smart City Development Initiatives	Potential Smart City Technologies for Implementation	Type ID
Infrastructure Development		infrastructure and creating a smart urban transportation system. The introduction of technologies to improve the efficiency of operation and management (including software), such as the introduction of a system that allows administrative initiative to manage motorbike taxis and other vehicles, is also eligible for support. The goal is to introduce an efficient public transportation system by supporting the introduction of smart technology in the software aspect as the multi-modalization of public transportation is promoted.		
	Road development and intersection improvements not keeping pace with the pace of overall urban development	Development speed is increased by streamlining the construction schedule through the use of CIM and other technologies from the planning and design stages of road maintenance. Development efficiency is also improved by optimizing vehicle regulations, traffic restrictions, traffic detours, etc., which contribute to efficient and fast construction, including comprehensive management of regional road networks and signal control, using AI technology, etc. Technical support for activities, such as studying road improvement plans, including detailed programs for the construction phase, is envisioned. For intersection improvement, support for activities to analyze the traffic network from the viewpoint of demand and other factors to develop an optimal intersection improvement plan and implement the project is envisioned.	<ul style="list-style-type: none"> • BIM・CIM • DX with Data Management Tool • Integrated Operation Management Technologies • ICT Technologies • AI Analysis Technology, etc.	ID-2
	Widespread increase in traffic demand due to residential development in suburbs and along arterial roads, and gap between peak and off-peak traffic demand	By utilizing location information from mobile devices, which are becoming increasingly common among citizens, the city will be divided into zones and the daily movement of the population will be monitored. By measuring changes in demand for travel between zones using mobile phone information, it is possible to demonstrate a flexible public transportation system that uses AI to manage the limited allocation and operation of public transportation vehicles. Multimodal transportation can also be realized through public-private partnerships for efficient vehicle operation through taxis, motorbike taxis, and other vehicles linked to this information network. While many governments face the problem of limited development budgets, support for projects that utilize AI technology and citizens' device information will be provided from the formulation of implementation plans to implementation support. The operation of legal systems related to privacy assurance must also be handled from an ethical viewpoint, and technical assistance is highly significant in this respect as well.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • Integrated Operation Management Technologies • ICT Technologies • AI Analysis Technology, etc.	ID-3
	Inefficient transportation services provided by the informal sector	While promoting the operation of public transportation services that utilize AI technology and device information possessed by citizens, the service will be used in conjunction with digital currency, etc., that allows citizens to receive points for using the service and redeem them. By creating a social environment in which citizens (demand) select efficient and beneficial services, the process of weeding out inefficient services from the market will be pursued. If the informal sector also gains benefit from more efficient services, such as stabilization of revenues by participating in services that are highly needed by citizens, the inefficient informal service structure can be reformed. In this way, several smart applications can be introduced within the software planning approach to help implementing projects with less financial burden.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology. • Digital Currency System, etc.	ID-4
	Delays in expanding water supply, sewerage development, and waste management	As in the field of technology for land use upgrading, mapping the current status of infrastructure development, as well as population dynamics and distribution, and managing them as integrated information will contribute to efficient infrastructure development planning. In project planning with limited budgets, this system can be applied to support efforts to extract high-priority areas for construction based on data analysis. In waste management, smart approaches are required from both the disposal side and the collection/management side by introducing a GPS-	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • GPS Data Utilization Technology • DX with Data Management Tool • Integrated Operation Management Technologies • ICT Technologies • AI Analysis Technology 	ID-5

Urban Development Issues		Potential JICA's Assistance for Smart City Development Initiatives	Potential Smart City Technologies for Implementation	Type ID
		based waste collection system (including monitoring of the status of collection bins from and truck operations) to improve management efficiency and by introducing a system that provides incentives to citizens by giving them points (points can be used for shopping at government-registered stores or converted to bus fares). The introduction of a system that streamlines and improves the efficiency of waste management is highly likely to provide support. Initiatives can be realized by providing support starting with mapping to identify locations where thorough waste management is needed and smart waste management to data the origin of waste.	<ul style="list-style-type: none"> • Digital Currency System • Blockchain Technology, etc.	
Environmental Impact	Deterioration of noise and air pollution due to increased traffic	These problems are often caused by reasons, such as inefficient traffic patterns created by the road network, inadequate traffic control at intersections, and the unrestricted entry of trucks and other large vehicles into the city center, amid inadequate traffic control. In this regard, the legal system for large vehicles operating in the city should be reviewed and a more efficient road and intersection development plan should be put in place. Smart support can begin by conducting a survey of the actual conditions of traffic congestion and its locations, the time of day, the main types of vehicles, OD information, and mapping the traffic data. Since traffic congestion has a starting point and can spread to urban areas in a chain reaction, there is a high potential for technological support to monitor the process of traffic congestion using ICT technology (GPS information from mobile terminals, etc.), analyze it together with vehicle OD data analysis information, and reflect it in future development plans.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology, etc.	EI-1
	Deterioration of the surrounding environment due to unaddressed increases in waste emissions and illegal dumping	See above under "Infrastructure Development: Delays in expanding water supply, sewerage development, and waste management," and together with the above, possible support for program establishment, including guidance and education of implementers of related administrative services and introduction of a penalty system for illegal dumping.	<ul style="list-style-type: none"> • GPS Data Utilization Technology • DX with Data Management Tool • ICT Technologies • AI Analysis Technology • Blockchain Technology, etc.	EI-2
	Increase in urban flooding due to illegally dumped waste blocking drainage channels	Along with the support described above under "Infrastructure Development: Delays in expanding water supply, sewerage development, and waste management," monitoring in the city will be conducted from the introduction of CCTV, etc., targeting areas where illegal dumping in the city has been observed. In addition, a monitoring system for waste discharge in drainage channels and rivers will be introduced, and monitoring of areas where accumulation is particularly noticeable and upstream of such areas will also be strengthened to prevent overflow of waterways, etc. The introduction of monitoring system technology and AI-based analysis technology of the images is expected to have potential and effectiveness in supporting smart initiatives for waste management and to reduce secondary disasters, etc. caused by waste.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • CCTV System • ICT Technologies • AI Analysis Technology, etc.	EI-3
	Worsening of water pollution due to delays in the development of sewer systems	The basic idea is to support the formulation of a priority sewerage system development plan based on the data from the network mapping and organization of detailed information on the current maintenance infrastructure using GIS as well as the data on population density. For the measurement of water quality deterioration, tools that can manage water quality analysis and location information in an integrated manner will be introduced, and will be used to identify the source of pollution and identify targets for improvement of the polluted environment. Composite technical cooperation is needed to manage data on the location of industries and other facilities that could become sources of pollution even after the sewerage system has been improved, and to build an administrative system that encourages businesses to give necessary instructions and guidance for improvement.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology, etc.	EI-4

Urban Development Issues		Potential JICA's Assistance for Smart City Development Initiatives	Potential Smart City Technologies for Implementation	Type ID
Social and Economical	Deterioration in public safety due to the mix of various income groups	In order to curb crime, it is important to strengthen safety management by public safety agencies, etc., and at the same time, to respond to crime by community-based monitoring, identification and sharing of risk factors, knowledge sharing, and training in defensive measures, etc. To this end, it is necessary to support communities by utilizing cutting-edge technology for watching over them, and mobile tools that enable communities to easily share information about their concerns. In addition, a system that can be used to immediately report emergencies would also be necessary. In addition, it is essential to establish a situation where education on crime prevention and defense is routinely provided (or programs can be accessed). From this perspective, it is necessary to provide support for the integrated introduction and implementation of monitoring technology, information sharing technology, and the establishment of education and training programs.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • CCTV System • ICT Technologies • Remote Education System, etc. 	SE-1
	Insufficient employment opportunities (especially for young people), increase in informal employment	While the increase in crime in society is concerned, and while it is a prerequisite to increase opportunities for work and employment and to build a social structure that allows citizens to earn a stable income, it is expected to support the development of job training programs to help more citizens obtain job opportunities, which can be taken not only at training facilities as places to conduct such programs, but also remotely. The program is expected to be effective in supporting the establishment of a comprehensive system with the cooperation of information networks as a means of supporting more citizens to obtain employment opportunities. Synergistic effects can be expected by including a project to educate citizens about the relationship between regular employment and stable livelihood, such as by developing a legal system that increases incentives to receive social services by collecting income tax even at low amounts.	<ul style="list-style-type: none"> • DX with Data Management Tool • CCTV System • ICT Technologies • AI Analysis Technology • Remote Education System, etc. 	SE-2
	Increased traffic accidents due to increased traffic volume	Reducing traffic volume, lowering speeds, obeying traffic rules, and ensuring that citizens also to behave safely in traffic are considered fundamental to preventing and reducing accidents. However, in today's social conditions it is difficult to immediately change such environment, and it is also necessary to act as a deterrent by, for example, strengthening penalties for perpetrators of traffic accidents. In this regard, it is necessary to strengthen monitoring systems and introduce a system to properly manage driving restrictions based on driver ID registration and strict data management of accident histories, etc. As a foothold, it would be helpful to introduce a driver/vehicle information management system that utilizes ICT technology, including data management of driver IDs (licenses) (including accident and violation histories), proper vehicle registration, and acquisition of GPS information on vehicle operation (also taking privacy protection into consideration), to begin providing support, which would lead to gradual solutions to traffic accidents and other problems. This will lead to a step-by-step solution to the problems of traffic accidents, etc.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • GPS Data Utilization Technology • DX with Data Management Tool • ICT Technologies, etc. 	SE-3
	Lack of public service facilities and inadequate maintenance	First, in order to expand and enhance service provision at existing facilities, there is a strong need to strengthen the maintenance and management of those facilities. Various technologies and products that contribute to the maintenance and management of facilities are available, including diagnosis of deterioration, monitoring of mutations and changes through fixed-point observation, cleaning technology for water supply and drainage pipes, and inspection technology for equipment systems. By appropriately selecting and introducing these technologies and products into maintenance and management operations, the government can extend the life of equipment and facilities. By initially introducing support that contributes to smarter facility maintenance and management, the government can maintain facilities continuously and reduce	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • Facility Monitoring System • ICT Technologies • AI Analysis Technology, etc. 	SE-4

Urban Development Issues		Potential JICA's Assistance for Smart City Development Initiatives	Potential Smart City Technologies for Implementation	Type ID
		maintenance and management costs. The experience gained in strengthening maintenance and management capacity will also enhance the capacity to develop new facility maintenance plans.		
Governance	Lack of capacity in urban planning and its implementation	It is important for urban development planning to understand urban problems from a broad perspective that includes the society, economy, culture and history, and to identify the priorities needed to solve these problems as the basis for planning and strategies. In order to understand urban problems, it is important to promote citizen participation (citizen's voice) and move away from the old approach of planning solely by the government. On the other hand, as cities continue to grow and change, it is necessary to review plans and redefine and implement necessary actions on a case-by-case basis. Assistance begins with the introduction of a program to fully understand this modern approach to urban development. In the course of this technical cooperation, it is necessary to learn the process of collecting, analyzing, and utilizing a large amount of data from the perspective of how to accurately grasp urban problems, identify issues, and absorb the opinions of citizens. Therefore, it is essential to introduce technology to optimize the operation and management of urban information (data) for planning the effective growth of cities. Therefore, it is important to support the introduction of data management systems using ICT technology from a medium- to long-term perspective, including from the perspective of contributing to the improvement and enhancement of public services. In particular, it is important to help urban development planning by constantly identifying and updating the needs of citizens through the use of ICT technology. Here, it is necessary to collect and utilize citizens' activity information with appropriate privacy protection.	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology, etc. 	GV-1
	Slow introduction of ICT in public service delivery			

Source: Survey Team

Note 1: The possibilities of assistance for SC development shown in this table are illustrative, and it should be added that there are also broader possibilities of related support menu.

Note 2: The Type IDs shown in the table are set to carry over each assistance proposal to the matrix of possible cooperation based on the SC approach and the relevance of initiatives to solve urban development issues being described in the following section.

Note 3: "ICT Technology" in this table mainly considers information networking as of smart initiative.

(2) Potential Cooperation based on the Smart City Approach and the relevance of JICA Assistance based on Urban Development Issues

As discussed in Chapter 2 and Section 10.1 (2) "Applicability of smart city approach in the target area" above, the cities in sub-Saharan Africa, where the urban population is likely to continue to increase, need to address urban development issues while reviewing existing plans. Therefore, when examining the potential for cooperation in promoting smart city development for cities in sub-Saharan Africa in the future, support measures based on the concept of the smart city approach, taking into account the progress of existing plans and projects, are considered effective. The following are possibilities of cooperation based on the smart city approach:

- Cooperation in application of "Smart Concept Formulation" to create the foundation of visions and strategies at national level on the basis of existing urban planning and development (national level)
- Cooperation in application of "Accelerate" to ongoing development plans and projects (city level)

- Cooperation in application of “Small Start” to energize industries playing a central role in economic activities (city level)
- Cooperation in the introduction of multiple approaches, “Accelerate” to existing plans while also applying “Small Start” showing the new way of infrastructure development (city level)
- Cooperation that raises current efforts to a higher level of approach and contributes to improved sustainability through creating and improving the Enabling Environment (national/city level)

In order to apply the above listed five possible JICA cooperation, the relevance to “the conditions that may be applicable and issues” and “the elements of the related initiatives”⁹ and the expected benefits of the cooperation are examined, and the results are shown in Table 10-2. In addition, the evaluation was made based on the information collected on the status of smart city development initiatives in each country, and the countries that are expected to be supported in this direction were compiled. The direction of cooperation based on the Smart City Approach is also shown in relation to the initiatives toward urban development issues faced by the countries in the target region, based on their conditions and the development issues they face. The following table were designed to tie the development assistance menus that are expected to have synergistic effects of implementation by indicating the Type ID set in previous Table 10-1. It is important to note that the countries targeted under the assistance menu as measures to address urban development issues and the possibility of cooperation based on the smart city approach do not necessarily coincide due to the different evaluation axes.

Table 10-2: Potential JICA Cooperation based on Smart City Approach and the Relevance of JICA Assistance for Smart City Initiatives based on Urban Development Issues

Cooperation Options	Conditions of applicability and challenges faced	Related Smart City Initiative Elements	Considered Target Country
<p>Cooperation in application of “Smart Concept Formulation” to create the foundation of visions and strategies at national level on the basis of existing urban planning and development (national level)</p> <p>Benefits By utilizing existing urban development plans and enabling projects that have been implemented individually related to smart cities to be implemented within the framework of smart city development, it</p>	<p>【Applicable Conditions】</p> <ul style="list-style-type: none"> • Support has been provided for urban development Master Plan formulation in the past. • Urban development plans have been developed independently or with the support of other donors. <p>【Challenges】</p> <ul style="list-style-type: none"> • Implementation and coordination of separately implemented smart city developments from an integrated perspective • Creating a vision for Smart City development (There is a system to promote smart city development, and there are plans and projects related to digitalization and innovation promotion, but these have not been integrated into a smart city development concept.) 	<p>【Policy and Vision】</p> <p>01. Establishment of policy and vision of smart city 02. Comprehensiveness of policy and vision 03. Specifics of policy and vision</p> <p>【Organization】</p> <p>06. Sharing and promotion of visions and concepts 07. Promotion body</p>	<p>Angola Burkina Faso Cameroon Ethiopia Ghana Madagascar Mozambique Sudan</p>

⁹ Refers to the 21 elements listed under the five domains shown in the JICA SMART CITY APPROACH.

will be possible to make the implemented projects more comprehensive as smart city development. At the same time, by clarifying which agency will be the driving force, it will lead to the establishment of a national level system for smart city development.	Potential JICA Assistance for Smart City Initiatives based on Urban Development Issues	Potential Smart Technologies for Implementation (example)	Remarks
	<p>This may be applicable when a new urban development master plan, land use plan revision, social service improvement plan, etc. is about to be implemented in the target city (or as a national project).</p> <p>UL-1, UL-2, UL-4 SE-2, SE-4 GV-1</p>	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • DX with Data Management Tool • ICT Technologies • AI Analysis Technology. • Remote Management System, etc. 	

Cooperation Options	Conditions of applicability and challenges faced	Related Smart City Initiative Elements	Considered Target Country
<p>Cooperation in application of “Accelerate” to ongoing development plans and projects (city level)</p> <p>Benefits The development and utilization of tools to promote project implementation will be facilitated, including the relaxation of existing regulations, the formulation of new legal systems, and the utilization of incentives to leverage private-sector funds. Furthermore, an ecosystem and platform will be created to promote smart city development, leading to the formation of an environment in which smarter development will spill out into a wider range of service provision.</p>	<p>【Applicable Conditions】</p> <ul style="list-style-type: none"> • An agency or department in charge of urban development planning and implementation actually exists. • Budget allocations have been made for planned projects, and some projects are making progress. <p>【Challenges】</p> <ul style="list-style-type: none"> • Allocation of funds to projects that were not progressing as planned due to budget limitations • Set cost-effective implementation methods through the use of smart technology, since the project scale being too large for conventional implementation methods 	<p>【System】</p> <p>10. Building ecosystem 12. Setting laws, regulations and systems 14. Cross disciplinary</p> <p>【Technology】</p> <p>15. Urban infrastructure platform 18. Social system design and implementation</p>	<p>Côte d'Ivoire Kenya Nigeria Rwanda Senegal Tanzania Uganda Zambia</p>
	Potential JICA Assistance for Smart City Initiatives based on Urban Development Issues	Potential Smart Technologies for Implementation (example)	Remarks
	<p>Potential applications include those where planning and project implementation of urban transportation development and improvement is in progress, project promotion related to social services such as waste management and public services, as well as cities where management and use of various types of information is required.</p> <p>UL-3 ID-1, ID-3, ID-5 EI-3 SE-3</p>	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • GPS Data Utilization Technology • DX with Data Management Tool • ICT Technologies • Signal and Intersection Control System • Traffic Control and Management System • Integrated Operation Management Technologies • Digital Currency System • Blockchain Technology, etc. 	<p>It may be applicable to cities that have a clear policy and vision for smart city development initiatives at the target city level, and that have already established an organization with the necessary capacity for planning, implementation management, and operation, etc., to ensure systematic implementation and management.</p>

Cooperation Options	Conditions of applicability and challenges faced	Related Smart City Initiative Elements	Considered Target Country
Cooperation in application of “Small Start” to energize industries playing a central role in economic activities (city level) Benefits Setting up a smart development direction and vision for regional development through revitalization of existing industries and clarification of the promoting entity will lead to the establishment of a system for smart city development in the target city.	【Applicable Conditions】 <ul style="list-style-type: none"> An industrial development plan exists, and an agency or department in charge of its implementation have been identified. The target city falls under “Logistics & Transportation Center City” and “Production & Resource Center City” in the classification set under this survey. 【Challenges】 <ul style="list-style-type: none"> Economic revitalization through strengthening the role of cities and effectively utilizing the unique characteristics and resources of the region Resolving and mitigating urban issues arising from the characteristics of the city 	【Policy and Vision】 <ol style="list-style-type: none"> Establishment of policy and vision of smart city Comprehensiveness of policy and vision Specifics of policy and vision 【System】 <ol style="list-style-type: none"> Building ecosystem Setting laws, regulations and systems Cross disciplinary 【Technology】 <ol style="list-style-type: none"> Urban infrastructure platform 	Angola Burkina Faso Côte d'Ivoire Cameroon Ethiopia Ghana Madagascar Nigeria Senegal Sudan Uganda Zambia
	Potential JICA Assistance for Smart City Initiatives based on Urban Development Issues	Potential Smart Technologies for Implementation (example)	Remarks
	This may be applicable to cities (or countries) that are planning to formulate or implement new development plans or industrial promotion plans, etc., and are considering clarification of the role of the city and industrial promotion policies that are linked to such plans, etc. ID-4 SE-2, SE-4 GV-1	<ul style="list-style-type: none"> Data Mapping Tools, such as GIS, etc. DX with Data Management Tool Facility Monitoring System ICT Technologies AI Analysis Technology Digital Currency System, etc. 	

Cooperation Options	Conditions of applicability and challenges faced	Related Smart City Initiative Elements	Considered Target Country
Cooperation in the introduction of multiple approaches, “Accelerate” to existing plans while also applying “Small Start” showing the new way of infrastructure development (city level) Benefits The environment for smart city development to solve urban issues in a wider range of fields will be improved through the review of existing implementation methods, the use of new technologies, and the promotion of new entrants, while the promoting entities with experience in this field will	【Applicable Conditions】 <ul style="list-style-type: none"> A smart city development plan exists, and an agency or department in charge of its implementation have been identified. Budget allocations have been made for planned projects, and some projects are making progress. The willingness to utilize smart city development to develop and improve infrastructure and services is clarified in policies and other means. 【Challenges】 <ul style="list-style-type: none"> Allocation of funds to projects that were not progressing as planned due to budget limitations Set cost-effective implementation methods through the use of smart technology, since the project scale being too large for conventional implementation methods Resolving and mitigating urban issues arising from the unique characteristics of the city 	【System】 <ol style="list-style-type: none"> Building ecosystem Setting laws, regulations and systems Cross disciplinary 【Technology】 <ol style="list-style-type: none"> Urban infrastructure platform Data utilization Digital security Social system design and implementation 	Côte d'Ivoire Kenya Mozambique Nigeria Senegal Tanzania Uganda

make use of their experience. In addition, this will lead to the development of a system and environment to deal with new risk-assumed issues such as digital security.	Potential JICA Assistance for Smart City Initiatives based on Urban Development Issues	Potential Smart Technologies for Implementation (example)	Remarks
	<p>It may be applicable in cities where new problems have arisen and need to be addressed through development in accordance with existing plans with applicable smart solutions to solve problems.</p> <p>UL-2, UL-3 ID-1, ID-2, ID-3, ID-5 EI-1, EI-2, EI-3, EI-4 SE-1, SE-3 GV-1</p>	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • GPS Data Utilization Technology • DX with Data Management Tool • Integrated Operation Management Technologies • ICT Technologies • AI Analysis Technology • Digital Currency System • Blockchain Technology • CCTV System • Remote Management System • Signal and Intersection Control System • Traffic Control and Management Systems, etc. 	It may be applicable to cities that have a clear policy and vision for SC initiatives at the city level, and that have already established an organization with a certain level of capacity for planning, implementation management, and operation, etc., and can manage individual projects.

Cooperation Options	Conditions of applicability and challenges faced	Related Smart City Initiative Elements	Considered Target Country
<p>Cooperation that raises current efforts to a higher level of approach and contributes to improved sustainability through creating and improving the Enabling Environment (national/city level)</p> <p>Benefits Elements necessary for sustainability of the smart city development ecosystem that has been established will be clarified. The conditions and environment for making smart city development sustainable then will be organized and improved, including a review of the structure necessary for sustainability, the creation of an environment to promote the participation of new players, and the strengthening of existing collaborative relationships.</p>	<p>【Applicable Conditions】</p> <ul style="list-style-type: none"> • Certain progress has been made in smart city development and the project is at a stage where its achievements can be evaluated (setting and monitoring of KPIs). <p>【Challenges】</p> <ul style="list-style-type: none"> • There is a need to shift from conventional technology-oriented development to human-centered development. • Improvements in maintenance and sustainability are needed. 	<p>【System】</p> <ol style="list-style-type: none"> 10. Building ecosystem 11. Creating trust 12. Setting laws, regulations and systems 13. Citizen participation and co-creation 14. Cross disciplinary <p>【Technology】</p> <ol style="list-style-type: none"> 15. Urban infrastructure platform 16. Data utilization 17. Digital security 18. Social system design and implementation <p>【Operation】</p> <ol style="list-style-type: none"> 19. Flexibility of promotion system 20. Strengthening collaboration and partnerships 21. Ensuring sustainability 	<p>Kenya Nigeria Rwanda Tanzania Uganda</p>

	Potential JICA Assistance for Smart City Initiatives based on Urban Development Issues	Potential Smart Technologies for Implementation (example)	Remarks
	<p>It may be applicable in cities (or countries) aiming for smart initiatives, including advanced urban and economic development, which are considered to require effective and high-quality development perspectives that include governance, management, communication, co-creation, and confidence building as well as technology and solution provision as the underlying foundation.</p> <p>All Assistance (with higher level goals being considered)</p>	<ul style="list-style-type: none"> • Data Mapping Tools, such as GIS, etc. • GPS Data Utilization Technology • DX with Data Management Tool • ICT Technologies • AI Analysis Technology • Digital Currency System • Blockchain Technology • CCTV System • Remote Management System • City-OS (Operation System), etc. 	<p>Cities or countries that can apply higher approaches, such as Sustainable Growth and Accelerate, will be targeted. Or, cities or countries that have a high probability of progressing from the lower approach to the Accelerate approach by phasing in their smart city initiatives will be included.</p>

Source: Survey Team

As indicated earlier, the relevance of JICA assistance for smart city development initiatives and the potential for cooperation based on the smart city approach shown in the table above will need to be reevaluated and verified according to each country's current urban development situation, views on issues, and smart city development initiatives. This consideration also should add that the above discussion of relevance needs to be updated along with future information collection, given that this is a discussion of possibilities that can be considered based on the limited information gathered from the desktop research conducted in this study.

(3) Precedent Smart City Development Initiatives by Urban Development Challenges

The relationship between urban issues and the target technologies and measures for smart city development by linking the five typical urban development issues in sub-Saharan Africa that have been presented in the previous section 2.3 with the smart city development that the cities (countries and governments) are trying to implement. The following examples illustrate the relationship between urban issues and potential smart city solutions to be implemented in smart city development. Also, the points that could be challenges in the implementation of similar smart city development are indicated in the context of the Sub-Saharan Africa region urban development issues, since it is considered that there could be organizational issues, budgetary measures, and various other hurdles to implementation in precedent cases (each information is extracted from the official website of the city government). These examples not only show the possibility of smart city development through “technology oriented solutions,” but also the verified possibility of smart city development based on basic policies and visions.

Table 10-3: Compilation of Urban Challenges, Initiatives, Implementation innovations, etc. from the World Precedent Cases

Urban Development Challenges	Infrastructure Development (Transportation): Providing adequate services to meet mobility demand while reducing investment while lacking progress in developing or strengthening public transportation in cities.
Smart City Initiatives	The initiative aims to introduce a transportation service in a model district, in which resident drivers “give rides to anyone who wants a ride with them” when they go out on their own purposes.
Country/City	Hamamatsu City, Japan
Implementation Body(s)	Hamamatsu City and Hamamatsu City Mobility Service Promotion Consortium
Abstract of Initiatives	Although the city has been promoting the introduction of regional buses as a means of local transportation, improving the utilization rate in the region has been a challenge, and it has been necessary to consider how to create a sustainable regional transportation system. Under such circumstances, “mutual aid transportation using private cars” is expected to contribute to the construction of a mutual aid-oriented society that the city is aiming for by strengthening communication and connections within the community and revitalizing the community.
Innovative approaches	A volunteer conference was set up to incorporate the opinions of people in the driver industry, design a system for registering drivers to provide services and a system for safe operation (alcohol detection, fare collection, etc.), and establish a system that both users and service providers can use with peace of mind.
Issues arose after implementation	It is necessary to provide services that meet the demand for transportation over short distances, build win-win relationships with taxi and bus operators, and establish measures to “revitalize the community” beyond these services.

Urban Development Challenges	Environmental Impact Measures: Realization of environmentally friendly urban development through reduction of various environmental impact factors, such as traffic congestion, greenhouse gas emissions, and waste problems caused by daily life and economic activities.
Smart City Initiatives	The city aims to become the world’s first carbon neutral city by 2025, and to realize a balanced and smart society through the initiatives in the five areas of health, mobility, climate change, smart citizenship, and smart learning.
Country/City	Capital City of Copenhagen, Denmark
Implementation Body(s)	Promote PPPs and collaboration between industry, government and academia, with implementation managed by the national and municipal governments.
Abstract of Initiatives	The city has developed a number of projects, including the “Copenhagen Connecting” data strategy, the “CITS” smart mobility initiative, and the “DOLL” living lab, with the aim of creating a comprehensive future city. Urban transportation in the city is also an all-citizen-participant smart city initiative, with citizens proactively using bicycles by increasing the convenience of public transportation and reduce the use of private vehicles.
Innovative approaches	The city is being developed as a place where the city can grow rich in nature and coexist with it, and where not only citizens but also inbound travelers can experience the benefits of eco-friendly initiatives, thus creating an urban mechanism for all to participate that encourages environmentally symbiotic behavioral choices out of necessity.
Issues arose after implementation	Future smart city development in Denmark needs to restructure existing green technologies and develop new ones with the Danish smart city system in mind. More public-private partnerships also need to be encouraged, and both the private and public sectors need to move away from the traditional customer-supplier relationship to develop common solutions (Source: Danish Smart Cities: Sustainable Living in an Urban World).

Urban Development Challenges	Urbanization and Land Use: Effective implementation and management of solutions to housing shortages and lagging infrastructure development in response to population influx and rapid urban growth.
Smart City Initiatives	Even before the term “smart city” was popularized, the city’s growth is managed in a planned manner, promoting housing development, area management, and public transportation networks, as well as efforts to create a pedestrian-centered urban living environment. Currently, efforts are underway to realize surveillance technology for citizen safety and community safety from citizen participation.
Country/City	City of Portland, United States
Implementation Body(s)	City of Portland (and Metro, etc.) plans and manages implementation
Abstract of Initiatives	Based on the urban growth strategy of region 2040 (Metro, 1995), the city has promoted the participatory planning and implementation of development plans for all citizens (needs), including indigenous people and immigrants living in the city, and has smartly promoted urban development from the beginning with proper development management based on the Urban Growth Boundary, effective land use and housing development, and easy-to-use public transportation for all citizens.
Innovative approaches	It is rare to find an American city that has been aiming for a human-centered, walkable, compact city since the 1970s. On the other hand, the city’s early planning reflected concerns about regional population growth and sprawl associated with economic growth, and its efforts to create a city that does not need to rely on ultra-high technology and large-scale infrastructure are smart and ahead of their time.
Issues arose after implementation	The city faces the challenge of providing 120,000 additional housing units in the city that needs to strengthen its housing development. Construction costs have risen more than 50% since 2016, and significant market externalities since COVID have hampered housing development. Rising inflation, interest rates, wages, materials, supply chain issues, and other compounding challenges require the City of Portland to take action to solve these issues.

Urban Development Challenges	Social and economic measures: From efforts to prevent and control urban crime by reforming the legal system and introducing technology to ensure privacy and a safe urban living environment.
Smart City Initiatives	The goal is to create a smart “hometown” where citizens can raise their children with peace of mind by ensuring the safety of children on their way to and from school and when out and about by installing watchful surveillance cameras mainly along elementary school routes and around the school.
Country/City	Kakogawa City, Japan
Implementation Body(s)	Conducted by Kakogawa City and the Japan Data Management Consortium (JDMC)
Abstract of Initiatives	Install advanced surveillance cameras using AI to detect abnormal sounds and approaching vehicles, in addition to conventional watchful security, in order to prevent crimes and traffic accidents. In addition, the use of data to measure the flow of people around the Kakogawa Station area should improve the ease of travel, thereby realizing effective urban development.
Innovative approaches	In order to maximize data utilization and privacy protection, systems and programs were introduced to destroy all but the most abnormal data, process (modify) images of people during AI analysis so that personal information is not obtained, store data on a server using a highly secure closed communication network, and destroy information after AI data learning.
Issues arose after implementation	In order to ensure the freedom and safety of people’s activities in the city while protecting their privacy and achieving a high level of control over information, further efforts should be strengthened to work with local police and related agencies, and citizens should be further encouraged to understand the service.

Urban Development Challenges	Governance: Improvement of city administrative services and efficiency in billing and collection of various service fees and streamlining of various payment and settlement procedures for citizens, etc.
Smart City Initiatives	Promoting initiatives, such as to utilize ICT and digital technology in many areas related to the lives of citizens, and to introduce a digital local currency that solves local issues, are in the process.
Country/City	Aizuwakamatsu City, Japan
Implementation Body(s)	Aizu Wakamatsu City, the University of Aizu, and the Super City AiCT Consortium have signed a basic agreement to implement the program.
Abstract of Initiatives	The city establishes a cashless payment service that enables lower fees and immediate cash conversion, and promotes cashless payment services in the region by improving payment convenience and introducing “Aizu Coin,” a digital local currency.
Innovative approaches	The University of Aizu, which specializes in computer science, is located in the city. In response to the challenges of a declining population and an exodus of young people, the city is promoting the use of digital technology as a means of creating new jobs and employment and realizing an attractive “city” while aiming for the same convenience and comfort in large cities, even in rural areas.
Issues arose after implementation	While digitalization is necessary to improve efficiency and convenience in urban life, it is also necessary to further improve services and increase opportunities for citizens to experience, and to further promote their understanding of services in order to encourage citizens to use digital services with ease.

Source: Organized by the Survey Team based on the official web page information of each city government

(4) Possible JICA Assistance considered from Senegal • Rwanda Visit and On-Site Study

The possibilities for JICA assistance as seen from the field surveys conducted in Senegal and Rwanda, summarized in Chapter 7, are discussed in this section. There would be an expectation that there is a wide range of development assistance possibilities in other countries in the Sub-Saharan Africa region, as shown here. Therefore, it is assumed that the essence of these possibilities can be utilized in the study of assistance for initiatives in each city to grasp the potential for cooperation. The information is based on limited interviews with government agencies involved in smart city initiatives, questionnaire responses, and site visits to capital cities, and the optimal plan for actual assistance needs to be determined based on updated information and coordination with related agencies.

Table 10-4: Potential Development Assistance for Smart City in Senegal and Rwanda

	Potential Development Assistance	Remarks
Senegal	There is an opportunity to support smart development in the on going development of Diamniadio. This support can include formulating a detailed action plan, enhancing the capacity of the DGPU and other entities responsible for implementing the development project . Additionally, there is potential to assist with mid- to long-term planning, such as implementing a comprehensive information management system for the broader area. This could involve applying the “Accelerate” approach to existing development projects or adopting the “Smart Concept Formulation” approach, which would diverge from current development projects.	The formulation or review of the master plan for Diamniadio’s smart city development could potentially complicate the ongoing development efforts from a policy perspective. Therefore, it should be carefully evaluated as a target for the support.
	Daga Kholpa, identified as another important urban development hub is facing challenges in executing its development plan due to financial constraints. Therefore, offering technical assistance to related organization, such as DGUA on how to optimize financial resource utilization and considering financing mechanisms could be possible. For new initiatives, support in the form of “Smart Concept Formulation” could be effective.	Promoting smart development efforts can be achieved by aligning them with SDG-11 goals and other targets from the early stages of planning.
	While Dakar’s smart city development is not clearly planned, support for the implementation of smart solutions is important for the city to address overall urban development issues. Technical support is needed in reviewing the current master plan, conducting comprehensive assessments of urban issues, proposing effective	Introducing smart technologies into transportation systems (e.g., smart signaling systems, traffic control systems, and informa-

	Potential Development Assistance	Remarks
	solutions, and incorporate them into the urban development plan in collaboration with the city government. There is potential to combine the support of the “Small Start” approach and “Smart Infrastructure Development” approach.	tion management technologies linked to BRT systems), offers approach to addressing various transportation issues at an early stage.
	The historical City, Rufisque holds potential for JICA support, particularly in formulation of master plan on smart city development linked to tourism and heritage conservation. Through JICA’s support in the formulation and implementation of a comprehensive SC development master plan, it will be possible to monitor the cityscape, including mapping of tourism resources, maintenance and restoration, and introduction of smart technologies to support the reuse of historical buildings as assets and management of the revenues from them. This is support for compact “Small Start” projects.	
	In Senegal, currently there is no particular smart city master plan, vision, and strategy at national level. Therefore, it is necessary to provide technical cooperation for the formulation of master plan at the national level and strengthen the capacity of related organizations such as MCTEN, DGUA and DGPU, and for medium- to long-term development support through technical cooperation and dispatch of experts are considered necessary. It is necessary to take a long-awaited approach by starting from the understanding of the situation at the national level through a “Smart Concept Formulation” approach.	
Rwanda	In Rwanda, the SC development aligns with the Smart Rwanda 2020 Masterplan. MINICT oversees the overall SC plan, while RISA leads its implementation. JICA’s supports have been provided to the Working Group and Taskforce. Furthermore, JICA’s support may involve utilizing the Working Group and Taskforce frameworks to establish a national smart city implementation system, review the system, and clarify the roles of Kigali City and surrounding areas. The support aims to enhance coordination among relevant organizations engaged in the smart city initiative and facilitate a comprehensive planning and implementation process. It incorporates elements of the “Accelerate” and “Small Start” approaches, while primarily focusing on the “Smart Concept Formulation.” Additionally, if the Rwanda government has the capacity, this support could transition into an integrated implementation approach.	
	Despite Kigali City’s efforts to enhance the efficiency of administrative services using various data (e.g., IREMBO), it has not yet established a system to integrate and utilize these data on a shared platform. To address this gap, Kigali City has the potential to introduce a City-OS as an integrated platform for managing data collected through existing ICT-based services. The planning and implementation of a City-OS can also lay the foundation for expanding smart city development to other regions of the country. Support through an “Accelerate” approach or higher-level “Sustainable Growth” approach is assumed to be feasible. To support this, a special task force will be established, led by MINICT and RISA, to enhance their capacity through action planning and implementation. This support aims to accelerate smart city development efforts at the national level.	There is also alignment with the existing other JICA’s assistance projects. Although integrating unintegrated data systems presents a significant challenge, the Rwandan government is believed to have the potential capacity to address such obstacles effectively.
	Support could be provided for developing individual smart city implementation plans at the local level, utilizing on the unique strengths of rural areas and regions. For instance, in peripheral areas where agriculture dominates land use, strengthening the agro-industry sector and promoting technology innovation in agriculture could be benefit for Rwanda. An effective approach could involve revitalizing local industries through the introduction of technologies that enhance product traceability and productivity, such as drones and efficient logistics systems. This support could be coordinated through RISA’s task forces and other affiliated organizations, while leveraging the “Small Start” approach for the implementation.	The efforts are also expected to contribute to a wide range of SDG areas.
	Given Kigali City’s hilly terrain and challenges in urban mobility, there’s potential for JICA’s support in the development of a master plan to introduce smart transportation solutions. Demonstrating flexible smart public transportation options, such as using AI to optimize the allocation and operation of limited public transportation vehicles, could be possible. achieving multimodal transportation through initiatives like public-private collaborations, involving taxis and motorbike taxis linked to this information network, could reduce the need to shift policy direction to the introduction of large-scale urban transportation. This approach represents a new way to infrastructure development, ranging from supporting implementation plans for governments facing limited budgets to adopt “Accelerate” or “Small Start” approaches.	It could consider that dividing hilly areas into zones to understand the daily demand of people’s movement and using AI to measure changes in the travel demand between zones from mobile phone information, etc. to manage the traffic.

Source: Survey Team

10.3. Suggestions for Cooperation Policy of Smart City Development

As has been reiterated in previous chapters, the formation of cities in sub-Saharan Africa differs from that of the Asian region in its historical and cultural background, which requires an analysis of urban development issues based on the historical functions of the cities targeted for cooperation, and the formulation of plans and application of approaches for smart city initiatives. In this context, it is necessary to formulate support policies that take into account the creation of an enabling environment that promotes initiatives based on the UN-Habitat concept of People-centered Smart Cities, rather than the conventional “technology and product-based” approach.

Initiatives and developments to solve urban problems and improve public service delivery have also been implemented in cities in sub-Saharan Africa with the support of donors. Supporting creation of a system that can incorporate these existing activities into the smart city approach and promote the project as an integrated smart city development will contribute to sustainable economic growth and sustainability of the city, commitment to ongoing urban management, etc., and will also lead to governance, communication, co-creation and building trust of citizen derived from continuity, that are smart city elements.

10.4. Challenges in Promoting Future Cooperation for Smart City Development

This study examines a phased approach based on the characteristics of cities in sub-Saharan Africa, which are different from those in the Asian region. To the three phases formulated for the Asian region, two further phases have been added: “4. Cities (or countries) that need groundwork for smart city discussions”, and “5. Cities (or countries) that need to prioritize basic infrastructure development before smart city development”. One of the challenges in promoting cooperation is how to introduce smart city development initiatives while also accelerating infrastructure development, especially in the context of regional challenges that make it difficult to develop infrastructure, as mentioned in the fifth approach. These challenges include financial capacity, how to introduce good practices from the developed countries and Asia to the sub-Saharan African region, which has a different historical and cultural background, how to secure and strengthen human resources (including organizational capacity), and how to build an effective organizational structure, as organizational building is the first effort for many cities.

Another challenge in developing a smart city is how to establish a common definition and perception of a “smart city” and its “effects” within a country (or city). As conventional technology-oriented development and “people-centered” development have different definitions and different ways of proceeding with development, it is also necessary to create a mechanism to establish this common understanding in order to promote smart city development and achieve the SDGs within limited resources.

APPENDIX

- 1. Country Profile**
- 2. Smart City Initiatives in Other Countries**
- 3. Meeting Memo**
- 4. Answer to the Questionnaire**
- 5. Participant List of the Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa**
- 6. Presentation Material of the Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa**
- 7. Declaration on the Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa**

Appendix 1 Country Profile

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#17. Ethiopia	A1-33	#41. Somalia	A1-81
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		#49. Zimbabwe	A1-97



Country Profile

#1 Angola

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
35,588,987 (2022)	2,998.5 (2022)	33% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
68% (2022)	3.0% (2022)	48.2% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.0% (2022)	36.8% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
63% (2020)	13.6% (2022)	No Data
Unemployment Rate (%)		
10.2% (2022)		



OVERVIEW

Angola is a country located in southwestern Africa. It is bordered by Namibia, Botswana, Zambia, and the Democratic Republic of the Congo. With a population of approximately 35.5 million as of 2022, Angola is home to various ethnic groups and languages. Angola is rich in natural resources, including oil and

diamonds, and as a result its economy is one of the fastest growing in the world. However, the impoverished population has yet to see the benefits of increased prosperity, and the country is still in a state of reconstruction after decades of civil war.

ISSUES AND CHALLENGES

	Country Level	City Level (Luanda)
Urban/Land Use	<ul style="list-style-type: none"> Rapidly growing population Densely populated informal neighborhoods in all urban centers 	<ul style="list-style-type: none"> Facing extreme challenges in urban development, stemming from the country's turbulent history and its peripheral role in the global economy Experiencing mass migration to the city
Infrastructure Development	<ul style="list-style-type: none"> Infrastructure inefficiencies in all transport sub-sectors, including road, rail, air and maritime Many areas lack access to water, electricity, sanitation, health and education 	<ul style="list-style-type: none"> Informal settlements are prevalent
Environmental Situation	<ul style="list-style-type: none"> Prone to extreme climatic events 	<ul style="list-style-type: none"> Significantly affected by severe climate change impacts
Social Context and Economic Situation	<ul style="list-style-type: none"> High poverty level which is linked to a lack of good quality jobs High rate of unemployment among the youth 	<ul style="list-style-type: none"> Urban poverty is a pressing issue
Governance	<ul style="list-style-type: none"> Persistent issue in government corruption 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

Framework	Country/Region	Angola	Namibe
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	GMD Solutions carried out the project for the illumination of the bridge over the Giraul River in Namibe, Angola, in collaboration with DISOLED and LUXIOT, technology companies in LED lighting and solar remote control Smart Cities.
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/AO>)
World Bank Country Profile (<https://www.worldbank.org/en/country/angola/overview>)
Photo: <https://www.afdb.org/en/countries/southern-africa/angola>



Country Profile #2 Benin

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
13,352,864 (2022)	1,303.2 (2022)	34% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
50% (2022)	6.3% (2022)	42% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.8% (2022)	35% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
68% (2020)	26.9% (2022)	3% (2022)
Unemployment Rate (%)		
1.7% (2022)		



OVERVIEW

Benin's geographical position at the juncture of two major regional corridors - the Abidjan-Lagos and Cotonou-Niamey corridors - makes this West African country an important commercial and tourism hub. Benin has a 121 kilometer-long coastline on the Gulf of Guinea and is bordered by Nigeria, Burkina Faso, Niger, and Togo. About half of the population reside

in urban areas. The highest concentration of people in the country reside in and around the cities on the Atlantic Coast. Benin's economy is highly dependent on subsistence agriculture, cotton production, and regional trade. Benin is a politically stable country and has achieved successive democratic transitions.

ISSUES AND CHALLENGES

	Country Level	City Level (Cotonou)
Urban/Land Use	<ul style="list-style-type: none"> Rapid pace of urbanization and informal settlements 	<ul style="list-style-type: none"> Demographic pressure and fast urbanization Large areas of informal and precarious housing
Infrastructure Development	<ul style="list-style-type: none"> Disparities in access to water, sanitation and electricity services Poor condition of Benin's road and rail transport systems Lack of adequate houses and modern infrastructure 	<ul style="list-style-type: none"> Basic sewer system Gap between the transport infrastructures and the transport demand Inadequacy of facilities and infrastructure Lack of basic services and public facilities
Environmental Situation	<ul style="list-style-type: none"> Lagging environmental and natural resources management Urban flooding 	<ul style="list-style-type: none"> Recurrent flooding
Social Context and Economic Situation	<ul style="list-style-type: none"> Slow labor productivity growth Large disparities exist in access to education and health between regions Prevalence of informal employment creates vulnerability for workers Gender imbalances 	<ul style="list-style-type: none"> Social vulnerability of many segments of the population
Governance	<ul style="list-style-type: none"> Poor management of local institutions Weak governance and insufficient Government commitment 	<ul style="list-style-type: none"> Low coordination between central and municipal authorities

CURRENT STATUS OF SMART CITY DEVELOPMENT

Benin is currently advancing its smart city initiatives primarily through project-based efforts, as there is no comprehensive national-level policy for smart cities. Despite the absence of a specific system tailored for smart cities, the government has undertaken a notable

flagship project – the International City of Innovation and Knowledge (Sèmè City), focusing on becoming a regional center of excellence in education, research, innovation and economic development.

Framework	Country/Region	Benin	Sèmè City / Cotonou
	Policy and Vision	Although there is a national development vision aiming for Benin to “ <i>become a centre of inclusive and sustainable development</i> ” (Revealing Benin), there is currently no national-level smart city policy. However, a flagship project of the Government Action Programme is the creation of the International City of Innovation and Knowledge (Sèmè City).	There is currently no city-level smart city policy in Sèmè City / Cotonou. However, Sèmè-Podji benefits from the national development initiative “Revealing Benin” aiming to create a smart city as a regional center of excellence in higher education, research, innovation, and economic development.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Ministry of Digital Affairs and Digitalization, Ministry of the Living Environment and Sustainable Development). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities. The Sèmè City Development Agency (ADSC), public institution with financial autonomy, has been entrusted with the creation and implementation of the Sèmè City.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	The government has deployed a wide range of digital services platforms and projects.	Sèmè-Podji has recently adopted digital tools and uses Geographic information Systems (GIS) to map the town. The city is also working on its local master plan, of which digitisation is a key element.
	Operation	Benin is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank. Open Data Home Page (<https://data.worldbank.org/country/BJ>)
World Bank. Country Profile (<https://www.worldbank.org/en/country/benin/overview>)
Journal of Social Sciences, *City Growth: Issues and Challenges of Urban Sustainability in Republic of Benin*, 2017
(<https://thescipub.com/pdf/jssp.2017.208.215.pdf>)
Photo: <https://www.afdb.org/en/countries/west-africa/benin>



Country Profile

#3 Botswana

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
2,630,296 (2022)	7,737.7 (2022)	74% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
72% (2022)	5.8% (2022)	73.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
2.5% (2022)	45.6% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
40% (2020)	1.8% (2022)	No Data
Unemployment Rate (%)		
20.7% (2022)		



OVERVIEW

Botswana is a landlocked country located at the center of Southern Africa, bordered by South Africa, Namibia, Zambia, and Zimbabwe. Around 84% of the country is covered by Kalahari Desert. With around 2.6 million people in 2022, the majority of the population is concentrated in the eastern and southeastern parts of the country.

Botswana is the world's largest producer of diamonds and the trade has transformed it to achieve middle-income status. However, despite its relatively high-income level, poverty rates remain high. Additionally, job creation has been lagging, resulting in a structurally high unemployment rate of 20.7% as of 2022.

ISSUES AND CHALLENGES

	Country Level	City Level (Gaborone)
Urban/Land Use	<ul style="list-style-type: none"> Rural-urban migration and subsequent urban expansion 	<ul style="list-style-type: none"> The lack of densification has resulted in urban sprawl Ongoing uncontrolled leap-frog expansion has caused Gaborone to spill over into peri-urban areas There is a shortage of available land for housing
Infrastructure Development	<ul style="list-style-type: none"> The scarcity of safe drinking water is a result of prolonged drought conditions 	<ul style="list-style-type: none"> The rapid growth of passenger cars has led to increased traffic congestion, road accidents, and rising greenhouse gas emissions
Environmental Situation	<ul style="list-style-type: none"> Experiencing harsh weather conditions and drought 	<ul style="list-style-type: none"> Air pollution is a concern, originating from mines, breweries, various institutions, textile industries, and small-scale chemical industries
Social Context and Economic Situation	<ul style="list-style-type: none"> High rate of poverty, unemployment, inequality and HIV/AIDS prevalence Concerns exist in the quality of education, the relevance of the curriculum, and the incorporation of science and technology in teaching and learning Informal sector has experienced rapid growth but contributes minimally to the annual GDP 	<p><currently there is no information></p>
Governance	<ul style="list-style-type: none"> Poor policy coherence and weak implementing authorities Corruption is a pervasive issue within the country 	<ul style="list-style-type: none"> Facing challenges in revenue collection, resulting in low collection rates Facing weak municipal finance capacity

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

	Country/Region	Botswana	Gaborone
Framework	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/botswana>)
World Bank Country Profile (<https://www.worldbank.org/en/country/botswana/overview>)
Photo: <https://www.forbesafrica.com/africa-undiscovered/2023/01/23/botswana-a-hidden-gem-of-africa/>



Country Profile

#4 Burkina Faso

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
22,673,762 (2022)	832.9 (2022)	22% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
32% (2022)	1.5% (2022)	19% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.6% (2022)	46.6% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
27% (2020)	20.4% (2022)	10% (2022)
Unemployment Rate (%)		
5.2% (2022)		



OVERVIEW

Burkina Faso is a landlocked country in Western Africa, shares borders with Mali, Niger, Ivory Coast, Ghana, Togo, and Benin. The population is approximately 22.6 million as of 2022. Burkina Faso is characterized by a significant youth population. It is considered a low-income Sahelian country with limited natural resources. The economy primarily relies on agriculture, although there has been a recent

increase in gold exports.

Burkina Faso is among the most vulnerable countries to the impacts of climate change due to limited natural resources and a highly variable climate. Unpredictable rainfall patterns, dust storms, and temperature spikes have a detrimental effect on agricultural production, leading to more frequent food insecurity situations.

ISSUES AND CHALLENGES

	Country Level	City Level (Ouagadougou)
Urban/Land Use	<ul style="list-style-type: none"> The geographical position results in high energy costs, which is a major bottleneck for development 	<ul style="list-style-type: none"> Rapid urbanization is occurring in the city
Infrastructure Development	<ul style="list-style-type: none"> Limited access to natural resources in general and water resources in particular There is imbalance between housing supply and demand 	<ul style="list-style-type: none"> Public roads lack of systematic sidewalk infrastructure, and crosswalks are not very safe
Environmental Situation	<ul style="list-style-type: none"> Facing droughts and water shortages 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Violence against women and children in particular represent major concerns There are numerous inequalities and disparities between men and women 	<ul style="list-style-type: none"> Experiencing high poverty rate
Governance	<currently there is no information>	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

The government of Burkina Faso announced an ambitious new plan to build a 650-kilometer fiber-optic network. This network will connect all major

cities in the country to a new Smart City platform powered by Huawei.

	Country/Region	Burkina Faso	Ouagadougou
Framework	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	A partnership between local electricity company and NGO Open Burkina has helped residents of its capital Ouagadougou to become more resilient to power outages using “sensors installed in homes to collect data on power grid performance”.
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/BF>)
World Bank Country Profile (<https://www.worldbank.org/en/country/burkinafaso/overview>)
Photo: <https://www.afd.fr/en/actualites/burkina-faso-operation-easing-congestion-ouagadougou>



Country Profile

#5 Burundi

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
12,889,576 (2022)	238.4 (2022)	6.0% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
14% (2022)	1.8% (2022)	10.2% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
5.2% (2022)	81.9% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
37% (2020)	27.6% (2022)	No Data
Unemployment Rate (%)		
1.0% (2022)		



OVERVIEW

Burundi, a landlocked country in East Africa, is classified as a low-income economy, with 80% of its population employed in the agricultural sector (The World Bank). Situated in the Great Lakes region, Burundi shares borders with Rwanda to the north, Tanzania to the east, the Democratic Republic of the

Congo to the west. Additionally, it is bordered by Lake Tanganyika to the southwest. With a population of 12.8 million people as of 2022, Burundi is one of the most densely populated countries in the world considering its small size.

ISSUES AND CHALLENGES

	Country Level	City Level (Gitega)
Urban/Land Use	<ul style="list-style-type: none"> Urbanization in the country lacks accompanying structural changes in the economy Areas outside the main cities suffer from weak land property rights 	<ul style="list-style-type: none"> Experiencing a constant population growth, with majority of people live in rural areas
Infrastructure Development	<ul style="list-style-type: none"> There is a need to implement appropriate infrastructures to support agricultural production 	<ul style="list-style-type: none"> There is a significant lack of access to health and education services
Environmental Situation	<ul style="list-style-type: none"> Facing both man-made and natural disasters 	<p><currently there is no information></p>
Social Context and Economic Situation	<ul style="list-style-type: none"> Economic activity remains fragile and vulnerable to shocks The need to control demographic growth and ensure food security Addressing unemployment and increasing household incomes Efforts need to be made to raise the level of literacy and create skilled workforces 	<ul style="list-style-type: none"> Facing high mortality rate among young children and high number of children suffering from malnutrition Food insecurity is a prevalent issue Health challenges such as cholera, malaria and HIV/AIDS
Governance	<ul style="list-style-type: none"> Reconstruction of national unity and achieving a secure and peaceful nation are essential goals 	<p><currently there is no information></p>

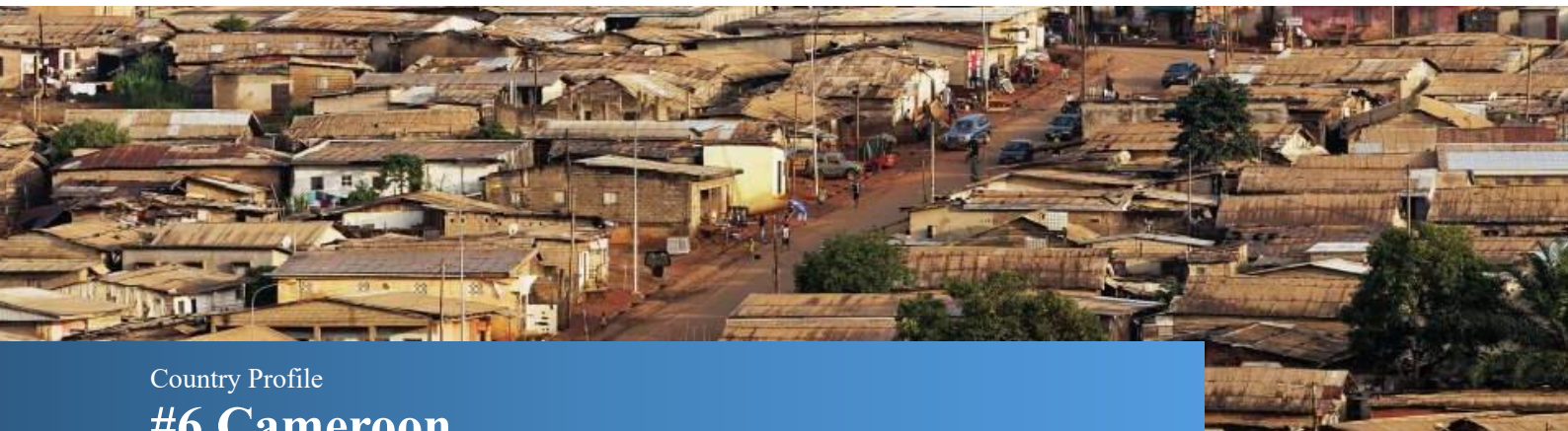
CURRENT STATUS OF SMART CITY DEVELOPMENT

The Kabonga Smart City Project is located in the southern region of Burundi, near the border with Tanzania. The smart city will be in close proximity to the upcoming Kabonga Port, which is being developed by the African Development Bank. This project

primarily focuses on the industrial sector, aiming to create a significant industrial area. It is anticipated that the development will generate numerous job opportunities for young individuals, adults, and even refugees.

Framework	Country/Region	Burundi	Kabonga
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/BI>)
World Bank Country Profile (<https://www.worldbank.org/en/country/burundi/overview>)
Vision Burundi 2025 (https://www.undp.org/sites/g/files/zskgke326/files/migration/bi/UNDP-bi-vision-burundi-2025_complete_EN.pdf)
Kabonga Smart City (<https://www.linkedin.com/pulse/smart-cities-burundi-shores-lake-tanganyika-dr-amir/>)
Photo: <https://www.bbc.com/news/world-africa-13087604>



Country Profile #6 Cameroon

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
27,914,536 (2022)	1,588.5 (2022)	46% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
59% (2022)	3.5% (2022)	65.4% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.6% (2022)	20.6% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
33% (2020)	17.0% (2022)	No data
Unemployment Rate (%)		
4.0% (2022)		



OVERVIEW

Cameroon is a lower-middle-income country with a population of over 27.9 million. Located along the Atlantic Ocean, it shares its borders with the Central African Republic, Chad, Equatorial Guinea, Gabon, and Nigeria. Two of its border regions with Nigeria are Anglophone, while the rest of the country is Francophone. Cameroon is endowed with rich natural resources, including oil and gas, mineral ores, and high-value species of timber, and agricultural products,

such as coffee, cotton, cocoa, maize, and cassava. Having enjoyed several decades of stability, Cameroon has in recent years been grappling with attacks by Boko Haram in the Far North and a secessionist insurgency in the Anglophone regions. Since September 2017, this situation has displaced more than one million internally and around 470,000 refugees have sought shelter in Cameroon.

ISSUES AND CHALLENGES

	Country Level	City Level (Douala)
Urban/Land Use	<ul style="list-style-type: none"> Complex land tenure systems Rapid urbanization compounded by urban poverty Growth of slums and informal settlements 	<ul style="list-style-type: none"> Complex and competitive land tenure systems Absence of land control for the creation of facilities Poor quality housing system in vulnerable areas
Infrastructure Development	<ul style="list-style-type: none"> Needs in terms of infrastructure, public facilities and urban services Inadequate service delivery capacities 	<ul style="list-style-type: none"> Poor transportation infrastructure Inequality in access to basic services and lack of maintenance of existing infrastructure Public health provision is of low quality Inequalities in access to education
Environmental Situation	<ul style="list-style-type: none"> Highly vulnerable to climate change Increased incidences of weather events (drought, floods, etc.) 	<ul style="list-style-type: none"> Vulnerable to many natural hazards including sea level rise, landslides and flooding Unequal collection and poor quality of waste management is one of the sources of pollution in the current environment
Social Context and Economic Situation	<ul style="list-style-type: none"> Insufficient growth to reduce poverty significantly Internal and external conflicts fueled by religious and political grievances 	<ul style="list-style-type: none"> Unequal wealth distribution Unemployment is high
Governance	<ul style="list-style-type: none"> Lack of empowerment of local government and communities Weak governance in the public and private sectors 	<ul style="list-style-type: none"> Lack of capacity of municipal stakeholders Weak coordination of stakeholders in the area

CURRENT STATUS OF SMART CITY DEVELOPMENT

Cameroon is in the initial phases of smart city development. Despite outlining a long-term vision and implementing a digital strategic plan, there is no national-level smart city policy in place. However, the Ministry of Housing and Urban Development

established a working group in 2022 to develop a national plan for smart cities. Some smart initiatives, such as the Cameroon Intelligence Cities, have already been launched; however, the overall approach remains project-based.

Framework	Country/Region	Cameroon	Douala
	Policy and Vision	Although Cameroon has identified ICT as a critical pillar of its long-term development plan (Cameroon Vision 2035) and has implemented a digital strategic plan, currently, there is no national-level smart city policy in the country. However, in 2022, the Ministry of Housing and Urban Development (MINHDU) created a working group to develop a national plan for smart cities aiming “to construct smart cities with a new civic-centered governance model that prioritizes the well-being of the people”.	Currently, there is no city-level policy and vision in Douala.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Ministry of Posts and Telecommunications, National Agency for Information and Communication Technologies, etc.). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	Several public information systems and municipal administration are currently being digitized. Digital ecosystem activities are mainly concentrated in the cities of Douala Yaoundé and Buea.	Some “smart” initiatives or projects are ongoing in Douala (e.g., Cameroon Intelligence Cities).
	Operation	Cameroon is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank. Open Data Home Page (<https://data.worldbank.org/country/CM>)
World Bank. Country Profile (<https://www.worldbank.org/en/country/cameroon/overview>)
UN Habitat. Urban Planning & Infrastructure in Migration Contexts, Douala Urban Profile (https://unhabitat.org/sites/default/files/2022/10/221006_douala_spatial_profile_vf_compressed_0.pdf)
Photo: <https://www.accord.org.za/news/accord-tfp-participates-in-the-16th-apsta-annual-general-meeting/yaounde-cameroon/>



Country Profile

#7 Cabo Verde

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
593,149 (2022)	3,902.6 (2022)	7.0% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
68% (2022)	17.7% (2022)	95.5% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
1.5% (2022)	19.6% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No Data	3.7% (2022)	No Data
Unemployment Rate (%)		
13.6% (2022)		



OVERVIEW

Located 500km off the west coast of Africa, Cabo Verde is an archipelago consisting of ten islands, nine of which are inhabited. With a population of approximately 500,000 as of 2022, only 10% of its territory is classified as arable land, and the

availability of mineral resources is limited, according to The World Bank. The fragmentation of the islands poses significant challenges in terms of connectivity and the delivery of essential services such as energy, water, education, and healthcare.

ISSUES AND CHALLENGES

	Country Level	City Level (Praia)
Urban/Land Use	<ul style="list-style-type: none"> Facing high urbanization rate Informal settlements are prevalent on islands experiencing significant migratory pressure 	<ul style="list-style-type: none"> Urbanization and migration exert significant pressures and challenges Facing insufficient urban planning to keep pace with the growing urban population
Infrastructure Development	<ul style="list-style-type: none"> There is inadequate quantity and quality of access to urbanized land, adequate housing, sanitation 	<ul style="list-style-type: none"> There is a shortage of housing to meet the demand
Environmental Situation	<ul style="list-style-type: none"> Experiencing pressure on soil, basic structures and natural resources 	<ul style="list-style-type: none"> Climate change poses a significant threat Vulnerable to drought, landslides, and rising sea levels
Social Context and Economic Situation	<ul style="list-style-type: none"> The main drivers of economic growth (tourism, foreign direct investment, migrant's remittances) are highly vulnerable to external fluctuations and global shocks Disparities exist among municipalities and islands, particularly in terms of youth unemployment rates and poverty levels in rural areas 	<ul style="list-style-type: none"> There is a lack of economic density, which hampers economic development and growth
Governance	<ul style="list-style-type: none"> There is lack of coordination between central and municipal governments 	<currently there is no information>

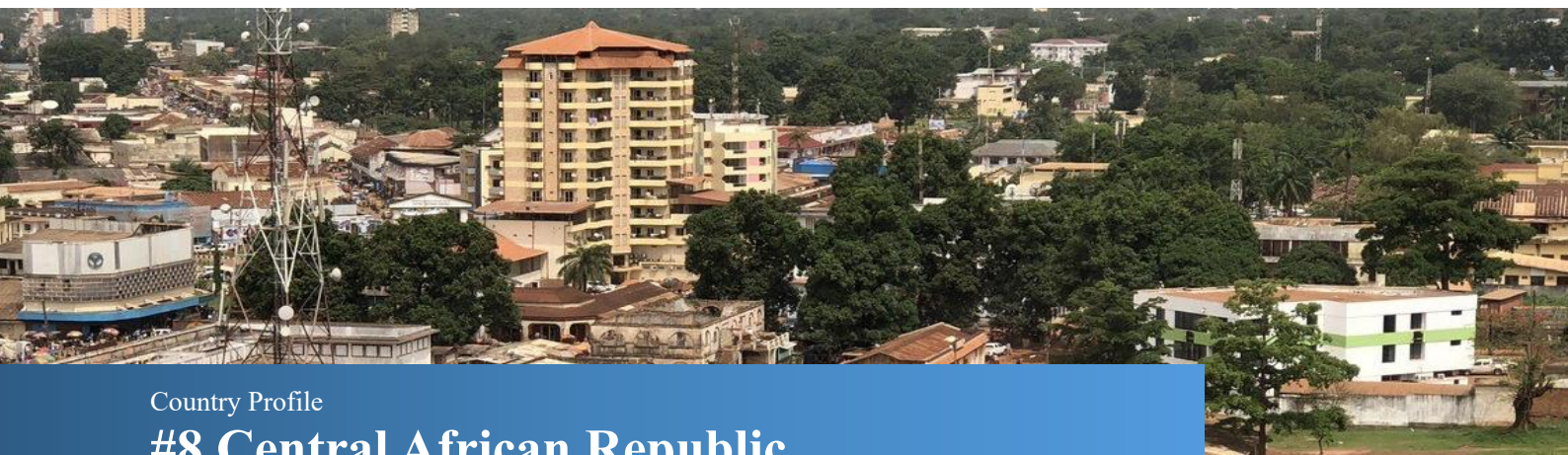
CURRENT STATUS OF SMART CITY DEVELOPMENT

The Smart City Foundation, a non-profit organization founded by the urban ambassador of UN-Habitat Cabo Verde, collaborates with the Cape Verde Government, Municipality, private companies, universities, and civil society organizations to implement the Sustainable Development Goals (SDGs) through the promotion of urban innovation and smart city academia. The relevant programs in smart city academia are as follows:

- 1) Smart Communities Settlements
 - Smart people transform the mind set project
 - Working with Vulnerable Women Project
 - Start Smart (Youth) Project
- 2) Nos Zona Smart – Smart City Living Lab
 - Smart urban design project
 - Smart and sustainable infrastructure
 - Smart, efficient, sustainable building project

Framework	Country/Region	Cabo Verde	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	Initiated by Smart City Foundation in collaboration with public and private sectors.	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/CV>)
 World Bank Country Profile (<https://www.worldbank.org/en/country/caboverde/overview>)
 UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/cabo_verde_country_brief_en.pdf)
 Cabo Verde – Country and Industry Profile (https://caboverde.un.org/sites/default/files/2022-02/Country%20Industry%20Profile_CaboVerde.pdf)
 Cabo Verde Smart City Foundation (https://www.ccila-portugal.com/filehub/deliverFile/57e59e02-4187-4839-9afc-d0678f90fdb6/1273001/03_Foundation_Smart_City_CV_Loide_Monteiro_1273001.pdf)
 Photo: <https://www.afdb.org/en/countries/west-africa/cabo-verde>



Country Profile

#8 Central African Republic

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
5,579,144 (2022)	427.1 (2022)	11% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
43% (2022)	0.0% (2022)	15.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.3% (2022)	7.9% (2021)	6.0% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
69% (2016)	29.3% (2022)	13% (2022)
Unemployment Rate (%)		
6.4% (2022)		



OVERVIEW

The Central African Republic is a landlocked country located in Central Africa, sharing borders with Cameroon, Chad, Sudan, South Sudan, the Democratic Republic of the Congo, and the Republic of the Congo. The geography of the Central African Republic is characterized by vast flatlands with scattered hills in the northeast and southwest. Despite

its abundant natural resources, including 470 mineral occurrences with significant potential in oil, gold, and diamonds, it remains one of the poorest and most fragile nations in the world. The country has a sparsely populated with a total population of approximately 5.6 million people as of 2022.

ISSUES AND CHALLENGES

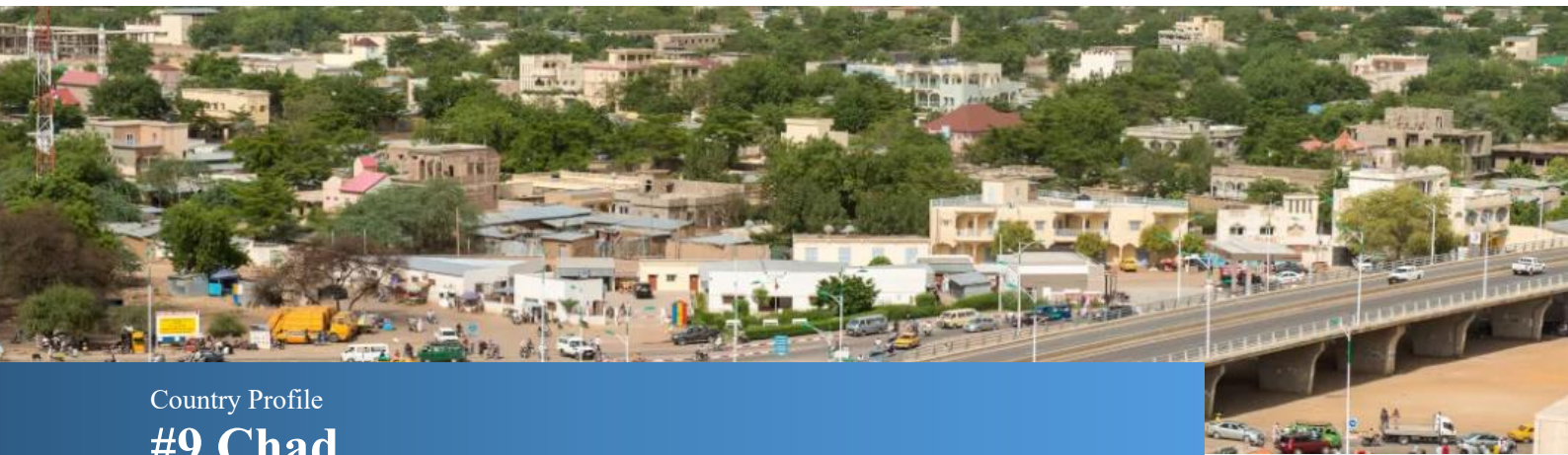
	Country Level	City Level (Bangui)
Urban/Land Use	<ul style="list-style-type: none"> Experiencing high level of urbanization 	<ul style="list-style-type: none"> Rapid urbanization is occurring in the city
Infrastructure Development	<ul style="list-style-type: none"> Having extremely limited transportation and the electrical infrastructure 	<ul style="list-style-type: none"> There is widespread destruction of housing and infrastructure, along with disruptions to basic services
Environmental Situation	<ul style="list-style-type: none"> Threatened by natural hazards dominated by floods, forest fires and droughts 	<ul style="list-style-type: none"> Seasonal flooding poses a challenge
Social Context and Economic Situation	<ul style="list-style-type: none"> Gender-based violence (GBV) is a significant issue Having the largest gender gaps in the world Having the lowest education indicators High number of populations living below the international poverty line Maternal mortality rates are among the highest in the world 	<ul style="list-style-type: none"> Efforts are needed to fight against malaria infection Violence and insecurity are prevalent Rising rate in poverty and declining in economic activity
Governance	<ul style="list-style-type: none"> There is lack of social cohesion and concentration of political power The government is suffering by repeated military coups 	<ul style="list-style-type: none"> Facing very difficult period of military and political post-crisis period

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

Framework	Country/Region	Central African Republic	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/CF>)
World Bank Country Profile (<https://www.worldbank.org/en/country/centralafricanrepublic/overview>)
Photo: <https://news.un.org/en/story/2018/05/1008762>



Country Profile #9 Chad

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
17,723,315 (2022)	716.8 (2022)	18% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
24% (2022)	2.2% (2022)	11.3% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.3% (2022)	40% (2021)	6.0% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
82% (2020)	22.6% (2022)	11% (2022)
Unemployment Rate (%)		
1.4% (2022)		



OVERVIEW

Chad is a large landlocked country in Central Africa, located in the Sahelian region. Chad shares borders with Libya to the north, Sudan to the east, the Central African Republic to the south, Cameroon and Nigeria to the southwest, and Niger to the west. As of 2022, its population exceeds 17 million. Its population is unevenly distributed across its territory. The distribution of population is influenced by varying climates and physical geography, with the highest

density found in the southwest, particularly around Lake Chad and further south. In contrast, the dry Saharan zone in the north is the least densely populated. The country's economy relies heavily on agriculture and oil production. However, Chad still faces significant challenges of poverty and economic disparities.

ISSUES AND CHALLENGES

	Country Level	City Level (N'Djamena)
Urban/Land Use	<ul style="list-style-type: none"> Unevenly population distribution due to contrasts in climate and physical geography 	<ul style="list-style-type: none"> Facing unplanned and rapid urbanization Facing uncontrolled expansion of settlements and substandard construction practices
Infrastructure Development	<ul style="list-style-type: none"> There is lack of infrastructure, education and access to health care 	<ul style="list-style-type: none"> Inadequate stormwater drainage, flood management infrastructure, and improper waste disposal are prevalent issues
Environmental Situation	<ul style="list-style-type: none"> Experiencing hot, dry, dusty harmattan winds in the north, periodic droughts and locust plagues 	<ul style="list-style-type: none"> Vulnerable to floods caused by heavy rainfall, the overflowing of rivers, and the breaching of dykes
Social Context and Economic Situation	<ul style="list-style-type: none"> There is wide spread of poverty and vulnerability The country has the world's second highest maternal mortality rate (as of 2017) Experiencing malnutrition crisis Limited resources and tensions in communities due to a high number of refugees from Sudan and Central African Republic 	<currently there is no information>
Governance	<ul style="list-style-type: none"> There is significant violence between government and antigovernment forces in different parts of the country 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

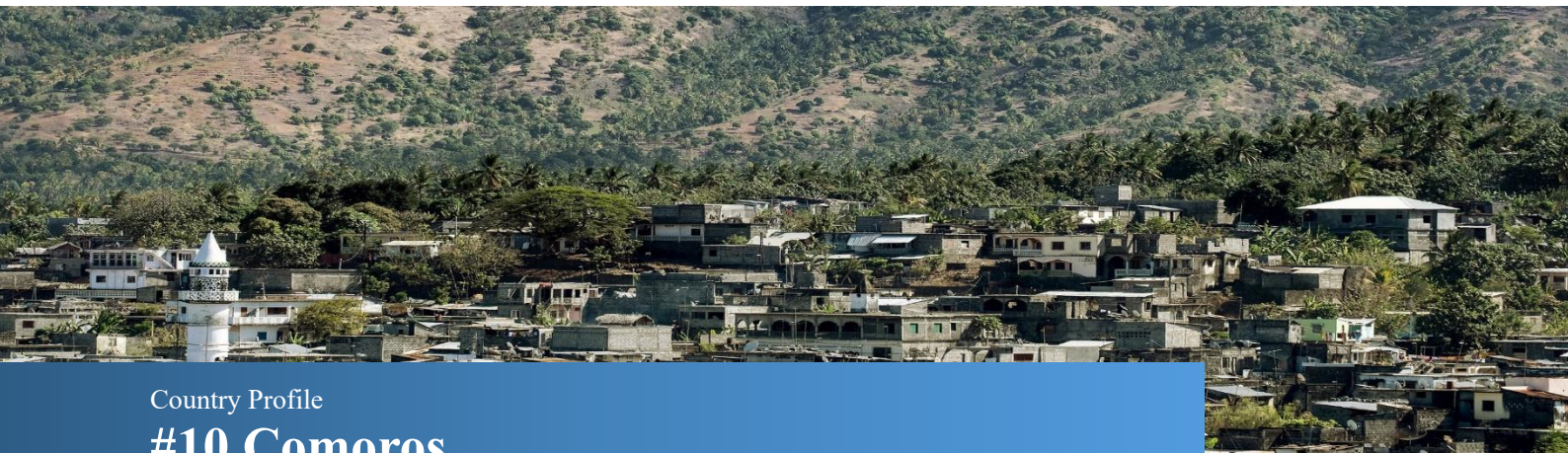
<currently there is no information>

Framework	Country/Region	Chad	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/TD>)

World Bank Country Profile (<https://www.worldbank.org/en/country/chad/overview>)

Photo: <https://blogs.worldbank.org/african/chads-economic-and-poverty-outlook-10-charts>



Country Profile

#10 Comoros

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
836,774 (2022)	1,484.9 (2022)	27% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
30% (2022)	2.4% (2022)	87.9% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
2.7% (2022)	71.5% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
69% (2018)	36.4% (2022)	No Data
Unemployment Rate (%)		
8.8% (2022)		



OVERVIEW

The Union of the Comoros, one of the world's smallest and most vulnerable countries, is classified as a Small Island Developing State (SIDS). It is located in the Mozambique Channel of the Indian Ocean, northwest of Madagascar and facing Mozambique. The country's location and topography make it highly susceptible to climate-related challenges, including cyclones, floods, and droughts. As of 2022, the total population of

Comoros is approximately 800,000, making it a densely populated country with around 465 inhabitants per square kilometer. Moreover, 53% of the population is under 20 years of age, as reported by The World Bank. The Comoros economy is heavily reliant on agriculture, with approximately 80% of the population earning their livelihoods through this sector.

ISSUES AND CHALLENGES

	Country Level	City Level (Moroni)
Urban/Land Use	<ul style="list-style-type: none"> Uncontrolled and largely unplanned urbanization 	<ul style="list-style-type: none"> The rapid urbanization poses significant challenges in terms of infrastructure, services, and social development
Infrastructure Development	<ul style="list-style-type: none"> There is lack of access to water, sanitation and health care 	<currently there is no information>
Environmental Situation	<ul style="list-style-type: none"> Vulnerable to cyclones, floods and droughts There is low disaster preparedness in vulnerable urban areas 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Having high poverty rate 	<currently there is no information>
Governance	<currently there is no information>	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

Framework	Country/Region	Comoros	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/KM>)
World Bank Country Profile (<https://www.worldbank.org/en/country/comoros/overview>)
UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/union_of_comoros_country_briefen.pdf)
Photo: <https://www.nytimes.com/2020/04/16/world/africa/comoros-climate-change-rivers.html>



Country Profile

#11 Democratic Republic of the Congo (DRC)

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
99,010,212 (2022)	586.5 (2022)	23% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
47% (2022)	8.9% (2022)	20.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.5% (2022)	15.0% (2021)	12% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
78% (2020)	17.4% (2022)	13% (2022)
Unemployment Rate (%)		
5% (2022)		



OVERVIEW

The Democratic Republic of the Congo (DRC), about the size of Western Europe, is the largest country in Sub-Saharan Africa. DRC is endowed with exceptional natural resources, including minerals such as cobalt and copper, hydropower potential, significant arable land, immense biodiversity, and the world's second- largest rainforest.

Most people in DRC have not benefited from this wealth. A long history of conflict, political upheaval and instability, and authoritarian rule have led to a grave, ongoing humanitarian crisis. DRC is among the five poorest nations in the world. In 2022, nearly 62% of Congolese, around 60 million people, lived on less than \$2.15 a day.

ISSUES AND CHALLENGES

	Country Level	City Level (Kinshasa)
Urban/Land Use	<ul style="list-style-type: none"> Spatial sprawl is disorderly and uncoordinated Poorly controlled urban development and poorly organized rural development High land prices and unequal access to property rights Creation of residential areas rarely regulated 	<ul style="list-style-type: none"> Proliferation of slums and informal settlements Open public spaces are rare and increasingly inaccessible Construction on non-edificant areas and often without compliance with national regulations
Infrastructure Development	<ul style="list-style-type: none"> Strong disparities in access to basic services Low connectivity between regions and within cities Housing deficit and high volume of low-quality housing 	<ul style="list-style-type: none"> Lack of access to drinking water, electricity, sanitation and security Poor management of water resources and waste management infrastructure Unreliable electricity Lack of affordable housing Traffic congestion and high transport costs
Environmental Situation	<ul style="list-style-type: none"> Air, soil and water pollution and deforestation Climate-related hazards (floods, drought, volcanic activity, epidemics) 	<ul style="list-style-type: none"> Unsanitary conditions (waste management) Vulnerability to floods, droughts, and other climate shocks
Social Context and Economic Situation	<ul style="list-style-type: none"> Islands of insecurity (street children, armed groups) Productivity and livability are both low Concentration of activities in primary and nontradable sectors Poor quality of education 	<ul style="list-style-type: none"> Widespread poverty Decades of violent confrontation
Governance	<ul style="list-style-type: none"> Institutional framework is poorly defined Ineffective implementation of existing land use plans and poor control of land bases 	<ul style="list-style-type: none"> Corruption and clientelist practices

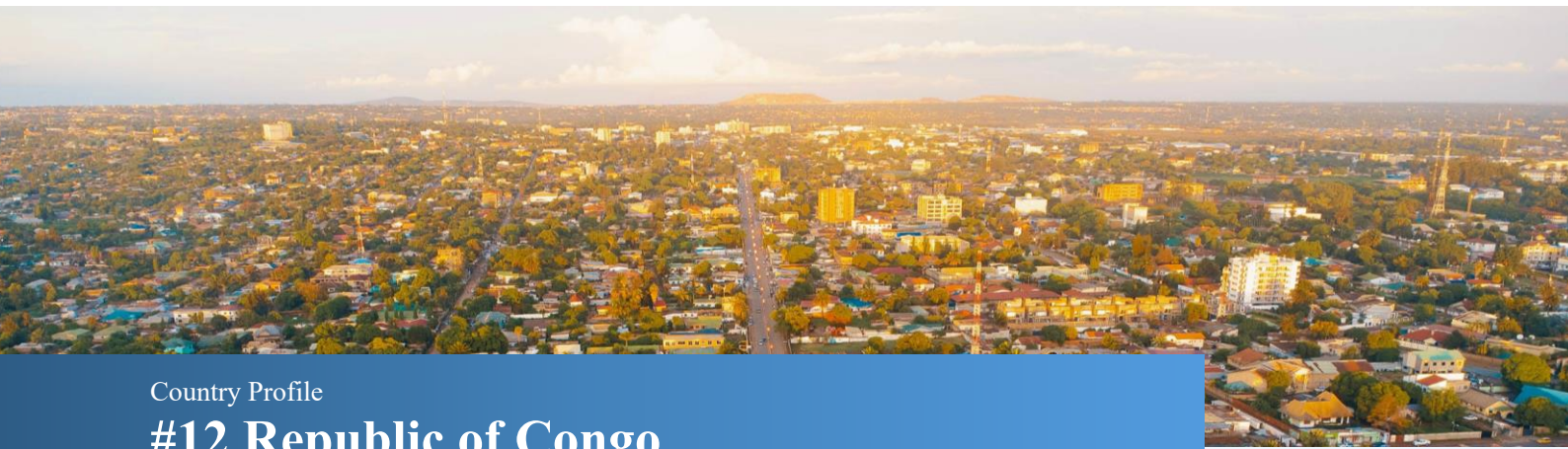
CURRENT STATUS OF SMART CITY DEVELOPMENT

As of now, the Democratic Republic of the Congo (DRC) is in the early stages of smart city development. While a new vision for the digital economy is outlined in the “*Plan National du Numérique (PNN) - Horizon 2025*”, the country lacks a comprehensive national-level smart city policy. While Kinshasa lacks a city-

level smart city policy, the approved Kitoko New Smart City project, situated east of the capital, aspires to be a flagship for green mobility among African metropolises. The DRC is taking strides toward smart city development, yet challenges such as regulatory frameworks and coordinated efforts remain.

Framework	Country/Region	DRC	Kinshasa
	Policy and Vision	Although there is a new vision for the digital economy, as outlined in the “ <i>Plan National du Numérique (PNN) - Horizon 2025</i> ”, there is currently no national-level smart city policy in the DRC.	Currently there is no city-level smart city policy in Kinshasa. Nevertheless, the Kitoko New Smart City project, approved by the Government of the DRC and located 40km east of Kinshasa, aims to become “ <i>the showcase for green mobility in the competition with other African metropolises</i> ”.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT and Smart City projects (e.g., Ministry of Posts, Telecommunications and New Technologies, Ministry of Urban Development and Housing (Kitoko New Smart City project)). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities. Designed by the Group ATEPA, the Kitoko New Smart City project has received approval from the Government of DRC.
	System	There is no system specific to smart cities. A New Telecommunication Framework Law has been promulgated in November 2020 but key regulatory aspects are still missing.	There is no system specific to smart cities.
	Technology	Several networking and computerization projects have been initiated by different public entities, often in an independent and uncoordinated manner.	<currently there is no information>
	Operation	The DRC is a signatory of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/CD>)
World Bank Country Profile (<https://www.worldbank.org/en/country/drc/overview>)
World Bank, Democratic Republic of Congo, Urbanization Review, 2018
(<https://openknowledge.worldbank.org/server/api/core/bitstreams/476fa459-a41b-5ca3-9532-33266c6034f3/content>)
UN-Habitat, Country Brief – Democratic Republic of Congo, 2023
(https://unhabitat.org/sites/default/files/2023/07/drc_country_brief_en.pdf)
Photo: <https://en.zoom-eco.net/breaking-news/drc-there-is-no-ebola-in-kinshasa-official/>



Country Profile

#12 Republic of Congo

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
5,970,424 (2022)	2,448.0 (2022)	9.0% (2017)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
69% (2022)	1.5% (2022)	49.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
2.9% (2022)	31.3% (2021)	46% (2021)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
44% (2020)	8.5% (2022)	No Data
Unemployment Rate (%)		
21.8% (2022)		



OVERVIEW

Republic of Congo, located in Central Africa, boasts diverse geography, including tropical forests, tropical peatlands, savannah, and a coastline along the Atlantic Ocean. As of 2022, the population of the country exceeds 5 million, with over half of the population residing in its two main cities, Brazzaville and Pointe-Noire. In terms of population density, the country is one of the least densely populated in Africa, with 14.8 inhabitants per square kilometer, according to The

World Bank.

The economy of Republic of Congo heavily relies on oil production, which contributes significantly to government revenue. However, key challenges remain in diversifying the economy, improving the business climate, and ensuring a balance between environmental sustainability and promoting growth and job creation.

ISSUES AND CHALLENGES

	Country Level	City Level (Brazzaville)
Urban/Land Use	<ul style="list-style-type: none"> Forest areas are under threat due to the expansion of agricultural activities by family farms and agro-industrialists, as well as the production of firewood and charcoal 	<ul style="list-style-type: none"> Facing unplanned urbanization Population growth poses real problems both in space and population management
Infrastructure Development	<currently there is no information>	<ul style="list-style-type: none"> There is lack of urban infrastructures in marginalized areas There is housing crisis due to high urbanization rate
Environmental Situation	<ul style="list-style-type: none"> Prone to outbreaks of cholera, measles and Ebola Prone to natural disasters, including floods 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Extreme poverty is on the rise, particularly in southern rural region A significant portion of the population remains employed in informal sectors There are high rates of youth unemployment Facing strong social disparities 	<currently there is no information>
Governance	<ul style="list-style-type: none"> There is high-level of corruption 	

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

Framework	Country/Region	Congo Republic	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/congo-rep?view=chart>)
World Bank Country Profile (<https://www.worldbank.org/en/country/congo/overview>)
Photo: <https://www.state.gov/countries-areas/democratic-republic-of-the-congo/>



Country Profile #13 Côte d'Ivoire

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
28,160,542 (2022)	2,486.4 (2022)	35% (2022)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
53% (2022)	6.7% (2022)	71.1% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.4% (2022)	73.9% (2021)	44% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
53% (2020)	16.7% (2022)	17% (2022)
Unemployment Rate (%)		
2.6% (2022)		



OVERVIEW

Côte d'Ivoire has a land area of 322,000 km2. It has an east-west coastal line of 515 km with many lagoons, especially in its eastern part. The country is surrounded by Ghana, Burkina Faso, Mali, Guinea and Liberia.

Côte d'Ivoire, the world's leading cocoa and cashew producer, is the largest economy in francophone Sub-Saharan Africa, and the third largest in West Africa, with a population of 28.1 million.

The country is highly urbanized, and the Greater Abidjan Area is the engine of growth of the country. More than half of Côte d'Ivoire's population lives in urban centers.

Côte d'Ivoire has enjoyed notable political and social stability. However, the country is facing a humanitarian challenge in its northern part, bordering Burkina Faso, due to the influx of refugees mainly fleeing jihadist violence in the neighboring country.

ISSUES AND CHALLENGES

	Country Level	City Level (Abidjan)
Urban/Land Use	<ul style="list-style-type: none"> Challenges in managing urban land Growth of slums and informal settlements 	<ul style="list-style-type: none"> Spontaneous densification and proliferation of informal settlements Public open space for recreation and amenity use is deficient
Infrastructure Development	<ul style="list-style-type: none"> Deficit in housing Inadequate public infrastructure Difficulties in accessing basic social services Infrastructure is unequally distributed and poorly diversified 	<ul style="list-style-type: none"> Shortfall and inequitable distribution of community facilities Inadequate housing supply Under capacity utilities provision Disparities in access to water and electricity services Traffic congestion and outdated and inadequate public transport system
Environmental Situation	<ul style="list-style-type: none"> Frequent severe floods and cities low resilience to natural disasters Environmental degradation and loss of diversity 	<ul style="list-style-type: none"> Loss of natural forest and biodiversity assets Increased noise and air pollution High vulnerability to flood risks
Social Context and Economic Situation	<ul style="list-style-type: none"> Increase in income inequality 	<ul style="list-style-type: none"> Proliferation of bad neighbor development
Governance	<ul style="list-style-type: none"> Political instability from 1999 to 2011 has impeded progress in urban planning 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Côte d'Ivoire has implemented key digital strategies and initiatives aiming for widespread, affordable digital access. While lacking a national-level smart city policy, various ministries and organizations engage in "Smart City" projects. The Municipality of Le Plateau pioneers the "Eco" Citizen" policy,

aspiring to create a model Smart City with innovative projects in sectors like video surveillance and digital services. Overall, smart city in Côte d'Ivoire is project-based and evolving, with a focus on leveraging technology for urban efficiency and sustainability.

Framework	Country/Region	Côte d'Ivoire	Abidjan
	Policy and Vision	Côte d'Ivoire has implemented a National Digital Development Strategy (NDDS) 2021-2035, a National Cybersecurity Strategy 2025 and a National Innovation Strategy 2025, with the goal of establishing an affordable, inclusive, and high-quality digital infrastructure network for all. However, there is currently no national-level smart city policy in Côte d'Ivoire.	Currently, there is no city-level smart city policy in Abidjan. However, the "Eco2 Citizen" policy, implemented by the Municipality of Le Plateau (Abidjan), serves as a municipality management program, employing innovative methods and technologies to create a model of a smart, modern, green, connected, and secure city.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT development and "Smart City" projects (e.g., National Agency for the Universal Service of Telecommunications, Minister of Tourism). Each project operates under the jurisdiction of its respective organization.	The Municipality of Le Plateau oversees the "Eco2 Citizen" policy.
	System	There is no system specific to smart cities. However, over the past few years, several policies, strategies, laws, and regulations have been adopted to improve public sector management through a greater use of ICT services in the public sector.	There is no clear system specific to smart cities.
	Technology	Côte d'Ivoire was one of the first West African countries to invest in digital platforms. More than 90 government procedures or services are dematerialized and available online for individuals in diverse domains (education, health, etc.)	Several "smart" projects in different sectors (video surveillance, Digital Civil Registry, Plateau Campus, WiFi for All, etc.) have been or are implemented under the "Eco2 Citizen" program.
	Operation	Côte d'Ivoire is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/CI>)
World Bank Country Profile (<https://www.worldbank.org/en/country/cotedivoire/overview>)
JICA, *The Project for the Development of the Urban Master Plan in Greater Abidjan (SDUGA)*, 2015 (<https://openjicareport.jica.go.jp/pdf/12230595.pdf>)
UN-Habitat, Country Report – Cote d'Ivoire 2023 (https://unhabitat.org/sites/default/files/2023/07/cote_divoire_country_brief_en.pdf)
Photo : <https://www.afdb.org/en/countries/west-africa/cote-divoire>



Country Profile #14 Djibouti

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
1,120,849 (2022)	3,136.1 (2022)	69% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
78% (2022)	3.0% (2022)	65.4% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
1.6% (2022)	73.5% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No Data	1.7% (2020)	40% (2022)
Unemployment Rate (%)		
27.9% (2022)		



OVERVIEW

Djibouti, with an area of 23,200 square kilometers, is one of the smallest countries in Africa. As of 2022, the estimated population of Djibouti is about 1.1 million. The country shares borders with Eritrea, Ethiopia, and Somalia, while also having maritime borders with Yemen. Djibouti's strategic strength lies in its location at the

southern entrance to the Red Sea, acting as a bridge between Africa and the Middle East. The landscape of Djibouti is characterized by its varied and extreme features. In the north, rugged mountains dominate the scenery, while in the west and south, a series of low desert plains are separated by parallel plateaus.

ISSUES AND CHALLENGES

	Country Level	City Level (Djibouti)
Urban/Land Use	<ul style="list-style-type: none"> Has limited arable land for agriculture 	<ul style="list-style-type: none"> The population in informal urban settlements is rapidly rising More than one-third of the population lives in informal settlements
Infrastructure Development	<ul style="list-style-type: none"> There are inadequate supplies of potable water, water pollution 	<ul style="list-style-type: none"> There is lack of affordable housing Low access to public services such as water and sanitation
Environmental Situation	<ul style="list-style-type: none"> Facing deforestation (forests are threatened by agriculture and the use of wood for fuel), desertification and endangered species Coastal urban areas are prone to flooding, while the eastern regions often experience droughts. The coastal areas are at a higher risk of earthquakes, while the western interior regions face greater risks of volcanic activity and landslides 	<ul style="list-style-type: none"> Flooding is exacerbated by heavy rainfall, overflow from the Ambouli Wadi, and the fact that some areas of the city are below sea level
Social Context and Economic Situation	<ul style="list-style-type: none"> Heavily relies on food imports 	<ul style="list-style-type: none"> Facing high poverty rates
Governance	<currently there is no information>	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

As part of the Djibouti Digital 2024 campaign, Djibouti Telecom has launched a plan for the development of the Iroley Smart City, which is located 40 km from the capital. The objective of this project is to attract ICT-related activities, including data centers, cloud computing storage, and call centers. These activities will be powered by dedicated renewable generating facilities.

The Iroley Smart City is envisioned to cover an area of 3.6 sq km, divided into three separate zones. It is planned to

accommodate 50,000 residents and 1,000 businesses, with an estimated 50,000 workers commuting to the city on a daily basis. The project also aims to establish a training academy that will provide vocational training. Eventually, residential housing will be developed to accommodate workers and students.

In January 2015, the project initiated its first batch of training programs in collaboration with the Egyptian Information Technology Institute. Approximately 100 Djiboutians have already received training through this program.

Framework	Country/Region	Djibouti	Iroley
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	The government of Djibouti (Ministry of Communication) and Djibouti Telecom initiated to implement smart city with ICT based.
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	Promoting high speed internet access, voice service, high resolution broadcast, smart building, public safety, smart lighting, smart grid, smart transportations
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/DJ>)
World Bank Country Profile (<https://www.worldbank.org/en/country/djibouti/overview>)
Implementing Zero Slums Program in Djibouti (<https://www.thegpsc.org/sites/gpsc/files/djibouti.pdf>)
Djibouti to utilize geostrategic location to develop ICT connectivity hub (<https://oxfordbusinessgroup.com/reports/djibouti/2016-report/economy/emerging-gateway-the-country-seeks-to-leverage-its-geostrategic-location-to-develop-a-connectivity-hub>)
Photo: <https://www.unops.org/djibouti>



Country Profile #15 Eritrea

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
3,684,032 (2022)	643.8 (2011)	22% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
43% (2022)	8.7% (2011)	52.5% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.3% (2022)	62.7% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No Data	14.1% (2009)	No Data
Unemployment Rate (%)		
6.6% (2022)		



OVERVIEW

Eritrea is situated in Eastern Africa and shares borders with Djibouti, Ethiopia, Sudan, and the Red Sea. The country boasts a diverse geography, with lowlands in the west, highlands in the central and northern regions, and plains in the east and along the coast. Eritrea has a population of approximately 3.7 million as of 2022, with the majority residing in the cooler areas of the central highlands (UNDP, 2007).

Due to its strategic location on the busy Red Sea shipping lane, Eritrea possesses mineral resources. However, despite this potential, it remains one of the least developed countries worldwide. The economy heavily relies on rain-fed agriculture and mining, both of which are susceptible to drought and market volatility.

ISSUES AND CHALLENGES

	Country Level	City Level (Asmara)
Urban/Land Use	<ul style="list-style-type: none"> The highest population density is observed in the cities of Asmara and Keren Increasing conflict on land use pressure and land degradation 	<ul style="list-style-type: none"> Overwhelmed by rapid population growth, rural-urban migration, returnees from abroad, and expellees from Ethiopia
Infrastructure Development	<ul style="list-style-type: none"> 40% of the population consumes unsafe water from unprotected sources (UN-Habitat) 	<ul style="list-style-type: none"> There is a shortage of clean water
Environmental Situation	<ul style="list-style-type: none"> Experiencing frequent droughts, rare earthquakes and volcanoes, locust swarms 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Facing significant human rights issues due to its involvement in the conflict in northern Ethiopia There is a severe shortage of doctors, medical personnel, equipment and medication There is a shortage of teachers and school facilities Widespread of poverty and malnutrition Striving for macroeconomic stability 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Governed by a one-man dictatorship under unelected President, with no legislature, independent civil society organizations or media, and no independent judiciary 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

Framework	Country/Region	Eritrea	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/ER>)
World Bank Country Profile (<https://www.worldbank.org/en/country/eritrea/overview>)
Eritrea: National and Cities Urban Profile (https://unhabitat.org/sites/default/files/2020/10/eritrea_-_national_and_cities.pdf)
DFAT Country Information Report Eritrea (<https://www.dfat.gov.au/sites/default/files/country-information-report-eritrea.pdf>)
Photo: <https://www.worldwatchmonitor.org/2018/07/use-ethiopia-reconciliation-to-improve-human-rights-in-eritrea-un-rapporteur/>



Country Profile #16 Eswatini

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
1,201,670 (2022)	4,039.5 (2022)	59% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
25% (2022)	3.9% (2022)	82.9% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
1.6% (2022)	69.5% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
11% (2020)	8.1% (2021)	No Data
Unemployment Rate (%)		
24.4% (2022)		



OVERVIEW

Eswatini is a small, landlocked country located in Southern Africa. It shares borders with South Africa and Mozambique. As of 2022, it has a population of approximately 1.2 million people. The country's per capita GDP was around 4,000 USD in 2022. Services play a significant role in Eswatini's economy, accounting for slightly more than half of its GDP. The

country also has a notable presence in the industrial sector, particularly in manufacturing, which comprises around one-third of its economy.

Furthermore, Eswatini is known for its agricultural sector, which contributes to the country's overall economic output. The country produces crops such as sugarcane, maize, citrus fruits, and timber.

ISSUES AND CHALLENGES

	Country Level	City Level (Mbabane)
Urban/Land Use	<ul style="list-style-type: none"> Peri-urban residents reside in informal communities on un-surveyed land without legal titles Facing land use changes and land management practices, including farming and forestry systems 	<ul style="list-style-type: none"> Uncontrolled settlements are a prevailing issue
Infrastructure Development	<ul style="list-style-type: none"> There is inequality to public services Limited access to electricity and energy 	<currently there is no information>
Environmental Situation	<ul style="list-style-type: none"> Climate change poses significant challenges Vegetation clearing leads to habitat fragmentation 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> High and persistent poverty is a pressing concern The quality of jobs is low, and unemployment rates are rising The education system lacks sufficient quality and does not adequately respond to the labor market 	<currently there is no information>
Governance	<currently there is no information>	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

The small African nation of Eswatini is embarking on an ambitious journey to transform into a smart city. With the goal of enhancing the quality of life for its citizens and driving economic growth, Eswatini is harnessing the potential of 5G technology. 5G will

play a pivotal role in revolutionizing transportation by enabling the implementation of autonomous vehicles and smart traffic management systems. This advancement will significantly improve efficiency, safety, and overall mobility within the country.

Framework	Country/Region	Eswatini	Mbabane
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/SZ>)
World Bank Country Profile (<https://www.worldbank.org/en/country/eswatini/overview>)
Photo: <https://techcabal.com/2023/12/19/eswatini-starlink-launch/>



Country Profile #17 Ethiopia

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
123,379,924 (2022)	1,027.6 (2022)	17% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
23% (2022)	5.3% (2022)	54.2% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.7% (2022)	34.2% (2021)	13% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
64% (2020)	37.6% (2022)	7.0% (2022)
Unemployment Rate (%)		
4% (2022)		



OVERVIEW

With a population of approximately 123 million people as of 2022, Ethiopia holds the second position as the most populous nation in Africa, following Nigeria. Moreover, it boasts one of the fastest-growing economies in the region, with an estimated growth rate of 5.3% in 2022. However, despite its economic progress, Ethiopia still grapples with high poverty rates and is considered one of the poorest nations. Ethiopia has set an ambitious target to attain lower-

middle-income status by 2025. The country is dedicated to formulating a sustainable and inclusive development strategy, with the primary objective of accelerating poverty reduction and promoting shared prosperity. To achieve these goals, significant advancements in job creation and improved governance are crucial to ensure that the benefits of growth are distributed equitably across all segments of society.

ISSUES AND CHALLENGES

	Country Level	City Level (Addis Ababa)
Urban/Land Use	<ul style="list-style-type: none"> There is unbalanced urban system in term of population distribution Need improvement in land development and management practices 	<ul style="list-style-type: none"> Built-up areas are expanding at a faster rate than population growth, resulting in changing land use patterns Limited access to land and services
Infrastructure Development	<ul style="list-style-type: none"> Urban infrastructure and housing require attention There is a need for financial resources management in waste management 	<ul style="list-style-type: none"> High traffic congestion and low mobility Facing a massive housing shortage due to rural-to-urban migration
Environmental Situation	<ul style="list-style-type: none"> Climate change poses a significant challenge 	<ul style="list-style-type: none"> Vulnerable to both natural and man-made disasters Reduction of green space affects the city's resilience to hazards and disasters
Social Context and Economic Situation	<ul style="list-style-type: none"> Unbalanced of economic activities leading to high unemployment rates 	<ul style="list-style-type: none"> Facing a slow economic transformation
Governance	<ul style="list-style-type: none"> Low municipal finance and implementation capacity Sporadic conflicts arise over territorial claims Highly polarized politics and high turnover of officials Rapid government and region restructurings occurred frequently 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

The government has initiated a 10-Year Development Plan, building upon the 2019 Home-Grown Economic Reform Agenda. This plan spans from 2020/21 to 2029/30 and seeks to maintain the impressive growth achieved during the previous decade under the Growth and Transformation Plans. Additionally, it aims to

transition towards a more private-sector-led economy. The plan also focuses on enhancing efficiency, introducing competition in vital sectors such as energy, logistics, and telecom, improving the business environment, and addressing macroeconomic imbalances.

Framework	Country/Region	Ethiopia	Addis Ababa
	Policy and Vision	Although there is no specific policy and vision for smart city in national level, the government launched smart city efforts encompassing four pillars, namely comprehensive development, institutional, physical, social and economic infrastructure.	There is no specific policy and vision for smart city in city level.
	Organization	No specific organization for smart city has been formed.	No specific organization for smart city has been formed.
	System	No national system for smart city has been established. It is only project-based.	No actual system for smart city has been established. Addis Ababa Smart City plan mentioned that the project would help realize speedy and reliable services, ensure safety and security of residents and facilitate better understanding and collaboration between the government and dwellers.
	Technology	In the “Digital Ethiopia 2025” plan it is stated that Ethiopia provides digitalization across 4 foundation cross sector areas of infrastructure (digital connectivity), enabling system (digital ID system, digital payment), digital interaction (e-government, e-commerce), digital ecosystem (digital finance, policy and regulation)	The project is based on digital transformation drive, AI-powered traffic management system, and big data.
	Operation	No project as a cross sectoral smart city has been established.	Many projects are in the conceptual/planning stage. It is an individual technical initiative. For Addis Ababa Smart City plan, a state-owned company (Ethio Telecom) signed an agreement with the Ministry of Revenue to digitalize tax payments.

Source: World Bank Country Data (<https://data.worldbank.org/country/ET>)
 World Bank Country Profile (<https://www.worldbank.org/en/country/ethiopia/overview>)
 UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/ethiopia_country_brief_final_en.pdf)
 Digital Ethiopia 2025 (https://mint.gov.et/wp-content/uploads/2022/01/Summary_of_Digital_Strategy_Final_English1.pdf)
 Future of Addis Ababa 2021 (<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/841961623399992742/Future-of-Addis-Ababa-2021-Addis-Ababa-s-Strategic-Development-Framework>)
 Photo: <https://www.cntraveler.com/story/ethiopia-anna-getaneh-locals-guide>



Country Profile #18 Gabon

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
2,388,992 (2022)	8,820.3 (2022)	72% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
91% (2022)	3.0% (2022)	91.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
2.4% (2022)	8.4% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
44% (2018)	5.6% (2022)	No Data
Unemployment Rate (%)		
21.5% (2022)		



OVERVIEW

Gabon, situated on the western coast of Africa, is a Central African country that overlooks the Atlantic Ocean. It shares the northern border with Cameroon, Equatorial Guinea to the northwest, and the Republic of the Congo to the east and south. The country is predominantly covered by tropical rainforest, accounting for 88% of its land area. This rainforest is part of the Congo Basin, considered the world's second-largest "green lung" after the Amazon.

As of 2022, Gabon has a population of around 2.4 million people. The country boasts one of the highest levels of urbanization in Africa, with over 80% of its population residing in urban areas, according to the World Bank. Gabon is classified as an upper-middle-income nation, abundant in natural resources, and stands out as one of the most prosperous and stable countries in Central Africa.

ISSUES AND CHALLENGES

	Country Level	City Level (Libreville)
Urban/Land Use	<ul style="list-style-type: none"> The current land tenure system fails to address issues related to land governance and food security Urban expansion has been poorly organized and lacks of proper planning 	<ul style="list-style-type: none"> Income inequality and high unemployment have led to the emergence of slums in Libreville
Infrastructure Development	<ul style="list-style-type: none"> Having limited and poor infrastructure Health care delivery systems are ineffective 	<ul style="list-style-type: none"> Waste recovery and disposal system are underdeveloped Natural or piped drainage system is inadequate
Environmental Situation	<ul style="list-style-type: none"> Facing a high risk of climate change 	<ul style="list-style-type: none"> Highly vulnerable to flooding
Social Context and Economic Situation	<ul style="list-style-type: none"> Over a quarter among the youth population is unemployed The education system suffers from a shortage of qualified teachers and quality education Approximately one-third of the population lives below the poverty line Heavy reliance on oil has resulted in the neglect of other sectors 	<ul style="list-style-type: none"> There is a high number of migrant workers from Senegal, Nigeria, Cameroon, Benin, Togo, and elsewhere in West Africa
Governance	<ul style="list-style-type: none"> Excessive bureaucracy and corruption plague the country 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

African nations are leveraging the opportunities presented by new communication and information technologies to bridge the gap with other global counterparts. Additionally, numerous African cities have adopted geographical information systems for the purpose of knowledge acquisition, planning, and

programming. These cities are also increasingly relying on smart technologies to effectively maintain and manage crucial infrastructure. The Smart Africa – Agenda 2063 has seen 15 African countries, including Gabon, embracing the smart cities initiative.

Framework	Country/Region	Gabon	
	Policy and Vision	Although there is no specific policy and vision for smart city in national level, Gabon has taken note of the World Bank's call for countries in Africa to embrace technology in order to fully develop the country.	<currently there is no information>
	Organization	Gabonese National Agency for Numerical Infrastructure and Frequency and the African Development Bank (AfDB) recently signed agreements for a feasibility study for the country's component of the Central African Backbone (CAB) project. The project requires integrated, innovative and transformative infrastructure, to provide the 901.8km fiber optic connectivity.	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	The envisaged large internet broadband will boost regional integration with Gabon, endowed with the largest ICT hub in Central Africa and able to attract international companies within the central free trade zone with innovations in various sectors.	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/GA>)
World Bank Country Profile (<https://www.worldbank.org/en/country/gabon/overview>)
Gabon seeks to be largest ICT hub in Central Africa (<https://www.smart-energy.com/policy-regulation/gabon-to-be-largest-ict-hub-central-africa/>)
Photo: <https://commonwealthchamber.com/member-countries/gabon/>



Country Profile #19 Gambia

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
2,705,992 (2022)	840 (2022)	33% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
64% (2022)	4.9% (2022)	63.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.5% (2022)	62.6% (2021)	48% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
39% (2020)	22.6% (2022)	28% (2022)
Unemployment Rate (%)		
4.8% (2022)		



OVERVIEW

Gambia, a West African country, is bordered by Senegal and situated along the Atlantic Ocean. Despite being the smallest country on the African mainland, with a population of just over 2.7 million as

of 2022, it ranks as the eighth most densely populated nation on the continent. Gambia is well-known for its political stability, liberal trade policies, and market-based economy.

ISSUES AND CHALLENGES

	Country Level	City Level (Banjul)
Urban/Land Use	<ul style="list-style-type: none"> Rapid and unplanned urbanization has resulted in challenges for infrastructure development 	<ul style="list-style-type: none"> A significant portion of the land is below sea level The population in coastal areas are susceptible to sea level rise and extreme weather events
Infrastructure Development	<ul style="list-style-type: none"> Having a poor, unsafe and incomplete road networks Experiencing an erratic power supply 	<ul style="list-style-type: none"> Substandard infrastructure such as inadequate drainage and stormwater management systems Lack of affordable housing and limited access to safe public spaces
Environmental Situation	<ul style="list-style-type: none"> Vulnerable to climate change and environmental degradation Facing challenges of drought and desertification Deforestation resulting from slash-and-burn agriculture practices further exacerbates environmental degradation Water pollution and water-borne diseases are prevalent issues that affect public health 	<ul style="list-style-type: none"> Erosion, sea level rise, flooding pose significant risks and challenges for coastal areas Vulnerable to the adverse effects of climate change
Social Context and Economic Situation	<ul style="list-style-type: none"> High unemployment rates especially among youths Poverty is predominantly concentrated in rural areas Heavily relies on agriculture and fishing, making it vulnerable to climate shocks and commodity price fluctuations Facing food insecurity and malnutrition 	<ul style="list-style-type: none"> Undiversified economy and limited access to resources Informal commerce and markets dominate the retail sector, sprawling throughout the city and creating challenges for urban planning and regulation
Governance	<ul style="list-style-type: none"> Corruption within the government further hinders development and effective governance 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

There is an ongoing initiative for a smart city project in Banjul City. The pilot project for Banjul Smart City aims to enhance urban living in the capital of Gambia by integrating technology to improve infrastructure and services. In January 2020, the

UNDP Gambia Accelerator Lab (AccLabGM) outlined the components for the Banjul City Council (BCC) to adopt a smart approach to city administration.

Framework	Country/Region	Gambia	Banjul
	Policy and Vision	Although there is no policy and vision related to smart city at the national level, Ministry of Communications and Digital Economy Gambia published the “National Digital Economy Master Plan 2023~2033”.	<currently there is no information>
	Organization	The government of The Gambia under the auspicious of DOSCIT has recently launched the E-Government project at the GRTS Building Complex.	The UNDP The Gambia Country Office was selected for the Smart Cities Pilot initiative as an implementing partner to work with the Singapore Center for Technology, Innovation, and Sustainable Development, AccLabGM quickly regrouped to commit resources to the project and get an early start.
	System	<currently there is no information>	<currently there is no information>
	Technology	Promoting e-government in education, health and local government sectors.	Promoting the use of QR codes for vendor stall identification and registration; digitizing rate collection by market staff; and, using smart digital kiosks as information management systems.
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/GM>)
World Bank Country Profile (<https://www.worldbank.org/en/country/gambia/overview>)
Banjul City Council Leads the Way for Municipalities to go Digital (<https://www.undp.org/gambia/blog/banjul-city-council-leads-way-municipalities-go-digital>)
Photo: <https://www.wanderlust.co.uk/destinations/gambia/>



Country Profile #20 Ghana

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
33,475,870 (2022)	2,175.9 (2022)	68% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
59% (2022)	3.2% (2022)	86.3% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.0% (2022)	55.4% (2021)	44% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
33% (2020)	18.8% (2022)	16% (2022)
Unemployment Rate (%)		
3.9% (2022)		



OVERVIEW

Ghana is situated along the Atlantic Ocean, sharing borders with Togo, Cote d'Ivoire, and Burkina Faso. As of 2022, Ghana has a population of approximately 33 million, making it the second-most populous country in West Africa. The vibrant capital, Accra, is the largest and most densely-populated area, home to nearly 3 million residents.

Ghana is classified as one of the U.N.'s least-developed countries, ranking 133 out of 191 countries listed in the 2022 Human Development Index. The country operates under a mixed economic system, combining elements of private freedom with centralized economic planning and government regulation, albeit with weak implementation.

ISSUES AND CHALLENGES

	Country Level	City Level (Accra)
Urban/Land Use	<ul style="list-style-type: none"> Inequalities exist between the north and south as well as between rural and urban areas in Ghana (the northern regions face challenges like irregular rainfall, poor soil, and insufficient infrastructure) 	<ul style="list-style-type: none"> Rapid urbanization has led to increasing of slums and squatter settlements
Infrastructure Development	<p><currently there is no information></p>	<ul style="list-style-type: none"> Poor sanitation and poor infrastructure developments Inadequate access to basic facilities
Environmental Situation	<ul style="list-style-type: none"> Destruction of the environment and water bodies poses significant environmental and ecological concerns 	<ul style="list-style-type: none"> Flooding is a major vulnerability, attributed to factors such as unplanned development and inadequate drainage
Social Context and Economic Situation	<ul style="list-style-type: none"> Poor macroeconomic conditions Facing high unemployment rates, poverty and low-income people Growing income inequalities further exacerbate social and economic disparities Low adoption of modern agricultural technology hinders agricultural productivity and efficiency 	<ul style="list-style-type: none"> An estimated 74% (2010) of the working population are employed in the informal economy, lacking job security and social protection The official unemployment rate in the Accra metropolis is 7.2%, higher than the national average of 5.8%
Governance	<p><currently there is no information></p>	<ul style="list-style-type: none"> The political challenge lies in mobilizing and translating them into policies and transformative actions

CURRENT STATUS OF SMART CITY DEVELOPMENT

Ghana is currently taking significant steps to participate in the smart city project alongside other African countries. The country has introduced various bills and policies aimed at promoting innovation and development.

The progress of smart city development in Ghana demonstrates a growing commitment to embracing technological advancements and sustainable urban solutions. Multiple cities in Ghana are actively exploring and implementing smart initiatives to improve efficiency, connectivity, and the overall quality of life for residents. These initiatives involve integrating digital technologies, data analytics, and

innovative infrastructure to address urban challenges such as traffic congestion, waste management, and energy efficiency.

Collaborations between the government and private sector are driving efforts to transform cities into more intelligent and responsive entities. The objective is to stimulate economic development and enhance the well-being of the population. Although smart city development is still in its early stages, the momentum indicates a positive movement towards creating resilient, interconnected, and technologically empowered urban spaces in Ghana.

	Country/Region	Ghana	Accra
Framework	Policy and Vision	Although there is no specific policy and vision for smart city in national level, the promotion of smart city project by private sector designed the Ghana Smart City projects to provide affordable Wi-Fi network in collaboration with the local government and other strategic and relevant government agencies.	There is no specific policy and vision for smart city in city level.
	Organization	No specific organization for smart city has been formed. It is only project-based.	No specific organization for smart city has been formed.
	System	No national system for smart city has been established. It is only project-based.	No actual system for smart city has been established. Accra Smart City project include citizens engagement to encourage citizens to use digital engagement tools.
	Technology	The government introduced digital property address system and smart administration.	Accra has made large technology investment in mobile app, biometric/facial recognition, IoT and sensors, cloud and online collaboration tools.
	Operation	No project as a cross sectoral smart city has been established.	This is being considered on a project basis.

Source: World Bank Country Data (<https://data.worldbank.org/country/GH>)
World Bank Country Profile (<https://www.worldbank.org/en/country/ghana/overview>)
UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/ghana_country_brief_final_en.pdf)
Smart City in Accra-Ghana: A Gold Coast again (<https://www.thesmartcityjournal.com/en/articles/smart-city-accra-ghana-gold-coast>)
Photo: <https://kids.nationalgeographic.com/geography/countries/article/ghana>



Country Profile #21 Guinea

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
13,859,341 (2022)	1,531.7 (2022)	35% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
38% (2022)	4.7% (2022)	46.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.5% (2022)	59.6% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
49% (2020)	27.3% (2022)	No Data
Unemployment Rate (%)		
5.7% (2022)		



OVERVIEW

Located on the Atlantic coast, Guinea shares its borders to the north with Guinea Bissau, Senegal, and Mali, and to the south with Sierra Leone, Liberia, and Côte d'Ivoire. The country is rich in natural resources, particularly in the mining sector, with significant deposits of bauxite, diamonds, and gold, as well as hydropower resources. Despite these resources,

Guinea's economy is still heavily reliant on agriculture. Unfortunately, Guinea remains one of the poorest countries in the world. According to the United Nations' Human Development Report of 2022, it ranks 178 out of 189 countries assessed in terms of development. As of 2022, the country's population stood at approximately 13 million.

ISSUES AND CHALLENGES

	Country Level	City Level (Conakry)
Urban/Land Use	<ul style="list-style-type: none"> Unbalanced urban growth with uneven development between cities 	<ul style="list-style-type: none"> The largely unplanned urban growth has resulted in poor housing conditions, limited access to public services, scarcity of available land for productive activities, and vulnerability to natural hazards
Infrastructure Development	<ul style="list-style-type: none"> Suffering from chronic electricity shortages, inadequate road networks, rail lines and bridges, and a lack of access to clean water 	<ul style="list-style-type: none"> Investments in infrastructure are constrained by the limited resources available to local governments
Environmental Situation	<ul style="list-style-type: none"> The hot, dry, dusty harmattan haze reduce visibility during dry season Deforestation, inadequate potable water, desertification, soil contamination and erosion are prevalent issues 	<ul style="list-style-type: none"> The low-lying peninsular geography exposes the city to significant climate risks such as storm surge and extreme precipitation Extreme precipitations have resulted in the degradation of urban infrastructure and spread of water-borne disease
Social Context and Economic Situation	<ul style="list-style-type: none"> Ethnic tension persists, and the country struggles economically due to the influx of thousands of refugees from Liberia and Sierra Leone The growth of Ebola Virus outbreak The lack of literacy and vocational training programs limits job prospects for young people 	<ul style="list-style-type: none"> Residents face disconnection from job opportunities, congestion, and pollution due to the concentration of jobs at the end of the peninsula, the absence of a mass transport system, and the poor condition and lack of road infrastructure
Governance	<ul style="list-style-type: none"> The government capacity is limited and often associated with corrupt practices 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

The Government of Guinea has approached the Arab Federation for Digital Economy to seek support in developing a digital transformation strategy, taking inspiration from the Arab Digital Economy Strategy. The Guinea Digital Economy Strategy will prioritize areas such as education and qualifications, infrastructure expansion, and data utilization and security. To fully harness the benefits of the ongoing and future

innovations brought by the 4th Industrial Revolution, Guinea must embrace technology and allocate the necessary resources to enhance government infrastructure, internal capacity, and relationships with the people, businesses, and civil society. This includes building trust and implementing effective programs and projects.

Framework	Country/Region	Guinea	
	Policy and Vision	Although there is no policy and vision related to smart city in the national level, there is “Guinea Digital Road Map” to provide digital strategy for the government.	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	The Guinea Digital Economy Strategy will focus on education and qualifications, expansion of infrastructure, and the use and security of data.	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/GN>)
World Bank Country Profile (<https://www.worldbank.org/en/country/guinea/overview>)
Republic of Guinea – Planning, Connecting, Financing in Conakry
(<https://documents1.worldbank.org/curated/zh/761191559149103957/pdf/Guinea-Urban-Sector-Review-Planning-Connecting-Financing-in-Conakry.pdf>)
Guinea Digital Road Map (<https://www.arab-digital-economy.org/2020/12.pdf>)
Photo: <https://earlywarningproject.ushmm.org/countries/equatorial-guinea>



Country Profile

#22 Equatorial Guinea

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
1,674,908 (2022)	7,053.5 (2022)	54% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
74% (2022)	3.1% (2022)	66.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.1% (2022)	3.7% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No Data	2.6% (2022)	No Data
Unemployment Rate (%)		
8.7% (2022)		



OVERVIEW

Equatorial Guinea, located on the west coast of Africa, is a small country comprising a continental territory and five inhabited islands. It shares borders with Cameroon to the north, Gabon to the east and south, and is bordered by the Gulf of Guinea to the west. With a population of approximately 1.6 million as of 2022, the country boasts a diverse ethnic makeup.

The economy of Equatorial Guinea is heavily dependent on oil, which accounts for the majority of its exports and government revenue. However, despite its wealth, the country faces significant challenges in areas such as education, healthcare, and poverty reduction. There are ongoing efforts to diversify the economy and improve social conditions.

ISSUES AND CHALLENGES

	Country Level	City Level (Malabo)
Urban/Land Use	<ul style="list-style-type: none"> There is a significant rural-urban inequality, with the majority of the country's population concentrated in the two main cities, Bata and Malabo 	<ul style="list-style-type: none"> Malabo and Bata have the highest population concentration compared to other cities in the country
Infrastructure Development	<ul style="list-style-type: none"> There is a need on establishing a link between the agricultural production areas and the strengthening of road infrastructure with bordering countries There is a need on improving drinking water supply and sanitation sector 	<ul style="list-style-type: none"> The water supply system suffers from poor maintenance and an aging infrastructure
Environmental Situation	<ul style="list-style-type: none"> Prone to violent windstorms and flash floods Deforestation, desertification, water pollution, and the need for wildlife preservation are pressing concerns 	<ul style="list-style-type: none"> The deterioration of the environment is closely linked to the population increase
Social Context and Economic Situation	<ul style="list-style-type: none"> Limited job opportunity in non-oil sectors There is a lack of skills among young people Malaria and other vector-borne diseases remain the main health threat Facing high poverty rates 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Poor governance and corruption are persistent issues 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

<currently there is no information>

Framework	Country/Region	Equatorial Guinea	
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/GQ>)
World Bank Country Profile (<https://www.worldbank.org/en/country/equatorialguinea/overview>)
Photo: <https://statemag.state.gov/2020/03/0320pom-2/>



Country Profile

#23 Guinea-Bissau

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
2,105,566 (2022)	775.8 (2022)	35% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
45% (2022)	3.5% (2022)	35.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.1% (2022)	29% (2021)	24% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
61% (2020)	30.9% (2020)	15% (2022)
Unemployment Rate (%)		
3.6% (2022)		



OVERVIEW

Guinea-Bissau is a low-income country in West Africa that faces significant development challenges despite economic opportunities in agriculture, fisheries, tourism and mining. Since independence from Portugal in 1974, the country has been ridden by political turmoil and institutional fragility. Political instability, overreliance on cashew nut production, and high vulnerability to climate change impacts and

environmental degradation, which affect the availability of natural resources, translate into widespread food insecurity and a high prevalence of malnutrition, particularly among children, rural women, older people and people living with HIV, tuberculosis or disabilities. In recent years, the country has experienced relative political stability and renewed confidence from the international community.

ISSUES AND CHALLENGES

	Country Level	City Level (Bissau)
Urban/Land Use	<ul style="list-style-type: none"> Unplanned rapid growth Lack of land use planning 	<ul style="list-style-type: none"> Unplanned rapid growth
Infrastructure Development	<ul style="list-style-type: none"> Low reliable access to electricity and high cost Urban infrastructure is scant and its maintenance is practically non-existent 	<ul style="list-style-type: none"> Poor waste management Obsolescence of technical structures Lack of basic urban services
Environmental Situation	<ul style="list-style-type: none"> High vulnerability to climate change impacts Deforestation, coastal erosion, saltwater intrusion Overgrazing of farm animals, overfishing 	<ul style="list-style-type: none"> High vulnerability to climate change impacts
Social Context and Economic Situation	<ul style="list-style-type: none"> Limited educational and economic resources Gender-based violence and inequalities High HIV adult prevalence rate 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Limited political leadership and inter-ministerial coordination Political fragmentation and instability Inadequate land allocation policies Lack of property cadaster system for tax collection Weak technical and institutional capacity Lack of financial resources to provide adequate services at the local level 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Extreme political and institutional fragility hampers Guinea-Bissau's development. These challenges have strained the country's capacity to fully embrace and

advance its smart city endeavors and its digital economy.

Framework	Country/Region	Guinea-Bissau	Bissau
	Policy and Vision	There is currently no national-level smart city policy in Guinea-Bissau. The ICT sector operates under the guidance the strategic and operational plan Terra Ranka (2015-2025) and a three year National Development Plan 2020-2023.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. The digital sector in Guinea-Bissau is under the leadership of the Ministry of Transport and Communications (MTC), charged with setting and implementing sectoral strategic orientations and policy.	<currently there is no information>
	System	<No information has been found>	<currently there is no information>
	Technology	<No information has been found>	<currently there is no information>
	Operation	<No information has been found>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/GW>)
World Bank Country Profile (<https://www.worldbank.org/en/country/guineabissau/overview>)
World Bank Group, Digital Economy Diagnostic Guinea-Bissau, 2022
(<https://thedocs.worldbank.org/en/doc/61714f214ed04bcd6e9623ad0e215897-0400012021/related/P177016084979202b08dd501a5690c82506.pdf>)
Photo: <https://www.rfi.fr/en/africa/20230425-guinea-bissau-first-non-european-country-to-sign-environmental-democracy-treaty>



Country Profile #24 Kenya

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
54,027,487 (2022)	2,099.3 (2022)	29% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
29% (2022)	4.8% (2022)	76.5% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.7% (2022)	48.7% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
51% (2020)	21.2% (2022)	31 (2022)
Unemployment Rate (%)		
5.5% (2022)		



OVERVIEW

Situated in East Africa, Kenya boasts diverse landscapes that range from the Great Valley to coastal plains. As of 2022, the country's population has surpassed 54 million people. Kenya has undergone significant political and economic reforms, leading to sustained growth in the economy, social development, and political stability over the past decade.

The country's long-term development agenda focuses on transforming Kenya into a competitive and prosperous nation with a high quality of life. The government's bottom-up economic model prioritizes sectors such as agriculture, healthcare, affordable housing, micro and small enterprises, as well as the digital and creative economy.

ISSUES AND CHALLENGES

	Country Level	City Level (Nairobi)
Urban/Land Use	<ul style="list-style-type: none"> The number and proportion of the urban poor living in slums and informal settlements are growing 	<ul style="list-style-type: none"> The high population density strains the city's ability to provide services to its population
Infrastructure Development	<ul style="list-style-type: none"> Inequalities in access to essential services, especially water and poor health condition Rising the amount of unemployment among youths contributes to high crime rates 	<ul style="list-style-type: none"> Facing a lack of access to stable water supply, poor management solid waste, lack of proper sanitation facilities, poor drainage systems and unreliable energy supplies
Environmental Situation	<ul style="list-style-type: none"> Rapid urbanization leads to challenges such as drought, floods, extreme temperatures, and rising sea levels Inland lakes and rivers are expanding Biodiversity loss, pollution, climate change are significant concerns 	<ul style="list-style-type: none"> There is water crisis in the city Ongoing urban sprawl and highway construction contribute to increased air pollution, forced evictions, and a decline in green spaces
Social Context and Economic Situation	<ul style="list-style-type: none"> Massive income inequality exists among different regions and groups within the country 	<ul style="list-style-type: none"> Urban poverty is a significant issue Acute child malnutrition is prevalent Lack of access to healthcare services
Governance	<ul style="list-style-type: none"> Government corruption is a prevalent issue 	<ul style="list-style-type: none"> Insecurity in Nairobi is often related to issues such as land control, elections, state repression, extrajudicial killings, and terrorism/radicalization

CURRENT STATUS OF SMART CITY DEVELOPMENT

Numerous African countries, including South Africa's Moderfontein New Town, are actively planning and promoting the concept of smart cities as a means of efficient urban management in response to urbanization. Among these initiatives, Kenya's Konza Technopolis has emerged as a prominent example of a

smart city. Konza Technopolis is a significant flagship project aligned with Kenya's Vision 2030, aiming to transform the country into a newly industrialized, upper middle-income nation that offers a high quality of life to all its citizens by 2030.

Framework	Country/Region	Kenya	Konza (South of Nairobi)
	Policy and Vision	Although there is no specific policy and vision for smart city in national level, Kenya Digital Economy Blue Print serves as one of Kenya's contributions in championing the growth of an African-wide digital economy for all Smart Africa Alliance members.	There is no specific policy and vision for smart city in city level. It is only project-based. Konza Technopolis is a key flagship project of Kenya's Vision 2030 economic development portfolio.
	Organization	No specific organization for smart city has been formed, but Kenyan Ministry of Information and Communications takes lead on promoting digital economy.	The Government of Kenya (Kenyan Ministry of Information and Communications), through the Konza Technopolis Development Authority (KoTDA) selected Tetra Tech as the Master Delivery Partner 2 (MDP2) for the Konza Technopolis project.
	System	No national system for smart city has been established. It is only project-based.	No actual system for smart city has been established.
	Technology	Promoting digital government and big data technology.	Konza will be a smart city, with an integrated urban information and communication technology (ICT) network that supports delivery of connected urban services and allows for efficient management of those services on a large scale. Specifically, a smart city framework will integrate the following four key city services: <ul style="list-style-type: none"> • Infrastructure services (transportation, utilities, public safety, environment) • Citizen services (access and participation) • City services (city information, planning and development) • Business services (supportive services for local commerce)
	Operation	No project as a cross sectoral smart city has been established.	This is being considered on a project basis.

Source: World Bank Country Data (<https://data.worldbank.org/country/KE>)
World Bank Country Profile (<https://www.worldbank.org/en/country/kenya/overview>)
UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/kenya_country_brief_final_en.pdf)
Konza Technopolis (<https://konza.go.ke/>)
Photo: <https://kenyatraveltips.com/wp-content/uploads/2015/07/cities-in-kenya.jpg>



Country Profile

#25 Lesotho

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
2,305,825 (2022)	1,107.4 (2022)	48% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
30% (2022)	0.6% (2022)	50.4% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
2.6% (2022)	80.1% (2021)	28% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
26% (2020)	3.5% (2022)	48% (2022)
Unemployment Rate (%)		
18% (2022)		



OVERVIEW

Lesotho is a small, mountainous, landlocked country surrounded by its much larger neighbor, South Africa. Previously a British protectorate, the nation gained its independence in October 1966. The main growth drivers of Lesotho’s economy are construction, mining, manufacturing, business services, and public

administration. Lesotho’s greatest challenges include a high unemployment rate. The main factors inhibiting returns to labor and jobs in Lesotho are lack of skills, high burden of disease (especially HIV/AIDS and tuberculosis), poor investment climate, and lack of key infrastructure.

ISSUES AND CHALLENGES

	Country Level	City Level (Maseru)
Urban/Land Use	<ul style="list-style-type: none"> • Rapid urban transition with large-scale internal migration to the urban centers • Uncontrolled, overcrowded, and unplanned urban settlements 	<ul style="list-style-type: none"> • Uncontrolled, overcrowded, and unplanned urban settlements
Infrastructure Development	<ul style="list-style-type: none"> • Solid waste is poorly handled • Housing deficit in urban areas and housing deterioration in rural areas • Inadequate urban infrastructure and services • Deteriorating infrastructure 	<ul style="list-style-type: none"> • Traffic congestion • Lack of basic urban services
Environmental Situation	<ul style="list-style-type: none"> • High vulnerability to climate change impacts • Increasing environmental degradation 	<ul style="list-style-type: none"> • Air and water pollution • High vulnerability to climate change impacts
Social Context and Economic Situation	<ul style="list-style-type: none"> • Slow economy growth • Persistent poverty and growing inequality • High unemployment rates • Malnutrition and food insecurity • Low quality of education, skills mismatch and shortage of critical skills • High HIV adult prevalence rate 	<ul style="list-style-type: none"> • Poverty, crime, homelessness, poor health, prostitution
Governance	<ul style="list-style-type: none"> • Inadequate governance 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Lesotho is in the early stages of smart city development, marked by the implementation of a National Digital Transformation Strategy in 2021 and

the launch of a e-government infrastructure. Despite these initiatives, progress remains at a nascent stage.

Framework	Country/Region	Lesotho	Maseru
	Policy and Vision	The National Strategic Development Plan II (NSDP) of Lesotho outlines the development of enabling infrastructure, including digital infrastructure, as one of its key goals and wants to “ <i>promote climate smart and resource efficient infrastructure</i> ”. However, there is currently no national-level smart city policy in Lesotho.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. The Ministry of Communications, Science and Technology (MCST) has a definitive overall responsibility for designing and implementing ICT policy.	<currently there is no information>
	System	<No information has been found>	<currently there is no information>
	Technology	The State Of the African Diaspora and International Trade Forum have signed a MOU in 2022 to create a smart city in Lesotho. The City will be called Moshoeshoe City. The government aims to improve good governance by the deployment of a modern and secure e-government broadband infrastructure (ongoing project)	<currently there is no information>
	Operation	<No information has been found>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/LS>)
World Bank Country Profile (<https://www.worldbank.org/en/country/lesotho/overview>)
Government of Lesotho, National Strategic Development Plan II 2018/19 – 2022/23 (<https://www.gov.ls/wp-content/uploads/2021/06/National-Strategic-Development-Plan-II-2018-19-2022-23.pdf>)
The State of the African Diaspora, Moshoeshoe Smart City to be created in Lesotho, 2022 (<https://thestateofafricandiaspora.com/moshoeshoe-smart-city-to-be-created-in-lesotho/>)
World Bank Group, Digital Economy Diagnostic Lesotho, 2020 (<https://documents1.worldbank.org/curated/en/196401591179805910/pdf/Lesotho-Digital-Economy-Diagnostic.pdf>)
Photo: <https://freedomhouse.org/country/lesotho>



Country Profile #26 Liberia

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
5,302,681 (2022)	754.5 (2022)	34% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
53% (2022)	4.8% (2022)	29.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.0% (2022)	20% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
64% (2020)	36.2% (2022)	No data
Unemployment Rate (%)		
3.6% (2022)		



OVERVIEW

Liberia is a country in West Africa. It is bordered by Sierra Leone on the west, Guinea on the north and Ivory Coast on the east. Liberia's coastline is composed of mostly mangrove forests while the more sparsely populated inland consists of forests that open to a plateau of drier grasslands. Along with Ethiopia, Liberia is one of the two modern countries in Sub-Saharan Africa without roots in the European colonization of Africa. A military coup overthrew the

Americo-Liberian leadership in 1980, marking the beginning of political and economic instability and two successive civil wars that left approximately 250,000 people dead and devastated the country's economy. Today, Liberia is recovering from the lingering effects of the civil war and related economic dislocation, with about 85% of the population living below the international poverty line.

ISSUES AND CHALLENGES

	Country Level	City Level (Monrovia)
Urban/Land Use	<ul style="list-style-type: none"> Sprawl of slum settlements Limited availability of land in urban areas for the provision of open green spaces 	<ul style="list-style-type: none"> Proliferation of slums Rapid and uncontrolled urbanization Outdated and ineffective zoning law
Infrastructure Development	<ul style="list-style-type: none"> No provision of affordable decent housing Insufficient infrastructure and basic services Poor transport connectivity of municipalities 	<ul style="list-style-type: none"> Lack of basic urban services Lack of resources for expansion of services
Environmental Situation	<ul style="list-style-type: none"> Limited knowledge of environmental issues and climate change 	<ul style="list-style-type: none"> Increasing environmental degradation in urban areas Increased dumping of waste in wetlands Lack of data on climate change Poor disaster response mechanisms
Social Context and Economic Situation	<ul style="list-style-type: none"> Limited educational and economic resources Lack of sustained economic opportunities Ethnic conflicts, tribalism Drug use among the youth 	<ul style="list-style-type: none"> High unemployment
Governance	<ul style="list-style-type: none"> No information on or implementation of the new Local Government Act among Local Government Authorities (LGAs) Limited ability of LGAs to generate revenue 	<ul style="list-style-type: none"> Lack of enabling regulations to guide planning Lack of information systems on revenue sharing Poor financial planning

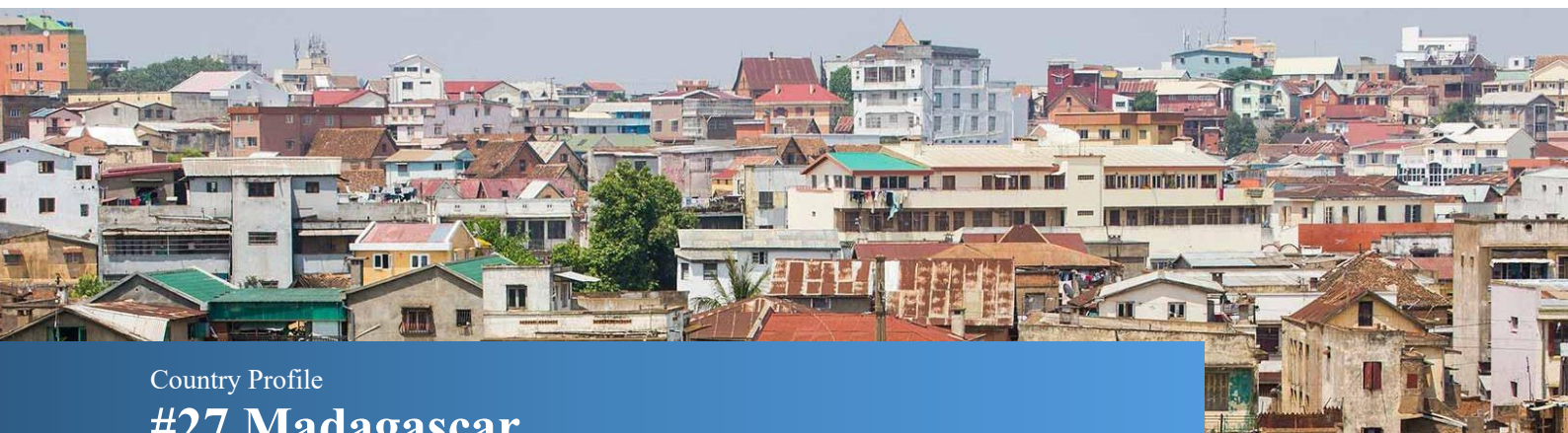
CURRENT STATUS OF SMART CITY DEVELOPMENT

Liberia is in the early stages of smart city development, marked by the implementation of an ICT policy and the launch of an online portal for government services. Despite these initiatives, progress remains at a nascent stage, largely impeded by the aftermath of the civil war

and subsequent crises such as the Ebola and COVID-19 pandemics. These challenges have strained the country's capacity to fully embrace and advance its smart city endeavors.

	Country/Region	Liberia	Monrovia
Framework	Policy and Vision	There is currently no national-level smart city policy in Liberia.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Ministry of Posts and Telecommunications, Liberia Telecommunications Authority (LTA)).	<currently there is no information>
	System	<No information has been found>	<currently there is no information>
	Technology	In 2018, the Government of Liberia launched the eLiberia portal as an intuitive and user-friendly access point for government services. The portal serves as a one-stop-shop to access government services online.	<currently there is no information>
	Operation	<No information has been found>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/LR>)
World Bank Country Profile (<https://www.worldbank.org/en/country/liberia/overview>)
UN-Habitat, Diagnosis Note for Liberia, Implementing the New Urban Agenda Through National Urban Policy, 2020 (https://unhabitat.org/sites/default/files/2021/03/diagnosis_note_for_liberia_02022021-final_1.pdf)
Cities Alliance, Greater Monrovia Urban Development Strategy, 2020 (https://www.citiesalliance.org/sites/default/files/2021-06/CitiesAlliance_GrMonroviaUrbanDevStrategy_2021.pdf)
USAID (2020) Digital Liberia and Electronic Government Activity (https://pdf.usaid.gov/pdf_docs/PA00WJGZ.pdf)
Photo: <https://advox.globalvoices.org/2020/07/22/in-liberia-a-new-mobile-phone-tariff-collides-with-digital-rights/>



Country Profile #27 Madagascar

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
29,611,714 (2022)	505.0 (2022)	20% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
40% (2022)	3.8% (2022)	35.1% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.1% (2022)	70.3% (2021)	22% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
67% (2020)	22.5% (2022)	12% (2022)
Unemployment Rate (%)		
2.1% (2022)		



OVERVIEW

Madagascar is the world's fifth largest island, situated in the Indian Ocean off the coast of southern Africa. Despite considerable natural resources, for decades, Madagascar has struggled with sluggish growth and persistent poverty, largely due to weak governance, inadequate human and physical capital development, and slow structural transformation. The situation is

exacerbated by increasing climate crises and heightened vulnerability to external shocks. Moreover, weak economic growth combined with rapid population growth has resulted in Madagascar having one of the highest poverty rates in the world, reaching 75% in 2022 using the national poverty line.

ISSUES AND CHALLENGES

	Country Level	City Level (Antananarivo)
Urban/Land Use	<ul style="list-style-type: none"> • Rapid and uncontrolled urbanization • Increasing land pressure in big city • High levels of informal settlements 	<ul style="list-style-type: none"> • Rapid and uncontrolled urbanization • Lack of land use planning • Lack of land for manufacturing and logistic industries
Infrastructure Development	<ul style="list-style-type: none"> • Inadequate infrastructure and services • Dilapidated condition of streets and sewage systems • Lack of access to energy, public transportation, drinkable water and basic sanitation facilities 	<ul style="list-style-type: none"> • Low level of infrastructure development • Overcrowding and traffic congestion • Public water and electricity shortage • Inadequate waste management system
Environmental Situation	<ul style="list-style-type: none"> • Increasing climate crises • Climate risks (drought, cyclones, floods, sea level rise, storm, heat stress) 	<ul style="list-style-type: none"> • Extreme air pollution • Degradation and loss of green space • Areas prone to significant flood risk
Social Context and Economic Situation	<ul style="list-style-type: none"> • Health problems due to air pollution and poor hygiene 	<ul style="list-style-type: none"> • High levels of poverty and inequality • Lack of employment for the urban growing population • Few economic opportunities
Governance	<ul style="list-style-type: none"> • Disjuncture between national and local policies and urban planning processes • Weak governance 	<ul style="list-style-type: none"> • Limited funds and management issues

CURRENT STATUS OF SMART CITY DEVELOPMENT

Madagascar is in the early stages of smart city development. While ICT is recognized as a priority, there is currently no national-level smart city policy. Various ministries and organizations are engaged in

ICT and “smart” projects. Madagascar’s commitment to smart development is reinforced by its participation as a signatory of the Smart Africa Manifesto.

Framework	Country/Region	Madagascar	Antananarivo
	Policy and Vision	Although the government’s development strategy, “ <i>Initiative pour l’Emergence de Madagascar</i> ” (IEM), which was released in 2018, identifies the development of ICT as on the six priority sectors for economic development, there is currently no national-level smart city policy in Madagascar.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT and “smart” projects (e.g., Ministry of Telecommunications, Posts and Communication (MPTDN)).	<currently there is no information>
	System	There is no system specific to smart cities.	<currently there is no information>
	Technology	The MPTDN has supported a number of projects to broaden ICT infrastructure and use (e.g., extending infrastructure to uncovered zones; developing the Smart City Nosy Be; deploying “digital window” computer labs in educational institutions; expanding the higher education research network and distributing tablet computers to schools). In 2022, an agreement have been signed by the Governor of the Menabe Region and the State of the African Diaspora to build a smart city.	<currently there is no information>
	Operation	Madagascar is one of the signatories of the Smart Africa Manifesto.	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/MG>)
World Bank Country Profile (<https://www.worldbank.org/en/country/madagascar/overview>)
UN-Habitat, Country Brief Madagascar, 2023 (https://unhabitat.org/sites/default/files/2023/07/madagascar_country_brief_final_en.pdf)
World Bank, Madagascar Digital Economy Assessment, June 2019
(<https://documents1.worldbank.org/curated/en/099350005162234945/pdf/P1707240c74c000f40920204d74f8ac1770.pdf>)
The State of the African Diaspora, *Agreement signed for the construction of a smart city in Madagascar*, May 15, 2022
(<https://thestateofafricandiaspora.com/agreement-signed-for-the-construction-of-a-smart-city-in-madagascar/>)
Photo: <https://www.afd.fr/en/page-region-pays/madagascar>



Country Profile #28 Malawi

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
20,405,317 (2022)	645.2 (2022)	24% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
18% (2022)	0.9% (2022)	14.2% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.2% (2022)	64.2% (2021)	18% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
50% (2020)	21.8% (2022)	46% (2022)
Unemployment Rate (%)		
5.6% (2022)		



OVERVIEW

Located in Southern Africa, Malawi is landlocked, sharing its borders with Mozambique, Zambia, and Tanzania. Malawi remains one of the poorest countries in the world despite making significant economic and structural reforms to sustain economic growth. The

economy is heavily dependent on agriculture, which employs over 80% of the population, and it is vulnerable to external shocks, particularly climatic shocks. Malawi has enjoyed sustained peace and stable governments since independence in 1964.

ISSUES AND CHALLENGES

	Country Level	City Level (Lilongwe)
Urban/Land Use	<ul style="list-style-type: none"> • Rapid urbanization • Poor land use planning and insecure tenure • High levels of informal settlements • Weak rural-urban linkages 	<ul style="list-style-type: none"> • Urban sprawl and unplanned settlements expand in almost all areas • Inadequate planning
Infrastructure Development	<ul style="list-style-type: none"> • Pressing housing demand • Limited drainage system and inadequate and unregulated waste disposal • Inadequate and poor urban roads network • Inadequate capacity for development of urban infrastructure and basic services 	<ul style="list-style-type: none"> • Lack of access to safe sanitation and clean water • Traffic congestion • Lack of public transport facilities, lack of access to unpaved areas, and narrow main trunk roads • Lack of infrastructure and poor maintenance • Unprotected water sources and sanitation facilities
Environmental Situation	<ul style="list-style-type: none"> • Increase in the frequency and magnitude of disasters in urban areas • Poor environmental management and weak resilience to disaster and other shocks 	<ul style="list-style-type: none"> • Vulnerable to the impacts of climate change (floods)
Social Context and Economic Situation	<ul style="list-style-type: none"> • Limited economic opportunities and urban poverty • Social exclusion and marginalization in urban development 	<ul style="list-style-type: none"> • High levels of poverty and inequality • Unemployment • Gender disparities
Governance	<ul style="list-style-type: none"> • Limited revenue collection and planning capacity • Weak governance structures • Poor coordination in urban governance 	<ul style="list-style-type: none"> • Limited financial resources • Limited capacities of local government • Limited community participation and civic inclusion in decision making

CURRENT STATUS OF SMART CITY DEVELOPMENT

Malawi is in the early stages of smart city development, with a clear commitment outlined in the Malawi Vision 2063. The government, through ministries and organizations such as the Malawi Communications Regulatory Authority, is engaged in various “smart”

initiatives and aims to create a strong digital ecosystem. Malawi’s participation in the Smart Africa Manifesto and the upcoming hosting of the African Smart Cities Congress 2024 underscore its growing momentum in the smart city domain.

Framework	Country/Region	Malawi	Lilongwe
	Policy and Vision	In the Malawi Vision 2063 (MW2063), the voice of Malawians is clear: “ <i>Our country shall have smart, well-planned and serviced secondary cities that are anchored on sustainable economic activities in agriculture, tourism, mining and industry</i> ”. The Malawi Secondary Cities Plan (MSCP) has been developed in 2022 to provide a spatial foundation for the implementation of this vision. As outlined in the “Digital Economy Strategy 2021-2026”, the Government also aims to create a strong digital ecosystem.	Although there is a strategic development vision aiming to make “ <i>a future Lilongwe that is clean, green and prosperous</i> ” (Strategic Plan 2020/1-2024/5), there is currently no city-level smart city policy in Lilongwe.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT and “smart” projects (e.g., Ministry of ICT, Malawi Communications Regulatory Authority). The development of the MSCP was coordinated by the National Planning Commission (NPC) in close liaison with the Ministries responsible for physical planning; economic planning and development; natural resources; and local government.	There are no specific organizations dedicated to smart cities.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	A number of “smart” initiatives have been implemented toward strengthening the Government’s ability to deliver public services (e.g., National Registration and Identification System). The Malawi Communications Regulatory Authority has also identified a piece of land at Mvera in Dowa District to develop a Smart City (2023).	Some “smart” initiatives have either been implemented or are currently underway (online complaints handling and anti-corruption unit, solar street lights, upgrading Lilongwe city council LAN network, etc.).
	Operation	Malawi is one of the signatories of the Smart Africa Manifesto. The country will host the African Smart Cities Congress in 2024.	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/MW>)
World Bank Country Profile (<https://www.worldbank.org/en/country/malawi/overview>)
UN-Habitat, Country Brief Malawi, 2023 (https://unhabitat.org/sites/default/files/2023/07/malawi_country_final_en.pdf)
African Cities Research Consortium, Lilongwe: City Scoping Study, 2021 (https://www.african-cities.org/wp-content/uploads/2021/12/ACRC_Lilongwe_City-Scoping-Study.pdf)
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Lilongwe City Council (2021). Strategic Plan 2020/1-2024/5 (<https://lcc.mw/wp-content/uploads/2021/09/STRATEGIC-PLAN-ABRIDGED-VERSION-ENGLISH-1.pdf>)
African News Agency (2023). Macra Identifies Smart City Land (<https://www.africannewsagency.com/times-group-malawi/macra-identifies-smart-city-land-c08646fb-87f7-5e7b-a88c-39683a996cee/>)
Photo: <https://freedomhouse.org/country/malawi>



Country Profile #29 Mali

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
22,593,590 (2022)	833.3 (2022)	34% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
45% (2022)	3.7% (2022)	53.4% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.8% (2022)	35.3% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
42% (2020)	36.4% (2022)	16% (2022)
Unemployment Rate (%)		
2.8% (2022)		



OVERVIEW

Mali, a vast landlocked Sahelian country, faces multiple structural and economic constraints that hinder its socioeconomic development. Mali has been experiencing political instability, turmoil, and conflict since the military coup of 2012 and the occupation of the northern regions by extremist forces. The COVID-19 pandemic and sociopolitical crisis resulting from

the 2020 coup tipped Mali into an economic recession in 2020, although real GDP growth rebounded slightly in 2021. The country underperforms on most living condition dimensions, and extreme poverty incidence, at 16.3 percent in 2021, is associated with low endowment of human capital.

ISSUES AND CHALLENGES

	Country Level	City Level (Bamako)
Urban/Land Use	<ul style="list-style-type: none"> Rapid and uncontrolled urbanization Land speculation and land grabbing 	<ul style="list-style-type: none"> Unplanned, spatially fragmented urban development Informal settlements and slums have emerged in many parts of the city
Infrastructure Development	<ul style="list-style-type: none"> Damaged and inadequate infrastructure and services Lack of access to energy, public transportation, drinkable water and basic sanitation facilities 	<ul style="list-style-type: none"> Inadequate urban infrastructure, particularly in transportation, sanitation, and water supply Limited access to clean and safe water Public transport services are lacking and road infrastructure lack quality
Environmental Situation	<ul style="list-style-type: none"> Vulnerability to natural disasters caused by climate change 	<ul style="list-style-type: none"> Vulnerability to natural disasters caused by climate change
Social Context and Economic Situation	<ul style="list-style-type: none"> Social and economic inequality Situation of increased fragility, conflict, and violence that is inflicting a growing toll on the economy 	<ul style="list-style-type: none"> Prominence of informal employment Urban poverty Social and economic inequality
Governance	<ul style="list-style-type: none"> Lack of adequate registration and demarcation of spaces delineated in the Urban Development Master Plan (SDU) Territorial authorities and customary chiefs often ignore regulations Absence of legislation to enforce the collection of land revenues 	<ul style="list-style-type: none"> Coordination failures related to urban planning and service delivery on the Greater Bamako area

CURRENT STATUS OF SMART CITY DEVELOPMENT

Mali is in the early stages of smart city development, marked by the implementation of an ICT policy and the launch of a few digital services. Despite these initiatives, Mali's landlocked geography, dispersed

population, political instability, and conflict create significant structural barriers to smart city development.

	Country/Region	Mali	Bamako
Framework	Policy and Vision	While the Government of Mali (GoM) has articulated a vision for digital transformation (Digital Mali 2020), significant challenges remain in operationalizing this vision. There is currently no national-level smart city policy in Mali.	< currently there is no information >
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT and "smart" projects (e.g., Ministry of Communication, Digital Economy and Modernization of the Administration, Malian Regulatory Authority for Telecommunications and Posts).	< currently there is no information >
	System	There is no system specific to smart cities.	< currently there is no information >
	Technology	Only a handful of G2B and G2P digital services have been deployed, including for tax declaration, university enrollment, and civil service exams.	Some "smart" initiatives have either been implemented or are currently underway (e.g., video surveillance network). Bamako is part of the Africa Smart Towns Network (ASToN).
	Operation	Mali one of the signatories of the Smart Africa Manifesto.	< currently there is no information >

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/ML>)
World Bank Country Profile (<https://www.worldbank.org/en/country/mali/overview>)
UN-Habitat, Country Brief Mali, 2023 (https://unhabitat.org/sites/default/files/2023/07/mali_country_brief_final_en_1.pdf)
World Bank, The time to act is now! Bamako, An Engine of Growth and Service Delivery, 2018 (<https://documents1.worldbank.org/curated/en/154691549486819482/pdf/127221-repl-Bamako-Report-final-v4.pdf>)
World Bank, Mali Digital Economy Diagnostic, 2023 (<https://documents1.worldbank.org/curated/en/099320408092229246/pdf/P17487603465eb02082e70a588acd95033.pdf>)
Photo: <https://www.afdb.org/en/countries/west-africa/mali>



Country Profile

#30 Mauritania

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
4,736,139 (2022)	2,190.7 (2022)	59% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
57% (2022)	5.2% (2022)	47.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.0% (2022)	38.5% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
56% (2020)	19.2% (2022)	No data
Unemployment Rate (%)		
11.1% (2022)		



OVERVIEW

The country bridging the Maghreb and Sub-Saharan Africa is one of the largest states on the African Continent. It consists mainly of deserts and is one of the poorest countries in the world. Mining, fishing and agriculture are the most important sectors in the economy, which requires diversification. Mauritania,

independent of France since 1960, has been repeatedly interrupted in its development by several military coups in the past. The contrast between urban and rural areas is huge. Many of its people are nomads, with an Arab-Berber population to the north and black Africans in the south.

ISSUES AND CHALLENGES

	Country Level	City Level (Nouakchott)
Urban/Land Use	<ul style="list-style-type: none"> Rapid and uncontrolled urbanization 	<ul style="list-style-type: none"> Uncontrolled and inequitable urban sprawl Land speculation and illegal settlement Difficulties to secure public lands Low density of urban fabric Lack of green and public spaces
Infrastructure Development	<ul style="list-style-type: none"> Damaged and inadequate infrastructure and services Lack of infrastructure and services 	<ul style="list-style-type: none"> Traffic congestion, limited public transportation system, uneasy traffic management Infrastructure penetration coverage is weak and unequal
Environmental Situation	<ul style="list-style-type: none"> Vulnerability to natural disasters caused by climate change (cycles of drought and flood) 	<ul style="list-style-type: none"> Vulnerability to natural disasters caused by climate change (frequent flooding, coastal erosion, sebkhas, etc.) Air pollution, water and soil contamination
Social Context and Economic Situation	<ul style="list-style-type: none"> Prevalence of extreme poverty Security risks in the Sahel region Chronic and recurrent food and malnutrition crises Demographic and health challenges 	<ul style="list-style-type: none"> Large urban poverty and income gap Mostly informal and weak economic sectors Geographically unbalanced employment pools Degraded human health situation Unstable security and feeling of unsafety
Governance	<currently there is no information>	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Mauritania is in the early stages of smart city development, marked by the implementation of an ICT

policy and the launch of a “smart” project in Nouakchott, the capital.

	Country/Region	Mauritania	Nouakchott
Framework	Policy and Vision	In 2022, the Ministry of Digital Transformation, Innovation and Modernisation of the Administration (MTNIMA) has launched the “Agenda National de Transformation Numérique 2022-2025” that gives a clear political framework for the digital transformation in Mauritania. However, there is currently no national-level smart city policy in Mauritania.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. Guided by the High-Level Digital Council (HCN), the MTNIMA is driving the digital transformation of the country.	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	Nouakchott is part of the Africa Smart Towns Network (ASToN). The objective of the project in Nouakchott is to set up a modern street addressing system.
	Operation	Mauritania is one of the signatories of the Smart Africa Manifesto.	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/MR>)
World Bank Country Profile (<https://www.worldbank.org/en/country/mauritania/overview>)
JICA, Nouakchott City Urban Master Plan Development Project in Islamic Republic of Mauritania, 2018 (<https://openjicareport.jica.go.jp/pdf/12324729.pdf>)
UNDP, UNDP helps accelerate inclusive digital transformation in Mauritania, 2022 (<https://www.undp.org/fr/mauritania/news/undp-helps-accelerate-inclusive-digital-transformation-mauritania>)
Medium, Nouakchott develops a street addressing system to improve the everyday life of citizens, 2023 (<https://medium.com/civictch/nouakchott-develops-a-street-addressing-system-to-improve-the-everyday-life-of-citizens-f242089e977>)
Photo: <https://eiti.org/countries/mauritania>



Country Profile

#31 Mauritius

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
1,262,523 (2022)	10,216.3 (2022)	68% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
41% (2022)	8.7% (2022)	99.6% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
-0.2% (2022)	43.1% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No Data	3.4% (2022)	No data
Unemployment Rate (%)		
7.2% (2022)		



OVERVIEW

Mauritius, a subtropical island nation located off the south-eastern coast of Africa, is comprised of its main island along with outlying territories such as Rodrigues Island and other smaller islands. The main island is renowned for its coral reefs, sandy beaches, and fertile plains that abruptly rise to form Rocky Mountains. With a population of 1.2 million as of 2022, Mauritius is not only considered an ideal tourist

destination but also boasts growing financial and industrial sectors.

Despite its successes, Mauritius faces key challenges in managing the transition to a knowledge-based economy and adapting to the impacts of climate change. Nevertheless, the country stands out as one of the wealthiest in Africa and does not grapple with significant issues of poverty or major inequality.

ISSUES AND CHALLENGES

	Country Level	City Level (Port Louis)
Urban/Land Use	<ul style="list-style-type: none"> Rapid urbanization is occurring due to high population growth, both from natural increase and in-migration 	<ul style="list-style-type: none"> Uncontrolled urbanization has led to land shortage Squatters can be seen in the outskirts of towns Municipalities lack of effective land management
Infrastructure Development	<ul style="list-style-type: none"> Roads in both urban and rural areas tend to be narrow, lacking sufficient space for vehicles to maneuver 	<ul style="list-style-type: none"> Basic urban services such as water supply, garbage collection, and electricity are currently inadequate Residents of squatter settlements are highly vulnerable to natural disasters due to the poor housing condition
Environmental Situation	<ul style="list-style-type: none"> Experiencing seasonal cyclones and disruptive flooding Water scarcity, water pollution, and pressures on marine and coastal areas are caused by effluents from households, industries, hotels, and agriculture 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Child abuse, violence against women, sexual exploitation, and the increasing prevalence of drug and alcohol abuse are observed There is a number of mosquito-borne diseases 	<currently there is no information>
Governance	<currently there is no information>	<ul style="list-style-type: none"> The municipality has not allocated a specific budget for the rehabilitation of illegal settlements

CURRENT STATUS OF SMART CITY DEVELOPMENT

The Smart Mauritius initiative is a bold economic development program aimed at transforming Mauritius into a thriving international business and financial hub, providing optimal conditions for work, living, and investment. This vision is to be achieved through the establishment of Smart Cities throughout

the island, utilizing the latest advancements in urban planning and digital technologies. The Smart City Scheme, launched by the Board of Investment in collaboration with the Mauritian government, was introduced in 2015 (amended in October 2020) to facilitate the realization of this vision.

Framework	Country/Region	Mauritius	Moka
	Policy and Vision	The Mauritian government launched the Smart City Scheme (SCS) in 2015. The pillars of the SCS are innovation, sustainability, efficiency and quality of life. The SCS mentioned that, a smart city project has goals to achieve smart economy, smart environment, smart governance, smart mobility, smart people and smart living.	There is no specific policy and vision for smart city in city level. It is only project-based. Moka Smart City aims at rethinking the city to be more ecological and more responsible in order to anticipate the changes to come.
	Organization	The SCS is formulated by Economic Development Board (EDB).	Moka Smart City has been officially launched by the Prime Minister of Mauritius. It is a project developed by the ENL group (a Mauritian private sector company specializing in real estate development).
	System	It is assumed that efforts are being made based on guidelines in SCS document. Currently 13 smart city projects are issued in this document.	No actual system for smart city has been established.
	Technology	It is assumed that the technology is based on each project implementation.	Moka City aims to continuously evolve and offer new smart initiatives around mobility, technology and the optimal use of resources. The city is equipped with an IoT platform to record water consumption, energy consumption, and water temperature, environmental data such as air temperature, CO2 levels, light levels, and noise pollution.
	Operation	Several projects have been issued in SCS as a smart city promotion, but none have been fully implemented yet.	This is being considered on a project basis.

Source: World Bank Country Data (<https://data.worldbank.org/country/MU>)
World Bank Country Profile (<https://www.worldbank.org/en/country/mauritius/overview>)
Photo: <https://www.afrik21.africa/en/mauritius-smart-city-port-louis-first-african-city-where-lives-good/>



Country Profile #32 Mozambique

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
32,969,518 (2022)	541.5 (2022)	17% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
38% (2022)	4.1% (2022)	31.5% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.2% (2022)	52.7% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
55% (2020)	27.5% (2021)	No data
Unemployment Rate (%)		
3.9% (2022)		



OVERVIEW

Mozambique borders Tanzania, Malawi, Zambia, Zimbabwe, South Africa, and Eswatini. Its long Indian Ocean coastline of 2,700 kilometers faces east to Madagascar. About two-thirds of its estimated 33 million (2022) people live and work in rural areas. The country is endowed with ample resources, including arable land, abundant water sources, energy, and mineral resources, as well as newly-discovered deposits of natural gas off its coast. The country has three deep seaports and a relatively large potential

pool of labor. Mozambique has been grappling with an insurgency in parts of the gas-rich province of Cabo Delgado since 2017. The conflict has however killed thousands and displaced over a million people, causing an unprecedented humanitarian crisis. Despite having one of the fastest-growing economies in Sub-Saharan Africa from 2000-2015, job-creation, poverty reduction, and human capital accumulation are still limited.

ISSUES AND CHALLENGES

	Country Level	City Level (Maputo)
Urban/Land Use	<ul style="list-style-type: none"> Massive population displacements to urban areas (province of Cabo Delgado) High rate of urbanization and poor urban planning leading to settlements in hazard-prone areas 	<ul style="list-style-type: none"> Rapid pace of urbanization and proliferation of informal settlements Majority of the population live in informal settlements with limited or no services and poor housing conditions
Infrastructure Development	<ul style="list-style-type: none"> Huge pressure on housing and basic services Deficiencies in public services and infrastructure Lack of solid waste management 	<ul style="list-style-type: none"> Increased demand for housing, infrastructure and services
Environmental Situation	<ul style="list-style-type: none"> High climate vulnerability (floods, cyclones, intense storms, droughts) Improper use of natural resources 	<ul style="list-style-type: none"> Vulnerable to the impacts of climate change Land degradation, soil erosion Maputo's freshwater sources are subject to saltwater intrusion from rising sea level
Social Context and Economic Situation	<ul style="list-style-type: none"> Poverty levels remain high Gender inequality 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Unprepared local urban authorities Absence of effective land use management and planning systems 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in Mozambique is currently in its early stages. While ICT is consistently integrated into national development plans, there is an absence of a national-level smart city policy. However, several

“smart” initiatives like the Uxene Smart City project, Mozambique’s first ecological smart city or the ASToN project in Maputo, highlight Mozambique’s commitment to smart urban development.

	Country/Region	Mozambique	Maputo
Framework	Policy and Vision	For the government of Mozambique, the digital economy is a key priority. ICT is consistently integrated into national development plans, with concrete benchmarks and targets to be achieved to maximize ICT’s contribution to development goals. However, there is currently no national-level smart city policy in Mozambique.	Currently, there is no city-level policy and vision in Maputo. However, the Uxene Smart City project, Mozambique’s first ecological smart city project, has been launched in 2022.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., National eGovernment Institute). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities. Developed by the company Memba Imobiliária, Uxene Smart City signed memorandums of understanding with 11 partners (e.g., the mobile phone company Vodacom, the Higher Polytechnical Institute of Mozambique (ISCTEM), the transport operator Metro Bus, and the government’s Water Supply Assets and Investment Fund (FIPAG)).
	System	<currently there is no information>	There is no system specific to smart cities.
	Technology	A number of “smart” initiatives have been implemented by the government (e.g., creation of the National eGovernment Institute, Biometric ID Card and Passport System, Digital Taxation System).	Some “smart” initiatives have either been implemented or are currently underway. A bus rapid transit project (BRT) will be implemented in Maputo from 2023 to alleviate the pressure on public transport and ensure greater mobility in the Greater Maputo region. Maputo is part of the Africa Smart Towns Network (ASToN).
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/MZ>)
World Bank Country Profile (<https://www.worldbank.org/en/country/mozambique/overview>)
UN-Habitat, Country Brief Mozambique, 2023
(https://unhabitat.org/sites/default/files/2023/07/mozambique_country_brief_final_en.pdf)
UN-Habitat Country Programme Mozambique, 2018-2021
(https://unhabitat.org/sites/default/files/2019/10/hcpd_2019_-_english_feb2019.pdf)
World Bank, Mozambique Digital Economy Diagnostic, Executive Summary Report, 2019
(<https://thedocs.worldbank.org/en/doc/833211594395622030-0090022020/original/MozambiqueDECA.pdf>)
The Smart City Journal, Mozambique's capital city to implement bus rapid transit project in 2023
(<https://www.thesmartcityjournal.com/en/smart-mobility/mozambique-s-capital-city-to-implement-bus-rapid-transit-project-in-2023>)
Uxene Smart City, Home Page (<https://uxene.com/o-que-e-uxene-smart-city/>)
Photo: <https://www.gecf.org/countries/mozambique-republic-of-mozambique>



Country Profile

#33 Namibia

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
2,567,012 (2022)	4,911.3 (2022)	53% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
54% (2022)	4.6% (2022)	55.2% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.2% (2022)	47.1% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
41% (2018)	8.6% (2022)	No data
Unemployment Rate (%)		
20.8% (2022)		



OVERVIEW

Namibia is a geographically large country with a small population of about 2.56 million (2022) and a 1,500 km-long coastline on the South Atlantic. The driest country in Sub-Saharan Africa, it is rich in mineral resources, including diamonds and uranium, sharing borders with Angola, Botswana, South Africa, and Zambia. Resource wealth, political stability, and

sound macroeconomic management have helped poverty reduction and allowed Namibia to become an upper-middle-income country.

However, socioeconomic inequalities, the legacy of apartheid systems of government in the past, remain extremely high and were worsened by the COVID-19 pandemic.

ISSUES AND CHALLENGES

	Country Level	City Level (Windhoek)
Urban/Land Use	<ul style="list-style-type: none"> Urban sprawl and growth of informal settlements Increasing demand for land in Namibia's urban centers Insecurity of tenure 	<ul style="list-style-type: none"> Rapid pace of urbanization and proliferation of informal settlements Sporadic conversion of agricultural into residential land and shortage of land Proliferation of informal settlements without accessible water and sewerage facilities
Infrastructure Development	<ul style="list-style-type: none"> Poor housing conditions Traffic congestion Energy and water insecurity Poor access to basic services and infrastructure 	<ul style="list-style-type: none"> Increased demand for housing, infrastructure and services Traffic congestion Provision of municipal services and infrastructure is costly Increased transportation cost to the ultra-low income groups
Environmental Situation	<ul style="list-style-type: none"> Air pollution Vulnerable to climate change 	<ul style="list-style-type: none"> Vulnerable to climate change (droughts, flash floods)
Social Context and Economic Situation	<ul style="list-style-type: none"> Poverty levels remain high among the rural and marginalized members of the society Food insecurity and unemployment Unhealthy environment for the youth 	<ul style="list-style-type: none"> Difficulties to get employment opportunities
Governance	<No information has been found>	<ul style="list-style-type: none"> Lack of spatial governance due to diverse land ownership on its periphery

CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in Namibia is currently in its early stages. While the government introduced the “Digital Namibia Strategy” in 2021, outlining a plan for digital literacy, cybersecurity, e-governance, and

data-driven decision-making, there is an absence of a national-level smart city policy. Localized efforts in Windhoek showcase initiatives, illustrating a commitment to sustainable urban solutions.

Framework	Country/Region	Namibia	Windhoek
	Policy and Vision	Although the government unveiled the “Digital Namibia Strategy” in 2021, which outlined a comprehensive plan to enhance digital literacy, cybersecurity, e-governance, and data-driven decision-making, there is currently no national-level smart city policy in Namibia.	Currently, there is no city-level policy and vision in Windhoek.
	Organization	There are no specific organizations dedicated to smart cities.	There are no specific organizations dedicated to smart cities.
	System	<currently there is no information>	There is no system specific to smart cities.
	Technology	<currently there is no information>	Some “smart” initiatives have either been implemented or are currently underway. Smart City Sweden is currently conducting a pre-feasibility study together with the City of Windhoek to investigate the possibilities for a waste-to-energy plant in the capital. In 2022, Smart City Hunt app, was developed to guide strategies to transform the City of Windhoek into a smart and sustainable city. The project was done in collaboration with the UNDP accelerator lab Namibia, the City of Windhoek, and youth from informal settlements.
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/NA>)
World Bank Country Profile (<https://www.worldbank.org/en/country/namibia/overview>)
Republic of Namibia, Namibia Country Report (Draft), 2015 (<https://habitat3.org/wp-content/uploads/National-Report-Africa-Namibia-English.pdf>)
Tjipetkera, Cyrlus and Gumbo, Trynos and Yankson, Eric (2022) *Analysing the Causes and Challenges of Urban Spatial Expansion in Windhoek, Namibia: Towards Sustainable Urban Development Strategy*, (https://repository.corp.at/926/1/CORP2022_94.pdf)
Smart City Sweden, *Continued collaboration with the city of Windhoek*, 2023 (<https://smartcitysweden.com/continued-collaboration-with-the-city-of-windhoek/>)
UNDP, *Would a “City Hunt” help in popularising the smart city and the achievement of Sustainable Development Goals?*, 2023 (<https://www.undp.org/namibia/blog/would-city-hunt-help-popularising-smart-city-and-achievement-sustainable-development-goals>)
Photo: <https://www.weforum.org/agenda/2021/10/namibia-is-positioned-to-become-the-renewable-energy-hub-of-africa/>



Country Profile #34 Niger

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
26,207,977 (2022)	585.4 (2022)	22% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
17% (2022)	11.5% (2022)	18.6% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.6% (2022)	36.8% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
70% (2018)	36.5% (2021)	8% (2022)
Unemployment Rate (%)		
0.5% (2022)		



OVERVIEW

Located in the heart of the Sahel, Niger has a poorly diversified economy, dependent on agriculture for almost 40% of its GDP. The level of extreme poverty is expected to reach 44.1% in 2023, which will increase the extremely poor population by 700,000 bringing the total to 12 million in 2023. Following the recent putsch, ECOWAS has imposed financial sanctions on the country, freezing "all commercial and financial transactions" between member states and Niger, one of the world's poorest

countries. In the absence of a political resolution, the outlook is highly uncertain. In addition to the risks of climatic shocks and falling world oil prices, the risks of environmental degradation are also significant. Growth and poverty prospects are subject to a prolonged political crisis, sanctions that last beyond 2023, a continued pause in major international infrastructure projects and their financing, and the deteriorating security situation.

ISSUES AND CHALLENGES

	Country Level	City Level (Niamey)
Urban/Land Use	<ul style="list-style-type: none"> Rapid growth of informal settlements and slums 	<ul style="list-style-type: none"> Rapid population growth and uncontrolled spatial expansion High density and prevalence of slums
Infrastructure Development	<ul style="list-style-type: none"> Poor and inadequate infrastructure Lack of basic urban services Insufficient waste management system 	<ul style="list-style-type: none"> Inadequate provision of basic infrastructure and services Extremely limited coordinated trash collection and serious sanitation issues Insufficient transport infrastructure (high road accident rates)
Environmental Situation	<ul style="list-style-type: none"> Air and water pollution Recurrent drought and flooding Water scarcity, longer dry seasons, higher temperatures 	<ul style="list-style-type: none"> Climate-related challenges (among the world's hottest cities, prolonged dry season) Water pollution (Niger River)
Social Context and Economic Situation	<ul style="list-style-type: none"> Primary health care and basic education are denied to most and adequate sources of food, nutrition and water are scarce Insecurity 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Political instability 	<ul style="list-style-type: none"> Administrative system decimated by corruption

CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in Niger is currently in its early stages. While there is no specific policy focusing on smart cities, the country is making strides through initiatives like the Smart Village Blueprint. This aligns with the objectives of the Niger 2.0 Smart Villages

project, aimed at providing broadband infrastructure to enhance Internet access in rural and remote areas. Niger's commitment to the Smart Africa Manifesto underscores the pursuit of smart city development through specific initiatives.

Framework	Country/Region	Niger	Niamey
	Policy and Vision	Currently, there is no national-level smart city policy in Niger. However, a Smart Village Blueprint, initiated in Niger, serves as a practical tool for establishing Smart villages, supporting the Niger 2.0 Smart Villages project, which aims at providing broadband infrastructure to improve Internet access in rural and remote parts of the country.	Currently, there is no city-level policy and vision in Niamey.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., National Agency for the Information Society). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	A number of "smart" initiatives have been implemented or are currently ongoing through the "Niger 2.0 Program" (e.g., establishment of an innovation and technology city).	Some "smart" initiatives have either been implemented or are currently underway (e.g., video surveillance network). Niamey is part of the Africa Smart Towns Network (ASToN).
	Operation	Niger is a signatory of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/NE>)
World Bank Country Profile (<https://www.worldbank.org/en/country/niger/overview>)
ITU, Building Smart Villages: A blueprint As piloted in Niger, 2020 (https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-SMART_VILLAGE.NIGER-2020-PDF-E.pdf)
Photo: <https://www.mappr.co/capital-cities/niger/>



Country Profile #35 Nigeria

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
218,541,212 (2022)	2,184.4 (2022)	55% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
54% (2022)	3.3% (2022)	59.5% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.8% (2022)	75.4% (2021)	29% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
49% (2020)	23.7% (2022)	32% (2022)
Unemployment Rate (%)		
5.8% (2022)		



OVERVIEW

Nigeria, situated in West Africa, has land borders with the Republic of Benin on its west, Chad and Cameroon on its east, and Niger to the north. With a total population estimated at 218 million by the end of 2022, Nigeria is ranked the largest country in sub-Saharan Africa, both in terms of size of the economy and population. Despite being the largest crude oil producer in Africa, poverty and unemployment remain high. Nigeria is vulnerable to conflict-related and

environmental risks. Governance, peace, and security deficits constitute direct threats to development and citizen trust in Nigerian public institutions and policies. Nigeria has identified key opportunities in agriculture, manufacturing, and regional trade alongside challenges such as vulnerability to oil shocks, increasing pressures on poverty, inequality, unemployment, hunger, malnutrition, and gender imbalances.

ISSUES AND CHALLENGES

	Country Level	City Level (Lagos)
Urban/Land Use	<ul style="list-style-type: none"> High rural-urban migration exacerbated by climate and conflict-induced displacements Insecure land tenure Gross negligence to formulate, adopt and implement development/land use master plans for towns and cities Lack of adequate land use planning, ineffective development control and poor land husbandry Rapid growth of informal settlements and slums 	<ul style="list-style-type: none"> Rapid population growth and uncontrolled spatial expansion Prevalence of slums
Infrastructure Development	<ul style="list-style-type: none"> Poor and inadequate infrastructure Lack of basic urban services Substandard building materials 	<ul style="list-style-type: none"> Inadequate provision of basic infrastructure and services Shortage of affordable housing options Insufficient transport infrastructure
Environmental Situation	<ul style="list-style-type: none"> Increasing air pollution arising from the use of fossil fuels for cooking, lighting and vehicular locomotion Abuses of the natural environment resulting in loss of biodiversity, deforestation, desertification, flooding, soil erosion and pollution of land, air and water 	<ul style="list-style-type: none"> Context of increasing natural disasters and climate change Building and infrastructure systems, together with urban sprawl, are major contributors to carbon emissions and pollution Other prominent risks include sea level rise, extreme

	Country Level	City Level (Lagos)
	<ul style="list-style-type: none"> Climate induced hazards (flash floods, mudslides) 	heat events, droughts and wildfires
Social Context and Economic Situation	<ul style="list-style-type: none"> Vulnerability to oil shocks Increasing pressures on poverty, inequality, unemployment, hunger, malnutrition, and gender imbalances 	<ul style="list-style-type: none"> Economic growth is stagnating while poverty remains high A lagging business environment High rate of unemployment
Governance	<ul style="list-style-type: none"> Absence of adequate legislative framework to guide the housing industry 	<ul style="list-style-type: none"> Weak urban governance and finance systems Ineffective urban planning system and fragmented land administration

CURRENT STATUS OF SMART CITY DEVELOPMENT

Nigeria is one of the few African countries that have launched smart city initiatives at the national level. The Nigeria Smart City Initiatives (NSCI) was launched in August 2017 with the goal of enabling cities across Nigeria build smart solutions to their most pressing challenges.

The “2030 Lagos Smart City Vision”, envisions to transform Lagos, the capital, as a smart city. The Lagos State government has championed for a smart city vision, geared towards making Lagos “Africa’s model megacity”.

	Country/Region	Nigeria	Lagos
Framework	Policy and Vision	Currently, there is no national-level smart city policy in Nigeria. However Nigeria is one of the few African countries that have launched smart city initiatives at the national level (Nigeria Smart City Initiatives Program).	The “2030 Lagos Smart City Vision”, envisions to transform Lagos as a smart city.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Federal Ministry of Communication Technology, National Information Technology Development Agency). Each project operates under the jurisdiction of its respective organization.	The Lagos State Government (LASG) is leading the smart city project, assisted by several individuals and organizations in both the public and private sectors.
	System	There is no system specific to smart cities.	This vision has resulted in a series of governance reforms, regulatory and legislative frameworks, projects and interventions.
	Technology	At the federal and state levels, a number of new initiatives have been taken to provide digital services. A number of ICT initiatives and platforms have been implemented through the “Nigeria Smart City Initiatives” Program.	The Lagos smart city is expected to comprise components such as e-government, safe city, open data, smart agriculture, smart buildings, and smart energy amongst others.
	Operation	Nigeria is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/NG>)
World Bank Country Profile (<https://www.worldbank.org/en/country/nigeria/overview>)
UN-Habitat, Country Programme Document 2016-2021, Nigeria (https://unhabitat.org/sites/default/files/documents/2019-09/hcpd_nigeria_final_draft_6_sept.pdf)
UN-Habitat, Country Brief - Nigeria 2023 (https://unhabitat.org/sites/default/files/2023/07/nigeria_country_brief_final_en.pdf)
World Bank, *Lagos Diagnostic Study and Pathway for Transformation*, 2023 (<https://documents1.worldbank.org/curated/en/099062123034023646/pdf/P1750310c8d0390000afa70e5c583aa3b87.pdf>)
Photo: <https://unctad.org/news/blog-building-socio-economic-resilience-nigeria-fostering-productive-capacities>



Country Profile

#36 Rwanda

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
13,776,698 (2022)	966.3 (2022)	30% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
18% (2022)	8.2% (2022)	48.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.2% (2022)	81.3% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
38% (2020)	24.9% (2022)	No data
Unemployment Rate (%)		
13% (2022)		



OVERVIEW

Rwanda, a small and landlocked country with a population exceeding 13 million as of 2022, is characterized by its hilly and fertile terrain. It shares borders with the significantly larger and more prosperous Democratic Republic of the Congo, as well as its East African neighbors Tanzania, Uganda, and Burundi. Despite being one of the most densely populated countries in Africa, Rwanda is also among

the least urbanized.

Since the 1994 genocide against the Tutsi, Rwanda has maintained political stability. In 2022, the country's economy encountered several challenges, including the COVID-19 pandemic, climate-related shocks, and rising inflationary pressures. Despite these challenges, real GDP grew by 8.2% in 2022.

ISSUES AND CHALLENGES

	Country Level	City Level (Kigali)
Urban/Land Use	<ul style="list-style-type: none"> The rural to urban transition is occurring at a slow pace 	<ul style="list-style-type: none"> There is uncontrolled urban expansion and a high gross density There is a shortfall of safe and affordable housing There is challenge in maintaining city cleanliness
Infrastructure Development	<ul style="list-style-type: none"> There is a lack of connectivity between cities The primary mode of transportation is road, due to the absence of alternative infrastructure Disparities exist in access to water and electricity services There is a high cost of energy 	<ul style="list-style-type: none"> Vulnerability of its infrastructure to the impacts of climate change and a lack of comprehensive information on the locations of the infrastructure
Environmental Situation	<ul style="list-style-type: none"> It is vulnerable to the impacts of climate change 	<ul style="list-style-type: none"> Limited effective stormwater management and mitigation of flood risks Transportation sector stands out as the primary source of emissions
Social Context and Economic Situation	<ul style="list-style-type: none"> Disparities exist in access to basic services such as education, healthcare, and social safety nets Poor economic performance on a global scale remains a significant challenge 	<ul style="list-style-type: none"> The existence of informal settlements and a heavy dependence on agriculture for employment Limited availability of public parks within the city decreases recreational spaces and communal areas
Governance	<ul style="list-style-type: none"> Local government entities have limited capacity 	<ul style="list-style-type: none"> Challenges in coordination among stakeholders and the enforcement of laws and regulations

CURRENT STATUS OF SMART CITY DEVELOPMENT

In recent years, Rwanda has adopted a series of important policy frameworks that laid the foundations for the Smart City Rwanda Masterplan 2020. This masterplan provides a framework to guide Rwandan cities and towns through the process of developing their own smart city strategies and masterplans, as well as providing a strategy for the government to promote

the development of smart cities on a national level. The Smart Rwanda Masterplan 2020 has three goals: economic transformation, job creation and accountable governance. These in turn are supported by seven pillars ranging from education to finance and women and youth empowerment in technology.

Framework	Country/Region	Rwanda	Kigali
	Policy and Vision	There is a vision to transform the country from an agrarian economy into a knowledge-based economy by 2020 mentioned in the Smart City Rwanda Master Plan.	There is no city level policy and vision, they are following the Smart City Rwanda Master Plan.
	Organization	There are organizations related to smart cities which are Ministry of ICT and Innovation (MINICT) and Rwanda Information Society Authority (RISA).	Currently the smart city projects in Kigali is managing by the national level organization.
	System	A national framework has been established. The implementation is changing and adapting based on the results of each pilot project.	There is no actual ecosystem, laws and regulations in the city level. It is being considered on project basis (e.g., Kigali Innovation City Project).
	Technology	27 smart city initiatives have been identified in the Smart City Rwanda Masterplan 2020.	Efforts are being made in the areas of ICT infrastructure to enable smart services for the city and be accessible to all citizens through enhanced governance, integrated planning, implementation, and management. The smart city solutions are ranged across some functional areas, including: mobility, parking management, blockchain, waste management, IoT, etc.
	Operation	The direction of smart cities development is left up to each city.	It is being considered on a project basis (e.g., Kigali Innovation City Project).

Source: World Bank Country Data (<https://data.worldbank.org/country/RW>)
 World Bank Country Profile (<https://www.worldbank.org/en/country/rwanda/overview>)
 Kigali City Master Plan 2020 (<https://bpmis.gov.rw/>)
 (<https://masterplan2020.kigalicity.gov.rw/portal/apps/webappviewer/index.html?id=218a2e3088064fc6b13198b4304f3d35/>)
 Smart City Rwanda Master Plan (https://unhabitat.org/sites/default/files/documents/2019-05/rwanda_smart_city-master_plan.pdf)
 Photo: <https://time.com/collection/worlds-greatest-places-2022/6194625/kigali-rwanda/>



Country Profile

#37 Sao Tome and Principe

COUNTRY FACT

Total Population	227,380 (2022)	GDP per Capita (USD)	2,404.3 (2022)	Access to Internet (%)	51% (2021)
Urban Population (%)	76% (2022)	GDP Growth Rate (%)	0.9% (2022)	Access to Electricity (%)	78.5% (2021)
Urban Population Growth Rate (%)	2.8% (2022)	Agricultural Land (%)	43.8% (2021)	People using Safe Drinking Water (%)	36% (2022)
Population Living in Slums (% of Urban Population)	53% (2020)	Agriculture Sector (% GDP)	13.1% (2022)	People using Safe Sanitation Services (%)	34% (2022)
Unemployment Rate (%)	15.3% (2022)				



OVERVIEW

The Republic of Sao Tome and Principe is an archipelago 350 km off the west coast of Africa in the Gulf of Guinea. Despite its size and remote location, it has a significant untapped natural wealth, including pristine rainforests with a rich and unique biodiversity. Despite having a young and increasingly educated population, the country faces structural challenges typical of small, remote countries. Its small size and

low population limit the development of large-scale economic activities. Its remoteness and insularity increase trade costs and make it more vulnerable to terms-of-trade and climate shocks. Despite a GDP per capita of about \$2,400, the country faces significant socio-economic vulnerability due to elevated poverty, income inequality, and a lack of employment opportunities.

ISSUES AND CHALLENGES

	Country Level	City Level (São Tomé)
Urban/Land Use	<currently there is no information>	<currently there is no information>
Infrastructure Development	<ul style="list-style-type: none"> Poor infrastructure and limited equipment Poor access to clean water and improved sanitation Unreliable electricity supply Difficulties in access to adequate housing 	<currently there is no information>
Environmental Situation	<ul style="list-style-type: none"> Highly vulnerable to the impacts of climate change 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Socio-cultural norms that reinforce gender inequality Weaknesses in nutrition, hygiene and waste management practices Weak economy and quality of education insufficient to provide decent jobs to young women and men in particular 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Basic public administration functions of planning, data analysis and monitoring Weaknesses in control mechanisms, institutional capacities and core administration functions affect effective delivery of services 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in Sao Tomé and Principe is still in its early stages. Digital technologies are a significant opportunity to directly address STP's small island state connectivity challenges while also

improving service delivery and supporting several priority areas. Yet, despite investments in connectivity, STP's digital economy remains nascent, lacking both supply of digital services and demand.

	Country/Region	Sao Tome and Principe	São Tomé
Framework	Policy and Vision	Although the “National Strategy for Digital Governance” calls for several digital transformation initiatives aimed at boosting the provision of digital services, there is currently no national-level smart city policy in Sao Tomé and Principe.	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/ST>)
World Bank Country Profile (<https://www.worldbank.org/en/country/saotome/overview>)
United Nations, Sustainable Development Cooperation Framework, Sao Tome & Principe 2023-2027
(https://unsdg.un.org/sites/default/files/2022-11/UNSDCF_Sao%20Tome%20and%20Principe_2023-2027.pdf)
Photo: <https://www.africa.com/heres-what-you-need-to-know-about-sao-tome-and-principe/>



Country Profile #38 Senegal

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
17,316,449 (2022)	1,598.7 (2022)	58% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
49% (2022)	4.2% (2022)	68% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.6% (2022)	49.4% (2021)	27% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
32% (2020)	15.7% (2022)	14% (2022)
Unemployment Rate (%)		
3.4% (2022)		



OVERVIEW

Located in the westernmost part of the continent, Senegal is bordered by Mauritania, Mali, Guinea, and Guinea-Bissau. It has a dry, tropical climate and a population of 17.3 million (2022), a quarter of whom live in the Dakar region (0.3% of the territory). Its capital and largest city, Dakar, serve as a cultural and

economic hub. The country boasts a rich cultural heritage influenced by various ethnic groups, with a predominant Muslim population. Despite regional disparities, Senegal is recognized as one of Africa's most stable countries.

ISSUES AND CHALLENGES

	Country Level	City Level (Dakar)
Urban/Land Use	<ul style="list-style-type: none"> Rapid pace of urbanization and informal settlements High population density disparities 	<ul style="list-style-type: none"> Demographic pressure and fast urbanization Uncontrolled urban sprawl Land speculation Large areas of informal and precarious housing (slums)
Infrastructure Development	<ul style="list-style-type: none"> Disparities in access to water, sanitation and electricity services 	<ul style="list-style-type: none"> Heavy traffic congestion Inadequacy of the road network Inadequacy of facilities and infrastructure Lack of basic services and public facilities
Environmental Situation	<ul style="list-style-type: none"> Degradation of natural resources and the environment Rise in insecurity and vulnerability to disasters (flooding) Increase in environmental risks (pollution, overfishing, soil erosion) and health risks 	<ul style="list-style-type: none"> Climate induced hazards (frequent and prolonged flooding) Air pollution
Social Context and Economic Situation	<ul style="list-style-type: none"> High level of youth unemployment Disparities in access to education Heavy reliance on agriculture Challenging economic situation due to the COVID-19 pandemic, the vulnerability of healthcare system and the size of the informal sector 	<ul style="list-style-type: none"> Disparities in access to essential services, such as healthcare and social amenities High unemployment rate in youth Low community engagement and beggary
Governance	<ul style="list-style-type: none"> Low capacity for intervention by local authorities Inadequate institutional framework for key sectors 	<ul style="list-style-type: none"> Low coordination between central and municipal authorities

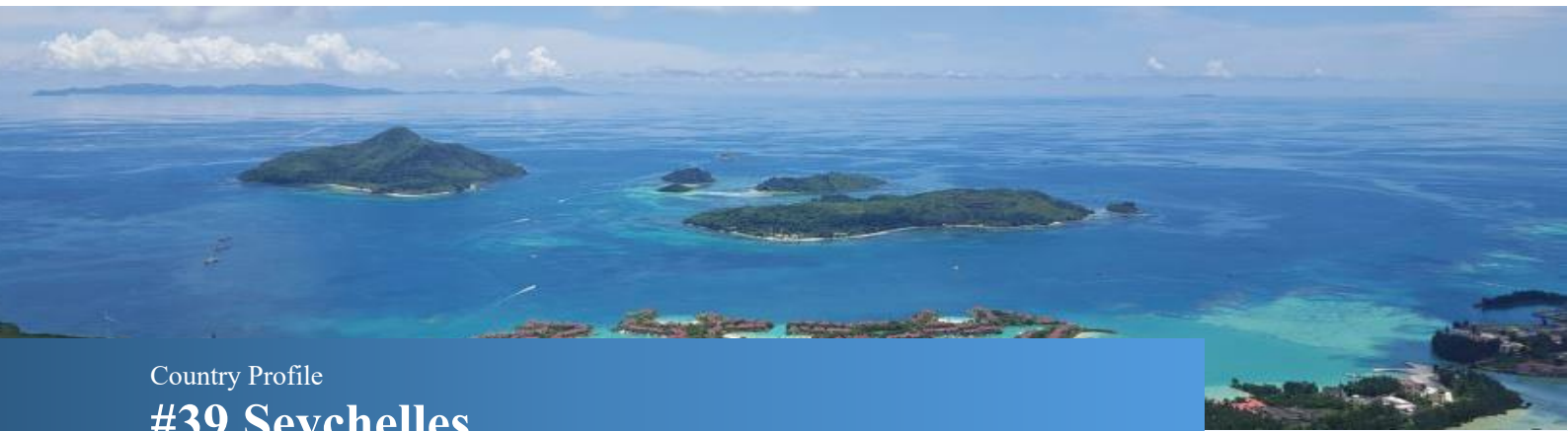
CURRENT STATUS OF SMART CITY DEVELOPMENT

In Senegal, the projects for new cities align with broader public policy programs, notably the *Plan Sénégal Émergent 2035* (Plan for an Emerging Senegal). These initiatives are presented as instruments of public policy, strategically designed to attract investment, stimulate economic growth, and reduce poverty rates. Specifically, initiatives such as the Diamniadio Lake City project express the

authorities' aspirations to realize smart cities, addressing the pressing demographic challenges in the Dakar region. This project aligns with the vision of the Territorial Climate Energy Plan of Dakar 2021-2025, which envisions Dakar as a smart city with a low-carbon footprint, emphasizing inclusive and resilient development.

	Country/Region	Senegal	Dakar
Framework	Policy and Vision	Although there is a national development vision aiming for Senegal to “become a reference country in Africa in the digital domain” (Plan Senegal Emergent (PSE) and a digital Senegal strategy known as Stratégie Sénégal Numérique 2025 (SSN2025), currently there is no national-level smart city policy in Senegal.	Although there is a vision of making the “capital a smart city and low-carbon for inclusive and resilient development by 2050” (Territorial Climate Energy Plan of Dakar, 2021-2025)”, currently there is no city-level smart city policy in Dakar.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects which are Ministry of Communications, Telecommunications and Digital Economy (MCTEN) and General Delegation for Urban Poles of Diamniadio and Lac Rose (DGPU).	There are no specific organizations dedicated to smart cities. The General Delegation for the Promotion of the Urban Poles of Diamniadio and the Lake Retba is overseeing Diamniadio Lake City project.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	The government has deployed a wide range of digital services platforms and projects.	Some “smart” initiatives or projects are ongoing (e.g., Diamniadio Lake City project).
	Operation	Senegal is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Home Page (<https://www.worldbank.org/en/country/senegal/overview>, <https://data.worldbank.org/country/SN>)
 UH-Habitat Report, Country Brief Senegal, 2023 (https://unhabitat.org/sites/default/files/2023/07/senegal_country_brief_final_en.pdf)
 UN-Habitat Home Page (Dakar: <https://urbanresiliencehub.org/city-hazards/dakar/>)
Plan Sénégal Émergent 2035 (<https://www.senfinances.org/app/uploads/PAP-2019-2023-PSE-Senegal.pdf>)
 Territorial Climate Energy Plan of Dakar 2021-2025
 (https://cdn.locomotive.works/sites/5ab410c8a2f42204838f797e/content_entry5c8ab5851647e100801756a3/60dadeb05761d600a57c9345/files/C40_Dakar_English_Final.pdf?1624956592#:~:text=Dakar's%20Climate%20Action%20Plan%20is,of%20strengthening%20its%20climate%20governance)
 Photo: <https://www.cio.com/article/193360/senegal-accelerates-e-commerce-initiatives-to-combat-covid-19.html>



Country Profile

#39 Seychelles

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
119,878 (2022)	13,250.5 (2021)	82% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
58% (2022)	9.0% (2022)	100% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
0.8% (2021)	3.4% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No data	2.9% (2022)	No data
Unemployment Rate (%)		
No data		



OVERVIEW

The Republic of Seychelles lies northeast of Madagascar, an archipelago of 115 islands. The country has a total population of 119,878 inhabitants, three-quarters of whom live on the main island of Mahé. Independent since 1976, the Seychelles is a relatively young democracy. With well-established democratic institutions, Seychelles' political

environment is expected to remain stable. Seychelles is the most prosperous nation in Sub-Saharan Africa. The economy remains highly dependent on tourism, making it highly vulnerable to global macroeconomic developments. Investor interests in the blue economy sector are growing. Fisheries remain the largest sector after tourism.

ISSUES AND CHALLENGES

	Country Level	City Level (Victoria)
Urban/Land Use	<ul style="list-style-type: none"> Heavy urbanization of the coastal zones 	<currently there is no information>
Infrastructure Development	<currently there is no information>	<ul style="list-style-type: none"> Limited resource and infrastructure Traffic congestion
Environmental Situation	<ul style="list-style-type: none"> Highly vulnerable to climate change and natural disasters (floods, rising sea levels, landslides, tsunamis) Unsustainable exploitation of natural resources Deforestation, wetland destruction, coral reef degradation Increasing occurrence of natural disasters associated with effects of climate change 	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Limited capital and human resources High-prevalence of non-communicable diseases and food insecurity Deterioration in the quality of health and education services Youth unemployment and gender inequality 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Limited technical capacity, weak policy, legislation and regulatory frameworks, weak institutional capacity 	<currently there is no information>

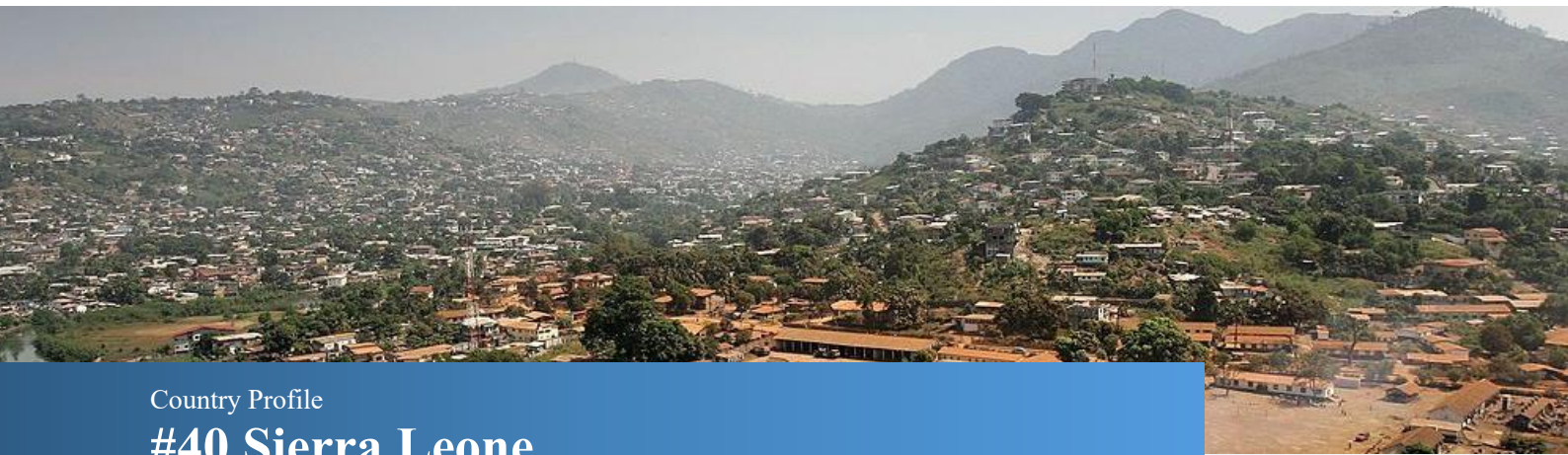
CURRENT STATUS OF SMART CITY DEVELOPMENT

Seychelles is strategically leveraging ICT to enhance government efficiency, as outlined in the National Development Strategy 2019-2023. Despite the absence of a national-level smart city policy, Seychelles is actively collaborating with the United Nations Development Program (UNDP) to develop a

comprehensive roadmap for smart city development. While there is currently no dedicated system for smart cities, the government's substantial investments in improving broadband connectivity, deploying IoT devices, and digitizing public services signify a commitment to technological advancement.

	Country/Region	Seychelles	Victoria
Framework	Policy and Vision	Although Seychelles has recognized ICT as a key tool for enhancing government efficiency vis-à-vis citizens and businesses (National Development Strategy 2019-2023), there is no national-level smart city policy in the country. However, the United Nations Development Programme (UNDP) is collaborating with Seychelles to formulate a roadmap for smart city development.	Currently, there is no city-level policy and vision in Victoria.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Ministry of Finance, Trade, Investment and Economic Planning). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	The government has been investing heavily in improving broadband connectivity, deploying IoT devices, and digitizing government services.	<currently there is no information>
	Operation	Smart city development is pursued on a project basis.	<currently there is no information>

Source: World Bank. Open Data Home Page (<https://data.worldbank.org/country/SC>)
World Bank. Country Profile (<https://www.worldbank.org/en/country/seychelles/overview>)
United Nations, Gov. of the Republic of Seychelles & The United Nations Strategic Partnership Frameworks (SPF) 2019-2023, 2018 (<https://seychelles.un.org/sites/default/files/2021-08/SPF%20Seychelles.pdf>)
ISP. AI and Smart Cities: Building a Sustainable Future for Seychelles' Urban Centers, 2023 Urban Planning & Infrastructure in Migration Contexts, Douala Urban Profile (<https://isp.page/news/ai-and-smart-cities-building-a-sustainable-future-for-seychelles-urban-centers/#gsc.tab=0>)
Photo: <https://www.state.gov/countries-areas/seychelles/>



Country Profile

#40 Sierra Leone

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
8,605,718 (2022)	461.4 (2022)	18% (2020)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
44% (2022)	3.5% (2022)	27.5% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.2% (2022)	54.7% (2021)	10% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
51% (2020)	57.4% (2021)	15% (2022)
Unemployment Rate (%)		
3.6% (2022)		



OVERVIEW

Sierra Leone shares borders with Guinea to the north and northeast, Liberia to the south and southeast, and the Atlantic Ocean to the west. According to the 2022 World Bank data, the population of Sierra Leone is estimated to be 8.6 million, comprising various ethnic groups. Approximately 44% (2022) of the population resides in urban areas, including major cities and towns like the capital, Freetown.

Sierra Leone is a small West African nation that is blessed with abundant natural landscapes and resources, including diamonds, titanium ore, iron, chromite, and gold. However, despite the abundance of natural and human resources, the country continues to face significant economic challenges and remains one of the poorest in Africa.

ISSUES AND CHALLENGES

	Country Level	City Level (Freetown)
Urban/Land Use	<ul style="list-style-type: none"> Access to secure land is crucial for the farming livelihoods of various communities and groups, as well as for domestic and foreign investments in the agriculture sector 	<ul style="list-style-type: none"> Unplanned and unregulated urban sprawl continues to encroach upon the mountains of the peninsula and vulnerable coastal areas There is a lack of coordination among various ministries on urban land management
Infrastructure Development	<ul style="list-style-type: none"> There is limited access to affordable and reliable electricity supply 	<ul style="list-style-type: none"> Lack of adequate access to basic services like water, sanitation and electricity
Environmental Situation	<ul style="list-style-type: none"> Deforestation or the rampant cutting down of trees for timber is a pressing issue Land and water pollution are major concerns 	<ul style="list-style-type: none"> There is high risk on landslide and flood due to unplanned urban sprawl
Social Context and Economic Situation	<ul style="list-style-type: none"> Fiscal pressures, debt burden and inflation pose significant challenges There is a high rate of youth unemployment High rate of population lives in poverty Disease outbreaks, including HIV/AIDS, yellow fever, malaria, and diarrhea occur at high rates 	<currently there is no information>
Governance	<ul style="list-style-type: none"> Corruption and weak governance are prevalent issue Underperformance of domestic revenue mobilization 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Sierra Leone, like many other African countries, has been actively exploring the concept of smart cities. The government has been striving to create a conducive environment for the development of smart cities, with a particular emphasis on establishing a strong telecommunications infrastructure. Recognizing the significance of telecommunications infrastructure in smart city development, the

government of Sierra Leone has made substantial investments to expand and enhance the country's telecommunications network. These investments encompass both physical infrastructure, such as fiber optic cables and cell towers, as well as the regulatory framework governing the telecommunications industry.

Framework	Country/Region	Sierra Leone	Freetown
	Policy and Vision	<currently there is no information>	<currently there is no information>
	Organization	<currently there is no information>	<currently there is no information>
	System	<currently there is no information>	<currently there is no information>
	Technology	<currently there is no information>	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Country Data (<https://data.worldbank.org/country/SL>)
World Bank Country Profile (<https://www.worldbank.org/en/country/sierraleone/overview>)
Photo: <https://www.elleddecor.com/life-culture/travel/g10283807/sierra-leone-travel-destination/>



Country Profile

#41 Somalia

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
17,597,511 (2022)	461.8 (2022)	2% (2017)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
47% (2022)	4.8% (2022)	49.3% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.3% (2022)	70.3% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
No data	62.7% (1990)	No data
Unemployment Rate (%)		
20% (2022)		



OVERVIEW

Somalia is experiencing multivariate climate shocks, including a severe drought following four consecutive failed rainy seasons in 2020 and 2021 and a locust infestation in 2021, in addition to COVID-19 and consistent security challenges. As a mostly agro pastoral economy, the acute drought has significantly reduced food output and livestock exports, a key source of income, which along with spikes in international food prices, have led to a worsening of

poverty and malnutrition across large parts of the country. Those factors have left Somalia highly reliant on external support, from diaspora in the form of remittances, humanitarian aid directly to communities through NGOs, and budget and development support to the government. Somalia today remains one of the poorest countries worldwide with a per capita GDP of US\$ 461.8 (2022).

ISSUES AND CHALLENGES

	Country Level	City Level (Mogadishu)
Urban/Land Use	<ul style="list-style-type: none"> Rural-urban migration and migration due to conflict 	<ul style="list-style-type: none"> Land conflicts rooted in a history of clan competition, forced appropriations and fraudulent transactions Growth of informal settlements and massive level of forced displacement within the city
Infrastructure Development	<ul style="list-style-type: none"> Overstretched infrastructure and inadequate housing Pressure on the delivery of basic services 	<ul style="list-style-type: none"> Unplanned, poorly serviced and dislocated settlements Inadequate services and infrastructures
Environmental Situation	<ul style="list-style-type: none"> Increasing incidence of natural disasters Poor environmental and natural resource management 	<ul style="list-style-type: none"> Environmental degradation and poor water resource management Heavy rains brought flash flooding to the city
Social Context and Economic Situation	<ul style="list-style-type: none"> High levels of inequality and rampant urban poverty Threats to Somalia's national security are systemic 	<ul style="list-style-type: none"> Ongoing insecurity and violence High levels of inequality
Governance	<ul style="list-style-type: none"> Political instability and weak government institutions Inadequate legal and institutional frameworks and lack of human capability and sufficient funding to deal with continued high urbanization growth rates 	<ul style="list-style-type: none"> The status of Mogadishu has not been determined Very limited investments in urban infrastructure or services

CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in Somalia is still in its early stages. The country is still developing foundational

infrastructure and policies to support digital applications and services.

Framework	Country/Region	Somalia	Mogadishu
	Policy and Vision	Although the government has prepared a five-year (2019-2024) “National ICT Policy and Strategy” which provides the regulatory framework needed to leverage the benefits of ICT, there is currently no national-level smart city policy in Somalia.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. Various stakeholders are responsible for developing and carrying out ICT programs (e.g., National Communications Authority).	<currently there is no information>
	System	There is no system specific to smart cities.	<currently there is no information>
	Technology	At the federal several initiatives have been taken to provide digital services (E-Business registration system, Human Resources Management System, etc.)	<currently there is no information>
	Operation	<currently there is no information>	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/SO>)

World Bank Country Profile (<https://www.worldbank.org/en/country/somalia/overview>)

UN-Habitat, Country Brief Somalia, 2023 (https://unhabitat.org/sites/default/files/2023/07/somalia_country_briefing_final_en_1.pdf)

Ministry of Planning, Investment and Economic Development, Somalia National Development Plan 2020 to 2024

(<https://mop.gov.so/national-development-plan/>)

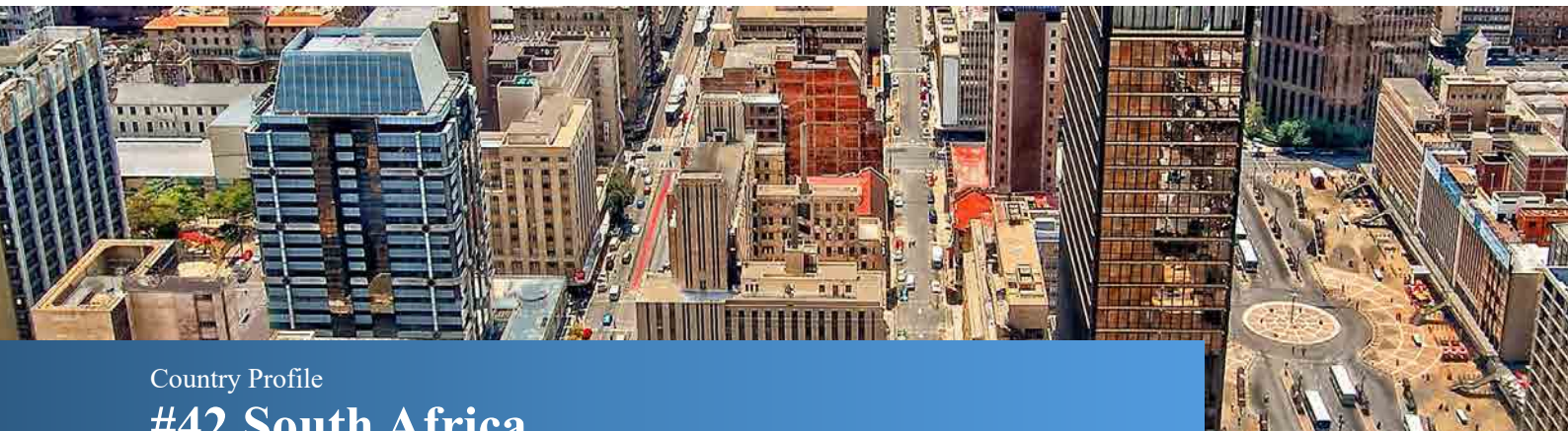
UNICEF, Investing in Social Development in the Federal Republic of Somalia, Budget Brief, 2022

(<https://www.unicef.org/esa/media/11721/file/Somalia%20National%20Brief.pdf>)

African Cities Research Consortium, Mogadishu: City Scoping Study, 2021

(https://www.african-cities.org/wp-content/uploads/2021/12/ACRC_Mogadishu_City-Scoping-Study.pdf)

Photo: <https://freedomhouse.org/country/somalia>



Country Profile

#42 South Africa

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
59,893,885 (2022)	6,776.5 (2022)	72% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
68% (2022)	2.0% (2022)	89.3% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
1.6% (2022)	79.4% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
24% (2020)	2.6% (2022)	72% (2022)
Unemployment Rate (%)		
29.8% (2022)		



OVERVIEW

Situated at the southernmost tip of the African continent, South Africa is renowned for its diverse topography, breathtaking natural beauty, and cultural richness. With a population of nearly 60 million as of 2022, it stands as one of the most populous nations in Africa. Pretoria serves as the executive capital, Cape Town as the legislative capital, and Bloemfontein as the judicial capital. The South African economy is characterized by a

blend of agriculture, mining, and the service sector, making it one of the largest and most industrialized economies on the continent. However, the country also faces socio-economic challenges, including income inequality and unemployment. Inequality remains among the highest in the world, and based on the upper-middle-income country poverty line, the World Bank estimates that poverty stood at 62.6% in 2022.

ISSUES AND CHALLENGES

	Country Level	City Level (Cape Town)
Urban/Land Use	<ul style="list-style-type: none"> The spatial challenges persist, leading to the marginalization of the poor 	<ul style="list-style-type: none"> Rapid urbanization contributes to the grow of informal housing
Infrastructure Development	<ul style="list-style-type: none"> There are shortages in electricity supply Limited Access to Public Services 	<ul style="list-style-type: none"> Poor connectivity due to traffic congestion and inefficient public transport system
Environmental Situation	<currently there is no information>	<currently there is no information>
Social Context and Economic Situation	<ul style="list-style-type: none"> Deep poverty and inequalities persist The quality of school education for most black people is sub standard Inadequate and poorly located infrastructure hampers social inclusion and hinders faster economic growth The public health system is struggling with a significant disease burden The unemployment rate is high 	<ul style="list-style-type: none"> Many cities face a shortage of healthcare resources that do not align with population growth The growing burden of diseases, including HIV/AIDS, TB, and noncommunicable diseases, puts enormous pressure on the healthcare system High crime rates, poor livability, and low-quality education, healthcare, and social services prevail
Governance	<ul style="list-style-type: none"> The performance of the public service is uneven Corruption undermines state legitimacy and service delivery 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Several African cities have been adopting data-driven technologies and solutions to tackle the challenges arising from rapid urbanization and population growth. Among these cities, South Africa stands out with its impressive portfolio of 26 ongoing major projects. South African urban centers are increasingly under pressure to transform into smarter cities. However, the lack of a shared understanding of the concept poses

difficulties in identifying appropriate interventions for some. To address this, the Department of Cooperative Governance (DCoG) has developed the South African Smart Cities Framework (SCF). The SCF aims to provide municipalities, national and provincial governments, the private sector, civil society, and other stakeholders with unbiased and factual information about smart cities in South Africa.

Framework	Country/Region	South Africa	Eastern Cape, Port Elizabeth
	Policy and Vision	Smart Cities Framework (SCF) provides guideline on principles to create inclusive smart cities, factor that should inform the planning and implementation of smart city initiatives, and initiating smart city interventions in South Africa.	Although the Provincial Government announced Eastern Cape as a smart city, there is no specific policy and vision for smart city. It is only project-based.
	Organization	The Department of Cooperative Governance (DCoG) provides leadership in the development of cities and towns in South Africa.	In light of the President's vision to develop new post-Apartheid smart cities, the National Department of Cooperative Governance and Traditional Affairs (CoGTA) through the Municipal Infrastructure Support Agent (MISA) has embarked on a process to develop the Eastern Seaboard regional project which will ultimately culminate in one or more African coastal smart cities in the region.
	System	The SCF assists in establishing a common understanding of smart cities in the South African context and outlines a set of principles to guide decision-making for smart cities. It is also highlighting critical issues to consider and outlining initial steps to be taken when identifying, planning and implementing smart city initiatives.	No actual system for smart city has been established. The project is still in the planning and design phase.
	Technology	The availability and quality of digital infrastructure are important for smart cities. In this instance, digital infrastructure refers to the physical assets required to operate technologies such as digital communication, computing or data storage.	The municipality intends to promote smart city initiatives and prioritize an effective and responsive Information Communication Technology (ICT) environment to cater for the internal and external needs of the municipality.
	Operation	The SCF aim to support all those involved in the planning and implementation of smart city initiatives with impartial, factual information about smart cities in South Africa. The SCF supports DCoG in its efforts to guide and coordinate smart city initiatives implemented at municipal level throughout the country.	The project is still in the planning and design phase.

Source: World Bank Country Data (<https://data.worldbank.org/country/ZA>)
World Bank Country Profile (<https://www.worldbank.org/en/country/southafrica/overview>)
Smart City is the only key to Africa's urbanization (<https://www.smart-interaction.com/2023/02/15/smart-city-is-the-only-key-to-africas-urbanization/>)
Photo: <https://elitewaystravel.com/south-africa-cape-town/>



Country Profile

#43 South Sudan

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
10,913,164 (2022)	1,071.8 (2015)	7% (2020)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
21% (2022)	-10.8% (2015)	7.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.1% (2022)	44.7% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
94% (2016)	10.4% (2015)	No data
Unemployment Rate (%)		
13.0% (2022)		



OVERVIEW

The Republic of South Sudan became the world's youngest nation and Africa's 54th country on July 9, 2011. However, outbreaks of civil war in 2013 and 2016 have undermined the post-independence development gains it made, as well as making its humanitarian situation worse. More than a decade after independence, South Sudan remains impacted by fragility, economic stagnation, and instability. Poverty is ubiquitous, exacerbated by conflict, displacement,

and external shocks. South Sudan's vulnerability to climate change and natural disasters compounds the country's humanitarian crisis, jeopardizing recovery and undermining development efforts. Some 9.4 million people, 76% of the population, are estimated to be in need of humanitarian assistance in 2023, an increase by half a million people compared to 2022. Women and children continue to be the most affected.

ISSUES AND CHALLENGES

	Country Level	City Level (Juba)
Urban/Land Use	<ul style="list-style-type: none"> Massive displacement of people 	<ul style="list-style-type: none"> Uncontrolled growth and development patterns (land and housing) Several land tenure issues
Infrastructure Development	<ul style="list-style-type: none"> Collapse of infrastructure and basic services caused by recent armed conflict Housing and basic services shortage in major cities 	<ul style="list-style-type: none"> Limited coverage of water, sanitation and urban health services Inadequate services and infrastructures
Environmental Situation	<ul style="list-style-type: none"> Increasing incidence of natural disasters Sudan's biodiversity is threatened by illegal poaching, invasive species and repaid deforestation 	<ul style="list-style-type: none"> Environmental imbalance and climate change risk Severe agricultural and water stress Instability of the rains and droughts caused by climate change
Social Context and Economic Situation	<ul style="list-style-type: none"> Millions of people were displaced (civil war) Lack of enabling conditions for sustainable livelihoods and urban economic development 	<ul style="list-style-type: none"> Unstable population dynamics (returnees, refugees 6 IDPs)
Governance	<ul style="list-style-type: none"> Inadequate policies, legal and institutional frameworks for land mediation, governance, and administration Lack of proper data and indicators on the state of cities as well as a sustainable urban development plan 	<ul style="list-style-type: none"> Land administration is unprepared to absorb large numbers of returnees, IDPs and newcomers Low capacity to manage sustainable development

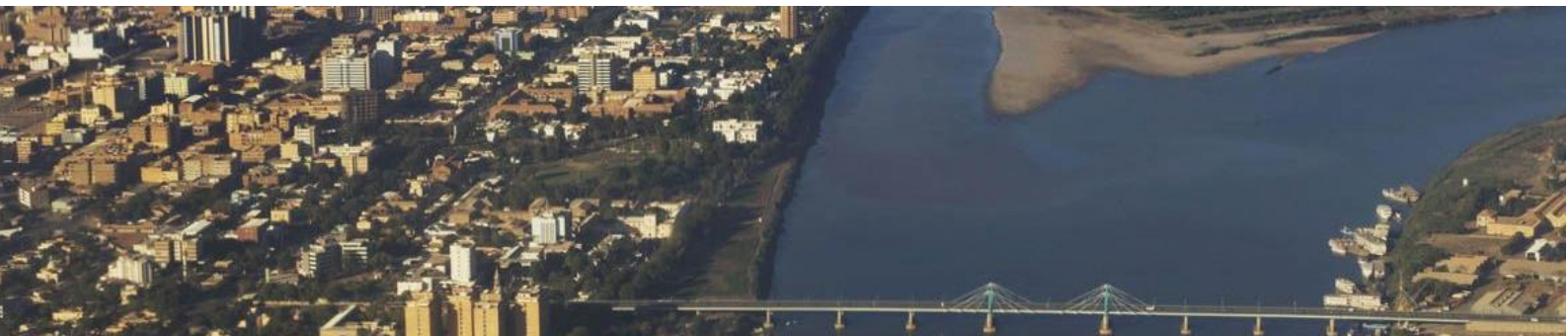
CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in South Sudan is still in its early stages. The country is still developing foundational infrastructure and policies to support digital applications and services. Activities around ICT development are focused on extending electricity

access and connectivity infrastructure. Specific sectors do not yet have digital strategies or widespread use of digital applications, outside some use of DHIS2 within the health sector.

Framework	Country/Region	South Sudan	Juba
	Policy and Vision	Although under the Revised National Development Strategy 2021-2024, the government has agreed on a cluster of goals and objectives, including “ <i>procuring broadband equipment and institute e-governance</i> ”, there is currently no national-level smart city policy in South Sudan.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. Various stakeholders are responsible for developing and carrying out ICT programs (e.g., National Communications Authority, Ministry of Information, Communication Technology, and Postal Services).	<currently there is no information>
	System	South Sudan has passed several Acts and a National Development Strategy that aim to guide aspects of digital transformation. However, there is no system specific to smart cities.	<currently there is no information>
	Technology	A number of “smart” initiatives have been implemented (e.g., CCTV cameras, satellite services).	A project named “Smart City” was implemented by an Israeli company in 2017 consisting of launching surveillance drones and CCTV cameras in 11 locations in the capital.
	Operation	South Sudan is one of the seven original signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/SS>)
World Bank Country Profile (<https://www.worldbank.org/en/country/southsudan/overview>)
UN-Habitat, Country Brief South Sudan, 2023 (<https://www.worldbank.org/en/country/southsudan/overview>)
UN-Habitat, Juba Strategic Plan, 2023 (https://unhabitat.org/sites/default/files/2023/01/juba_strategic_plan_digital_2023.pdf)
EAC Digital Strategy National Consultation Meeting – Summary Findings, 2023
(https://vitalwave.com/wp-content/uploads/2023/10/Final-South-Sudan_EAC-Digital-Strategy-National-Consultation-Brief.pdf)
Photo: <https://www.theguardian.com/global-development/2023/sep/08/city-of-hope-and-fear-life-in-africas-youngest-capital>



Country Profile

#44 Sudan

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
46,874,204 (2022)	1,102.1 (2022)	28% (2020)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
36% (2022)	-1.0% (2022)	61.8% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.6% (2022)	60.3% (2021)	No data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
74% (2020)	5.0% (2022)	No data
Unemployment Rate (%)		
18.7% (2022)		



OVERVIEW

Sudan lies at the crossroads of Sub-Saharan Africa and the Middle East, bordering the Red Sea. For most of its independent history, the country has faced substantial internal conflict that has weakened its ability to play a leadership role in the region. The high incidence of conflict has led to a large population of refugees and internally displaced persons. Sudan is now a source, destination, and transit country for

irregular migration. The recent situation in Sudan has been characterized by escalating conflict with significant consequences for the population. The unrest has affected individuals, social structures, infrastructure, and economic conditions. Reports from the United Nations indicate that, as of September 2023, over five million individuals have fled their homes and sought refuge in Sudan or neighboring countries.

ISSUES AND CHALLENGES

	Country Level	City Level (Khartoum)
Urban/Land Use	<ul style="list-style-type: none"> Massive flows of rural-urban migration and displacement High percentage of informal settlements and slums 	<ul style="list-style-type: none"> Rapid population growth and migration Vast unplanned and informal settlement areas, poorly served
Infrastructure Development	<ul style="list-style-type: none"> Lack of basic urban services State of Sudan's hospitals is dire, with over 80% of them out of service 	<ul style="list-style-type: none"> Inefficient - and often corrupt - distribution of resources and urban services Lack of access to basic services Sequential power cuts, open garbage belts, traffic jams, flooded streets
Environmental Situation	<ul style="list-style-type: none"> Exposed to a wide range of natural hazards Unsustainable uses of natural resources and environment deterioration 	<ul style="list-style-type: none"> Vulnerable to climate change related issues, such as dust storms and heat waves Environmental degradation
Social Context and Economic Situation	<ul style="list-style-type: none"> Large population of refugees and internally displaced persons Social and economic insecurity 	<ul style="list-style-type: none"> High-prevalence of insecurity High inflow of labor migrants Economic instability
Governance	<ul style="list-style-type: none"> Complex pattern of the country's political development Lack of National Urban Policy and its implementation strategy 	<ul style="list-style-type: none"> Inappropriate planning policies and underinvestment in urban infrastructure

CURRENT STATUS OF SMART CITY DEVELOPMENT

Smart city development in Sudan is still in its early stages. While various ministries and entities are engaged in ICT projects, and some “smart” initiatives like e-Government platforms have been implemented,

Sudan’s digital economy remains in a nascent stage. Specific information about the status of smart city development in Khartoum, the capital, is not available.

Framework	Country/Region	Sudan	Khartoum
	Policy and Vision	Currently, there is no national-level smart city policy in Sudan.	<currently there is no information>
	Organization	There are no specific organizations dedicated to smart cities. Various ministries and organizations are engaged in ICT projects but Sudan’s digital economy remains at a nascent stage.	<currently there is no information>
	System	There is no system specific to smart cities.	<currently there is no information>
	Technology	A number of “smart” initiatives have been implemented (e-Government platforms, e-services portal).	<currently there is no information>
	Operation	Sudan is a signatory of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	<currently there is no information>

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/SD>)
World Bank Country Profile (<https://www.worldbank.org/en/country/sudan/overview>)
UN-Habitat, Country Profile Sudan, 2018 (<https://habnet.unhabitat.org/sites/default/files/documents/Country%20Profile%20Sudan%20English.pdf>)
African Cities Research Consortium, Khartoum City Scoping Study, 2021 (https://www.african-cities.org/wp-content/uploads/2021/12/ACRC_Khartoum_City-Scoping-Study.pdf)
Photo: <https://www.sudanembassy.nl/khartoum-city/>



Country Profile

#45 Tanzania

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
65,497,748 (2022)	1,192.4 (2022)	32% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
37% (2022)	4.6% (2022)	42.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
5.0% (2022)	44.6% (2021)	11% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
41% (2020)	24.3% (2022)	25% (2022)
Unemployment Rate (%)		
2.8% (2022)		



OVERVIEW

Tanzania, the largest country in Eastern Africa, boasts diverse landscapes that encompass three distinct physiographic regions, along with islands, coastal plains, an inland saucer-shaped plateau, and highlands. The majority of the land cover is comprised of woodland, grassland, and bushland, accounting for approximately 80 percent of the total area. With

abundant natural resources and a youthful population, Tanzania is experiencing rapid economic growth, positioning itself as one of Africa's fastest-growing economies. As of 2022, the estimated total population of the country stands at 65 million, with 37 percent residing in urban areas.

ISSUES AND CHALLENGES

	Country Level	City Level (Dodoma)
Urban/Land Use	<ul style="list-style-type: none"> High rates of rural-urban migration have led to the densification of major cities and the expansion of informal settlements 	<ul style="list-style-type: none"> The rapid urbanization is challenging in the urban development and the planning of physical and social infrastructure
Infrastructure Development	<p><currently there is no information></p>	<ul style="list-style-type: none"> There is a deficit of utilities and community services, particularly in solid and liquid waste management, drinking water, education, healthcare, and integrated public transportation Poor digital connectivity and assimilation are prevalent issues Informal settlements are situated in vulnerable areas
Environmental Situation	<ul style="list-style-type: none"> There is a lack of investment in irrigation, leaving the agricultural sector highly vulnerable to the impacts of climate change 	<ul style="list-style-type: none"> The environmental quality and biosphere are deteriorating due to unmanaged urbanization and increasing motorized traffic The direct effects of climate change are being felt
Social Context and Economic Situation	<ul style="list-style-type: none"> The weak impact of economic growth on poverty reduction can be attributed to the scarcity of workers from low-income households. There is a shortage of skilled labor 	<ul style="list-style-type: none"> There is a high level of income inequality The high dependence on the agricultural sector makes the country susceptible to climate change, resulting in income loss and decreased agricultural productivity, affecting food supply
Governance	<p><currently there is no information></p>	<p><currently there is no information></p>

CURRENT STATUS OF SMART CITY DEVELOPMENT

The National Five-Year Development Plan 2021/22 – 2025/26 (FYDP) of Tanzania has set a theme of achieving competitiveness and industrialization for human development. The primary objective is to enhance efficiency and productivity in the manufacturing sector by utilizing the abundant resources available within the country. This FYDP places significant emphasis on the development of the new capital city, which entails the construction and enhancement of various infrastructure elements such

as transportation, education, healthcare, water, and government offices. This infrastructure development is in response to the growing population and the subsequent increase in demand for these services. Recognizing the potential of Dodoma as a potential smart city and the new political and administrative capital, the government has prioritized infrastructure development in the city to effectively support its evolving role.

Framework	Country/Region	Tanzania	Dodoma
	Policy and Vision	Although there is no specific policy and vision for smart city in national level, Tanzania National Urban Agenda Report 2022 mentioned that the country adopts smart city approach that leverages digitization, clean energy and technologies.	There is no specific policy and vision for smart city in city level. It is only project-based. Dodoma Master Plan has mission to make Dodoma as an economic hub, tourist destination, sport and recreational city, academic city, inclusive city, eco-friendly and green city, smart city, and TOD city.
	Organization	No specific organization for smart city has been formed.	The Minister for Information and Communications Technology insisted that it had earmarked Dodoma as a potential smart city.
	System	No national system for smart city has been established. It is only project-based.	No actual system for smart city has been established.
	Technology	Tanzania has adopted smart city in E-ticketing, E-Government, use of mobile banking services, establishment of City navigation system, application of electronic systems in taxi services, car tracking system for vehicles travelling long distances, speed monitoring system for buses, and traffic management system.	This is being considered on a project basis.
	Operation	No project as a cross sectoral smart city has been established.	This is being considered on a project basis.

Source: World Bank Country Data (<https://data.worldbank.org/country/RW>)
World Bank Country Profile (<https://www.worldbank.org/en/country/rwanda/overview>)
UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/tanzania_country_brief_final_en.pdf)
Investment Potentials for Dodoma National Capital City, 2023 (https://abcattorneys.co.tz/wp-content/uploads/2023/04/Dodoma-City-Council_2023-Preview-1.pdf)
Photo: <https://theconversation.com/tanzania-has-moved-its-capital-from-dar-after-a-50-year-wait-but-is-dodoma-ready-206508>



Country Profile #46 Togo

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
8,848,699 (2022)	918.4 (2022)	35% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
44% (2022)	5.8% (2022)	55.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
3.6% (2022)	70.2% (2021)	19% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
39% (2020)	18.3% (2022)	6% (2022)
Unemployment Rate (%)		
4.1% (2022)		



OVERVIEW

Located on Africa's west coast, Togo is bordered by Ghana, Benin, and Burkina Faso and is home to approximately 8.8 million people. The country, one of the smallest in the continent, possesses rich mineral resources, vast arable lands and a natural deep-water port. Togo economy, dominated by the informal sector and agriculture, is characterized by low productivity and competitiveness, exacerbating vulnerability to climate change. Although poverty has decreased, inequalities persist in the northern regions and rural

areas that are least covered by socio-economic infrastructure. Togo has improved its access to basic education and health services, which has resulted in an improvement in literacy and life expectancy. However, the accessibility and quality of education and health services in the country remain a challenge. Togo's political climate remains relatively unstable, facing an expansion of violent extremist movements in recent years.

ISSUES AND CHALLENGES

	Country Level	City Level (Lomé)
Urban/Land Use	<ul style="list-style-type: none"> Weak capacity for urban planning and inefficient use of land Growth of informal settlements 	<ul style="list-style-type: none"> Rapid, unplanned and unmanaged urban growth
Infrastructure Development	<ul style="list-style-type: none"> Insufficient transport connectivity and unsatisfying state of urban transport infrastructure Weak quality and limited access to utilities and other vital urban infrastructure Quality of buildings hindered by poor quality materials 	<ul style="list-style-type: none"> Inadequate waste disposal, sewage treatment and drinking water supply Traffic congestion and limited mobility for residents
Environmental Situation	<ul style="list-style-type: none"> The likelihood of disasters such as flooding, drought and fires is likely to increase with climate change 	<ul style="list-style-type: none"> Weak environmental protections Air pollution
Social Context and Economic Situation	<ul style="list-style-type: none"> Weak agro-industrial linkages and low agricultural productivity High costs of living and working in cities 	<ul style="list-style-type: none"> High costs of living and working Lack of economic opportunities for unskilled residents
Governance	<ul style="list-style-type: none"> Limited resources and capabilities of municipal administrations Deficiencies in governance 	<currently there is no information>

CURRENT STATUS OF SMART CITY DEVELOPMENT

Togo is currently in the early stages of smart city development. Despite having a long-term vision and a digital transformation strategy, there is no national-level smart city policy in place. Some smart initiatives, such as the Lomé II Financial & Administrative Hub

and the HubCité project, have been initiated, reflecting early steps towards smart city development. However, the overall approach is project-based, indicating a nascent stage in the comprehensive establishment of smart city strategies and infrastructure in Togo.

	Country/Region	Togo	Lomé
Framework	Policy and Vision	Although there is a long-term development vision aiming to “ <i>make Togo a regional reference in the digital sector</i> ” (The Government Roadmap Togo 2025) and a new strategy for digital transformation known as “Togo Digital 2025”, currently, there is no national-level smart city policy in Togo.	Currently, there is no city-level policy and vision in Lomé.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Ministry of Digital Economy and Transformation). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities.
	System	There is no system specific to smart cities.	There is no system specific to smart cities.
	Technology	The government has deployed a wide range of digital services platforms and projects.	Some “smart” initiatives or projects are ongoing (e.g., Lomé II Financial & Administrative Hub), while others have already been implemented (e.g., HubCité project).
	Operation	Togo is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/TG>)
World Bank Country Profile (<https://www.worldbank.org/en/country/togo/overview>)
World Bank. Togo Country Economic Memorandum, 2022
(<https://documents1.worldbank.org/curated/en/099715006162211825/pdf/P174741091bbc700a089000336ea46bdd3f.pdf>)
Photo: <http://www.africagreenmagazine.com/2019/04/ville-de-lome-togo.html>



Country Profile

#47 Uganda

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
47,249,585 (2022)	964.2 (2022)	10% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
26% (2022)	4.7% (2022)	45.2% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
5.3% (2022)	71.9% (2021)	19% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
54% (2020)	24.1% (2022)	18% (2022)
Unemployment Rate (%)		
4.3% (2022)		



OVERVIEW

Uganda is a landlocked country, situated astride the equator in East Central Africa, covering 241,551 square kilometers, with 18% consisting of inland waters and permanent wetlands. It shares economic and colonial ties with Kenya to the east and Tanzania to the south. To the north and west, Uganda borders Sudan and the Democratic Republic of the Congo, respectively, while Rwanda lies further southwest.

Kampala, the capital and largest city, is a bustling urban center. Despite historical challenges, including political instability, the country has experienced recent economic growth. Agriculture plays a crucial role in the economy. However, despite progress, issues such as healthcare and education remain top priorities for development.

ISSUES AND CHALLENGES

	Country Level	City Level (Kampala)
Urban/Land Use	<ul style="list-style-type: none"> Lack of funds to implement urban development plans Uncoordinated planning and development leading to uncontrolled sprawling of the major towns Growth of slums, informal settlements, and dilapidated housing Privatization of urban development without providing public space and connectivity Multiple land ownership and urban land for investment Lack of public space 	<ul style="list-style-type: none"> High rate of rural urban migration Proliferation of slums and informal settlements Limited space for further expansion
Infrastructure Development	<ul style="list-style-type: none"> Poor sanitation Weak coverage of basic infrastructure services, notably water, energy, and sanitation Very high-traffic congestion 	<ul style="list-style-type: none"> Poor sanitation and waste management Lack of affordable housing Traffic congestion and bad roads
Environmental Situation	<ul style="list-style-type: none"> Adverse changes of weather resulting in a reduction of wetlands, flooding in cities and rural areas, and an increase in landslides 	<ul style="list-style-type: none"> Encroachment on the existing wetlands leading to environmental degradation and floods Air pollution Water scarcity

	Country Level	City Level (Kampala)
Social Context and Economic Situation	<ul style="list-style-type: none"> • Rapid growth of populations with low levels of economic activity • Lack of capacity to generate jobs • Youth bulge in urban areas 	<ul style="list-style-type: none"> • High levels of crime and corruption • High rate of unemployment • High cost of living
Governance	<ul style="list-style-type: none"> • Weaknesses in administration, institutions, legal normative framework and overall planning capacity 	<ul style="list-style-type: none"> • Corruption by Kampala Capital City Authority (KCCA) officials

CURRENT STATUS OF SMART CITY DEVELOPMENT

Uganda is embracing the concept of green, sustainable and inclusive cities to tackle challenges arising from rapid urbanization and promote sustainable growth. Kampala, the capital, is at the forefront of this transformation and is on track to become Uganda's

first smart city. The city has already initiated several projects aimed at enhancing its infrastructure and services. Kampala has a strategic plan with the ambitious goal of transforming into a well-planned, attractive, self-sustaining, smart city by 2026.

	Country/Region	Uganda	Kampala
Framework	Policy and Vision	Although there is a vision called “Uganda Vision 2040” and the “Third National Development Plan (NDPIII) 2020/21 - 2024/25” that identify “ <i>ICT among the key fundamentals as well as an opportunity to spur Uganda’s transformation</i> ” and advocate for the promotion of “ <i>green and inclusive cities and urban areas</i> ”, currently, there is no national-level smart city policy in Uganda.	The “Information Systems Strategic Plan 2020-2026”, also referred to as the “KCCA Smart City Strategic Plan 2020-2026”, envisions to transform Kampala as a smart city. It focus on six areas: Smart People, Smart Mobility, Smart Governance, Smart Economy, Smart Environment, and Smart Living.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT projects (e.g., Ministry of ICT, National Information Technology Authority). Each project operates under the jurisdiction of its respective organization.	The KCCA is responsible for administering Kampala Capital City. The ICT Steering Committee is overseeing smart cities projects.
	System	The existing national framework (legal, policy, institutional) can be exploited to create cities that can use ICT. A supportive legal and regulatory framework has been adopted.	The “Information Systems Strategic Plan 2020-2026” mentions the necessity to enforce a Smart City Framework to develop and implement Smart City services and related digital projects.
	Technology	A number of ICT initiatives and platforms have been implemented to enhance democratic governance in Uganda.	Several “smart” projects across different sectors (-e-governance, traffic management, land use, health, etc.) have been implemented.
	Operation	Uganda is one of the seven original signatories of the Smart Africa Manifesto. Smart city development if pursued through individual approaches and on a project basis.	Kampala has a lead city role in the Africa Smart Towns Network (ASToN). Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/uganda>)
World Bank Country Profile (<https://www.worldbank.org/en/country/uganda/overview>)
UN-Habitat, Country Programme Document 2016-2021, Uganda (https://unhabitat.org/sites/default/files/documents/2019-05/un-habitat_country_programme_document_2016-2021_-_uganda.pdf)
UN-Habitat, Country Brief - Uganda 2023 (https://unhabitat.org/sites/default/files/2023/07/uganda_country_brief_final_en_1.pdf)
Problems facing Kampala city in Uganda, 2022 (<https://geographypoint.com/2022/08/12-problems-facing-kampala-city-in-uganda/>)
KCCA, Information Systems Strategic Plan 2020-2026
(https://www.kcca.go.ug/media/docs/Information_Systems_Strategic_Plan%202020-2026_V6.pdf)
Photo: https://www.nationsonline.org/oneworld/map/google_map_Kampala.htm



Country Profile #48 Zambia

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
20,017,675 (2022)	1,487.9 (2022)	21% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
46% (2022)	4.7% (2022)	46.7% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
4.0% (2022)	32.1% (2021)	No Data
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
48% (2020)	3.4% (2022)	No Data
Unemployment Rate (%)		
6.1% (2022)		



OVERVIEW

Zambia, located in the center of Southern Africa, is a vast landlocked country rich in resources but with sparsely populated areas. It is currently undergoing a significant demographic shift and is considered one of the youngest countries globally based on median age. With a large youth population reaching reproductive age, Zambia's population is projected to double in the next 25 years, creating additional pressure on the demand for jobs, healthcare, and other social services.

Unfortunately, Zambia ranks among the countries with the highest levels of poverty and inequality worldwide. Despite these challenges, Zambia has managed to maintain peace and political stability as its public institutions continue to grow and develop. The World Bank has identified Zambia's high dependence on natural resources, particularly mining and forestry. Additionally, the country is vulnerable to the impacts of climate change.

ISSUES AND CHALLENGES

	Country Level	City Level (Lusaka)
Urban/Land Use	<currently there is no information>	<ul style="list-style-type: none"> Rapid population growth, inadequate city planning, and rising poverty levels have led to the proliferation of informal settlements
Infrastructure Development	<ul style="list-style-type: none"> The landlocked nature of the country contributes to increased costs for imports and exports, as well as limited access to infrastructure 	<ul style="list-style-type: none"> Unauthorized urban settlements, lack of essential infrastructure, services, clean water, and safe sanitation are posing health risks to residents
Environmental Situation	<ul style="list-style-type: none"> Vulnerable to the effects of climate change Droughts, flash floods and extreme temperatures remains concerns 	<ul style="list-style-type: none"> Land degradation and contamination of land and water are pressing issues. Access to clean water and safe sanitation facilities is inadequate
Social Context and Economic Situation	<ul style="list-style-type: none"> Despite improvements in economic performance, poverty remains widespread and high The country's landlocked position presents a natural obstacle to economic growth The economy's dependence on copper mining has hindered efforts to diversify into other industries The quality of education is poor and limited 	<ul style="list-style-type: none"> The cost of living is extremely high, making it unattainable for households living below the poverty threshold
Governance	<ul style="list-style-type: none"> The government faces limitations in its revenue base, which have been exacerbated by the debt crisis 	<ul style="list-style-type: none"> Local authorities lack of financial autonomy

CURRENT STATUS OF SMART CITY DEVELOPMENT

The primary goal of Zambia's Seventh National Development Plan 2012-2021 is to achieve the long-term objectives set out in the Vision 2030, which aims to transform the country into a prosperous middle-income nation by 2030. This plan aligns with the

Smart Zambia transformation agenda 2064 and incorporates the essential measures for economic recovery, which are crucial for the realization of a Smart Zambia.

Framework	Country/Region	Zambia	Kalulushi
	Policy and Vision	Smart Zambia Master Plan has been developed with the vision: “a prosperous and globally competitive knowledge-based developed country by 2063”, to facilitate efficiency in the economy through the strategic application of ICT for job creation, value addition and global competitiveness.	There is no specific policy and vision for smart city in city level.
	Organization	The Electronic Government (e-Gov) also known as the Smart Zambia Institute is a Division in the Office of the President which is charged with the responsibility of the management and promotion of electronic Government services and processes; facilitate access to electronic Government services to improve service delivery to enhance citizens access to Government services, coordination of e-government and information and communication technology matters in public bodies.	Kalulushi Municipal Council in collaboration with Smart City Limited.
	System	There is no national system for smart city has been established. It is only project-based.	No actual system for smart city has been established.
	Technology	Through the Smart Zambia Master Plan, the government will achieve the harmonized construction of national ICT infrastructure.	This is being considered on a project basis.
	Operation	No project as a cross sectoral smart city has been established.	This is being considered on a project basis.

Source: World Bank Country Data (<https://data.worldbank.org/country/ZM>)
World Bank Country Profile (<https://www.worldbank.org/en/country/zambia/overview>)
UN-Habitat Country Brief (https://unhabitat.org/sites/default/files/2023/07/zambia_country_report_final_en.pdf)
Photo: <https://www.lcc.gov.zm/about-lusaka-2/>



Country Profile

#49 Zimbabwe

COUNTRY FACT

Total Population	GDP per Capita (USD)	Access to Internet (%)
16,320,537 (2022)	1,267.0 (2022)	35% (2021)
Urban Population (%)	GDP Growth Rate (%)	Access to Electricity (%)
32% (2022)	3.4% (2022)	49% (2021)
Urban Population Growth Rate (%)	Agricultural Land (%)	People using Safe Drinking Water (%)
2.3% (2022)	41.9% (2021)	27% (2022)
Population Living in Slums (% of Urban Population)	Agriculture Sector (% GDP)	People using Safe Sanitation Services (%)
22% (2020)	8.8% (2021)	32% (2022)
Unemployment Rate (%)		
7.9% (2022)		



OVERVIEW

Zimbabwe is a landlocked country in Southern Africa, between the Zambezi and Limpopo Rivers, bordered by South Africa to the south, Botswana to the southwest, Zambia to the north, and Mozambique to the east. The capital and largest city is Harare, and the second largest is Bulawayo. The country gained its independence from the British in 1980 and possesses abundant mineral and natural resources. Although

extreme poverty has declined since its peak in 2020, it remains high in the context of cyclical agricultural production and elevated food prices. Persistent inflation, high dependence on low-productivity agriculture, slow structural transformation, and intermittent shocks like drought, natural disasters, and the COVID-19 pandemic have contributed to the high rate of poverty and vulnerability in Zimbabwe.

ISSUES AND CHALLENGES

	Country Level	City Level (Harare)
Urban/Land Use	<ul style="list-style-type: none"> Growth of informal settlements in peri-urban areas Increasing occupation of unsafe or underserved land 	<ul style="list-style-type: none"> Rapid urbanization Rapid increase in informal settlements and slums
Infrastructure Development	<ul style="list-style-type: none"> Shortage in the quality, quantity, coverage and accessibility of basic services Higher cost and lower quality and coverage to basic services for deprived populations Housing supply affected by very low affordability and a lack of infrastructure Serious water and sanitation challenges Energy shortage is high in all urban areas 	<ul style="list-style-type: none"> Old water and sanitation systems in some places have collapsed due to over-crowding Water quality issues Increase traffic congestion, jams and accidents Energy shortage Insufficient transport infrastructure
Environmental Situation	<ul style="list-style-type: none"> Prone to natural disasters such as floods and cyclones Increase in intensity of extreme climatic events Observed pollution of water sources and air Environmental degradation of land 	<ul style="list-style-type: none"> Land, air and water pollution Recurrent droughts affecting both water supply and urban agriculture activities
Social Context and Economic Situation	<ul style="list-style-type: none"> Gender equality, unemployment and insecurity for the vulnerable Economic instability and food insecurity are growing Increase in multidimensional poverty in urban areas 	<ul style="list-style-type: none"> Informal practices to access amenities such as water, sanitation, education and even health services

	Country Level	City Level (Harare)
	<ul style="list-style-type: none"> Death of over 6000 from cholera and other water borne diseases in urban areas 	
Governance	<ul style="list-style-type: none"> Local authorities are unable to ensure the delivery of urban adequately The informal sector remains unacknowledged and unsupported by local authorities and national government 	<ul style="list-style-type: none"> Weakened and corrupt land administration systems

CURRENT STATUS OF SMART CITY DEVELOPMENT

Zimbabwe has embarked on a journey towards smart city development with the launch of “The Zimbabwe Smart Sustainable Cities Initiative” in 2018, aligned with the Vision 2030 Agenda. The government further bolstered its commitment in 2021 with the introduction of the “Smart Zimbabwe 2030 Master

Plan” in the field of ICT. The absence of a city-level smart city policy in Harare is being addressed by the ongoing development of master plans, aligning with the government’s Smart Cities Concept. The launch of the Zim Cybercity project in 2022 represents a significant stride.

	Country/Region	Zimbabwe	Harare
Framework	Policy and Vision	Zimbabwe formally launched its smart city blueprint named “The Zimbabwe Smart Sustainable Cities Initiative” in March 2018, in line with the Vision 2030 Agenda. In 2021, the Government introduced a new ICT strategy called the “Smart Zimbabwe 2030 Master Plan”.	Currently, there is no city-level smart city policy in Harare. However, the Harare Metropolitan Province is in the process of drafting master plans for local authorities that conform to the government’s Smart Cities Concept. Additionally, in 2022, the ‘Zim Cybercity’ was launched in Mount Hampden, west of the capital Harare, featuring homes, offices and commercial spaces connected to artificial intelligence and a digital transport system.
	Organization	There are no specific organizations dedicated to smart cities. However, various ministries and organizations are engaged in ICT and Smart City projects (e.g., Ministry of ICT, Postal and Courier Services, TelOne, Procurement Regulatory Authority). Each project operates under the jurisdiction of its respective organization.	There are no specific organizations dedicated to smart cities. The “Zim Cybercity” project is led by the Zimbabwean Ministry of Finance and Economic Development with Mulk International, a Dubai-based business conglomerate from the UAE, serving as the contractor of the project.
	System	There is no system specific to smart cities. However, Zimbabwe’s ICT policy and supporting legislation (e.g., E-Government Framework and Implementation Strategy, SI 137 of 2016 on Infrastructure Sharing) serve as key enabling legal frameworks under the Zimbabwe Sustainable Cities Initiative.	There is no clear system specific to smart cities.
	Technology	A number of ICT and “Smart City” initiatives have been implemented.	Some “smart” initiatives or projects are ongoing in Harare (e.g., Zim Cybercity).
	Operation	Zimbabwe is one of the signatories of the Smart Africa Manifesto. Smart city development is pursued on a project basis.	Smart city development is pursued on a project basis.

Source: World Bank Open Data Home Page (<https://data.worldbank.org/country/ZW>)
World Bank Country Profile (<https://www.worldbank.org/en/country/zimbabwe/overview>)
UNDP, Roadmap for Building Urban resilience in Zimbabwe, 2019
(https://www.undp.org/sites/g/files/zskgke326/files/migration/zw/UNDP_ZW_URR.pdf)
African Cities Research Consortium, Harare: City Scoping Study, 2021 (https://www.african-cities.org/wp-content/uploads/2021/12/ACRC_Harare_City-Scoping-Study.pdf)
Photo: <https://www.tourist-destinations.com/2013/09/harare-zimbabwe.html>

Appendix 2 Smart City Initiatives in Other Countries

Country Name	Page	Country Name	Page
Bangladesh	A2-1	Denmark	A2-24
Cambodia	A2-3	Finland	A2-27
India	A2-5	Germany	A2-31
Indonesia	A2-9	Italy	A2-36
Lao PDR	A2-11	Netherlands	A2-41
Malaysia	A2-13	Norway	A2-44
Philippines	A2-15	Spain	A2-51
Thailand	A2-17	Switzerland	A2-57
Vietnam	A2-21	United Kingdom	A2-61
		United States of America	A2-65

Data Collection on Smart Cities in Asia

Country/City	Bangladesh/Dhakka
Policy and Vision	<p>Bangladesh Smart Bangladesh Vision 2041 Issued by Prime Minister Sheikh Hasina and formulated by the National Economic Council (2022) Innovate and expand sustainable digital solutions that benefit all citizens regardless of socio-economic background and all businesses regardless of size, and bridge the digital divide. Four pillars. Smart citizens, smart government, smart economy, smart society Six development goals 1. high income: per capita GDP of at least USD 12,500 2. poverty-free: zero extreme poverty, poverty rate below 3% 3. macroeconomic stability: low inflation (4-5%), low deficit (5% of GDP), increased investment (40% of GDP), increased tax revenue (20% of GDP) 4. high human development: 100% high school education, including digital literacy, 100% health financing for all, while making the most of the demographic bonus 5. sustainable urbanization: 80% of city-states achieve 100% electrification, mostly renewable energy 6. services at your fingertips: 100% of public services are paperless and cashless, available to 100% of the population in the way they want</p> <p>Dhakka No specific information</p>
Organizational Structure and Promoting Agency	<p>Bangladesh a2i(Aspire to Innovate) It was organized within the Government of Bangladesh as a Smart City Promotion Entity in 2020, in cooperation with UNDP. It is organized as a smart city promotion entity as an extension of a programmed aimed at introducing a citizen-centered innovation culture in the civil service in order to make public services more inclusive, affordable, reliable and accessible.</p> <p>Dhakka No specific information</p>
System	<p>Bangladesh Smart City Innovation Hub The event brings together human resources contributing to SC in Bangladesh (urban decision-makers, experts, young people promoting SC, NGOs, etc.) to share their initiatives and good practices and to connect them with each other. Private sector technologies and services are exhibited, and matching and other activities are conducted.</p> <p>Dhakka No specific information</p>
Technology	<p>Bangladesh <u>Smart Governance:</u> E-government, e-participation, digital citizenship, digital business, online public services <u>Smart economy:</u> Online payment systems, online benefit application and receipt <u>Smart Environments:</u> Deployment of sensors to detect, predict, classify and solve environmental pollution <u>Smart mobility:</u> Ridesharing, car sharing, variable traffic management, traffic monitoring, traffic control, public transport apps, public transport cards, self-driving cars, electric vehicles</p> <p>Dhakka No specific information</p>
Operation	<p>Bangladesh No specific information</p> <p>Dhakka In 2019, as a joint venture between Sumitomo Corporation and the Bangladesh Special Economic Zone Authority, for the purpose of developing, marketing and operating a special economic zone (SEZ) in a project to promote smart and digitalization of industrial estates and the Bangladesh Special Economic Zone (BSEZ: Bangladesh Special Economic Zone). Bangladesh SEZ Ltd (BSEZL) was established. Establishment of a joint venture between the public and private sectors.</p>

Issue and Solution	Bangladesh Urban challenges Rapid urbanization and population growth are causing a range of socio-economic, technical and environmental problems in cities in developing countries, including poor governance, traffic congestion, inadequate health, education and housing facilities, public works management problems and environmental pollution. In addition, modern civic services and basic infrastructure have not been developed in time.
	Dhaka No specific information
Data Source	Smart Bangladesh Vision 2041, a2i HP https://a2i.gov.bd/a2i-missions/smart-bangladesh-vision-2041/
	Aspire to Innovate (a2i), UNDP https://www.undp.org/bangladesh/projects/aspire-innovate-a2i
	Research study on overseas smart city trends for overseas deployment of infrastructure systems——Summary of FY2022 Research Study—— (MLIT, 2023) https://www.mlit.go.jp/pri/kikanshi/pdf/2023/81_8.pdf

Data Collection on Smart Cities in Asia

Country/City	Cambodia / Phnom Penh and Siem Reap
Policy / Vision	National level No SC policy on national level. The Cambodia Digital Economy and Social Policy Framework 2021-2035, implemented in June 2021, focuses on integrating digital technology (ICT) into the economic structure, development, and international trade of Cambodia. Its objective is to establish an ecosystem that enhances productivity and economic efficiency. Additionally, the Cambodia Sustainable Development Goals (CSDGs) emphasize the need to strengthen urban planning and urban management, with smart city policies as a significant approach. The framework highlights the importance of establishing rules, laws, regulations, and building standards for smart cities to ensure quality, safety, attractiveness, efficiency, and to encourage the development of cities near neighboring countries.
	Phnom Penh No policy or vision for SC. The objective of the Creatanium Blockchain Smart City project is to enhance communication and cooperation between public and private entities through the utilization of blockchain technology. This technology ensures data transparency, which facilitates information and resource sharing. Additionally, the project strives to foster collaboration in the realm of development and area management. Furthermore, the project endeavors to establish a platform that allows small and medium-sized enterprises (SMEs) from across the ASEAN region to engage in transparent business operations.
	Siem Reap No policy or vision for SC.
Organization (Promoter)	National level In February 2021, the Prime Minister gave approval for the establishment of the Smart City Coordination Committee. The Secretary of this committee is the Ministry of the Interior. However, there is currently lack of clarity regarding the exact role of this organization, the availability of adequate resources (both human and financial) required to implement smart city policies, and the level of effectiveness it will achieve.
	Phnom Penh No policy or vision regarding SC. “Creatanium Blockchain Smart City,” promoted by Singapore's start-up “PLMP Fintech” and under its umbrella “Creatanium Development” is the green field development business in the agricultural and industrial SEZ (about 105 ha) located 30km southwest to Phnom Penh International Airport which has been developing as a part of the “One Way One Road” initiative by the Chinese and Cambodian governments.
	Siem Reap The Smart City Committee was established in 2019 under the Siem Reap Provincial Government, aiming to achieve the following primary goals: Smart City Project Review and Integration into Five-Year and Three-Year Development Plans <ul style="list-style-type: none"> • Sharing ideas in the public and private sector • Work plan development for project implementation • Reporting to relevant ministries, state agencies, and state legislatures • Integration of plans and projects into interagency committees for tourism development • Planning and Project Evaluation • Report to the Technical Coordinating Council of the State Legislature
System	National level In Cambodia, there are no policies or institutions dedicated to smart cities at the national level. Regarding investment, the new Investment Law promulgated in 2021 establishes 18 preferential investment sectors (innovative high-tech industry and R&D, etc.). The new investment law will apply preferential measures such as exemption of business income tax for a certain period of time to the relevant sectors and investment activities. Relatively open to foreign investment, it has introduced measures such as 100% capital ownership by foreign companies, corporate tax exemption for up to eight years, and duty-free importation of capital goods.
	Phnom Penh No specific information
	Siem Reap No specific information
Technology	National level Bakong (Electronic Currency Using Blockchain) Bakong, jointly developed by the National Bank of Cambodia and Soramitsu Corporation, is a central bank digital monetary system that uses digitized Cambodia Riel (KHR) or USD to enable

Country/City	Cambodia / Phnom Penh and Siem Reap
	<p>immediate and final transactions. Pilot operation started in July 2019, and formal operation started in October 2020. By this system, various payments between individuals, between corporations, and at the storefront can be made immediately by a personal computer or a smart phone.</p> <p>Phnom Penh Smart city development, including support for SMEs using blockchain technology. Data from IoT devices and sensors will be collected and managed in an integrated manner using blockchain.</p> <p>Siem Reap</p> <ul style="list-style-type: none"> • Project No. 1: Smart City Data Collection & Analysis (Building an integrated data collection and analysis system for the urban environment) • Project No. 2: CCTV System Introduction (Install CCTV camera system to monitor road environment) • Project No. 3: Official Parking System Introduction (Installation of parking sensors and development of a car availability information system) • Project No. 4: Traffic Signal System Improvement (Installation/renewal of traffic signals and traffic control systems) • Project No. 5: QR Code Development (Development of tourism-related services using QR codes, improving convenience during your stay) • Project No. 6: Rental Cycling Service (Diversify tourist transportation options and increase freedom of movement) • Project No. 7: Landfill Management System Introduction (Develop monitoring guidelines for landfill management) • Project No. 8: Garbage Collection IoT Installation (Install sensor-equipped trash cans in public areas for separate collection of trash)
Operation	<p>National level No specific information</p> <p>Phnom Penh Project implemented by a private company. Financial support from countries such as Singapore and Japan is available.</p> <p>Siem Reap No specific information</p>
Challenges and Solutions	<p>National level Developing the infrastructure for long-term sustainable economic growth and poverty reduction by raising the national income level through agricultural development, physical infrastructure development, private sector development and employment, and capacity building of human resources.</p> <p>Phnom Penh No specific information</p> <p>Siem Reap No specific information</p>
Source	Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)

Data Collection on Smart Cities in Asia

Country/City	India / New Delhi and Chennai
Policy / Vision	<p>National level Smart City Mission (2015) Policy : Aiming to secure the driving force for economic growth and improve the quality of life of residents Vision : A step towards Smart India Provide citizens with a decent quality of life, a clean and sustainable environment and smart solutions. The main focus is on sustainable and inclusive development, creating a replicable model in a compact region that can serve as a lighthouse (for other cities) to become a goal for other cities. To achieve the above, the Ministry of Urban Development (MoUD), which oversees the Smart City Mission (SCM), conducted a nationwide "Smart City Challenge" competition and selected a total of 100 cities as SC promotion cities.</p> <p>New Delhi There is no SC-specific plan, but the Delhi Master Plan sets the following goals:</p> <ul style="list-style-type: none"> • Making Delhi an environmentally sustainable and vibrant city with quality, affordable and safe living • Provides opportunities for economic, creative, and cultural development • Flexibility and transparency in customizing future developments to meet people's needs • Strengthening Delhi's preparedness for the impacts of climate change <p>Focus Areas</p> <ul style="list-style-type: none"> • Mobility - parking, congestion, traffic management and pricing • Consumer Sector - Freight and Logistics Movements • Affordable housing - especially for the poor • Environment, and Heritage and Culture • Support infrastructure for contract and freelance workers <p>Chennai Although there is no SC-specific plan, Chennai's Master Plan for Urban Planning sets the following goals:</p> <ul style="list-style-type: none"> • Provide regulations for development and building-related activities in the city • Enhancing the urban planning system by assisting in the development of guidelines for the master planning process • Capacity building for the establishment of a modern and comprehensive land use planning system • Provide public goods such as open space and protect key agricultural lands and ecosystems
Organization (Promoter)	<p>National level The 100 cities selected for the Smart City Mission will establish a Special Purpose Vehicle (SPV) as the driving body. Four organizations that monitor SPV are:</p> <ul style="list-style-type: none"> • Apex Committee (AC), Supreme Committee • National Mission Directorate (NMD) • High Powered Steering Committee (HPSC) • Smart City advisory forum, Smart City Advisory Committee <p>AC, Supreme Committee Headed by the Secretary of the Ministry of Urban Development (MoUD), approves all proposals related to SCM, monitors progress, and invests funds.</p> <p>National Mission Headquarters (NMD) It will be headed by a Deputy Secretary or higher in the Government of India as the National Mission Director. The director will be responsible for developing a strategic blueprint and detailed implementation roadmap for the Smart City Mission, coordinating with relevant agencies, and overseeing capacity building for SPVs, provinces, and urban local governments (ULBs).</p> <p>High Power Steering Committee (HPSC) The HPSC is chaired by the Provincial Chief Secretary. Provides guidance to missions and a state-level platform for exchange of ideas on smart city development</p> <p>Smart City advisory forum, Smart City Advisory Committee Composed of District Collector, Member of Parliament (MP), Member of Legislative Assembly (MLA), Mayor, CEO of SPV, local youth, technical experts, and at least one person from the region. Establish city-level forums to advise and enable collaboration among various stakeholders</p> <p>Special Purpose Vehicle (SPV) SPVs plan, appraise, approve, fund, implement, manage, operate, monitor, and evaluate smart city development projects</p>

Country/City	India / New Delhi and Chennai
	<p>New Delhi Submarine-launched ballistic missile New Delhi Municipal Council Smart City Limited (NDMCSCCL, a public limited liability company wholly owned by NDMC) is the SPV. The CEO of the SPV is selected by the Indian Administrative High Commissioner (IAS) (appointed with the approval of the Ministry of Home Affairs) to manage, operate, and supervise the SPV and to monitor and review the SPV's expenditures on a regular basis. In addition, the SPV will undertake the following activities:</p> <ul style="list-style-type: none"> • Gather resources and approve and sanction projects, including technical evaluations • Enter into contracts as needed, establish joint ventures and subsidiaries, and enter into public-private partnerships <p>Chennai Chennai Smart City Corporation (CSCL) Chennai Smart City SPV. Implementing Agency of the Smart City Project in Chennai an organization jointly owned by the Government of Tamil Nadu and the Chennai Corporation. The following organizations are under the Chennai SPV</p> <ul style="list-style-type: none"> • Design cell Led by a qualified architect/urban designer for the development of a master plan for the city • construction cell Supervise road construction work, led by a qualified project manager • infrastructure monitoring cell Review ongoing maintenance work and led by a qualified project manager • managed cell Coordinate between all line departments/agencies on service delivery, led by the project manager and line department representatives
System	<p>National level Each city will submit a Smart City Proposal (SCP) to the "Smart City Challenge" competition and 100 cities for SC promotion will be selected based on the following selection criteria. Selected cities will receive budgetary assistance and monitoring of SC measures from the AC.</p> <p>State-level selection criteria</p> <ul style="list-style-type: none"> • Standards for existing service levels • Criteria related to systems and competencies • Criteria related to past performance and reforms • Criteria for personal funds <p>National-level selection criteria</p> <ul style="list-style-type: none"> • Level of confidence in implementation by city • Urban vision and strategy • Impact of the proposal • Cost-effectiveness • Innovation and scalability • Implementation process <p>New Delhi Public participation (e.g. in a campaign) Institutionalize transparency and other measures to ensure effective participation of all stakeholders in key decision-making processes.</p> <p>Chennai Public participation (e.g. in a campaign) The use of an information and communication platform used to increase the efficiency of citizen participation. It makes the system more transparent and serves as an interactive forum between citizens and government.</p>
Technology	<p>National level India Stack A nationwide public data platform (≡ city OS) provided by the central government of India to ensure that all citizens have access to digital services. In this program five systems are offered, and APIs are publicly available for use by state and local governments as well as private businesses.</p> <ul style="list-style-type: none"> • Aadhaar : National Identification Number • eKYC : For identity verification • eSign : Electronic Signature • Digital Locker: Information Storage • UPI (Unified Payment Interface): Remittance

Country/City	India / New Delhi and Chennai
	<p>Urban OS for Developing Countries: URBGOV An urban OS for developing countries being developed since 2015 by the Centre for Urban and Regional Excellence of the Republic of India in partnership with the United States Agency for International Development(USAID), and is one of the NUA initiatives led by the United Nations Human Settlements Program (UN-HABITAT). It targets areas that are not financially affluent and underdeveloped in technology. Focusing on improving administrative efficiency using a GIS-based dashboard. The system has already been implemented in nine cities in India, including East Delhi.</p> <p>New Delhi</p> <ul style="list-style-type: none"> • Smart meters (power management) Rear time notifications regarding energy consumption information, power outages, etc. • Smart Pole Equipped with air sensors, energy-saving LED lighting, Wi-Fi connectivity, and a 360-degree camera that can capture images up to 100 meters A panic button is also provided and is connected to the central command and control center via a two-way communication channel. • Smart Public Restrooms Sensor-operated doors, solar-powered LED lights, automatic air purifiers, sensor-operated faucets, solar panels on roof, rainwater harvesting and gray water recycling facilities <p>Chennai</p> <ul style="list-style-type: none"> • Transportation infrastructure: implementation of PAN-city metro network (under construction), expansion of sidewalk coverage, reduction of accidents, etc. • Open Space: Adoption of long-range development plans that encourage a mix of uses, including employment, housing, community attractions, and public spaces to create a high-quality, compact urban environment • Safety: LED street lighting for pedestrian safety, video crime surveillance • Physical infrastructure: storm-water management that focuses on flood mitigation and facilitates runoff during heavy rainfall events • e-Governance: create a management information system platform for information sharing, issues, and public participation
Operation	<p>National level Financing Mechanisms Major financing mechanisms include user and beneficiary fee collection, land monetization, municipal bonds, loans, NIIF, financial convergence with other government programs, and PPPs. In addition to the use of private funds, a beneficiary-pay mechanism has also been introduced.</p> <p>Utilization of Foreign Companies Leveraging the technology of private foreign firms in the areas of IT connectivity and digitization, energy, transportation and mobility, water supply and solid waste management.</p> <p>New Delhi Fund: Financing through Smart City funds, integration with central government schemes, New Delhi Municipal Council (NDMC) funds, and public-private partnerships (PPP).</p> <p>Monitoring and Review Independently monitor and evaluate physical and financial progress with respect to project implementation and information dissemination.</p> <p>Capacity building Identification of training needs, exchange programs, modernization of incentive plans, building a culture of cooperation, emphasis on core beliefs and values.</p> <p>Chennai Fund: Central Government, Tamil Nadu State Government, Integration Scheme with Central/State Governments, PPP.</p>
Challenges and Solutions	<p>National level No specific information</p> <p>New Delhi Urban challenges: Lack of technological infrastructure and capabilities in areas such as renewable energy, process automation, and execution of large projects - Lack of land availability and statutory restrictions in Lutyens bungalow area vandalism of public infrastructure and public High incidence of disobedience in the area, Dependence on Delhi Water Board for water supply system including sewers and drains</p>

Country/City	India / New Delhi and Chennai
	Chennai Urban challenges: <ul style="list-style-type: none"> • Transportation: reduced walking corridors, increased use of private vehicles, inadequate parking spaces • Solid waste: limited solid waste management with limited separation, widespread open storage in dumpsters, inadequate recycling, lack of adequate treatment capacity such as composting units • Rainwater: flooding or inundation of roads and subways during heavy rains due to Chennai's flat terrain • Water supply: water shortages have hit cities 14-15 times in the past 25 years
Source	<p>Survey of Smart City Concept in India (JETRO, February 2022) https://www.jetro.go.jp/ext_images/Reports/02/2022/253bedded0fb9a3c/202202.pdf</p> <p>Structure and Characteristics of Smart Cities in India - Smart City Mission as a measure for further economic growth and solution of social issues (PwC, June 2019) https://www.pwc.com/jp/ja/knowledge/newsletters/electricity/201906.html</p> <p>Domestic and international literature collection survey for the definition of smart city (MLIT, August 2022) https://www.mlit.go.jp/pri/kikanshi/pdf/2023/81_1.pdf</p>

Data Collection on Smart Cities in Asia

Country/City	Indonesia / Jakarta Baniuwangi,
Policy / Vision	<p>National level Movement Towards Smart Cities (2017) A program in which the government provides assistance in the formulation of SC master plans for each city, including the dispatch of experts and budgetary support for the implementation of the plans. The program is part of the Smart City Policy being promoted mainly by the Ministry of Communications and Information Technology. Through the SC, Indonesia aims to become "a city that uses technology to effectively and efficiently organize resources and solve urban challenges while providing innovative, integrated, and sustainable solutions to improve people's lives."</p> <p>Jakarta Jakarta Smart City is an initiative of Jakarta Communication, Informatics and Statistics Department as part of the Jakarta City 4.0 initiative. The aim is to make the city a strong, sustainable and globally competitive city.</p> <p>Banyuwangi There is no clear policy regarding smart cities in Banyuwangi Regency. Banyuwangi Smart Kampung Master Plan 2017 Banyuwangi Prefecture Communications and Information Bureau takes the lead in promoting this project. The goal is to reduce poverty and enhance education and welfare services through smarter administrative services.</p>
Organization (Promoter)	<ul style="list-style-type: none"> • National level • The following seven ministries, together with the Ministry of Communications and Information (KOMINFO), promote the "Movement Towards Smart Cities". • Ministry of Public Works and Housing: PUPR • Ministry of Home Affairs • Coordinating ministry of maritime and investment • Ministry of Finance • Ministry of Tourism • Executive Office of the President: Kantor Staf Kepresidenan • Ministry of National Development Planning: Bappenas <p>There are no "Movement Towards Smart Cities" or countrywide SC regulations or platforms, and each city is developing its own SC.</p> <p>Jakarta</p> <ul style="list-style-type: none"> • The state government promotes the policy. • The development of SC services is promoted by private sector <p>Banyuwangi The Communication and Information Department of Banyuwangi Province has developed the SC Master Plan, and Banyuwangi district administration promotes SC programs.</p>
System	<p>National level Movement Towards Smart Cities In the Movement Towards Smart Cities, authorized cities will develop a master plan for smart cities, which will be able to receive assistance from the national government, including the dispatch of funding and experts, if they meet the standards. On the other hand, there is no national regulation or platform for smart city development. Smart city development is being carried out in each city by establishing frameworks, etc.</p> <p>Quick-win Program As part of the Movement Towards Smart Cities by KOMINFO, the "Quick-win Program" is implemented. This is a program in which each city launches a program within one year from the preparation of the master plan and provides support for achievements in the short term. As a concrete support scheme, the KOMINFO basically only gives advice and evaluations to each program, and the budget of each city is used. Budgeting for scaling up the reality can be supported by Ministry of Finance. The size of the budget for additional support is determined by the project.</p> <p>Jakarta The government's disclosure of data to residents and updating of data by residents have enabled residents to participate in SC policies. On the other hand, the government has not been able to eliminate residents' distrust of how data is being used.</p> <p>Banyuwangi No specific information</p>
Technology	<p>National Level There is no particular technology that Indonesia has introduced in the SC area at national level.</p> <p>Jakarta Focus on six areas: Smart Governance, Smart Mobility, Smart Environment, Smart Economy, Smart</p>

Country/City	Indonesia / Jakarta Baniuwangi,
	<p>People, and Smart Living. Develop a portal (jaki) associated with the SC, where residents can access SC services. Through the portal, residents can access data managed by the government, and information can be shared by residents with the government. The information provided by residents is analyzed by the Data Analysis Department and utilized as data-driven information for policy and application development (e-government).</p> <p>Banyuwangi No specific information</p>
Operation	<p>National level Reviews in the Quick-win Program are evaluated by a review committee. The review committee members include researchers affiliated with private companies and universities.</p> <p>Jakarta Resident participation through access and uploading of data by the residents to the data portal.</p> <p>Banyuwangi Measures to ensure the delivery of SC services by not only providing SC services but also encouraging citizens, the recipients of SC services, to acquire IT skills.</p>
Challenges and Solutions	<p>National level Indonesia's challenge: Indonesia has pledged to give priority to correcting economic disparities and decentralization in the eastern islands, where economic development is lagging behind. In addition, the country urgently needs to resolve conflicts over deteriorating living standards in urban areas and widening disparities between urban and rural areas, such as the proliferation of slums, deteriorating road transportation functions, and the decline of the rural economy due to rapid urbanization.</p> <p>Jakarta Challenge:</p> <ul style="list-style-type: none"> • Overcrowding and traffic congestion due to rapid urbanization and artificial influx. Ground subsidence. • The urban poor form high-density, informal residential areas, with more than 60% of northern Jakarta living below sea level. <p>Solution: Through the use of ICT technology.</p> <p>Banyuwang Challenge: Population distribution is uneven, with the population concentrated in Banyuwangi, the center of the region. As a result, administrative services are not evenly distributed throughout Banyuwangi.</p> <p>Solution Through smart technology, the city plans to distribute services to residents throughout the county.</p>
Source	Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)

Data Collection on Smart Cities in Asia

Country/City	Lao PDR/Vientiane
Policy and Vision	<p>Lao PDR No national SC policy or vision has been formulated. Relevant plans mentioned the following statement for SC. SC is seen as one of the key projects to attract more foreign investment and strengthen economic competitiveness by making Laos an open country connecting Indo-China from a landlocked country through the use of IT-enabled logistics facilities, etc. The 9th Socio-Economic Development Plan states that “strengthening ICT technology is a key to sustainable growth by facilitating the structural transformation of the economy and increasing productivity”.</p> <p>Vientiane There is no SC policy in the city level. In ASCN, Vientiane declared its development visions based on 6 indicators of “peace, cleanliness, greenery, light, attraction, and prosperity”.</p>
Organizational Structure and Promoting Agency	<p>Lao PDR Ministry of Public Works and Transport (MPWT), Department of Housing and Urban Planning (DHUP) incorporate SC into urban planning. Ministry of Technology and Communication (MTC) MTC implements ICT related measures. Under the MTC an organization called the E-Government Center has been established to promote ICT. It centralizes government IT services, manage and develop management and service software. The center also manages services related to access to government information, business and citizens, as well as training and promoting e-government. Lao National Internet Center (LANIC) An organization under MTC that develop internet and other communication infrastructures in Lao PDR and operate national data centers.</p> <p>Vientiane It is unclear which of the municipal administrations is the lead organization.</p>
System	<p>Lao PDR There are no policies and legal systems specializing in SC. However, ICT related laws has been promoting since 2011.</p> <p>Vientiane Vientiane City Administration encourages private companies to participate in development projects through PPP and several regions in Vientiane utilize ICT. It is designated to be developed as “Smart Zone” which cover Thatluang Marsh Specific Economic Zone, Vientiane Saysettha Development Zone, Long Thanh Specific Economic Zone and Nongchan, Nongtha, and Nong Or. Private sector-led SC development, such as foreign and local companies, is considered.</p>
Technology	<p>Laos The following are examples of ICT utilization measures.</p> <ul style="list-style-type: none"> • Developing e-learning tools • Introduction of mobile banking and mobile money to modernize payment and revenue collection • Developing e-administrative services such as e-disaster, e-agriculture, e-signature, and government based open data • Improving and expanding digital public services such as e-services and single sign-on • Establishing e-market • Promoting certification of electronic origin and electronic licensing <p>Vientiane No specific information.</p>
Operation	<p>Laos Investment promotion (tax and procedure relaxation)</p> <p>Vientiane SC development by foreign companies Designated to be developed as a "smart zone" of the districts, the Thatluang Marsh Specific Economic Zone has been developing IT systems for SC by Shanghai real estate companies. SC development by local companies Douangchaleun Development Construction Group, a local Lao construction company, conducted F/S of the Smart City project in Vientiane Capital. The Lao PDR Government approved the F/S in July 2020.</p>
Issue and Solution	<p>Laos Issue In Lao PDR, where the telecommunications infrastructure is not well developed, the immediate challenge is to improve the telecommunications infrastructure, such as the development and</p>

Country/City	Lao PDR/Vientiane
	<p>upgrading of internet communications, expansion of cloud systems and improvement of web-hosting systems, before smart cities can be built, and to use digitalization and ICT.</p> <p>Solution</p> <p>Establish digital parks and digital economic zones to encourage development and promote the development of digital infrastructure by providing incentives such as corporate tax exemptions and exemptions from land leasing and concession fees for sectors such as the use of advanced and modern technologies.</p> <p>Vientiane</p> <p>No specific information.</p>
Data Source	Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)

Data Collection on Smart Cities in Asia

Country/City	Malaysia/Kuala Lumpur/Iskandar
Policy and Vision	<p>Malaysia In 2018, the KPKT (Ministry of Housing and Local Government) formulated the MALAYSIA SMART CITY FRAMEWORK (Malaysia Smart City Promotion Plan) which contains: 16 policies, 36 strategies with the aim of improving urban living through SC promotion, reducing regional disparities, enhancing competitiveness and achieving "SDGs and NUA", 112 measures and 92 indicators.</p>
	<p>Kuala Lumpur KUALA LUMPUR SMART CITY PLAN 2021 -2025 Vision : KUALA LUMPUR, A CITY FOR ALL Human-centered smart cities. Using technology and data to create a better society. Mission: efficient, sustainable, safe, secure, clean and smart cities. Objective 1: To strengthen Kuala Lumpur's role as a national international commercialization & transformation into a financial center Objective 2: Establish mechanisms for an efficient and equitable city Objective 3: Enhance the living environment in the city Objective 4: Create a distinctive urban identity and image Creation of a unique urban identity and image Objective 5: Establish efficient and effective governance 7 areas of the smart city strategy</p> <ul style="list-style-type: none"> • Smart economy • Smart living • Smart environment • Smart citizens • Smart government • Smart mobility • Smart digital infrastructure
	<p>Iskandar Smart City Iskandar Malaysia</p> <ul style="list-style-type: none"> • Initiative to promote value-added realization to improve ease of doing business and quality of life in Iskandar • Plans to promote smart economy, smart governance, smart environment, smart mobility, smart people and smart living, focusing on three areas: economy, environment and society • Numerical targets Specific numerical targets have been set for smart transformation, with the goal of achieving GDP of RM120 Billion, a growth rate of 7.8%, employment of RM1.3 Million and investment of RM383 Billion in 2025.
Organizational Structure and Promoting Agency	<p>Malaysia MSCF, the main implementation agency for SC The main actor is positioned as the local government with jurisdiction over urban management, which is responsible for budget management and implementation of SC promotion measures. On the other hand, as local government resources are insufficient for communication infrastructure facilities and SC service provision, which form the basis of SC, cooperation with private companies, including communication infrastructure development companies, is planned. A system of public-private partnerships led by the public administration is planned, with the local government as the implementing body of urban management taking the lead. Within the Malaysia Smart City Framework (MSCF), the establishment of a committee (Smart City Council) with the participation of the various government ministries' organizations is being considered. The Malaysia Smart Cities Alliance (MSCA), a platform involving industry, government and academia, was established in 2018 to strengthen networking among stakeholders, among others.</p>
	<p>Kuala Lumpur The DBKL SC Unit is planned to be formed as the implementing body for SC promotion. The DBKL SC Unit is mainly responsible for progress management and publicity of SC promotion activities. The DBKL SC Unit does not specify an implementation structure for public-private partnerships, but there are plans to collaborate with private companies and academic societies in areas such as smart mobility and smart environment.</p>
	<p>Iskandar No specific information.</p>

System	Malaysia No specific information.
	Kuala Lumpur and Iskandar No specific information.
Technology	Malaysia A national data integration platform (City OS) - the Malaysia Urban Observatory (MUO) is planned.
	Kuala Lumpur KLUO (Kuala Lumpur Urban Observatory) <ul style="list-style-type: none"> Urban OS planned by KL City Hall (DBKL) Measures to build a comprehensive smart city platform by integrating and analyzing various data owned by DBKL Malaysia City Brain Project <ul style="list-style-type: none"> ET City Brain (=city OS) using Alibaba Cloud. Provides 48 applications in 11 fields related to urban life, including transport, e-government, culture and tourism, and health Kuala Lumpur Centre for Instructions and Management (KLCCC) <ul style="list-style-type: none"> Manages, collects and disseminates traffic information Traffic signal control systems Uses computer-connected traffic signals to manage intersections according to traffic conditions and prevent traffic congestion Traffic information provision systems Variable message signs (VMS) are installed on major roads to increase the efficiency of traffic information dissemination and provide up-to-date traffic information Integrated Waste Kuala Lumpur <ul style="list-style-type: none"> Integrated waste management systems that consolidate functions related to waste management, such as providing information on waste collection, waste collection applications, etc City Planning System (CPS) <ul style="list-style-type: none"> A GIS system designed as a digital mapping platform for land use information in the city of KL. The system enables land use to be determined by land parcel and improves land use transparency by sharing information with citizens
	Iskandar No specific information.
Operation	Malaysia Plans to promote SC through public-private partnerships.
	Kuala Lumpur Those who use private funding as a source of SC promotion
	Iskandar No specific information.
Issue and Solution	Malaysia Rapid urbanization has led to a concentration of the population in urban areas. As a result, the city faces urban challenges such as worsening traffic congestion, high crime indices and environmental pollution.
	Kuala Lumpur Issue <ul style="list-style-type: none"> Low rate on use of public transport Large amounts of municipal waste and low recycling rates Relatively high crime rate Low speed internet connections and low internet penetration Low data sharing levels within DBKL Solution <ul style="list-style-type: none"> To solve urban issues, a data integration infrastructure that collects, integrates and analyses data is necessary, and the introduction of an urban OS is planned in order to analyze urban issues from multiple perspectives from the collected data and implement measures that contribute to their solution.
	Iskandar No specific information.
Data Source	Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)

Data Collection on Smart Cities in Asia

Country/City	Philippines/Manila/Cebu
Policy and Vision	<p>Philippines There is no national level plan for smart city. There is a policy to introduce the idea of SC in the area of urban mobility, green cities and sustainable energy in the national development plan “Philippine Development Plan (PDP) 2017-2022”.</p> <p>Manila No SC-related plans. Develop on a project basis.</p> <p>Cebu No SC-related plans. Develop on a project basis.</p>
Organizational Structure and Promoting Agency	<p>The Philippines Each local government unit (LGU) has established a project-based promotion system. The Department of Internal Affairs and Local Government (DILG) is responsible for all LGUs nationwide.</p> <p>Manila Metropolitan Manila Development Authority (MMDA), local government units (LGUs) and government-related organizations work together. MMDA is responsible for the supervision of the LGUs, which are responsible for planning, including development planning, and service delivery pictures; LGUs are responsible for cross-sectoral service delivery; MMDA is responsible for the supervision of LGUs, which are responsible for planning, including development planning, and for service delivery pictures. Quezon City E-tricycle demonstration project.</p> <ul style="list-style-type: none"> • BEMAC (BEMAC): project implementer Development of e-tricycle base power supply equipment, demonstration project operation and system construction, establishment of business model and dissemination activities. • BEET (local subsidiary of BEMAC): project implementation entity Construction of maintenance and management system, technical guidance, data collection such as operational results, formulation of local business development plan. • JICA: advice and guidance related to project management and implementation • Quezon City: securing basis for demonstration operations, providing operational advice and support, coordinating with existing tricycle operators • Contracted operating businesses: implementation of demonstration operations, maintenance work • University of the Philippines: analysis of environmental impact reduction <p>Cebu A system of collaboration and promotion between the Metro Cebu Development and Coordinating Board (MCDCB), its affiliated LGUs, NGOs, businesses, NEDA and other government-related organizations. The MCDCB differs from the MMDA in that it is not a legally based organization. Metro Cebu Development Coordinating Board (MCDCB) Coordinates the response to issues across LGUs, coordination between LGUs and public-private partnerships, regional and national levels, as well as international partnerships.</p>
System	<p>The Philippines No specific information.</p> <p>Manila International projects supported by donors (JICA) to address the urban challenges faced by the main part of Manila as a special development and management area.</p> <p>Cebu Like Metro Manila, a metropolitan area officially established by the Philippine Government. As in Manila, international projects are implemented with assistance from donors (JICA) and intercity partnerships (Yokohama) to address urban issues. Project management staff are dispatched, deployed and monitored for the purpose of project management in MCDCB. Consideration of establishing a technical department related to urban development within the MCDCB when making decisions on technical perspectives.</p>
Technology	<p>The Philippines e-government system</p>

	Manila Projects to reduce environmental impact through the introduction of electricity supply systems, transport infrastructure systems and e-tricycles.
	Cebu No specific information.
Operation	The Philippines No specific information.
	Manila PPP utilization to reduce public cost burden Project management is planned to be carried out by the public (Philippine Base Conversion and Development Authority (BCDA)) and system implementation by a JV of private companies.
	Cebu In promoting the project to turn the reclaimed land into a base for IT-intensive industries (South Road Property, SRP), the following measures were taken to attract IT companies. <ul style="list-style-type: none"> • Electricity supply, establishment of energy-saving technologies, installation of energy-saving equipment and eco-mobility in residential and commercial areas • Disaster response systems, back-up water and power infrastructure from public institutions in case of disaster • Investment promotion (tax and procedure relaxation)
Issue and Solution	The Philippines No specific information.
	Manila Issue Serious challenges such as lack of living space, provision of housing in areas with low disaster risk and traffic congestion. Solution Demonstration of digital payments for e-tricycles and public vehicles; real-time monitoring of electricity consumption in homes, offices, factories, etc. + planning of efficient electricity supply systems
	Cebu Issue Cebu, Davao: It is stated that the Development Coordinating Committee, which has jurisdiction over LGUs, etc., is a body without legal basis, unlike Manila, and that the need for a body with legal basis has been advocated. → In other words, a lesson that the SC promoting body should be legally binding.
Data Source	Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)

Data Collection on Smart Cities in Asia

Country/City	Thailand / Bangkok, Phuket, Chonburi,
Policy and Vision	<p>National level The policy is not technology-driven, but a smart city that places priority on the lives of its citizens. DEPA (Thailand Smart City Office) supports entities, both governmental and private, that are promoting smart city development. Thailand 4.0, the national high-level strategy, stipulates the promotion of smart city initiatives. SC is one of the key policies in Thailand 4.0. This policy aims to overcome the stagnant economic growth situation (middle income trap) through sustainable value-added growth with the keywords of "innovation," "productivity," and "increased value in trade transactions."</p> <p>Thailand DEPA The Digital Economy Promotion Agency (DEPA), which is the main promoting agency for Thailand's smart city policy, defines smart cities as follows: "Smart cities are cities that improve the efficiency of urban services and urban management by incorporating advanced technologies and innovations into cities and optimize cost and resource use. Under proper design in urban development, they aim to encourage participation with business areas and people and improve the quality of life of urban residents and realize sustained happiness." DEPA had set out to identify 100 cities in Thailand to be smart cities by 2022. 40 cities were identified by DEPA as smart city promotion cities (as of March 2021).</p> <p>Bangkok There is no clear strategy or vision for smart cities at the level of the Bangkok Metropolitan Administration. However, the 20-year (~2032) growth strategy of the Bangkok Metropolitan Administration, developed by the Strategy and Evaluation Department of the Bangkok Metropolitan Administration in collaboration with Chulalongkorn University, could serve as a reference for interpreting the general direction. This is a strategy under the six axes with the keywords of safety, green, inclusive, compact city, governance, economics, learning, etc.</p> <p>Policy At the Bangkok metropolitan level, there is no policy specialized for smart cities, and it is carried out according to the national policy or under the leadership of the private sector in area development.</p> <p>Phuket Phuket Smart City Road Map (2015-2020) Vision → "The Tourism Island of Sustainable growth by enhancing Creative Economy to provide Happiness for all". Phuket City Smart City Plan "Smart Phuket" (2017) Developed in cooperation with the Digital Economy Promotion Agency (DEPA) of Thailand. Various efforts are being made to promote the tourism industry and the well-being of citizens.</p> <p>Chonburi Thailand's 20-year National Strategy has identified the Eastern Economic Corridor (ECC) development of the coastal region, including Chonburi Province, as a priority policy. The following six EEC development planning guidelines have been established. The vision of "Livable" and "Financial Center" is being promoted under the development of digital infrastructure.</p>
Organization (Promoter)	<p>National level A cross-agency national committee (National Steering Committee) was established to lead the development of smart cities based on the previously mentioned Smart City Criteria system and to chair it as an organization for policy coordination. The Secretariat (Smart City Thailand Office (DEPA)) and subcommittees responsible for practical work in various fields are established under this committee.</p> <p>National Steering Committee A cross-ministry organization chaired by the Deputy Prime Minister. An organization that leads and coordinates policy for smart city development based on the Criteria System. A secretariat (Smart City Thailand Office) and sub-committees in charge of practical work in each field have been established under the National Committee.</p> <p>Smart City Committee A cross-sectoral government organization chaired by the Deputy Minister of Transportation to promote and manage smart city initiatives in each city. Responsible for the following roles:</p> <ul style="list-style-type: none"> • Policy coordination with relevant government agencies • Study and coordination of deregulation measures for SC • Examination and evaluation of individual city initiatives (discussed and considered by subcommittees established under the SC Committee and committees for individual fields)

	<p>Bangkok Private companies and educational institutions, including Chulalongkorn University and major real estate companies, are promoting the project.</p>
	<p>Phuket Led by national institutions In addition to prefectures and cities, the Phuket Smart City has support from national organizations. Namely, the Ministry of Information and Communications of Thailand (MICT), Digital Economy Promotion Agency of Thailand (DEPA), Software Industry Promotion Agency of Thailand (SIPA), etc., National Science and Technology Development Agency (NSTDA), etc. Implementation of SC services through alliances with private companies, etc. Other key players include:</p> <ul style="list-style-type: none"> • Phuket City Development Co., Ltd. (PCKD): A private company established by a private organization in Phuket Province. It is a major private partner of smart city. For the development of Phuket as a sightseeing city, smart bus operation, development of sightseeing apps, and support of renewable energy are carried out. • Huawei: The company is involved in the development of smart cities for Phuket City, and in 2019 it released Phuket Smart City Development Program created with Roland Berger. Smart meters, streetlights, public transport, waste control, CCTV, tourism, are included in the program. 6 Strategies and projects in several areas are presented. A total of 39 projects have been proposed as projects to be addressed by the 2023.
	<p>Chonburi AMATA, the largest industrial park developer and operator in Thailand, is developing AMATA City Chonburi to promote projects such as the introduction of renewable energy and energy management systems. It also promotes the development of residential environments and the creation of R&D industries by implementing urban infrastructure development projects aimed at creating a favorable environment.</p>
	<p>National level Smart City Criteria are established, projects are reviewed and evaluated in light of these criteria, and tax incentives are granted to eligible projects to promote them. Thailand 4.0 This policy aims to overcome the stagnant economic growth situation (middle income trap) through sustainable value-added growth with the keywords of "innovation," "productivity," and "increased value in trade transactions" National Spatial Structure in National Spatial Development Plan 2057</p>
System	<p>Bangkok SRT (National Railways of Thailand) is focusing on considering and planning ways to build consensus among existing and surrounding residents in the Bang Sue area and promote their participation in the urban formation and development process.</p>
	<p>Phuket In addition to being one of the 26 ASCN cities, the city has been designated as a Smart City Pilot City by the government, and is implementing smart city initiatives with a focus on digital technology under the support of the government.</p>
	<p>Chonburi The following tax incentives and deregulation programs are available under the EEC Law (2019) for SC development projects in EEC promotion zones.</p> <ul style="list-style-type: none"> • Corporate income tax exemptions and incentives • Tariff incentive • Deregulation measures related to land ownership • Deregulation measures regarding entry and stay visas <p>EECO (EEC Secretariat) grants project management rights and concession rights. This allows projects to proceed more quickly and smoothly than traditional procedures based on laws and regulations.</p>
Technology	<p>National level No specific information</p>
	<p>Bangkok As an ASCN pilot project, the SC development is being promoted in the Bang Sue area with a basic policy of public transportation oriented development (TOD). The Bang Sue area development focuses on three areas: energy, mobility, and environment. Energy: Establishment of electric power and heat supply systems based on independent and distributed power sources Mobility: Public transportation system using small EV vehicles Environment: Monitoring and communicating environmental indicators communication system</p>

	<p>Phuket City data platform (data integration and utilization) is already in place focusing on tourism and security (safety).</p> <ul style="list-style-type: none"> Ensuring administrative efficiency and transparency in the data platform High-speed Wi-Fi network in public spaces, providing Internet access for all, including tourists Introduction of a bus system with GPS location system along the coast, where many tourists visit, and an app that shows arrival and departure times. Introduction of CCTV and facial recognition system to monitor suspicious persons and ensure maritime safety Development of incubation Center, Smart City Lab, etc. Building collaboration between the city's 8 hospitals through smart devices
	<p>Chonburi AMATA Smart City An MOU was signed between the Ministry of Energy and AMATA in 2017 to promote the development of the area as a model area for the EEC. while formulating the smart city concept and starting efforts toward a smart city, a study to formulate a smart city development plan and various studies and pilot projects related to smart energy have been conducted since 2018 by the city.</p>
Operation	<p>National Level Thailand has developed a certificate standard called Smart City Criteria, Which provides incentives and deregulation for cities and projects that meet the certification criteria. The contents of smart cities proposed by cities and businesses are evaluated according to seven areas: transportation, energy, environment, lifestyle, administration, economy, education, and welfare.</p>
	<p>Bangkok Basic infrastructure in the initial development is expected to be shared among the Thai central government, Bangkok Metropolitan Administration, and SRT, the land owner. A business model in collaboration with the private sector is under consideration, including cost sharing and profit structure in the SC business after the basic infrastructure is in place.</p>
	<p>Phuket The development of information and digital infrastructure is being carried out at administrative expense with the support of government agencies related to information technology and science and technology.</p> <ul style="list-style-type: none"> Ministry of Digital Economy (MDES): Development of public high-speed communication Wi-Fi (240 million THB scale) Software Industry Promotion Agency (SIPA) of Thailand: Digital human resource development, digitalization promotion (about 8 million THB) National Science and Technology Development Agency (NSTDA): CCTV system, traffic management system (7 million THB scale)
	<p>Chonburi AMATA Smart City An MOU was signed between the Ministry of Energy and AMATA in 2017 to promote the development of the area as a model area for the EEC. In the process of formulating a smart city concept and starting initiatives toward a smart city, the city have been conducting a research on the formulation of a smart city development plan and various surveys and pilot projects, related to smart energy since 2018. This is a project to introduce smart technologies and services in existing industrial parks, and is expected to be expanded and scaled up to in areas such as transportation, environmental fields, as well as lifestyle and education.</p>
Challenges and Solutions	<p>National level Challenge:</p> <ul style="list-style-type: none"> The local governments lack leadership and manpower in terms of capacity and are not agile and flexible enough to implement new technologies (due to the cumbersome administrative procedures in Thailand). Stagnant economic growth <p>Solution: As a foundation for promoting SC that contributes to economic growth, the country has established a mechanism to introduce the SC certification function for cities through a criteria system and to provide incentives to cities that have been certified as SC.</p>

	<p>Bangkok</p> <p>Urban challenge:</p> <p>Measures to promote economic activity, such as infrastructure development, provision of social services, and inducement of business and investment, have been developed more intensively than in other regions. This has led to a widening gap between the region and other regions in terms of employment opportunities and income, and has accelerated population attraction, resulting in rapid urbanization, especially since 1980.</p> <p>Social infrastructure development and urban housing provision did not keep pace with rapid population growth, causing issues such as urban sprawl and inappropriate land use.</p> <p>Urban sprawl and inappropriate land use are the root causes of urban environmental problems, traffic problems, unregulated urban development, conversion of agricultural land to residential use, and widening disparities among urban residents.</p> <p>Solution:</p> <p>Plans to utilize ICT and digital technologies under six axes with keywords such as safety, green, inclusive, compact city, governance, economy, and learning.</p>
	<p>Phuket</p> <p>Urban challenge:</p> <p>While the city has developed as a tourist center, the challenge is to improve its attractiveness to visitors and consumers while ensuring environmental sustainability.</p> <ul style="list-style-type: none"> • Destruction of natural and marine resources due to excessive visitor numbers, environmentally unfriendly tourism, and inadequate waste management • Traffic accidents due to traffic violations by visitors, illegal dumping of garbage and other manners violations, and deterioration of public safety, which will damage the image of the city as a tourist center. • Low level of citizen interest in tourism, city business, and participation in community and volunteer activities • Overly tourism-oriented local economy in Phuket Province makes the local economic structure vulnerable to shocks and changes in conditions. • Low productivity due to lack of human resources and capacity. Widespread use of products and services that are not up to international standards. • Insufficient mechanisms and systems for integrated data collection and utilization for policy analysis and evaluation
	<p>Chonburi</p> <p>Challenge:</p> <p>Thailand's slowing economic growth in recent years ("middle-income country trap")</p> <p>Solution:</p> <p>Promote development of the Eastern Gulf region as a new axis of economic growth. Enacting a law that allows for tax incentives and deregulation for SC development in the region, and creating a business environment that facilitates the entry of private companies.</p>
	<p>Source</p> <p>Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)</p>

Data Collection on Smart Cities in Asia

Country/City	Vietnam/Ho Chi Minh
Policy and Vision	<p>Vietnam The Prime Minister Decision No.950/QD-TTg “Scheme of Sustainable Smart City development in Vietnam 2018-2025, Orientation to 2030”.</p> <p>Policy: Efficient management of urban administration, efficient use of resources such as land and energy, improvement of the quality of life and socio-economic development through the use of ICT.</p> <p>Vision (Green Purpose):</p> <ul style="list-style-type: none"> • Economic growth and sustainable development • Effective utilization of natural resources and human resources • Improving the quality of life • Participation of citizens and organizational bodies in urban development • Limiting of potential risks • Improving national management and urban services • Improving economic competitiveness <p>Specific targets:</p> <ul style="list-style-type: none"> • 2018-2020: development of legal system and data infrastructure for smart cities • 2021-2025: implementation of pilot projects • 2026-2030: nationwide development of smart cities <p>Details information: Based on advanced scientific and technological achievements, apply the latest synchronization technologies, ensure technology neutrality, compatibility with many platforms, ensure cyber security, protect personal data and ensure synchronization between technology and non-technical solutions. Organizations implementing sustainable smart urban development combine both top-down and bottom-up methods, with the central government focusing on establishing a system of legal regulation and support policies and local governments playing an active role. Smart urban development based on the principle of justice, encouraging investment participation, calculating costs and risks, harmonizing the interests of stakeholders and encouraging the use of domestic products and services. Implementing typical pilots, gaining experience and progressing step by step.</p> <p>Ho Chi Minh The “2017-2020 Ho Chi Minh City Smart City Construction Plan Towards 2025” was formulated in November 2017. The main fields for smart cities include improving public services, applying it to policy decision making, ensuring administrative transparency, improving information access, environmental and disaster countermeasures, and improving transportation infrastructure.</p> <p>Vision:</p> <ul style="list-style-type: none"> • Secure the economic growth rate in the knowledge and digital economies • Forecast-based, effective urban governance • Improve the quality of living and work environment • Increase people’s involvement in management <p>Roadmap :</p> <ul style="list-style-type: none"> • Phase 1 (2017-2020) Build a technology platform for a smart city. Implement smart solutions to meet the urgent needs of the city under revolutionary programs that bring practical benefit to the people, such as e-government, transportation, environment, flood protection, safety and order, and health. • Phase 2(2021-2025) Implement smart solutions in specialized fields. Data is updated and further expanded to build a smart city. • Phase 3(2025 年以降) Goals and tasks from 2025 onwards will continue to be implemented toward the long-term vision, and specialized smart solutions will be upgraded to expand into other areas.
Organizational Structure and Promoting Agency	<p>Vietnam The central government (Ministry of Construction, Ministry of Information and Communication, etc) develop legal system and formulate policies, and each region formulates individual master plan and implement the projects.</p> <p>Ho Chi Minh Use of the private sectors in SC promotion Regarding the information security center, a project to established a joint stock company (HO Chi Minh Information Security Center Operating Joint Stock Company) to operate the smart information security center has been approved. Saigon Industry Co., Ltd owns 75% of the shares of the operating company.</p>

Country/City	Vietnam/Ho Chi Minh
System	<p>Vietnam A legal and regulatory framework has been developed at national level, with the Ministry of Information and Communications preparing regulations in database management in each region, and ICT technical standards and regulations applicable to SCs. Private sector involvement and investment is subject to appropriate planning, and projects of mutual benefit to government and business are encouraged.</p> <p>Ho Chi Minh The SC operation center developed in Ho Chi Minh City also provides the relevant ministries with the accumulated data and works to resolve issues in a bottom-up manner from the city to the state.</p>
Technology	<p>Vietnam</p> <ul style="list-style-type: none"> • Data-integration-platforms as a basis for SC service provision • e-government • Introduction of electronic identification and authentication • Development of urban spatial data infrastructures • Development of GIS platforms • Urban management, lighting, traffic, water supply and drainage, waste collection and treatment, electricity network, disaster risk warning systems and ICT infrastructure systems <p>Ho Chi Minh</p> <ul style="list-style-type: none"> • Shared data center and open data ecosystem • Smart city operations center (IOC: Intelligent Operations Center) • Socio-economic simulation center • Smart city information security center <p>Shared data centers: A range of information is needed to coordinate processing, forecasting and strategic planning, and a shared data center on urban and housing infrastructure, public investment management and land management has been established as a top priority.</p> <p>Smart city operation centers: To utilize the city's daily sources of information and data in all areas to aid management at all levels.</p> <p>Socio-economic simulation center: Research center for simulating development of urban socio-economic development strategies.</p> <p>Smart City information security center: The Information Security Centre was established as it is essential to ensure information security in order to ensure the operational safety of the above-mentioned centers.</p> <p>Database construction in the education sector: An integrated architecture system for the education sector has been completed, integrating schools across the city, covering records processing on an IT ecosystem platform, and 24 districts with a database of 1.7 million students and a database of 80 000 teachers.</p> <p>Camera systems improve security and provide emergency services: Data integration in some districts, using more than 1,500 cameras, 50 with facial recognition and other functions. The systems provide security measures through monitoring, vehicle detection, etc.</p>
Operation	<p>Vietnam</p> <ul style="list-style-type: none"> • Research and completion of legal documents and policy mechanisms for sustainable, smart urban development in Vietnam • Planning and attracting investment resources investment resources for the construction and management of smart urban infrastructure • Establishment, evaluation and approval of pilot programs and projects for sustainable, smart urban development • Promotion of training and capacity building for managers and professionals to meet the needs of the phased development and operation of smart cities <p>Ho Chi Minh Citizen participation through data access Data is shared for people and businesses through shared data centers, encouraging people to participate in monitoring and managing the activities of government and society. Applications in the areas of transport, health, education, flood control and the environment provide many utilities for people, including information retrieval, monitoring and opinion contributions.</p>
Issue and Solution	<p>Vietnam No specific information</p> <p>Ho Chi Minh Issue Rapid urbanization, traffic congestion, environmental problems including waste disposal, and other</p>

Country/City	Vietnam/Ho Chi Minh
	<p>social issues need to be addressed urgently, and public services need to be improved and policy decision-making made more efficient.</p> <p>Solution</p> <p>Open data has enabled citizen participation, monitoring of administration by citizens and contribution of their opinions, leading to efficient administration in line with the voice of citizens.</p>
Data Source	Data Collection Survey on the Applicability of Smart City Approach (JICA, March 2022)

Data Collection on Smart Cities in Developed Countries

Country/City	Denmark/Copenhagen
Policy/Vision	<p>Basic concept: The goal is to become the world's first carbon-neutral capital by 2025. In response to Denmark's plan to completely phase out fossil fuels by 2050 at the national level, the capital city of Copenhagen has declared its goal to become the world's first carbon-neutral capital by 2025.</p> <p>Vision: The Danish Smart Cities White Paper defines a smart city as follows: "A smart city is a society that uses digital solutions by creating mechanisms to enable citizen participation in an innovative ecosystem with the aim of achieving livability, sustainability, and prosperity. What is important is that new technologies and new models of governance become instruments of welfare and sustainable growth for citizens more than the solutions themselves."</p> <p>Policy: The vision and goal is to "create livable cities with smart cities to achieve sustainability and growth," and the target green sectors are "waste," "mobility," "water," "buildings," "heating and cooling," and "energy. In addition, "digitalization" is set as the foundation to support these sectors.</p>
Organizational Structure	<p>Cluster organizations have been established in each field (cluster), such as mobility, energy, and built environment, and as the central organization of the smart city ecosystem, they act as intermediaries between local governments, private companies, research institutions, and other stakeholders to provide matching, business development, financial support, and human resource mediation services. The organization is a central organization in the smart city ecosystem, and serves as the center of the smart city ecosystem.</p> <p>(P3-19) In Denmark, policy is driven by a people-centered approach in which citizens play a leading role. For this reason, while the national government sets the policy for smart cities, the industry-academia-government collaboration (Triple Helix) or industry-academia-government-private collaboration (Quadruple Helix) is the basis for social implementation with proactive participation by the industry, academia, government, and the private sector. In Denmark, organizations have been established at the national and municipal levels to serve as a foundation for industry-academia-government-private sector participation in smart cities and other innovations.</p> <p>1) Copenhagen Solutions Lab (CSL) CSL, founded in 2014, is the incubator for Copenhagen's smart city initiative and the organization that develops and coordinates smart cities across the city of Copenhagen, serving as the hub connecting the Quadruple Helix. CSL identifies and coordinates the smart city needs of municipal departments and matches them with existing knowledge and solutions on the market in order to generate ideas, technologies and solutions to urban challenges.</p> <p>2) Gate 21 Gate21 is a non-profit organization established to bring together municipalities, businesses, knowledge and research institutions to develop, demonstrate and promote energy and resource efficient solutions that promote Green Transition and the Green Economy Membership of 90 businesses and research institutions, including 38 municipalities. With partners (as of 2018), it is Denmark's largest green transition and green economy promoter, with more than 100 projects implemented since 2009 and more than 700 companies involved in projects. The company's priority areas are "Renewable Energy," "Smart Cities & Communities," "Sustainable Mobility," and "Circular Economy & Resources," and it is working on R&D, demonstration experiments through the Living Lab, and social implementation. The company is working on research and development, demonstration experiments through the Living Lab, and social implementation.</p> <p>3) 14 business clusters In Denmark, in order to create development and innovation and accelerate growth and value creation, there are state-run clusters composed of companies, research institutes, public institutions, end users, etc. The clusters represent innovation and are the driving force behind transitions and innovations that allow companies to adapt their products to sustainable solutions and new technologies. The clusters are divided into 14 sectors. For example, the "Building and Construction" cluster focuses on (1) sustainable construction and the circular economy, (2) digital transformation and automation, and (3) smart cities, and is using the Living Lab to conduct demonstrations of smart urban infrastructure, etc. The Living Lab is also being used to conduct demonstration experiments on smart urban infrastructures.</p>
System	<p>In 2011, Denmark published its Energy Strategy 2050, which aims to completely phase out the use of fossil fuels by 2050. Specifically, the strategy calls for achieving 100% renewable energy from wind, biomass, and biogas by 2050, with 2020 as the milestone; 30% share of renewable energy; 10% in the transportation sector; 4% reduction in primary energy consumption from the 2006 level; and 20% reduction in the non-ETS sector from the 2005 level. The company has set a target of</p>

Country/City	Denmark/Copenhagen
	<p>reducing primary energy consumption by 4% from the 2005 level, and by 20% from the 2005 level in the non-ETS sector.</p> <p>The Energy Strategy 2050 establishes three key objectives to implement the strategy</p> <ul style="list-style-type: none"> • [Track 1] Steps to convert to energy targets: renewable energy and energy efficiency improvements • [Track 2] Steps in the planning and preparation phase: implementation of high-performance energy systems, such as smart grids, and measures in the transportation sector, such as electric vehicles. • [Track 3] International cross-sectoral collaboration and technology development procedures: support for the development of new technologies such as district heating and large-scale heat pump demonstrations, renewable energy, etc. <p>Smart Cities in Copenhagen:</p> <p>The specific plan for smart cities is described in the CPH2025 Climate Plan, which states that the city will work toward carbon neutrality as a major goal through four approaches: "energy consumption," "energy production," "green mobility," and "city government initiatives. Of these four approaches, smart cities are identified as a specific approach to "energy consumption.</p>
Technology	<p>Solutions related to smart cities include the following</p> <ul style="list-style-type: none"> • Digital-infrastructure: optimizing energy consumption through energy consumption monitoring (especially in buildings) • Flexible energy consumption and smart grids: building flexible energy consumption systems with the use of renewable energy sources in mind • Smart Buildings: Efficient Energy Consumption in Buildings • Smart CPH2: Producing hydrogen from surplus wind power for transportation • Onshore Electricity Supply to Cruise Ships: Onshore Supply of Electricity to Engine-Generated Cruise Ships <p>Digital Infrastructure to Support Smart Cities</p> <p>Denmark has developed a digitalization strategy (Digital Strategy 2016-2020) and has been working to build a digital infrastructure. Digitalization is progressing in various documents and procedures, and the country is in a state of high potential for smart cities.</p> <p>Example of building a digital infrastructure:</p> <ul style="list-style-type: none"> • NemKonto: mandatory account of citizens for payments from authorities • NemID: Secure Electronic Authentication Solution (Online Authentication) • Sundhed.dk: Digital registration of real estate rights facilitates buying and selling real estate. Portal to access personal health data. • Borger.dk: single point of access to all digital public services • Virk.dk: Public service portal for businesses <p>In Denmark, cities are also working together to actively promote open data.</p> <p>City collaboration on data (major cities, other cities):</p> <ul style="list-style-type: none"> • City pack (Aarhus, Copenhagen, Odense, Aalborg, Vejle) • Open Data DK (2015-, 40 out of 98 Danish municipalities) <p>What makes Copenhagen a leader in sustainability and technology?</p> <p>Photovoltaic and wind energy will be key to decarbonize the city, but biomass usage is also notable. <u>Project Holmene</u> will create nine man-made islands hosting wind and waste-to-energy plants, generating over 300,000 MWh. In fact, cleantech has become the country's fastest growing sector in 2022.</p> <p>A constant review of energy and water consumption rates helps to minimize waste and the associated CO2 emissions. Copenhagen also keeps an eye on its water consumption using multiple sources of data. A dense network of acoustic leak sensors, smart water meters and intelligent valves and pumps work in unison with real-time software modeling to ensure its proper management. A dense network of acoustic leak sensors, smart water meters and intelligent valves and pumps work in unison with real-time software modeling to ensure its proper management.</p> <p>The urban code also innovates by introducing the concept of green roofs in newly built buildings, allowing for rooftop gardens that reduce pollution and make good use of rainwater in order to sustain themselves. The urban code also innovates by introducing the concept of green roofs in newly built buildings, allowing for rooftop gardens that reduce pollution and make good use of rainwater in order to sustain themselves.</p> <p>Bicycle friendly: Copenhagen is one of the most bicycle-friendly cities in the world. It has about 700,000 bikes, more than one per car. 's estimated that about 62% of the population use it in order to go to work or to study.</p>
Implementation	<p>It cites the establishment of a "living laboratory" as a center of activity and a place for open innovation to explore avenues for problem solving through the co-creation and proactive involvement of government, business, and citizens in the process of developing new technologies</p>

Country/City	Denmark/Copenhagen
	<p>and services, and partnership building to share experience and expertise with overseas cities.</p> <p>Danish smart cities differ from typical smart cities in the following ways</p> <ul style="list-style-type: none"> • The fact that it covers a wide range of sectors, not just the energy and transportation sectors • The objective of the project is not to be promoted mainly by industry or local governments, but to be implemented in society through a "human-centered approach" that includes the participation of citizens. <p>Sate of Green: Public-private Partnership between the Danish government and the country's three leading business associations (Danish Industry, Green Power Denmark, and the Danish Agriculture and Food Council). <u>Clean is The Danish Water and Environment Cluster and our vision is for Danish companies to be world leaders in the water and environment sector. companies, utilities, knowledge institutions and the public sector to market-driven green innovation in Denmark and abroad.</u></p> <p>Clean Cluster:</p> <p>Clean cluster is The Danish Water and Environment Cluster and its vision for Danish companies is, to be world leaders in the water and environment sector. This entity connects companies, utilities, knowledge institutions and the public sector to market-driven green innovation in Denmark and abroad.</p>
Date Source	<p>Data collection on Smart cities JICA Study</p> <p>Challenges https://studyindenmark.dk/news/denmark-in-smart-city-champions-league#:~:text=One%20of%20the%20great%20challenges,%2Dfocused%20and%20technology%2Ddriven.</p> <p>Sate of Green https://stateofgreen.com/en/about/about-state-of-green/what-we-do/</p> <p>Project Holmene https://holmene.com/english/</p> <p>Publications on Smart city solutions and challenges: https://stateofgreen.com/en/search/?search=smart%20city%20challenges</p> <p>Clean Cluster https://www.cleanccluster.dk/en/projects/</p>
Challenges and solutions.	<p>One of the great challenges is to combine sustainable urban development with competitiveness. To stay competitive, cities need to become more energy- To stay competitive, cities need to become more energy- efficient, consumer-focused and technology-driven.</p>
Source	<p>https://studyindenmark.dk/news/denmark-in-smart-city-champions-league#:~:text=One%20of%20the%20great%20challenges,%2Dfocused%20and%20technology%2Ddriven</p>
Memo	<p>Denmark Smart Cities</p> <p>In light of population growth, urbanization, and climate changes, public authorities and companies are focusing on mitigating these global challenges by implementing sustainable, efficient, and citizen-centered solutions in growing urban environments. An approach that has gradually become more popular to develop more sustainable and efficient cities is the "Smart City" approach. An approach that has gradually become more popular to develop more sustainable and efficient cities is the "Smart City" approach. In particular Copenhagen and Aarhus are far along in implementing these initiatives. Copenhagen has especially emphasized on reducing CO2 emissions and aims at becoming carbon-neutral by 2025. Copenhagen's efforts to use data as a tool to create a greener city and higher quality of life for its citizens have also been acknowledged globally.</p>

Data Collection on Smart Cities in Developed Countries

Country/City	Finland/Helsinki
Policy/Vision	<p>Vision: The City of Helsinki's vision in its City Strategy (2017-2021) is "The most functional city in the world" and aims for a fair, tolerant, open and inclusive society. The City of Helsinki aims to create a fair, tolerant, open and inclusive society.</p> <p>In addition, various strategies and plans, including the City of Helsinki's Transportation Plan and Environmental Action Plan, are set up consistently under the umbrella of the city's strategy.</p> <p>Policy: The strategy stipulates that Helsinki will be a platform for pilot projects and innovative businesses, and that the city will achieve carbon neutrality by 2035, and smart city initiatives are being promoted based on these visions and policies.</p> <p>The City of Helsinki's Smart City initiative is linked to the 6Aika (Six Cities) Strategy, a Finnish national strategy, and is building a platform for creating new technologies and services through innovation in collaboration with local businesses, citizens, communities, universities, research institutions, and other diverse actors. Co-creation is positioned as an important element in the 6Aika (Six City) Strategy and the Helsinki City Strategy, and the creation of new technologies and services will be based on the participation of industry, government, academia, and private sector entities. The creation of new technologies and services is based on the participation of industry, government, academia, and the private sector, and agile social experiments and pilot projects are conducted to effectively implement these technologies and services.</p> <p>Helsinki's smart city initiatives at the city level are linked to efforts at the national and city/municipality levels.</p> <p>1) Smart City Strategy at the national level: 6 Aika Strategy As a national smart city strategy and policy, Finland is promoting smart cities in six cities (Helsinki, Espoo, Vantaa, Tampere, Turku, and Oulu), where approximately 30% of the country's population resides. 6Aika aims to strengthen the competitiveness of Finland as a whole by creating cities that will become global references through the development of an infrastructure for innovation, and by spreading this to the surrounding urban areas. The six cities are to take the initiative in promoting the project over the time span from 2014 to 2020, under the supervision of the Ministry of Employment and the Economy (MEE). Over the past six years, about 60 projects have been implemented in the areas of mobility, education, health and wellbeing, circular economy, and energy. In implementing this strategy, the aim was to increase overall productivity and ensure inclusiveness by encouraging the participation of other cities and regions, as well as the public and private sectors, local communities, and citizens, and by making efforts open and accessible.</p> <ul style="list-style-type: none"> • Open Innovation Platforms: Provide platforms as environments for experimenting and implementing new products and services in real cities. • Open Data and Interfaces: Ensure data compatibility among cities and promote business activities of small and medium-sized enterprises (SMEs) and start-ups by sharing and publishing data in a common medium. • Open Participation and Customer ship: Promote innovation, create new services and improve public services by building open and accessible channels and systems in cooperation with users and consumers. <p>Based on the above policy, we are conducting demonstrations and social experiments of new technologies, creating standards for full-scale implementation, horizontal deployment, and shared knowledge of findings and best practices.</p>
Organizational Structure	<p>Based on the national and municipal planning systems, various initiatives are being promoted by the City of Helsinki's departments and related organizations in a consistent and coordinated manner. In particular, Forum Virium Helsinki (FVH) plays a central role in bridging and coordinating the various actors in industry, government, academia, and the private sector in Helsinki's smart city initiatives. The main actors involved in Helsinki's smart city initiatives are summarized below.</p> <p>The Economic Development Department of the City of Helsinki is in charge of Finland's 6Aika Strategy, a national-level strategy.</p> <p>Forum Virium Helsinki, a non-profit corporation that promotes digital services and innovation and is positioned as the Innovation Unit of the City of Helsinki, plays a central role in bridging and coordinating the various actors in the industry, government, academia, and private sectors.</p> <p>Other major players include Helsinki Partners, a public corporation that promotes marketing and investment in the city of Helsinki; Smart & Clean Foundation, an organization that promotes clean development; Uusimaa The city of Helsinki is home to the Uusimaa Regional Council, which is the prefectural government of Helsinki.</p>

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	<p>Other:</p> <p>1) Jätkäsaari Mobility Lab: is for digital solutions related to mobility and does not include large-scale infrastructure or district development in its project scope. The budget is allocated by the Innovation Fund of the City of Helsinki. It provides the Jätkäsaari district as a test bed for demonstration and pilot projects of smart mobility technologies and services, supporting tech companies and start-ups and helping them to scale up their operations.</p> <p>2) Business Finland Business Finland is a national agency under the Ministry of Employment and Economy that provides financial support for new industries, innovation projects, and research and development with the aim of promoting Finnish industry. (Finpro), and since 2018 it has been working to create and promote new industries, including the strengthening and fostering of export industries.</p> <p>3) VTT: Technical Research Center of Finland In 2015, following the merger with the Center for Metrology and Accreditation (MIKES), a state-owned limited liability company, it became a wholly-owned subsidiary of MIKES. The company became a state-owned limited liability company. It aims to leverage research and knowledge to provide professional services to domestic and international clients and partners in both the private and public sectors, and has experience in the field of smart cities, working with many companies in the conceptual design and demonstration stages in the areas of transportation, environment, and energy.</p> <p>Copenhagen Solutions Lab Functions as a link between external partners and those of Copenhagen Municipality's initiatives that affect the smart city.</p>
System	<p>1) Helsinki Strategy (2017-2021) Policies</p> <ul style="list-style-type: none"> • Securing sustainable growth, the most essential task of the city: setting a goal to achieve carbon neutrality by 2035 • Developing services: mentioning that the City of Helsinki will serve as a platform for pilot projects and innovation businesses • Responsible management of finances the foundation of a prosperous city: sound and sustainable financial management • Helsinki strengthens and diversifies its promotion of interests: As Finland's capital and largest economic center, Helsinki will communicate its values domestically and internationally based on its strengths in digital technology and climate change initiatives. <p>2) Helsinki Intelligent Transport System Development Programme 2030 In conjunction with the City Vision, the vision for transport is defined as: "Together with the ecosystem, the vital Helsinki will create the world's most functional, efficient and safe carbon neutral transport system. Helsinki will use intelligent systems to cost-effectively address the diverse needs of people and logistics, and support their sustainable choices. Everybody will feel safe in traffic." The goal of achieving this vision</p> <p>Low emission transport system: Reduce CO₂ emissions from the transport sector by 60% by 2030, and also reduce noise and pollution.</p> <p>Functional transport system: Build a reliable and efficient system and improve connectivity among modes, including bicycle and rail transportation, to create a favorable urban space and improve logistics efficiency.</p> <p>Safe transport system: Reduce accidents and make citizens feel safe and secure in their transportation.</p> <p>Vital City: functions as a platform for sharing and utilizing data to create business, testing new mobility businesses, promoting corporate growth, and attracting global companies.</p> <p>6Aika - the joint urban development strategy of the six largest cities in Finland 6Aika, the Six City Strategy was a joint urban development programme of the six largest cities in Finland: Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu. The goals of 6Aika, the Six City Strategy, included boosting Finland's competitiveness and the productivity of its public sector, developing new service innovations, and promoting business and The Six Cities served as development and testing environments for products and services. The strategy was implemented through projects, in which the city organisations developed services together with businesses, R&D organisations, and residents. The strategy was implemented through projects, in which the city organisations developed services together with businesses, R&D organisations, and residents.</p> <p>6Aika (Six City) Strategy Budget for implementation The amount is EUR 80 million, of which 50% comes from the European Regional Development Fund (ERDF), 17% from the national budget, and 33% from the municipal budget. P 3-29</p> <p>6Aika - the joint urban development strategy of the six largest cities in Finland 6Aika has three Guidelines: Under Open Innovation Platforms, Open Data and Interfaces, and Open Participation and Customer ship, it aims to organically 6Aika has three Guidelines: Under Open</p>

Country/City	Finland/Helsinki
	Innovation Platforms, Open Data and Interfaces, and Open Participation and Customer ship, it aims to organically collaborate with these diverse entities while sharing data and knowledge based on open and easy-to-understand methods and processes on a common platform.
Technology	<p>To demonstrate new technologies and services, the Kalasatama and Jätkäsaari districts are being used as smart city testbeds to promote advanced mobility technologies and services such as MaaS and automated driving, initiatives toward a decarbonized society such as smart grids, and new lifestyle proposals utilizing IoT technologies. The company is also promoting new lifestyle proposals that utilize IoT technology.</p> <p>Kalasatama District's vision is to increase disposable time by one hour, or "One more hour a day," through the incorporation of various technologies to increase convenience in daily life.</p> <p>Kalasatama District Smart Technology: Automated waste collection system</p> <p>For efficient waste disposal that does not rely on garbage collection vehicles, a major investment was made to build an automated collection system that utilizes underground space. The waste posts located in each block are connected by a network of underground pipes, and the waste is collected at the posts by pneumatic means, and from each post, waste collection vehicles carry it away in the form of containers. All residents are provided with an electronic key to the processing facility, and the door opens when the key is approached. Each electronic key is assigned an identification number, and data on who has taken out how much garbage can be obtained.</p> <p>2. Smart Energy</p> <p>The Kalasatama district consists of a smart grid, which also incorporates AI-based power load forecasting to enable peak shaving and peak shifting through demand response.</p> <p>3. Digital Twins project</p> <ul style="list-style-type: none"> • A 3D model (Digital Twin) of the Kalasatama district has been constructed and released as open data, and the Digital Twin is expected to be used as a platform for information sharing and communication with residents, in addition to developing services using the model and conducting simulations and hydraulic analyses. The Digital Twin is expected to be used as a platform for information sharing and communication with local residents. • Technology and systems in the jätkäsaari Mobility Lab: The lab supports tech companies and start-ups and helps them scale up their operations, and focuses on developing smart infrastructure in the region by installing sensors and controllable signaling systems in the district. • The City of Helsinki is acting as a flagship to create a platform for co-creating new technologies and services with diverse actors such as local companies, citizens, communities, universities, and research institutions. <p>In order to demonstrate new technologies and services, the Kalasatama and Jätkäsaari districts are being used as smart city test beds to promote advanced mobility technologies and services such as MaaS and automated driving, initiatives toward a decarbonized society such as smart grids, and new lifestyle proposals utilizing IoT technology. The company is also promoting new lifestyle proposals that utilize IoT technology.</p> <p>In the Kalasatama smart city, the Agile Piloting Programme was conceived and introduced to implement a pilot project in a short time, in a reliable and effective manner, and with the involvement of the public. The success of the model has led to the application of the Agile Piloting Programme not only in Helsinki, but also in other cities, districts and projects.</p>
Implementation	<p>Examples of Projects in 6Aika</p> <p>More than 60 projects were launched as part of the strategy, the majority of which were European Regional Development Fund projects and the rest European Social Fund projects. The themes of the pilot projects ranged from smart mobility, learning, health and wellbeing to circular economy and energy efficiency. The main target groups included businesses and R&D organisations, while the employment-related projects were mainly targeted at young people and the academic unemployed. The main target groups included businesses and R&D organizations, while the employment-related projects were mainly targeted at young people and the academic unemployed, for example.</p> <p>All the pilot projects had participants from at least two of the Six Cities. The projects were typically implemented by the <u>city organisations, economic development agencies</u> of the cities, <u>universities</u> and <u>vocational institutions</u>.</p> <p>The spearhead projects shared by the Six Cities - Open Innovation Platforms, Open Data and Interfaces and Open Participation and Customership - served as the foundation for smaller pilot projects. These spearhead projects helped advance the important components of <u>the Finnish smart city model: customer-focused co-creation, open data, utilisation of data and service development in authentic urban environments</u>.</p> <p>The total budget of the Six City Strategy was approximately <u>€95</u> million. Funding was allocated through 13 open calls for project proposals.</p>

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	<u>Last Mile Project (Mobility)</u> It includes the development and piloting of a booking app for boats called Bout. It includes the development and piloting of a booking app for boats called Bout. <u>Autonomous Buses (Mobility)</u>
Date Source	Copenhagen Solutions Lab https://cphsolutionslab.dk/
	Forum Virium Helsinki 6Aika https://forumvirium.fi/en/projects/six-finnish-cities-join-forces-to-become-better-and-smarter/
Challenges and solutions.	No information
Memo	No information

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Country/City	Germany/Berlin
Policy/Vision	<p>Vision: Aims to create sustainable, efficient, and livable urban environments by integrating digital technology, intelligent design, and networking. This encompasses various domains such as energy, mobility, government services, and infrastructure.</p> <p>Policy: The German Federal Ministry of the Interior, Building and Community (BMI) is responsible for urban development and, by extension, smart city policy. The "Smart Cities Model Projects" initiative is one example of a key policy that supports municipalities in implementing smart city solutions. This initiative funds projects that create innovative concepts for the city of the future and the digital transformation of municipal services.</p>
Organizational Structure	<p>In Germany often involves collaborations across <u>different levels of government federal, state (Länder), and local alongside private sector partners and research institutions</u>. Cities are usually divided into departments responsible for different aspects of urban management (e.g., <u>transportation, environment, public services</u>), and these departments often collaborate on smart city initiatives. <u>The federal government has undertaken to promote smart cities and smart regions more strongly and is making a total of €820 million available for this purpose. The Smart Cities Model Projects (Modellprojekte Smart Cities) supports 73 projects, which will create best practices for 11,000 German municipalities nationwide.</u></p> <p>Data from Scaling Germany's smart cities and smart regions</p> <ul style="list-style-type: none"> • BMI (Federal Ministry of the Interior, Building and Community) - Provides information about smart city initiatives funded by the German government. • The Smart City Charter –Making digital transformation at the local level sustainable. Developed by the German Academy for Urban and Regional Spatial Planning (DASL), this charter outlines the principles and objectives for sustainable and innovative urban development. The charter supports the implementation of the German Sustainable Development Strategy (Deutsche Nachhaltigkeitsstrategie) and the achievement of the Sustainable Development Goals of the United Nations Agenda 2030. <p>Support at the Federal Ministry Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)</p> <p>Contents:</p> <ol style="list-style-type: none"> I. Preamble II. Guidelines for smart cities III. Stakeholder-specific recommendations for action IV. The dialogue process V. Participating organizations <ul style="list-style-type: none"> • National Urban Development Policy: Platform for city makers • Fraunhofer Institute - Many smart city projects involve Fraunhofer society researchers, and their work reflects the cutting-edge technologies and methodologies being employed: • National Platform Future of Mobility: For an affordable, sustainable and climate-friendly mobility system <p>To shape this change, the Federal Government convened the National Platform Future of Mobility (NPM). The aim of the NPM was to develop paths that cross and link modes of transport for a largely greenhouse gas-neutral and environmentally friendly transport system that enables efficient, high-quality, flexible, available, safe, resilient and affordable mobility in both passenger and goods transport.</p>
System	<p>GERMANY'S SMART CITY DIALOGUE AND CHARTER</p> <p>The German smart city dialogue and the smart city charter, which are administered by federal ministries and agencies, have the support of a broad platform of organizations from politics, administration, business, research, and civil society. The platform has developed guidelines for smart city development in Germany, which prioritizes the well-being of citizens, livability, diversity, open democracy, participation and inclusion, climate-neutrality and resource efficiency, economic competitiveness and prosperity, innovation, responsiveness, and the protection of private and public digital spaces.</p> <p><u>To further advance the smart city dialogue and charter, the German government has launched two dedicated programs:</u></p> <ol style="list-style-type: none"> 1. A program for smart city pilot projects that supports cities and municipalities in developing and implementing smart city strategies since 2019. 2. A data strategy for city development that focuses on common welfare, evaluating the benefits and risks of digitalization in city development, which was published in 2021. <ul style="list-style-type: none"> • Digitalization Law: Germany has established the Digitalization Law to create a legal

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	<p>framework for the development and implementation of smart city technologies.</p> <ul style="list-style-type: none"> • Data Protection Laws: Germany's strict data protection laws ensure the security and privacy of citizens' data in smart city initiatives, such as the General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). • National Action Plan for Smart City Development: The National Platform for the Future of Mobility: Germany has launched this platform, bringing together stakeholders to promote sustainable and connected mobility solutions in smart cities. • National Urban Development Policy: the policy aims to enhance urban development by integrating digital technologies, energy efficiency measures, and sustainable urban planning. https://adelphi.de/en/projects/making-the-national-urban-development-policy-fit-for-future-challenges • Regulations on Energy Efficiency and Sustainability: • Energy Transition Strategy: Germany has committed to transitioning to renewable energy sources, promoting energy efficiency in buildings, and reducing greenhouse gas emissions. • 5G Deployment Strategy <ul style="list-style-type: none"> ➢ Step up network rollout ➢ Make available frequencies based on demand ➢ Promote cooperation between telecommunications and user industries; take account of requirements, ideas and solutions of the affected user industries in-standardization ➢ Targeted and coordinated research ➢ Initiate 5G in towns and cities early on
Technology	The technologies involved in smart city developments in Germany range from Internet of Things (IoT) devices and sensors to enable real-time data collection and analysis, to advanced networking infrastructure like 5G, to platforms that integrate data across services, and to AI and machine learning for predictive analytics and optimization, E-government.
Implementation	<p>Implementation methods can vary from public-private partnerships, which leverage the expertise and capital of private companies, to government-funded pilot projects and research collaborations. Projects are typically implemented in stages, starting with a feasibility study and pilot phase, followed by a rollout of successful implementations.</p> <p>Smart City Model Projects: The German government has funded and supported pilot projects in various cities to test and implement innovative smart city solutions, encouraging collaboration between municipalities, businesses, and citizens.</p> <p>The federal government has undertaken to promote smart cities and smart regions more strongly and is making a total of €820 million available for this purpose. <u>The Smart Cities Model Projects (Model project Smart Cities)</u> supports 73 projects, which will create best practices for 11,000 German municipalities nationwide. challenge is that many municipalities are working on the same projects in parallel. For this reason, working groups have now been initiated that are dedicated to the topics of smart city data platforms, smart neighborhoods or digital urban twins, for example. It is still unclear whether the program will demonstrably support digitization in rural regions in the coming years and lead to nationwide digitization. It is highly questionable whether the current funding program, which complements programs of the EU and the federal states, will lead to the scaling up of smart city initiatives in Germany.</p>
Challenges and solutions good examples	<p>SMART CITY OBJECTIVES IN GERMANY: WILL THOROUGH PLANNING KEEP ABREAST OF RAPID TECHNOLOGICAL CHANGE?</p> <p>Despite Germany's active development and promotion of smart city strategies and initiatives, as well as its profound industrial expertise in applications such as telecommunications, control systems for energy and water, traffic engineering, German cities are not among the smart city forerunners in Europe. One of the reasons for German cities to fall behind European counterparts, is the fact that the country is still deeply entrenched in the process of defining its strategy and objectives for a smart city development. These discussions are deeply embedded within a broader conversation on how to shape the digital transformation of German society, taking into account opportunities and risks associated with data collection, sustainability goals, and citizen participation. Despite the slow pace of smart city development in Germany, the government has decided stay its course over the coming years and continue the dialogue process, to implement the smart city charter and to evaluate the pilot projects that have already started. The German approach to smart city development is characterized by caution, vigilance, and a slower pace, which presents both risks and opportunities. The risk is that this approach may fall behind the rapid pace of technological advancements in the private sector and in other European countries and cities that are quickly gaining experience from trial projects of</p>

Country/City	Germany/Berlin
	<p>smart city applications. In addition, the advancement of smart cities in Germany faces a unique challenge in the form of widespread public opposition due to concerns about the collection and use of personal data, which are more prevalent among the German public compared to other countries. These concerns stem from Germany's history and experience of the importance of protecting democracy and privacy. Despite the stringent standards set by the European General Data Protection Regulation (GDPR) for handling personal data, the German public remains skeptical about the potential for smart city applications to collect excessive personal data for commercial use.</p> <p>E-government challenges</p> <p>Germany has been struggling with similar demands in the implementation of e-government for some time. German governments at federal, state and regional level have started far too late to digitalize their administrative services and to invest in the modernization of their internal administrative processes. The Online Access Act (Onlinezugangsgesetz) has set the goal of making all administrative services in Germany available digitally by the end of 2022. This goal has been missed by far: at the end of 2022, less than 100 of about 700 administrative services were available nationwide in Germany. Even worse: the digital services are hardly used by citizens and businesses.</p>
Date Source	<p>Scaling Germany's smart cities and smart regions https://cities-today.com/industry/scaling-germanys-smart-cities-and-smart-regions/</p> <p>National Platform Future of Mobility https://www.plattform-zukunft-mobilitaet.de/en/</p> <p>Germany Country profile https://www.iea.org/countries/germany</p> <p>German Energy Transition https://www.bmbf.de/bmbf/en/research/energy-and-economy/german-energy-transition/german-energy-transition_node.html</p> <p>Fostering Effective Energy Transition 2023 https://www.weforum.org/publications/fostering-effective-energy-transition-2023/in-full/germany/</p> <p>BMI (Federal Ministry of the Interior, Building and Community) https://www.bundesregierung.de/breg-en</p> <p>The Smart City Charter https://www.bbsr.bund.de/BBSR/EN/publications/SpecialPublication/2017/smart-city-charta-de-eng.html</p> <p>GERMANY'S SMART CITY DIALOGUE AND CHARTER https://www.ippi.org.il/navigating-smart-city-development-in-germany/#:~:text=The%20advancement%20of%20smart%20cities,public%20compared%20to%20other%20countries.</p> <p>The Smart City Charter https://www.connective-cities.net/en/media-centre/publications/publications-details/smart-city-charter</p> <p>National Urban Development Policy https://www.nationale-stadtentwicklungspolitik.de/NSPWeb/EN/Projects/Projects-Overview/projects-overview_node.html</p> <p>Fraunhofer Institute https://www.fraunhofer.de/en.html</p> <p>NAVIGATING SMART CITY DEVELOPMENT: A VIEW FROM GERMANY https://www.ippi.org.il/navigating-smart-city-development-in-germany/#:~:text=The%20advancement%20of%20smart%20cities,public%20compared%20to%20other%20countries.</p> <p>SMART CITY OBJECTIVES IN GERMANY: WILL THOROUGH PLANNING KEEP ABREAST OF RAPID TECHNOLOGICAL CHANGE? https://www.ippi.org.il/navigating-smart-city-development-in-germany/#:~:text=The%20advancement%20of%20smart%20cities,public%20compared%20to%20other%20countries.</p> <p>E-government challenges https://cities-today.com/industry/scaling-germanys-smart-cities-and-smart-regions/</p> <p>Cities Today https://cities-today.com/</p>
Berlin	City Level
Policy/ Vision	<p>A smart, connected, post-fossil and resilient capital.</p> <p>Berlin wants to be fit for the future - and is using smart and targeted innovative technologies, products and services to consequently achieve significantly higher standards of living with the same or fewer resources.</p>

Country/City	Germany/Berlin
Organizational Structure	<ul style="list-style-type: none"> • CityLAB Berlin CityLAB Berlin supports the implementation of the Smart City and Digital Strategy for Berlin "Gemeinsam Digital: Berlin." • Berlin Partner Berlin Partner works on economic growth, promotes business, technology and innovation, and presents the advantages of the capital to companies, investors and talents.
System	<ul style="list-style-type: none"> • Berlin's smart city strategy Berlin's smart city strategy is designed to improve the quality of life for its residents, reduce carbon emissions, and drive economic growth. • Together Digital: Berlin (sm strategy) Together Digital for a Smart City Visionary designs and specific construction plans: the capital's strategy for a smart city. Combines the digital and smart city strategies. This strategy helps to establish new work approaches, agile methods, competence building, and a systematic knowledge transfer between the administration and its inhabitants. By aligning technologies, methods, and cultural processes, it supports existing strategies to reach their respective goals. <ul style="list-style-type: none"> 1. Aligned with the needs of Berliners, 2. Not a specialist strategy, but an "enabler" that supports existing, specialist goals and strategies, 3. A learning strategy 4. A strategy that includes governance, a participatory implementation concept, measures and their success monitoring. • Berlin liveably smart As a model project, "Berlin liveably smart" is divided into three process phases: Phase I: Strategic Framework (February to May 2021). In participation formats such as online activities and workshops, Berlin's urban society developed the Strategic Framework of the Smart City Strategy. It contains guiding principles and defines the strategy's objectives. Phase II: Strategy (August 2021 to May 2022). The Smart City Strategy was written together with stakeholders from business, science and administration as well as urban society. The phase was characterized by the unification of the digital strategy and the smart city strategy into the strategy, "Gemeinsam Digital: Berlin" ("Digital Together: Berlin"). Phase III: Implementation (January 2022 to December 2026). Specific measures and projects are currently being tested and implemented, including five pilot projects. • Berlin's Smart City Strategy: A COLLABORATIVE APPROACH Berlin began by developing a smart city definition and strategy that considered digitalization in the context of common welfare and sustainability. The goal of this process was to create a shared understanding between the city administration, citizens, and the business sector, which would serve as a foundation for deriving guidelines for future projects. CityLAB Berlin also participated in creating the City's smart city strategy, Gemeinsam Digital: Berlin. The strategy planning also involved Berlin Partner, which promotes economic development in the city. The strategy highlights the cooperation of multiple operators in digitalization and urban development.
Technology	<p>IoT, Smart mobility, Energy-efficient buildings, digital infrastructure to improve connectivity and access to technology. Smart waste management, Water management</p>
Implementation Method	<p>One of the distinguishing features of Berlin's smart city initiatives is its advanced systems of urban services and infrastructure. These include, for example, its system of energy-saving smart streetlights, the use of real-time traffic and public transit data to improve traffic flow, and its pioneering bike-sharing program. These are all geared towards sustainability, as the city works towards its ambitious goal of becoming carbon neutral by 2050.</p> <p>Source: Top 10 leading global smart cities</p> <p>The city has identified and prioritized seven realms of smart city development: Education, energy, health, mobility, urban development, administration, and business. These realms are combined with three layers of digital transformation: the public sector, production and services, and citizen participation.</p> <p>The fields of energy and health were selected for the first two pilot projects:</p> <ul style="list-style-type: none"> • Energy monitoring in public buildings, with the goal of improving energy efficiency and reducing CO2 emissions • The development of an express check-in system for local health services including the hospital, with the aim of improving transparency and patient treatment quality. <p>Smart city projects in Berlin</p> <ol style="list-style-type: none"> 1. Smart mobility: Digital Berlin has launched several initiatives to improve mobility, including a smart parking system that uses sensors to detect available parking spaces and a digital

Country/City	Germany/Berlin
	<p>platform that integrates public transportation and bike-sharing services. The city has also introduced electric buses and is working to create a network of charging stations for electric vehicles.</p> <ol style="list-style-type: none"> 2. Energy-efficient buildings: Berlin has implemented several measures to improve the energy efficiency of buildings, including mandatory energy audits for large buildings and subsidies for energy-efficient renovations. The city also has a program to promote the use of renewable energy sources, such as solar panels and geothermal heat pumps. 3. Infrastructure: Digital Berlin is investing in digital infrastructure to improve connectivity and access to technology. This includes expanding broadband internet access, developing a city-wide data platform, and promoting the use of digital technologies in education and healthcare. 4. Smart waste management: Berlin is implementing a smart waste management system that uses sensors to monitor trash levels in public bins and optimize waste collection routes. This will result in significant cost savings and a reduction in carbon emissions. 5. 5. Water management: Berlin is working on a project called "Rain Sewer Berlin" that aims to make the city's sewer system more efficient by capturing and storing rainwater. This will reduce the risk of flooding and improve water quality in the city's rivers and lakes.
Challenges and good practices	No information
Data Source	<p>CityLAB Berlin https://citylab-berlin.org/en/start/</p> <p>Berlin Partner https://www.berlin-partner.de/en</p> <p>Smart City Strategy / Gemeinsame Digital Berlin https://oecd-opsi.org/innovations/smart-city-strategy-gemeinsame-digital-berlin/</p> <p>Gemeinsam Digital: Berlin https://gemeinsamdigital.berlin.de/en/</p> <p>The Digital Together : Berlin Strategy https://smart-city-berlin.de/en/smart-city-berlin/strategy-process</p> <p>Smart City Berlin https://www.businesslocationcenter.de/en/business-location/business-location/smart-city-berlin</p> <p>Top 10 leading global smart cities https://mobile-magazine.com/articles/top-10-leading-global-smart-cities</p> <p>About Smart Cities , Berlin https://www.aboutsmartcities.com/smart-city-berlin/</p> <p>Berlin's roadmap to becoming a smart city https://citylab-berlin.org/en/projects/smart_city/</p>
Memo	<p>The "Digital Together: Berlin" strategy comprises a concept and various measures as building blocks on the way to Smart City Berlin. Among other things, five pilot projects are to be implemented by the end of 2026 that have already been financed through the federal funding program, Model Projects Smart Cities. In these, solution approaches behind the Smart City Berlin are prototypically elaborated and tested. In addition, further measures are being implemented to further improve interaction within the administration and with the urban community. These will make the smart city visible, help people to better understand processes and realize the transformation step-by-step.</p>

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Country/City	Italy/Milan
Policy/Vision	Centered on creating urban environments that are sustainable, efficient, and enhance the quality of life for residents. The strategy often includes leveraging digital technologies to address various challenges faced by cities, such as traffic congestion, environmental issues, and resource management.
Organizational Structure	<p>National level</p> <p>The responsibility for smart city development, The Ministry of Economic Development, through its Digital Transformation Department, has played a significant role in promoting digital innovation and smart city initiatives. Additionally, individual municipalities and regions often have their own initiatives and strategies for smart city development.</p> <ol style="list-style-type: none"> 1. The Ministry of Economic Development 2. Ministry of Ecological Transition 3. Ministry of Infrastructure and Sustainable Mobility 4. Smart city Association 5. SMART CITY OBSERVATORY 6. SMART CITY OBSERVATORY <p>The Smart City Observatory was established in 2018 as a joint initiative of GREEN - Centre for Research in Geography, Resources, Environment, Energy and Networks - and "A. Saffa" Legal Studies Department. The Observatory focuses on the policy and legal issues arising from the emergence, development and governance of Smart Cities.</p> <ol style="list-style-type: none"> 7. TIM Group <p>Subnational (federal, regional and local)</p> <ol style="list-style-type: none"> 1. Department for Digital Transformation 2. Regional Governments 3. National Association of Italian Municipalities <p>Some key entities include:</p> <ol style="list-style-type: none"> 1. Smart City Italy: This organization focuses on promoting and implementing smart city solutions across various Italian cities. 2. Istituto Superiore Mario Boella (ISMB): Based in Turin, ISMB is a research institute that collaborates on smart city projects, contributing to innovation and technology development. 3. CSP - Innovazione nelle ICT: CSP is a research and innovation center that plays a role in advancing smart city technologies in Italy. 4. Fondazione Smart City Milano: This foundation works on projects related to urban innovation and sustainability in Milan, contributing to the city's development as a smart city. 5. ENEL: As a major energy company, ENEL is involved in smart city projects, particularly in the context of energy efficiency and sustainable urban development. <p>These entities collaborate with municipalities, businesses, and other stakeholders to implement technologies and strategies for making cities more efficient, sustainable, and technologically advanced.</p> <p>In addition, in Italy an increasing number of municipalities have started to plan smart cities and, according to estimates, by 2027 investments in ICT solutions for smart cities will grow to around €1.6 billion, while globally total spending on smart cities will reach a value of over US\$1 trillion. <u>Between 2023-2027</u>, Smart City applications based on 5G, IoT and Artificial Intelligence in Italy will help to reduce city traffic costs by a total of approximately €6.5 billion and those linked to urban pollution by over €400 million through improved planning of the public and private transport system and tourist flows. The new technologies will also allow an annual reduction in CO2 emissions of about 650,000 tons, guide the tourism industry and optimize services for the public.</p> <p>European Investment Bank (EIB): support for the development of smart cities in Italy, and EU bank as well.</p>
System	<p>Milan created a sustainable urban plan for reducing traffic in the city center and freeing spaces for walking and shared mobility. Uniting public institutions, transport companies and civil society in decision making, the plan features new service delivery models and a number of interconnected elements. These include sharing mobility schemes, a congestion charge and pedestrianization.</p> <ol style="list-style-type: none"> 1. Urban development strategy looking ahead to 2030. It focuses on three key points: <ol style="list-style-type: none"> 1. connection; 2. innovation;

Country/City	Italy/Milan
	<p>3. e-mobility.</p> <p>2. Agenda 2030</p> <p>3.National Sustainable Development Strategy The Strategy is organized in five areas: People, Planet, Prosperity, Peace, Partnership</p> <p>4.2020 Adaptation strategy (Milan) Sets comprehensive actions to reduce travel demand (e.g., promoting smart and remote work models) and to improve and diversify mobility options (e.g. promoting bicycles, electric scooters and shared vehicles). It aims to increase public transport safety by limiting the number of people in public buses and subways, building train stations with safety distancing, clearing sidewalks to integrate public transport with other mobility systems and enhancing automation of transport and parking tickets and passes. It also aims to invest in short-term parking spaces (e.g., for delivery of essential goods for healthcare and emergency services) and rethink the timing, timetables and the rhythm of the city, to maximize flexibility and spread the mobility demand over time, encouraging more flexible timetables for schools and workers, and extending opening hours of services and businesses, as well as cultural events. source: OECD</p> <p>5. Italian Digital Agenda The primary objective is to achieve in Italy to the digital revolution and to fill the longstanding National delay: in a perspective of inter-institutional cooperation among the State, the regions and the local institutions, the Italian Digital Agenda aims in fact to promote and lead in the country the wide spread of new technologies, the modernization of the PA, the creation of a digital single market of contents and services, thus enabling citizens, families and companies to access and exploit the potential of ICTs. In line with the Digital Agenda for Europe, the operational interventions are distributed in six strategic axes, that represent the six main topic areas:</p> <ul style="list-style-type: none"> • Infrastructures and Security • Digital identities • Public data and sharing • Digital skills • Digital administration • Smart communities.
Technology	<p>1. IoT (Internet of Things)</p> <p>2. Big Data and Analytics</p> <p>3. Renewable Energy:</p> <p>4. Urban Mobility Solutions</p> <p>5. E-Government Services</p> <p>6. EV</p> <p>7.5G and fiber development</p> <p>9.AI</p>
Implementation	<p>Milan's Sustainable City Transformation The city has adopted a comprehensive approach integrating green spaces, pedestrian zones, and cycling infrastructure. The transformation of formerly congested areas into public spaces encourages different modes of transportation while fostering a sense of community. Milan's urban planning also prioritizes mixed-use developments, reducing commuting distances and promoting efficient land use. Milan is actively fostering a livable and sustainable urban landscape by prioritizing the well-being of its residents and the environment.</p> <p>Sustainable mobility An integral aspect of Milan's sustainable future lies in its efficient and eco-friendly transportation systems. The city has successfully embraced an extensive network of electric buses and trams, effectively reduced air pollution and making significant progress in lowering carbon emissions. These electric vehicles are powered by clean energy sources, such as renewable electricity, further contributing to the city's environmental goals. <u>Milan's bike-sharing programs</u> and well-designed bike lanes have revolutionized transportation, making cycling a remarkably convenient and increasingly popular mode of getting around. In addition to these initiatives, <u>Milan has implemented congestion pricing in its city center</u>. By doing so, the city promotes a shift away from private cars, emphasizing the use of public transportation, walking, and cycling.</p> <p>Renewable energy technologies Solar panel installations on public and private buildings, Moreover, Milan actively supports the development of district heating networks, utilizing geothermal and biomass energy sources to provide efficient heating solutions while reducing reliance on fossil fuels. Milan fosters innovation and collaboration in renewable energy technologies through partnerships with local communities, private enterprises, and research institutions.</p> <p>Green infrastructure Milan's commitment to sustainability extends to its architecture. The city has implemented strict energy</p>

Country/City	Italy/Milan
	<p>efficiency standards, fostering the construction of green infrastructure. Innovative design techniques like <u>green roofs and solar panels</u> are integrated into new buildings, reducing energy consumption and harnessing renewable sources. The city is also <u>revitalizing existing buildings through energy retrofitting programs, improving insulation, upgrading lighting systems, and utilizing smart technologies to enhance efficiency and reduce greenhouse gas emissions.</u></p>
Challenges and solutions good examples	<p>Challenges: The main barriers smart city projects had in Italy in 2018 and 2019. Most of the local administrations surveyed referred to lack of skills and scarcity of economic resources as main obstacles to smart city project implementation. The <u>Smart City Index 2021</u>, highlights the gap between the cities of the north and the cities of the south, one of the main reasons for the gap is the lack of infrastructure and the low willingness of the community to use the services. The car-sharing service, for example, has failed and has also caused damage to vehicles.</p> <p>Benefits: The implementation of eco-friendly transport system in Milan, has not only improved the quality of air for residents and visitors but has also set an example for other cities worldwide, inspiring them to adopt similar sustainable initiatives for a greener future. Milan's bike-sharing programs and well-designed bike lanes have revolutionized transportation, making cycling a remarkably convenient and increasingly popular mode of getting around <u>By Implementing congestion pricing</u> the city promotes a shift away from private cars, emphasizing the use of public transportation, walking, and cycling. Furthermore, by embracing these sustainable mobility practices, Milan is not only prioritizing the well-being of its citizens but also taking charge in improving the air quality and overall livability of the city. Moreover, By promoting energy-efficient and smarter buildings, which rely on interconnected systems to optimize energy use, increase efficiency, and reduce waste, Milan is creating healthier and more environmentally friendly spaces for its residents and visitors.</p>
Date Source	<p>Governance – Italy https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/governance-italy</p> <p>The Smart City Association Italy https://thesmartcityassociation.org/</p> <p>SMART CITY OBSERVATORY https://green.unibocconi.eu/research/observatories/smart-city-observatory</p> <p>TIM Group https://www.gruppotim.it/en/innovation/innovation-news/The-Italy-of-Smart-and-Sustainable-Cities.html</p> <p>Smart City Italy https://www.smartcitiesitaly.it/idee-progettuali/</p> <p>Istituto Superiore Mario Boella (ISMB)</p> <p>SP - Innovazione nelle ICT https://www.csp.it/</p> <p>Fondazione Smart City Milano https://milanosmartcity.it/istitucional/</p> <p>ENEL https://www.enel.com/</p> <p>Sharing Mobility Strategy in Milan https://use.metropolis.org/system/images/1276/original/CitiesInAction_MilanSharingMobility_Nov15.pdf</p> <p>Lessons from Italy: Why smart city projects can bridge the urban development gap https://www.smartcitiesworld.net/opinions/lessons-from-italy-why-smart-city-projects-can-bridge-the-urban-development-gap</p> <p>Milan`s Sustainable City Transformation https://www.plugandplaytechcenter.com/resources/urban-planning-milan-sustainable-city/</p> <p>Italy`s route to innovation starts with smart cities https://www.intelligentcio.com/eu/2023/04/28/italys-route-to-innovation-starts-with-smart-cities/</p> <p>Shared mobility: Rome leads the Italian ranking in 2022 https://www.turismoroma.it/en/news/shared-mobility-rome-leads-italian-ranking-2022</p> <p>Milan, the Italian capital of smart mobility https://www.milanairports.com/en/around-milan/smart-sharing-mobility</p> <p>A digital mobility renaissance in Milan https://eurocities.eu/latest/a-digital-mobility-renaissance-in-milan/</p>

Country/City	Italy/Milan
	<p>Main barriers to implementation of smart city projects in Italy in 2018 and 2019 https://www.statista.com/statistics/914989/barriers-to-smart-city-projects-implementation-in-italy/</p>
	<p>Smart City Index 2021 https://imd.cld.bz/Smart-City-Index-2021</p>
Memo	<p>Sharing Mobility in Italy Report of the National Observatory on Sharing Mobility promoted by the Ministry of Ecological Transition, the Ministry of Infrastructure and Sustainable Mobility and the Foundation for Sustainable Development showed that Rome is at the top of the list of Italian cities in terms of demand for and use of shared vehicles. The use of shared mobility is increasingly widespread, especially in the central areas of the city and on the Ostia coast, with a growing number of users using bicycles, scooters and electric scooters to reach their destinations. In fact, in the period from January 2021 to June 2022, rentals grew by 83 percent, touching 1.2 million in June, mainly of scooters. In terms of daily rentals, however, bicycles surpassed scooters, thanks in part to the creation of new bike-sharing services with electric vehicles.</p> <p>2020 Adaptation strategy Other objectives of the plan are to reclaim public spaces for wellbeing, leisure, and sports, with a gradual reopening of parks and sport facilities. It commits to ensuring that there is a Piazza Aperte (open square) in every neighborhood, extending terraces over parking spaces, while limiting the speed limit to 30km/h in the whole city. The Strategy aims to support social innovation and start-ups to integrate business and social objectives while creating community cohesion. It promotes the recovery of the construction sector by launching widespread maintenance and redevelopment projects on existing real estate assets, both public and private, alongside energy-saving initiatives, environmental redevelopment and improved home comfort.</p>
Milan	City Level
Policy/ Vision	<p>Milan considers the idea of a smart city as being not technology-driven, but centered on its citizens. The concept 'smart city' for Milan covers smart mobility, smart environment, and smart inclusion and citizenship. This sets out a bold agenda, which will see the re-orientation of demand for transport services; the standardization of payment technologies and efficiency solutions.</p>
Organizational Structure	<p>The organizational structure for smart city initiatives in Milan typically involves collaboration between various stakeholders, including government bodies, private sector partners, research institutions, and local communities. While the specific structure may evolve over time and vary based on individual projects, here's a general overview:</p> <p>1. City Administration: Mayor's Office: Provides overall leadership and vision for smart city development. department of Digital Transformation: Often responsible for coordinating and implementing digital initiatives, including smart city projects.</p> <p>2. Municipal Agencies and Departments:</p> <ol style="list-style-type: none"> Transportation Department: Focuses on smart mobility solutions and traffic management. Environmental and Sustainability Departments: Works on initiatives and environmental sustainability. Urban Planning Department: Engages in smart infrastructure and urban development projects. <p>3. Collaboration with Private Sector:</p> <ol style="list-style-type: none"> Public-Private Partnerships (PPPs): Collaborations with private companies for technology deployment and innovation. Startups and Tech Companies: Engaged for developing and implementing specific smart city solutions. <p>4. Research and Innovation Centers:</p> <ol style="list-style-type: none"> Local Research Institutions: Collaborate on technological research and development. Innovation Hubs: Provide platforms for startups and tech innovators to contribute to smart city projects. <p>5. Citizen Engagement and Community Involvement:</p> <ol style="list-style-type: none"> Community Forums and Feedback Mechanisms: Engage citizens in the decision-making process and gather input on smart city initiatives. Digital Platforms for Citizen Interaction: Provide online tools for citizens to access information, participate in discussions, and report issues. <p>6. Advisory Boards and Committees:</p> <ol style="list-style-type: none"> Smart City Advisory Board: Offers strategic advice on the implementation of smart city projects. Technical Committees: Provide expertise on specific technological aspects.

Country/City	Italy/Milan
	7. Communication and Public Relations: a. Communication Office: Manages public relations and information dissemination regarding smart city initiatives. 8. Milano Smart City Alliance
System	No information
Technology	IoT, ICT, AI <ul style="list-style-type: none"> Energy Efficiency in Buildings Energy Systems Integration Mobility & Transport (Clean fuels and fueling infrastructure, Electric, hybrid and clean vehicles, car sharing)
Implementation Method	Milan's Sustainable City Transformation <ol style="list-style-type: none"> Sustainable Mobility: (Bike sharing programs, pedestrian friendly zones and efforts to reduce traffic congestion through technology) Environmental initiatives: (green spaces, environmental sustainability, with projects promoting green spaces, energy efficiency, and the use of renewable energy sources) Digital Infrastructure: Urban Innovation: (Milan digital city: reflect the city's commitment to digital innovation, fostering a culture of technological advancement and entrepreneurship.) Smart Infrastructure: (Milan has been working on incorporating smart infrastructure elements, like smart lighting and waste management systems, to enhance efficiency and reduce environmental impact.) Collaboration with Businesses: (The city collaborates with businesses, startups, and research institutions to drive innovation and implement cutting-edge technologies in various sectors.) Sharing Cities project Milan aims to: <ul style="list-style-type: none"> aggregate demand and deploy smart city solutions; deliver common and replicable innovative models; attract external investment; accelerate the take-up of smart city solutions; pilot energy-efficient districts; shift thinking irreversibly to local renewable energy sources; promote new models of e-mobility; successfully engage with citizens; exploit 'city data' to maximum effect; foster local-level innovation, creating new businesses and jobs. Sharing Mobility Milan: Milan created a sustainable urban plan for reducing traffic in the city center and freeing spaces for walking and shared mobility. The initiative targets the city's high level of private car ownership and aims to improve local air quality. Uniting public institutions, transport companies and civil society in decision making, the plan features new service delivery models and a number of interconnected elements. These include sharing mobility schemes, a congestion charge and pedestrianization.
Challenges and good practices	No information
Data Source	Smart Cities Milan https://www.bable-smartcities.eu/connect/cities/city/milan.html Sharing Cities Milan https://sharingcities.eu/city-milan/ Milan Strategy for Smart City https://www.yesmilano.it/en/invest-startup/cleantech/milano-smart-city#:~:text=Milano%20Smart%20City%20Alliance%20stands,the%20city%20and%20the%20territory. Sharing Mobility in Milan https://use.metropolis.org/case-studies/sharing-mobility-strategy-in-milan

Data Collection on Smart Cities in Developed Countries

Country/City	Netherlands /Amsterdam
Policy/Vison	<p>Basic concept/vision:</p> <p>Transformation into a knowledge-based city and responding to/leading the industrial transformation through ICT-centered innovation are positioned as key strategies for the Dutch nation and region, and the city of Amsterdam, the number one economic center in the Netherlands, shares this vision. The concept of the City of Amsterdam is that the use of ICT innovation is considered essential for solving urban challenges with the top goals of decarbonization, urban resilience improvement, and revitalization.</p> <p>As a system of innovation as a means of solving urban problems, an approach has been established by the industry-government-academia community to develop through a cycle of planning, demonstration, monitoring and evaluation with the participation of citizens, and to communicate this experience widely.</p> <p>In the early stages of the Smart City initiative, many efforts were made in the energy sector, such as the New Amsterdam Climate Action Plan developed by the city in 2008 to reduce greenhouse gas emissions.</p> <p>A wide range of urban problem-solving efforts are being promoted, including the improvement of the living environment and the shift to a recycling-oriented society, through the participation of a wide range of entities, including citizen participation.</p>
Organizational Structure	<p>Amsterdam Smart City (ASC) is promoting programs and various individual projects in collaboration with private sector, research institutions, citizens, and other organizations. Amsterdam Smart City (ASC), under the policy support of the City of Amsterdam, is promoting programs and various individual projects in collaboration with various actors such as the private sector, research institutions, and citizens.</p> <p>Amsterdam Smart City (ASC) was established in 2009 as a partnership between Amsterdam Innovation Motor (AIM), a foundation working to promote Amsterdam's knowledge industry, Liander, a power transmission company, and the City of Amsterdam, and is AMS's mission is to work for a smart, green and healthy future for the Amsterdam metropolitan area, with a central interest in data and technology being used to improve the quality of life for its citizens. To achieve this, it emphasizes open and transparent knowledge sharing and learning together.</p> <p>Under this concept, ASC initially acted as a project leader, but through the collaboration of various entities including citizen participation on an open platform, a mechanism was created for various projects to interconnect and develop demonstration programs, and ASC gradually shifted its focus to a facilitator role. As of October 2021, there were 22 Permanent Members, 652 organizations, and approximately 8,800 individuals (Innovators) registered. Permanent Members pay an annual membership fee and are granted decision-making authority over ASC operations.</p> <p>1. city of Amsterdam</p> <p>The City of Amsterdam created the position of Chief Technology Officer (CTO) in 2014, and an innovation team led by the CTO works with businesses, research institutions, startups, social organizations, and the civic community to quickly evaluate new initiatives and The CTO's role is to quickly evaluate new initiatives and bring them to fruition.</p> <p>2. incubators, community organizations, universities and research organizations</p> <p>Amsterdam Institute for Advance Metropolitan Solutions (AMS Institute)</p> <p>City Innovation Exchange Lab (CITIXL)</p> <p>The organization was founded by the City of Amsterdam and the private sector, in collaboration with the ASC and AMS, to connect the city and its partners with the public and to create a living lab, where the process of design, prototyping, testing, implementation, and sharing of results can be accelerated through crowdsourcing solutions. The Living Lab is a crowdsourcing solution that speeds the process of design, prototyping, testing, implementation and sharing of results. They also offer their services to cities and partners outside of Amsterdam by sharing and exchanging information through tours and workshops.</p> <p>The Amsterdam Economic Board (AEB) Amsterdam Economic Development Council</p> <p>The AEB is a public-private partnership of various organizations, including local businesses, research institutions including universities, and government agencies. In addition to Amsterdam Smart City, three other programs, Tech Connect and House of Skills, operate under the AEB umbrella.</p> <p>Waag: (A foundation)</p> <p>Waag Futurelab contributes to the research, design and development of a sustainable, just society. and questioning underlying cultural assumptions; and</p> <p>By experimenting with and designing alternatives on the basis of public values; and</p> <p>By developing an open, fair and inclusive future together with civil society.</p> <p>Financial Partners:</p> <p>Ministry of Education, Cultural and Science, City of Amsterdam</p>

Country/City	Netherlands /Amsterdam
	<p>Next to this, Waag executes many projects funded by public institutions and organizations, such as the European Commission, CLICKNL and Grant for the Web. Next to this, Waag executes many projects funded by public institutions and organizations, such as the European Commission, CLICKNL and Grant for the Web.</p> <p>Netherland Digital</p> <p>The website shows existing digitalization initiatives and describes how the Netherlands is giving the Dutch Digitalization Strategy momentum.</p>
System	<p>The City of Amsterdam's Smart City initiative is an open</p> <p>The platform is unique in that it promotes collaboration among various fields and organizations at various levels, sharing ideas and resources on a peer-to-peer basis to solve problems and promote the co-creation of new value.</p> <p>The history of development to date can be divided into two phases: (i) an experimental phase in which the number of participating companies was expanded and the scope of data and knowledge sharing was progressively broadened, and (ii) a phase in which innovation was more intentionally induced, such as by directing the content of initiatives more arbitrarily in accordance with the city's vision and goals based on the accumulation and experience from the experimental phase. (ii) a phase in which innovation is induced more intentionally, such as by directing the content of initiatives more arbitrarily in line with the city's vision and goals, based on the accumulation and experience of the experimental phase.</p>
Technology	<p>Creating a flood resilient community through citizen information and digital technology</p> <p>The Netherlands is a low-lying country in general, and dealing with flood damage has been identified as an important national issue.</p> <p>Waternet and Siemens are conducting a demonstration experiment of a system that assesses the risk of rising water levels and issues warnings in the city of Amsterdam, utilizing technologies such as sensors, simulation models, and AI analysis of big data. In the Rainproof initiative, rainwater is stored on rooftops and underground for use as water for gardening and other purposes, rather than being discharged as it is. These efforts are based on sensors installed in various locations and rainfall information reported by citizens through an app, and are highly advanced watershed management including water storage and drainage through remote operation using IoT, after collecting detailed information with a fine-grained mesh.</p> <p>Buurzaam Wonen (Neighbourly Living) Business</p> <p>As part of an energy-related pilot project in Amsterdam's New West district (Geuzenveld), smart meters and monitors displaying energy consumption were installed in 60 houses. The objective of the project was to raise awareness of energy consumption patterns among the citizens of Amsterdam and to raise awareness and discussion about sustainable energy consumption behavior. The project also provided citizens with the experience of using smart meters and monitors, as well as an opportunity for businesses to try out various technologies. In addition to the involvement of private service providers, the government also collaborated in the implementation of the project to broaden the participation of residents.</p> <p>eManagement Haarlem</p> <p>eManagement Haarlem is a project to demonstrate an energy management system in 250 homes. eManagement Haarlem uses a device called Plugwise, which is attached to a power socket, to measure the power consumption of appliances in the home and communicate it to a computer, which stores the data on power consumption. The system was built to store data on power consumption by using a device called Plugwise, which is attached to a power socket to measure the power consumption of household appliances in the house and communicate it to a computer.</p> <p>The project collected and accumulated electricity consumption data from residents. This project has helped to gain a detailed understanding of the energy consumption behavior of residents, and by feeding back electricity consumption data and electricity costs to residents, it has quantified and visualized their own behavior and promoted energy-saving behavior.</p> <p>Mokum Mariteam</p> <p>Mokum Mariteam is a project aimed at validating that inland water transportation by motorized transport vessels is an alternative logistics to road by establishing a sound business case. The validation also included uncovering potential clients and generating demand.</p> <p>The project was an initiative of the waste management company Icovia. In 2007, the company planned an electrically powered inland water transport project in the canals that stretch through Amsterdam as a smart design for multimodal urban transportation. Koninklijke Saan, a transportation service company, and three cruise lines joined in this initiative to jointly develop an electrically powered transport vessel. The boat is 20 meters long and 4.75 meters wide, making it slightly larger than other boats that navigate the canal. The boat is powered by 260 batteries and uses only electricity, not fossil fuels. The boat is equipped with a crane and is capable of both delivering goods and collecting and transporting them (e.g., garbage collection and transportation).</p>

Country/City	Netherlands /Amsterdam
	After the demonstration project, the five partners in the project established Mokum Mariteam, which has started a transportation business using several motorized transport vessels.
Implementation	No information
Date Source	Amsterdam Institute for Advance Metropolitan Solutions (AMS Institute) https://www.ams-institute.org/
	City Innovation Exchange Lab (CITIXL) http://www.citixl.com/
	The Amsterdam Economic Board (AEB) https://amsterdameconomicboard.com/en
	Human Values for Smarter Cities https://waag.org/en/project/human-values-smarter-cities/
	Waag:. https://waag.org/en/about-waag/
	Government of Netherlands https://www.government.nl/topics/enterprise-and-innovation/encouraging-innovation
	Netherland Digital https://www.nederlanddigitaal.nl/english
Challenges and solutions	No information
Memo	The AEB is working on the following themes: 1) promoting efforts to create a recycling-oriented society, 2) promoting digital technology and data-driven innovation, 3) energy, 4) creating a healthy and long-lived society, 5) promoting sustainable mobility, and 6) creating a resilient and attractive labor market.

Data Collection on Smart Cities in Developed Countries

Country/City	Norway/Oslo
Policy/Vison	<p>In a Norwegian context, the definition of a ‘smart city’ is as follows:</p> <p>Smart cities and communities focus on people, while using new technology, innovative methods, collaboration and co-creation to become more sustainable, attractive, productive and resilient. In order to provide a comprehensive guide for Norway’s local and regional authorities on how to create a smart city, the “Roadmap for smart and sustainable cities and communities in Norway” was launched in August 2019.</p> <p>National Smart City Roadmap</p> <p>The Norwegian roadmap for smart and sustainable cities and communities is a guide with visions and principals for municipalities and county councils. The roadmap is intended as a guide for municipalities and county councils wishing to use smart city as a method. Its overarching aim is to promote the development of sustainable, productive and adaptable cities and communities</p> <p>Vision – Smart cities and local communities:</p> <ol style="list-style-type: none"> 1. Attractive: provide the conditions for a variety of cultural activities, experiences, trade and other activities, as well as good public services 2. Inclusive: establish physical and digital platforms that connect citizens with the local community and strengthen local democracy, facilitate collaboration among academia, business professionals and the local authorities 3. Efficient: offer seamless services of high quality that ensure that citizens have access to what they need when they need it, facilitate an easier everyday life for citizens and greater agility for the business community. They utilize the available local resources effectively and structure land use, energy solutions and transport. 4. Climate-friendly: reduce greenhouse gas emissions and resource use in all areas of society. Implement environmentally friendly energy and transport solutions. encourage recycling and restoration of existing buildings 5. Adaptable: Resilient cities have a high innovation capacity and ability to develop and adapt to changing conditions and circumstances. 6. Health-promoting cities view society, nature and health within a strategic context. They ensure citizens’ rights to clean air, clean water and access to green recreation areas. They facilitate a varied blue-green infrastructure that contributes to dealing with climate challenges and promote biological diversity and animal life, as well as the physical and mental well-being of citizens. <p>Eight principles for smart and sustainable cities and communities :</p> <ol style="list-style-type: none"> 1) Place people in the center 2) Consider the bigger picture 3) Priorities climate and environment 4) Promote inclusion and co-creation 5) Focus on next generation business 6) Share and use open data 7) Develop competencies and embrace change 8) Act local, think global <p>These eight principles in the “Roadmap for smart and sustainable cities and communities in Norway” are designed to help local and regional authorities to prioritize focus areas and direction for their smart city initiatives.</p>
Organizational Structure	<p>One of the greatest cooperative projects for Norwegian Smart Cities is the roadmap for smart and sustainable cities and communities in Norway. This product was made in collaboration with <u>DOGA, Nordic Edge Smart City Innovation Cluster</u> and <u>different public and private players from all over the country</u>. The purpose was to create common ground, a guideline and a tool with a set of principles and goals for the municipalities and organizations to follow.</p> <p>Target groups and roles</p> <ol style="list-style-type: none"> 1. local and regional authorities that are the main target group. It is they who are to engage in dialogue with the relevant government agencies in order to implement the principles and measures defined in the roadmap. 2. business professionals, organizations and academics are the secondary target group. <p>Organizations involved in Smart city development:</p> <ol style="list-style-type: none"> 1. Norwegian Ministry of Climate and Environment 2. Digdir <p>The Norwegian Digitalization Agency (Digdir) is the primary tool of the Norwegian government for faster and more coordinated digitalization of its public sector. Digdir is subordinate to the Ministry of Local Government and Regional Development.</p> <ol style="list-style-type: none"> 3. Norwegian Public Roads Administration 4. Ruter :the public transport company for the region (Operates buses, boats, minibuses and taxis)

Country/City	Norway/Oslo
	<p>5. Nordic Edge</p> <p>Nordic Edge is a <u>non-profit organization working in close cooperation with private companies, municipalities, academia and citizens towards smarter and more sustainable cities and communities.</u> Our aim is to be a driving force for the development, testing and export of smart city technology and sustainable solutions on behalf of our cluster members.</p>
System	<p>National level</p> <ul style="list-style-type: none"> • White Paper on waste policies in a circular economy – Ministry of Climate and Environment • Act on protection against pollution and on waste • Norway's strategy for developing a green, circular economy <p>Detailed info on Page 5 → Oslo resourceful cities integrated action plan</p> <p>The roadmap is intended to ensure a comprehensive and inclusive approach to smart city efforts. It can be used as a basis for discussions pertaining to the formulation of new strategies, policy documents, projects and services. It can serve as a starting point for co-creation processes with citizens, business professionals, academics and other parties. The roadmap can also act as a strategic tool for communicating ambitions and values, both externally and internally within local and regional authorities. the roadmap supports the 'Norwegian smart city model', aimed at promoting sustainable societal development through 'green' business activities on the one hand and quality services and living environments for citizens on the other</p> <p>2. Diddir</p> <p>Main functions</p> <ol style="list-style-type: none"> 1. Contribute to development and implementation of government ICT policy. 2. Setting the agenda for digitalization and comprehensive information management. 3. Driving innovation in the public sector and having a special responsibility as a facilitator for effective collaboration among stakeholders in the field. 3. Coordinate cross-cutting digitalization measures. 4. Strategic planning and further development of a comprehensive 5. digital infrastructure for the public sector. 6. Coordinate and drive preventive information security efforts in the public sector. 8. Promote plain language in the public sector. 9. Develop digital services for citizens, municipalities, and businesses. 10. Operation, management, and further development of shared components and solutions. 11. Supervise universal design of ICT. 12. Diddir participates in several international projects. <p>> Norway's climate action plan for 2021-2030</p> <p>This document is the government's white paper laying out how it intends to meet its climate targets by 2030. It sets sectoral strategies of emissions reductions, notably with regard transport and the carbon tax. The government has proposed that it will increase the carbon tax to 2000 kroner per ton of CO₂ by 2030 on emissions not covered by the European ETS. The government has also introduced a tax on waste incineration.</p> <p>Target: To reduce greenhouse gas emissions by at least 50 % and towards 55 % by 2030 compared to 1990. This is a crucial step on the path towards Norway's target of being a low-emission society by 2050.</p> <p>Key strategies</p> <ul style="list-style-type: none"> • Strategy on Climate Change, Hunger and Vulnerability: The strategy supports climate-vulnerable societies to adapt to a changing climate. Developing countries are assisted in improving their adaptive capacity to climate change and their capacity for disaster risk reduction and for dealing with climate-related and natural disasters. It is also intended to play a part in ending hunger, achieving food security, improving nutrition and promoting sustainable food systems built on agriculture, aquaculture and fisheries. • Norway's International Climate and Forest Initiative (NICFI) strategic areas: Contribute to the reduction and reversal of tropical forest loss to enable a stable climate, preserved biodiversity and sustainable development. There are seven strategic areas: land-use policies, rights of indigenous peoples, carbon markets and international support structures, transparency, deforestation-free commodity markets, deforestation-free financial markets and international forest crime. • Food, People and the Environment: The Government's Action Plan on Sustainable Food Systems in the Context of Norwegian Foreign and Development Policy: Increased sustainable,

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	<p>climate-resilient food production and increased productivity from agriculture, fisheries and aquaculture sectors. Increased sustainable value creation and private sector development in the food sector that ensures stable access to healthy and safe food and reduces food waste. Improved nutrition and sustainable consumption patterns due to improved knowledge and access to healthy and varied diets, safe food and clean drinking water. Sustainable food systems are promoted at national, regional and global levels, and strengthened through institution building.</p> <ul style="list-style-type: none"> • Norway's Humanitarian Strategy: Support efforts to promote preparedness, disaster risk reduction and climate change adaptation as part of an integrated approach to reducing vulnerability and humanitarian needs. Promote green humanitarian response and will seek to ensure that climate change and environmental considerations are better integrated into humanitarian efforts. Require Norway's partners to choose sustainable and more environmentally friendly solutions for their humanitarian operations. • The Norwegian Development Program to Combat Marine Litter and Microplastics: Prevent and greatly reduce the extent of marine litter from large sources in developing countries. • The Security Council: Norway's Priorities: Ensure that the Security Council discusses climate-related security threats and that it assesses, on a continual basis, the possible impact of climate change on other issues on its agenda. • Blue Ocean, Green Future: Promote a sustainable blue economy in developing countries and contribute towards achieving the United Nations (UN) Sustainable Development Goals (SDGs). • The Place of the Oceans in Norway's Foreign and Development Policy: This White Paper aims to highlight the opportunities the oceans offer for Norway and the challenges that will need to be dealt with, and to describe how Norwegian foreign and development policy can be used to safeguard Norway's ocean interests and promote the achievement of the UN SDGs. It shows how Norway seeks to support implementation of the recommendations of the high-level panel for sustainable ocean economy, both taking an integrated approach for environment natural resources and development. • Panorama: Strategy for Co-operation on Research and Higher Education with Brazil, Canada, China, India, Japan, Russia, South Africa, South Korea and the USA (2021–2027): Research-based knowledge to achieve the UN SDGs is a prioritized area. Increase internationalization without increasing the carbon footprint. • Better Health, Better Lives: Help to prevent non-communicable diseases through development co-operation by contributing to healthy and sustainably produced food; a healthy environment with clean air and clean energy; [...] strengthen efforts to reduce the number of deaths caused by air pollution. • Digitalisation for Development: Digital Strategy for Norwegian Development Policy: Digitalization will be integrated into the Government's existing thematic priorities for Norway's development policy, climate, the environment and oceans. • Strategy for Norway's Efforts in the Sahel Region (2021–2025): Promote more sustainable, climate-resilient and productive food production. Strengthen analysis of climate-related security risks. Strengthen efforts to create sustainable, decent jobs. • Norad's Strategy towards 2030: Climate and the environment will be integrated into all Norad's work and be a leading principle when developing new partnerships and initiatives.
Technology	<p>ICT, IoT, Shared Mobility, Intelligent Lighting</p> <p>EV (EV buyers don't pay the 25-percent sales tax and enjoy free parking, access to the bus lane, free charging, and free transport on ferries. Norway (Oslo) is an electric-car-owner's paradise.)</p> <p>Open Data (Norway has a national registry which contains data in numerous areas, including the environment, health, geography, agriculture, traffic and demographics, and it is available for use by everyone. In the context of smart cities, for example, car-sharing companies can use traffic data and data from the Norwegian Mapping Authority to determine the demand for their services.),</p> <p>Smart Mobility (In Bergen in Western Norway – which is Norway's second largest city, shared mobility project, the city has opened several hubs made up of permanent, reserved parking spaces for car-sharing cars, primarily electric ones. Mobility hubs are located close to public transport and ride-sharing stops, and offer secure bicycle parking, access to city bikes and chargers for electric vehicles.)</p> <p>→ Ruter (the company that covers the greater Oslo region)</p> <p>Norway a public funding scheme – Pilot-T – to support the development of innovative and export-friendly smart mobility solutions.</p>
Implementation	<p>Project Goals</p> <ul style="list-style-type: none"> • Create closer interaction between the public, private sector, academia and residents.

Country/City	Norway/Oslo
	<ul style="list-style-type: none"> • Achieve UN Sustainability Goals • Creating smarter and more sustainable cities and communities • Do it together • Reduce risk • Copy good solutions and avoid bad ones • Increase implementation capacity
Challenges and solutions good examples	<p>challenges that inhibited the implementation of smart city in Norway? Which implementation challenges and obstacles are face and what are the key drivers for smart cities infrastructure?</p> <p>Good practices: Norway is a leader when it comes to IoT, implementing this technology on a large scale. For example, Statsbygg – which is responsible for all government-funded construction projects – is investing heavily here. This has opened up the market and made similar solutions more accessible for private actors. Norway also promotes advances through stringent requirements for energy use in new buildings. In the private sector, the Powerhouse alliance is developing energy-positive buildings that generate more energy than they consume throughout their lifespan. Powerhouse and similar Norwegian firms have been attracting significant international attention as spearheads for energy-positive architecture.</p> <p>the greater Oslo region: is an excellent test lab for smart, green transport solutions. Ruter– the public transport company for the region – has stated that all its modes of transport will become emission free by 2028.</p> <p>In Bergen in Western Norway – which is Norway’s second largest city with a population of just over a quarter million – shared mobility is the keyword.</p> <p>The city has opened several of what will be about 10 mobility hubs. The core of each hub is made up of permanent, reserved parking spaces for car-sharing cars, primarily electric ones. Mobility hubs are located close to public transport and ride-sharing stops, and offer secure bicycle parking, access to city bikes and chargers for electric vehicles.</p> <p>Stavanger in Southwest Norway, meanwhile, has a population of just under 130 000. In 2019 it received the Mobility Award from the Norwegian Public Roads Administration and was simultaneously named Norway’s smartest city. Norway even has a public funding scheme – Pilot-T – to support the development of innovative and export-friendly smart mobility solutions.</p> <p>Norway is a champion of open data, and the Agency for Public Management and eGovernment (Difi) runs a national registry of open data from the public sector.</p> <p>The registry contains data in numerous areas, including the environment, health, geography, agriculture, traffic and demographics, and it is available for use by everyone. In the context of smart cities, for example, car-sharing companies can use traffic data and data from the Norwegian Mapping Authority to determine the demand for their services.</p> <p>Access to such extensive open data makes it easier for entrepreneurs, innovators and others to identify problems and opportunities and develop smart solutions for smart cities.</p> <p>Challenges: Barriers to develop digital services among municipalities in Norway 2020-2021 Published by Bergur Thormundsson, Dec 19, 2022 Over 75 percent of Norwegian municipalities stated that difficulty to release resources for development work was the leading barrier to develop digital services in the country in 2021, making it the most common barriers for municipalities in Norway, just as in 2020. The second most common barrier was lack of skills in the enterprise, followed by higher ACT costs than expected.</p>
Date Source	<p>Smart cities in Norway enhance quality of life and reduce emissions https://businessnorway.com/articles/smart-cities-in-norway-enhance-quality-of-life-and-reduce-emissions</p> <p>Norway is mapping out the future’s smart cities https://businessnorway.com/articles/norway-is-mapping-out-the-futures-smart-cities</p> <p>The national smart city roadmap https://nordicedge.org/projects/norwegian-smart-cities/</p> <p>Barriers to develop digital services among municipalities in Norway 2020-2021 https://www-statista-com.translate.goog/statistics/1119119/barriers-to-develop-digital-services-among-municipalities-in-norway/? x tr sl=ja& x tr tl=en& x tr hl=ja& x tr pto=wapp</p> <p>Roadmap for smart and sustainable cities and communities in Norway https://doga.no/globalassets/pdf/smartby-veikart-19x23cm-eng-v1_delt.pdf</p> <p>Norway is mapping out the future’s smart cities</p>

Country/City	Norway/Oslo
	https://businessnorway.com/articles/norway-is-mapping-out-the-futures-smart-cities
	https://businessnorway.com/articles/norway-is-mapping-out-the-futures-smart-cities
	Digdir: https://www.digdir.no/digdir/about-norwegian-digitalisation-agency/887
	Nordic EDGE https://nordicedge.org/projects/norwegian-smart-cities/
	Norway's climate action plan for 2021-2030 https://climate-laws.org/documents/norways-climate-action-plan-for-2021-2030-6b7f?id=norway-s-climate-action-plan-meld-st-13-2020-2021_1aba https://climate-laws.org/document/norway-s-climate-action-plan-meld-st-13-2020-2021_1aba
	Environmental Policies & Climate Vulnerabilities https://earth.org/country/norway/
	NTNU Smart Sustainable Cities https://www.ntnu.edu/smartcities/smartcities
	Strategies and policies for systematic integration https://www.oecd-ilibrary.org/sites/eb61b4fb-en/index.html?itemId=/content/component/eb61b4fb-en
Memo	<p>Roadmap The main goal of this roadmap is to promote the development of sustainable, productive and resilient cities and communities. The roadmap is to serve as a:</p> <p>Guidebook: Describing the possible positive societal effects of smart city initiatives and identifying key opportunities, challenges and issues.</p> <p>Bridge Builder: Defining smart cities in a Norwegian context and using this definition to establish a common set of values that promote collaboration and co-creation across all sectors, professions at all levels and, in particular, together with the public.</p> <p>Value Creator: Aiming to contribute to renewal and innovation in the public sector. It describes the link between smart cities and urban and community development. It also shows how local and regional authorities can be the driving force behind this transformation.</p> <p>Platform: Positioning Norway within the smart city context. It serves as a communication platform both internally and externally and stimulates the development of innovative, multidisciplinary solutions that can be scaled, thereby promoting value creation. This first version of the roadmap provides a framework for smart city initiatives in Norwegian local and regional authorities, describing overriding principles and visions. In the next phase, the roadmap will be expanded with recommended measures, tools and best practices.</p>
Oslo	City Level
Policy/ Vision	<p>European Green capital A greener, warmer and more creative and inclusive city for all. Vision & focus area description Detailed info on Page11 ↓ Oslo resourceful cities integrated action plan</p>
Organizational Structure	<p>Overview of Oslo's ULG structure (URBACT Local Group) Public/ municipal:</p> <ul style="list-style-type: none"> • The Agency for Waste Management • ByKuben — Oslo Centre for Urban Ecology • The Agency for Urban Environment • The Agency for Improvement & Development • Green Municipality • Alna District/ Area boost Trosterud and Haugerud • Sagene District • Alna Renovation and Technical Central • The Norwegian Labour and Welfare Administration (NAV) • The Penal Care • The youth club Blokk 58 • The youth club Trosterudklubben • Stovner High School • The Oslo Trees Project and summer holiday jobs for young people <p>Private:</p> <ul style="list-style-type: none"> • Go Good

Country/City	Norway/Oslo
	<ul style="list-style-type: none"> • Lif laga • The Neighbourhood Factory • Møller Real Estate • Stovner Centre Citycon • Circular Ways • Rinato • Askim Apple and Berry Press <p>Civil society:</p> <ul style="list-style-type: none"> • Young people • Fagerholt and Stubberudlia Housing Associations • Kindergardens at Trosterud • Dr. Dedichens Green Square • Friends of the Earth Norway <p>Academia:</p> <ul style="list-style-type: none"> • The University of Agder • Indicator project (research partners in the project are Cicero, Norwegian Institute for Sustainability Research (Norsus) and Oslo Metropolitan University). <p>Oslo Municipality's work on the environment and climate is led by the <u>Department for Environment and Transport</u> with underlying agencies: <u>the Agency for Climate</u>, <u>the Agency for Waste Management</u> and <u>the Agency for Urban Environment</u>. The city's work on the <u>environment and climate</u> is also supported by the <u>Department for Urban Development</u> and the <u>Department for Finance</u>. In addition, Oslo has 15 districts that are carrying out environmental tasks at the local level.</p> <p>Detailed info on Page 4 ,14↓ Oslo resourceful cities integrated action plan</p>
System	<p>Plans :</p> <ol style="list-style-type: none"> ① Future of consumption – City of Oslo's strategy for sustainable and reduced consumption 2019-2030 ② Plan for sustainable and reduced consumption 2022-2025 (annual) ③ Professional basis for a Thematic Plan for Circular Economy <p>Detailed info on Page 5 ↓ Oslo resourceful cities integrated action plan</p> <p>Policy</p> <ul style="list-style-type: none"> • Our City, our Future – The social element of the municipal master plan for Oslo - Vision, objectives and strategies towards 2040. A greener, warmer and more creative and inclusive city. • Future of consumption – City of Oslo's strategy for sustainable and reduced consumption 2019 - 2030 • Oslo's Action Plan for Sustainable and Reduced Consumption 2022 - 2025 (revised annually) • Oslo Municipality Budget and economic plan 2022-2025 • Action Plan to Reduce Plastic Pollution in the Oslo Fjord 2019 - 2020 • Climate Strategy for Oslo Towards 2030 • Oslo's public procurement strategy • "Campus Oslo", an overarching plan for the development of Oslo as a knowledge capital Planned or on the way: • Thematic Plan for Circular Economy / circular economy strategy <p>Detailed info on Page10 ↓ Oslo resourceful cities integrated action plan</p>
Technology	<p>ICT, IoT, Open data</p> <p>There are a wide range of Smart City projects in Oslo, from <u>testing electrical buses</u>, <u>zero-emission construction sites</u> and <u>retrofitting existing buildings to developing circle-based waste management and green energy systems</u>. Any citizen-oriented services that can be digitalized will be digitalized and the needs of the citizens are the guiding principles for development.</p>
Implementation Method	<p>Projects</p> <ol style="list-style-type: none"> ①Oslo Trees Project and summer holiday jobs for young people ②Area support programs in Oslo Municipality ③Sustainable furniture procurement in Alna District ④Smart Oslo ⑤Innovation District Hovinbyen ⑥Start up Service <p>Detailed info on Page 6 and page 16 to 33 ↓ Oslo resourceful cities integrated action plan</p>

Country/City	Norway/Oslo
Challenges and good practices	3.4 Challenge to be addressed & SWOT Detailed info on Page 8-9 ↓ Oslo resourceful cities integrated action plan
Data Source	Oslo resourceful cities integrated action plan https://urbact.eu/sites/default/files/2023-04/oslo_iap_final.pdf
	Smart Oslo and Baerum https://nscn.eu/Oslo

Date Collection on Smart Cities in Developed Countries

Country/City	Spain/Barcelona
Policy/Vision	<p>The "City of Knowledge" initiative, which was launched in the early 2000s, was pursued with the overall goal of strengthening competitiveness through the promotion of the knowledge industry, developing culture by incorporating new values, and strengthening social cohesion.</p> <p>The Digital City Plan of 2015 sets the direction that digital technology should be used to improve the quality of life of citizens and to realize a citizen-centered society, and aims to improve public services, support digital businesses and entrepreneurs, and empower citizens, for government, private companies, and citizens respectively. empowerment and social inclusion.</p> <p>1) "City of Knowledge" initiative</p> <p>In the early 2000s, in response to the rapid development of science and technology in the information sector, intensifying competition between cities, and the need to respond to the resulting changes in socioeconomic structure, the Barcelona City Hall launched "Project Barcelona, City of Knowledge" to utilize knowledge at all levels of the city, to promote new industries, and to strengthen social cohesion. The city of Barcelona has launched "Project Barcelona, City of Knowledge" to promote new industries and strengthen social cohesion through the utilization of knowledge at all levels of the city.</p> <p>The "City of Knowledge" concept is based on the openness and creativity that characterize the city of Barcelona, and is an inclusive approach that aims to transform the city into an information society, to create jobs and economic growth through the promotion of the information industry, and to promote fair and transparent procedures for the dissemination of science and technology in the lives of citizens through the active participation of civil society. It is an inclusive effort to promote science and technology widely in the lives of citizens under fair and transparent procedures with the active participation of civil society. In this context, "Information" and "Knowledge" are clearly distinguished. The City of Knowledge concept is to promote a new economy (industry) that is not a traditional economy that relies on economies of scale by forming knowledge through the creative use of information accumulated by information technology. This City of Knowledge concept is a broad strategy that targets the utilization and promotion of new technologies, but also encompasses the economy and community. This strategy has led to concrete projects such as the redevelopment of the Poblenou district, known as 22@Barcelona, and is the basis for the City of Barcelona's smart city initiatives, as evidenced by the frequent references to the City of Knowledge in Barcelona's city documents. The City of Knowledge has been the foundation for smart city initiatives in the city of Barcelona, as evidenced by its frequent appearance in city documents.</p> <p>2) Barcelona Digital City Plan</p> <p>The city of Barcelona has developed the "Barcelona Digital City" plan, which aims to improve urban services for the people through the use of digital technologies. The plan aims to improve public services, support digital businesses and entrepreneurs, and promote citizen empowerment and social inclusion for public, private, and civic actors. Efforts in the public sector are aimed at improving the quality of public services using technology and open data, with digital transformation as the keyword.</p>
Organizational Structure	<p>The government agency leading the smart city policy:</p> <p>1. Instituto Municipal de Informática de Barcelona (IMI), which oversees the digital sector of the city of Barcelona.</p> <p>IMI is the central organization of Barcelona's smart city ecosystem, a public interest corporation under the jurisdiction of Barcelona City Hall with an independent legal personality and its own assets and budget, responsible for the development, provision and management of cross-functional digital solutions for the various departments and public interest companies of the city of Barcelona. In particular, its mission is to provide comprehensive and concrete ICT solutions to all administrative bodies involved in the city's public administration, to provide advisory services to administrative bodies and citizens with a priority on the public interest, and to market and network through ICT. IMI also plays a leading role in the conception and specification of this digital technology and services, and is responsible for monitoring and managing the services, but actively utilizes outsourcing to the private sector for the actual development and implementation of the services.</p> <p>2. BCN Ecologia Urbana (Barcelona City Ecology Agency)</p> <p>The Ecologia Urbana (Barcelona Urban Ecology Agency) is one of the organizations that are unique in the city's urban planning and urban space formation.</p> <p>(The process of transferring personnel and assets to the Regional Agencia Desenvolupament Urba Regional Urban Development Agency has begun in 2019.)</p> <p>Ecologia Urbana is a public benefit corporation under the jurisdiction of the Barcelona City Hall, the Metropolitan Region of Barcelona, and the Barcelona Council, with an independent legal personality and its own assets and budget. It simulates, plans, and implements urban policies to create livable and sustainable urban spaces. It also systematically identifies various fields such as mobility, energy, urban planning, and multiculturalism based on digitized data, and makes policy</p>

Country/City	Spain/Barcelona
	<p>proposals to the City and Province of Barcelona for the creation of a sustainable city. One characteristic smart city measure is Superilla (English: Superblock).</p> <p>Ministry of Economic Affairs and Digital Transformation Ministry of Digital Transformation Red.es: one of the pioneering public entities in the promotion and implementation of the Smart City concept in Spain. Red.es collaborating with the Spanish Network of Smart Cities (RECI) and the Spanish Federation of Municipalities and Provinces (FEMP) to promote the development of Smart Cities and Red.es collaborating with the Spanish Network of Smart Cities (RECI) and the Spanish Federation of Municipalities and Provinces (FEMP) to promote the development of Smart Cities and Territories.</p> <p>In addition, Within the framework of the Smart Cities and Territories plans, Red.es has promoted a total of five calls aimed at local entities, which have in addition Within the framework of the Smart Cities and Territories plans, Red.es has promoted a total of five calls aimed at local entities, which have €200M towards Smart solutions.</p> <p>Project fund: (1) co-financed by the European Regional Development Fund (ERDF).</p>
System	<p>The Poblenou area, originally an industrial district, is being redeveloped as an Innovation District to create new industries and implement new technologies, while at the same time, new technologies are being retrofitted into existing infrastructure, such as Sentilo, which uses sensor systems to improve the efficiency of city operations, and Superblock, which makes smart use of existing urban spaces. The Innovation District (22@) is creating new industries and implementing new technologies in conjunction with redevelopment projects.</p> <p>Under the policy of the city of Barcelona, smart city initiatives are being implemented in the context of collaboration among various actors, including the private sector, government, and citizens, and a bottom-up smart city is being devised in which data held by the private sector is opened and data held by citizens is shared.</p> <p>National Smart Cities Plan The National Smart Cities Plan is the determined commitment of the Ministry of Economic Affairs and Digital Transformation to promote the Smart Cities the Plan establishes an industrial policy to promote the growth of the technology sector and its capacity for internationalization, for which it is supported by the Smart Cities and Destinations. The Plan establishes an industrial policy to promote the growth of the technology sector and its capacity for internationalization, for which it is supported by the large Likewise, the Plan contemplates the creation of a Smart Cities Advisory Council in order to coordinate efforts, improve communication and likewise, the Plan contemplates the creation of a Smart Cities Advisory Council in order to coordinate efforts, improve communication and approve recommendations. Destinations will be represented: institutions, the Spanish Network of Smart Cities, industry representatives and experts.</p> <p>Objectives: <input type="checkbox"/> Increase the contribution of ICT to the GDP of the industrial sector. Improve the effectiveness and efficiency of Local Entities in the provision of public services through the use of ICT. <input type="checkbox"/> Advance the governance of the Smart Cities system. <input type="checkbox"/> Promote the standardization, regulation and regulations of Smart Cities.</p> <p>■ Spain 2050 The strategy aims to improve the quality of life for citizens, achieve a sustainable economic model, and reduce social inequalities while ensuring the country's transition to a green economy. The strategy aims to improve the quality of life for citizens, achieve a sustainable economic model, and reduce social inequalities while ensuring the country's transition to a green economy.</p> <p>Key pillars related to SC</p> <ol style="list-style-type: none"> 1. Economic Reforms: Promoting a sustainable and resilient economic model, investing in innovation, technology, and digitalization, as well as improving productivity. 2. Green Transition: Committing to environmental sustainability, reducing carbon emissions, promoting renewable energy, and protecting biodiversity Green Transition: Committing to environmental sustainability, reducing carbon emissions, promoting renewable energy, and protecting biodiversity, aligning with the European Union's climate objectives and the Paris Agreement. 3. Social Inclusion: Closing social gaps, promoting equal opportunities, improving the welfare state, enhancing healthcare, and addressing demographic challenges such as aging populations. 4. Territorial Cohesion: Strengthening infrastructure, promoting smart and sustainable urban development, and addressing the population disparities Territorial Cohesion: Strengthening infrastructure, promoting smart and sustainable urban development, and addressing the

Country/City	Spain/Barcelona
	<p>population disparities.</p> <ul style="list-style-type: none"> ■ Regional Development Policy in Spain ■ Circular Economy Spanish Strategy ■ Regional Development Policy in Spain ■ The State of National Urban Policy in Spain
Technology	<p>Internet of things (IoT) 1) Innovative Technologies that Transformed Barcelona Into a Smart City. a parking system that guides drivers to available spots, people and weather-adjusting LED lights, smart waste bins that reduce odors etc. For example, the city has implemented smart meters and sensors in buildings to monitor and optimize energy usage, allowing for efficient energy management. For example, the city has implemented smart meters and sensors in buildings to monitor and optimize energy usage, allowing for efficient energy management.</p> <p>The goal is to improve the quality of public services using technology and open data.</p> <ul style="list-style-type: none"> - Open data initiatives: - Free & open software: FLOSS Barcelona - Open Budget - Transparency Mail box - Progressive web applications - Initiatives to promote urban technology to citizens: - City OS - Sentilo - Superblocks (Superilla) - KIC Urban Mobility <p>-Sentilo: Since November 2012, the City of Barcelona (Barcelona Information Department) has introduced Sentilo as a sensor system platform based on the concept of centralized management of sensor data in real time. The objectives of this system are to reduce administrative costs, improve administrative services, improve the living environment, and enhance administrative operations through the use of data.</p> <p>- Superblocks (Superilla): With the aim of solving air pollution and traffic congestion issues in Barcelona's grid area and providing public space to citizens, a project to create various traffic measures and public space in a part of Barcelona's plot as a superblock has been implemented since 2016. The streets inside the superblock will be used to accommodate cars. The roads inside the superblock will be restricted to cars only to transport neighborhood residents and stores, with speed limits, pedestrian priority, and the removal of parking spaces. In addition, many trees are planted inside the area to provide a place for leisure, interaction, recreation, and other activities for the citizens.</p>
Implementation	<p>Framework for Resident Participation</p> <ul style="list-style-type: none"> · Participatory platform Decidim introduced in 2018 <p>The system is designed to reflect the opinions of residents in the direction of public policy through the "Fix my street" system. The system also takes into account the bottom-up approach to smart cities, in which information is transmitted by citizens, as in the case of "Fix my street".</p> <p>The participation of citizens in urban policy is still strong, and the "Citizen Commitment to Sustainability 2002-2012" was developed with the involvement of hundreds of organizations and thousands of citizens regarding community-level action plans based on Agenda 21 adopted at the Rio Earth Summit. The "Citizen Commitment to Sustainability 2002-2012" was developed with the involvement of hundreds of organizations and thousands of citizens. Its successor, "Public Commitment for Sustainability 2012-2022," was also developed with citizen participation, and has become widely accepted by civil society as a common goal.</p> <p>Decidim: Decidim is an online platform for participatory democracy with the ability to gather diverse citizens' opinions online, facilitate and consolidate discussions, and translate them into policies, and was introduced in February 2016 under the initiative of the Barcelona Information Institute (IMI)</p> <p>Decidim is a Catalan Decidim means "to decide" in Catalan and is a digital platform for participatory democracy, built with free software, and is being introduced by municipalities in Helsinki and Japan. The City of Barcelona is actively introducing offline citizen meetings at the same time as the release of Decidim. This is intended to encourage broad participation of citizens and realize a citizen-centered society. The specific issues discussed include the use of public spaces such as Superblock and other public spaces, the use of public budgets, and other issues related to the daily lives of citizens. As of August 2021, the number of participants was 97,393, the number of proposals was 27,037, and the number of proposals accepted was 12,308, indicating the active use of Decidim.</p> <p>2) Barcelona Digital City Plan</p>

Country/City	Spain/Barcelona
	<ul style="list-style-type: none"> - Open data initiatives: - Free & open software: FLOSS Barcelona - Open Budget - Transparency Mail box - Progressive web applications - Initiatives to promote urban technology to citizens: - City OS - Sentilo - Superblocks - KIC Urban Mobility <p>The private sector's efforts are aimed at promoting digital business and supporting companies using technology and open data, with digital innovation as the keyword.</p> <ul style="list-style-type: none"> - Initiatives to improve the digital economy and innovation ecosystem - Innovation ecosystem - 5G Barcelona - MediaTIC Incubator - Initiatives to bring about innovation - Digital social innovation in Barcelona - Digital social innovation fund - Maker Faire Barcelona - Initiatives as an Innovation Laboratory - i.lab & Ca l'Alie - i.lab challenges - Innovative public procurement <p>The efforts of the civil society sector are aimed at using technology and open data to bring about an improved quality of life for citizens, with digital empowerment as the keyword.</p> <ul style="list-style-type: none"> - Efforts to ensure democratic and free use of digital technology - Decidim Barcelona - Cities Coalition for Digital Rights - Improve citizens' digital skills - Cibernàrium - STEAM Bcn - Fab Labs - Initiatives as an Innovation Laboratory - Barcelona Declaration for digital social inclusion - Empowering Women in tech - REC: Barcelona's digital social currency
Date Source	<p>Spain 2050 https://futuros.gob.es/en/our-work/spain-2050</p> <p>Summary https://futuros.gob.es/sites/default/files/esp2050/pdf/en/Spain_2050_Executive_Summary.pdf</p> <p>ESPAÑA CIRCULAR 2030 Circular Economy Spanish Strategy https://circulareconomy.europa.eu/platform/sites/default/files/espana_circular_2030_executive_summary_en.pdf</p> <p>Regional Development Policy in Spain https://www.oecd.org/cfe/Spain.pdf</p> <p>THE STATE OF NATIONAL URBAN POLICY IN SPAIN https://www.oecd.org/regional/regional-policy/national-urban-policy-Spain.pdf</p> <p>National Smart Cities in Spain https://plantl.mineco.gob.es/planes-actuaciones/Paginas/plan-nacional-ciudades-inteligentes.aspx</p> <p>red.es https://www.red.es/es/iniciativas/ciudades-y-territorios-inteligentes</p> <p>Web about SM cities and national plan in Spain https://www.telefonica.com/en/communication-room/blog/spanish-smart-cities-and-the-national-plan-for-smart-cities/</p> <p>Spanish SM cities model 2017 https://plantl.mineco.gob.es/digital-agenda/Documents/Spanish-Smart-Cities-Model.pdf</p> <p>website: Internet of things (IoT) ① http://www.barcinno.com/barcelona-smart-city-technologies/</p> <p>Website: Internet of things (IoT) ②</p>

Country/City	Spain/Barcelona
	https://angrynerds.co/blog/the-future-of-internet-of-things-in-smart-cities-barcelona-case-study/
Challenges and solutions.	<p>Barcelona has emerged as a leading example of a smart city, leveraging IoT technology to manage energy, waste, and water consumption effectively. By implementing smart meters, sensors, and IoT systems, Barcelona has achieved significant cost savings, improved quality of life, and positioned itself as a thriving center for the IoT industry. However, challenges such as security loopholes, energy consumption, and the lack of standardization remain. Addressing these challenges will be crucial to unlocking the full potential of smart cities and creating a future where technology and urban living technology and urban living harmoniously coexist.</p> <p>Major sustainability and green city challenges in Spanish cities include preparing for climate change threats, strengthening water management, reversing the deterioration in air quality, improving waste management, managing urban biodiversity, and supporting alliances among smart cities and green cities. reversing the deterioration in air quality, improving waste management, managing urban biodiversity, and supporting alliances among smart cities and green city stakeholders.</p> <p>Detailed info</p> <p>Challenges and Concerns Linked to Building Smart Cities</p> <p>Security Loopholes</p> <p>The broad spectrum of security risks associated with smart cities includes both individual fraudulent activities, such as hacking payment portals, and larger cyber-physical risks like malfunctioning traffic light cameras that could potentially cause accidents. There is also the concern of nation- state actors sabotaging an entire city's operations. Furthermore, the interconnected nature of smart systems means that any vulnerability within the infrastructure can pose a threat to the entire system's security, not just a single device.</p> <p>Additionally, smart cities face governance challenges, as there is often a lack of clearly defined roles and responsibilities regarding security and risk management. Unlike corporate environments where specific security positions exist, smart cities within municipalities usually lack such clarity, leading to uncertainty in addressing security concerns effectively. Unlike corporate environments where specific security positions exist, smart cities within municipalities usually lack such clarity, leading to uncertainty in addressing security concerns effectively.</p> <p>To mitigate potential threats, the NCC Research group, led by Matt Lewis, has developed "A Blueprint for Secure Smart Cities. This blueprint emphasizes the importance of incorporating robust security measures and conducting rigorous testing throughout the design and implementation stages of smart city technologies. It also highlights the need for data protection practices that prioritize consent and fair use, considering the potential privacy implications for citizens. Building smart cities raises concerns regarding energy consumption and e-waste. This absence of uniformity makes it difficult to compare and evaluate energy consumption patterns among cities. patterns among cities. Source: The Future of Internet of Things in Smart Cities - Barcelona Case Study</p>
Good Practices	<p>The city also harnessed the fiber network to deploy individual IoT sensors used to monitor water usage, detect leaks, and manage irrigation systems, promoting water conservation and ensuring efficient water management throughout the city. For instance, the implementation of 20,000 smart meters to monitor and optimize irrigation and water levels in parks led to a 25% increase in water conservation, saving around \$555,000 annually. Additionally, IoT technology is employed to monitor waste levels in garbage bins, encouraging optimized waste collection routes and reducing unnecessary pickups. Innovative features like interactive digital bus stops, sensor-guided parking, and energy-efficient smart lampposts were introduced, contributing to reduced congestion, lower emissions, and energy savings.</p> <p>Sentilo platform</p> <p>To manage the vast amount of data generated, Barcelona developed the Sentilo platform, an open-source system that allows efficient data management and sharing with citizens and city workers. The Sentilo platform in Barcelona connects a network of 18,000 active sensors within the city. monitor various aspects, including weather conditions, electricity usage, water supply, air quality, and environmental noise.</p> <p>The IoT initiatives in Barcelona have delivered significant benefits, including substantial cost savings in water and parking revenues, the creation of thousands of new jobs, and improved energy efficiency. The city's commitment to smart urban infrastructure has not only transformed governance but has also enhanced the overall quality of life for residents, workers, and visitors. The city's commitment to smart urban infrastructure has not only transformed governance but has also enhanced the overall quality of life for residents, workers, and visitors.</p> <p>Source: The Future of Internet of Things in Smart Cities - Barcelona Case Study</p>

Country/City	Spain/Barcelona
Data Source	<p>Spanish cities sustainability and green city challenges https://www-beesmart-city.translate.goog/en/strategy/smart-environment/smart-cities-in-spain-the-commitment-to-a-green-economy? x tr sl=en& x tr tl=en& x tr hl=en& x tr pto=wapp</p> <p>The Future of Internet of Things in Smart Cities - Barcelona Case Study https://angrynerds.co/blog/the-future-of-internet-of-things-in-smart-cities-barcelona-case-study/</p> <p>Spain: Taking the Concept of Smart Cities to the Next Level https://iotblue.com/story-hub/spain-taking-the-concept-of-smart-cities-to-the-next-level</p> <p>How Smart City Barcelona Brought the Internet of Things to Life https://datasmart.hks.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789</p>
Memo	<p>How Smart City Barcelona Brought the Internet of Things to Life</p> <p>Conclusion</p> <p>The future of smart cities lies in the seamless integration of technology and urban living. As the global population continues to urbanize, digitalization and the Internet of Things (IoT) offer tremendous opportunities to create sustainable and equitable cities. Barcelona has emerged as a leading example of a smart city, leveraging IoT technology to manage energy, waste, and water consumption effectively. By implementing smart meters, sensors, and IoT systems, Barcelona has achieved significant cost savings, improved quality of life, and positioned itself as a thriving center for the However, challenges such as security loopholes, energy consumption, and the lack of standardization remain. Addressing these challenges will be crucial to unlocking the full potential of smart cities and creating a future where technology and urban living harmoniously coexist.</p> <p>The BCN Ecologia Urbana Agencia (BCN Ecologia Urbana Agencia (* now the Regional Agencia de Desenvolupament Urba), which makes policy recommendations for sustainable urban development based on data.</p>

Data Collection on Smart Cities in Developed Countries

Country/City	Switzerland/Zurich
Policy/Vision	<p>Switzerland is known for its commitment to sustainable development and smart city initiatives. The country emphasizes a comprehensive approach, integrating technology to enhance urban living.</p> <p>Vision: Envisions smart cities that prioritize sustainability, innovation, and quality of life.</p> <p>Policy: Swiss smart city policies focus on environmental sustainability, digital innovation, and citizen well-being. Policies often encourage public-private partnerships for effective implementation.</p>
Organizational Structure	<p>The Swiss approach involves collaboration among government bodies, private sector entities, and research institutions to foster a well-coordinated effort. several organizations and entities play crucial roles in smart city development and projects in Switzerland. <u>Here are some key entities involved:</u></p> <ol style="list-style-type: none"> 1. Swiss Smart Cities: An association that fosters collaboration among cities, industries, academia, and other stakeholders to advance smart city initiatives. 2. eSmart Switzerland: Focuses on promoting and implementing smart technologies to enhance sustainability, efficiency, and quality of life in Swiss cities. 3. Innosuisse: The Swiss Innovation Agency supports and funds innovation projects, including those related to smart city development. 4. ICT Switzerland: Represents the Swiss ICT sector, including companies involved in providing technologies for smart cities. 5. Federal Office of Spatial Development (ARE): The national authority responsible for spatial planning and development, which plays a role in shaping smart city strategies. 6. Swiss Federal Railways (SBB): Involved in smart mobility initiatives, including innovations in transportation and connectivity within cities. 7. Local Governments and Municipalities: Cantonal and municipal governments across Switzerland are actively involved in implementing smart city projects tailored to local needs. 8. Academic and Research Institutions: Universities and research centers contribute to smart city development through research, innovation, and academic collaborations. 9. Swiss Smart City Compass: online library of smart city projects in Switzerland 10. Smart City Lab Basel
System	<p>Switzerland's smart city strategy centers on leveraging technology to optimize infrastructure, improve mobility, and enhance public services while maintaining a high quality of life. Integrated smart systems incorporate IoT devices, data analytics, and connectivity to manage resources efficiently and enhance urban services.</p>
Technology	<p>Switzerland adopts cutting-edge technologies, including IoT sensors, AI, and data analytics, to create interconnected and intelligent urban ecosystems.</p> <p>Some common technologies used in Swiss smart city initiatives include:</p> <ol style="list-style-type: none"> 1. Internet of Things (IoT) 2. Data Analytics 3. Smart Grids 4. Digital Infrastructure 5. Smart Mobility 6. E-Government Services 7. Blockchain Technology 8. Augmented Reality (AR) and Virtual Reality (VR): Implementing AR and VR technologies for urban planning, interactive citizen engagement, and virtual simulations of proposed infrastructure projects. 9. Cybersecurity Solutions: Addressing the importance of securing smart city systems and data through robust cybersecurity measures. 10. Renewable Energy Solutions: Integrating sustainable energy solutions, such as solar panels and energy-efficient technologies, to promote environmental sustainability. 11. Waste Management Technologies: Implementing smart waste management systems that optimize collection routes and promote recycling through the use of sensors and data analytics.
Implementation	<p>Smart city initiatives are implemented through phased approaches, pilot projects, and collaborations to ensure sustainable, scalable solutions.</p> <p>Swiss Smart City Compass: Use Cases on the Swiss Smart City Compass platform are real-world reference projects sharing insights and learnings to show you what is already possible. Each Use Case contains a list of achieved benefits, driving factors, financial information, advice for replication and links to relevant Solutions and the implemented Products. There is also the opportunity to contact the Swiss Smart City Compass platform users who participated in implementing and managing the Use Case.</p> <p>List of Smart city projects in Swiss</p>

Country/City	Switzerland/Zurich
	<ul style="list-style-type: none"> • Smart city cases (projects) in Swiss • Smart City Lab Basel • Data Donation for non- profit in the city of Zurich • Pedestrian traffic light • ParkSmart • E-shop in the neighborhood • OpenData St.Gallen • Smart Road • Swiss Transit Lab • E-Buss • EV collection Vehicle <p>There are many other cases on different sectors namely, Mobility, Energy, ICT, Air, Health, Building, Security, waste, and water in this online library.</p>
Challenges and solutions good examples	No information
Date Source	Sustainable cities through forward-looking technologies https://www.swiss-smart-city-compass.com/en/home.html
	Swiss Smart Cities https://www.swiss-smartcities.ch/
	eSmart Switzerland https://esmart.swiss/
	Innosuisse https://www.innosuisse.ch/
	ICTswitzerland https://www.ictswitzerland.ch/
	ARE - Federal Office for Spatial Development https://www.are.admin.ch/
	Swiss Federal Railways (SBB) https://www.sbb.ch/en
	Smart City Lab Basel https://www.swiss-smart-city-compass.com/en/use-cases/use-case/smart-city-lab-basel.html
	Swiss Smart City Compass https://www.swiss-smart-city-compass.com/en/use-cases.html?q=&tx_solr%5Bcontroller%5D=Search&tx_solr%5Bfilter%5D%5B0%5D=sector%3AMobility
London	City Level
Policy/ Vision	Zurich is focused on achieving sustainable urban development through a comprehensive and collaborative approach that leverages the latest technologies and data to enhance the quality of life for its citizens while promoting economic growth and environmental sustainability.
Organizational Structure	<p>Some key stakeholders that are involved in smart city development in Zurich:</p> <ol style="list-style-type: none"> 1. City of Zurich 2. Zurich University of Applied Sciences (ZHAW) 3. Private Sector Partners 4. Swiss Federal Railways (SBB) 5. Smart City Zurich 6. Swiss Federal Institute of Technology Zurich (ETH Zurich) 7. Zurich Transport Authority (VBZ) 8. ETH Zurich: Dept. of Information Technology and Electrical Engineering
System	<p>Zurich Smart City Strategy</p> <p>The Smart City Zurich Strategy is designed to help bundle the future needs of the population, promote innovation and position Zurich as a Smart City. In this way, Smart City Zurich supports the implementation of the «Zurich Strategies 2035» and of a number of specific strategies.</p> <p>Some facts about Smart city strategy in Zurich</p> <ol style="list-style-type: none"> 1. Public Transport: Smart City Zurich has one of the most extensive public transport networks in the world, with over 450 million passengers using the system each year. The city's public transport network includes trams, buses, trains, and boats, and it is considered to be one of the most efficient and reliable systems globally. 2. Energy: Zurich aims to become a carbon-neutral city by 2050. As of 2019, the city had already achieved a 36% reduction in CO2 emissions compared to 1990 levels. Zurich is also the first city in the world to have an energy-efficient district that produces more energy than it consumes. The

Country/City	Switzerland/Zurich
	<p>district is called “Werkstadt Zurich” and uses renewable energy sources such as geothermal and solar power.</p> <p>3. Environment: Zurich has been recognized as one of the world’s greenest cities, with over 500 parks and green spaces covering more than 50% of the city’s total area. The city also has a comprehensive waste management system that aims to reduce the amount of waste produced and increase recycling rates.</p> <p>4. Digitalization: Smart City Zurich is home to several tech startups and innovation hubs, such as the ETH Zurich, the Swiss Federal Institute of Technology, and the Zurich University of Applied Sciences. The city also hosts several international conferences and events, such as the World Web Forum and the Digital Festival, which promote digital innovation and entrepreneurship.</p> <p>5. Governance: Zurich has a unique collaborative governance model that involves partnerships between the public and private sectors, as well as citizen engagement. The city has also implemented a Smart City Lab to test and develop new solutions and technologies in collaboration with stakeholders.</p> <p>Four essential guidelines of Smart City Zurich implementation:</p> <p>a. Alignment with the needs of the target groups and challenges of the city. Smart City Zurich focuses on the city’s long-term goals. New technological solutions meet urban challenges. The focus is on user-oriented development and people’s needs.</p> <p>b. Networking and cooperation between people, organizations, infrastructures: Smart City Zurich promotes internal and external interaction across borders between service departments and the city administration, the population, business, science, and culture. In this way, digital opportunities promote the participation of the people and the shared use of infrastructures.</p> <p>c. Availability, self-determination, and protection in dealing with data: Smart City Zurich develops a reliable and open data infrastructure. City administration data and information should be available to the public. So, when dealing with personal data, data protection, and informational self-determination have top priorities.</p> <p>d. Innovation and agile developments: Smart City Zurich supports the agility of the city with a view to accelerated technological change. Innovative approaches are tested in experimental open spaces, in pilot projects, or Living Labs. Promising solutions are recognized early and can be implemented.</p>
Technology	IoT, ICT, AR, AI, smart grids, data analytics, renewable energy, smart parking, digital platforms for citizen engagement etc.
Implementation Method	<p>Zurich focuses on three main areas in its smart strategy: Future forms of integrated public mobility, digital city, and smart participation. Thereby, many smart projects are carried out, such as:</p> <ul style="list-style-type: none"> – Pikmi – an on-demand taxi service that uses car-pooling to transport more than one passenger at a time that wants to travel in the same direction – LoRaWan – a Long Range Wide Area Network that lays the ground for IoT sensors in public spaces that can help to measure pollution, water values, and free parking lots – HoloPlanning – With augmented reality glasses such as the “HoloLens,” future buildings, underground pipelines, and much more are made visible on-site as semi-transparent 3D holograms. <p>Furthermore, Zurich has implemented several smart city projects under its 2030 Smart City Strategy, and many more are planned for the future. Here are some examples:</p> <p>Implemented Projects:</p> <p>Power-to-Heat (P2H) System: This system uses excess renewable energy to produce heat for buildings in the city’s district heating network.</p> <p>eZürich: This project promotes the use of digital technologies and data to improve the efficiency of public services and enhance citizen participation.</p> <p>Smart Parking: Zurich has implemented a smart parking system that uses real-time data to guide drivers to available parking spaces, reducing traffic congestion and improving air quality.</p> <p>Sharing Cities: Smart city Zurich is part of the Sharing Cities project, which aims to develop and implement smart city solutions that promote resource sharing, sustainable mobility, and citizen engagement.</p> <p>Climate-friendly Construction: Zurich has implemented several initiatives to promote sustainable construction practices, such as the use of energy-efficient building materials and green roofs.</p>
Challenges and good practices	No information
Data Source	<p>About Smart Cities Zurich https://www.aboutsmartcities.com/smart-city-zurich/</p> <p>Smart City Zurich https://www.stadt-zuerich.ch/prd/en/index/urban-development/smart-city.html</p> <p>Smart City Zurich Strategy https://www.stadt-zuerich.ch/portal/de/index/politik_u_recht/stadtrat/weitere-</p>

Country/City	Switzerland/Zurich
	politikfelder/smartcity/strategie.html
	Pikmi https://www.intelligenttransport.com/transport-news/111423/zurich-launches-pikmi-on-demand-transport-service-in-city-first/
	LoRaWan https://www.thethingsnetwork.org/community/zurich/
	HoloPlanning https://afca.ch/en/projects/holoplanning

Data Collection on Smart Cities in Developed Countries

Country/City	UK/London
Policy/Vision	<p>Aim to use digital technology and information to enhance the quality and performance of urban services like energy, transportation, and utilities to reduce resource consumption, waste, and overall costs.</p> <p>vision in UK, SC revolves around creating urban areas that are sustainable, highly efficient, and improve the quality of life for citizens.</p>
Organizational Structure	<p>Gov:</p> <ul style="list-style-type: none"> UK Parliament <p>POSTnote looks at smart city innovation in the UK and the technologies involved. It considers the factors driving the adoption of smart city technologies, and the potential benefits, barriers and risks associated with their implementation.</p> <ul style="list-style-type: none"> Smart Cities Council Department for Digital, Cultural, Media and Sport (DCMS) Innovate UK <p>PPP:</p> <ul style="list-style-type: none"> Siemens: project: Smart infrastructure, Mobility, Digital transformation, Sustainability etc, IMB: a global technology innovator, leading advances in AI, automation and hybrid cloud solutions Cisco: delivers innovative software-defined networking, cloud and security solutions to help transform your business, empowering an inclusive future for all. <p>These partnerships aim to integrate technology to enhance urban services, improve sustainability, and create more efficient and connected cities.</p>
System	<ul style="list-style-type: none"> The Climate Change Act 2008 is the basis for the UK's approach to tackling and responding to climate change. It requires that emissions of carbon dioxide and other greenhouse gases are reduced and that climate change risks are adapted to. The Act also establishes the framework to deliver on these requirements. The Act supports the UK's commitment to urgent international action to tackle climate change. Through the Climate Change Act, the UK government has set a target to significantly reduce UK greenhouse gas emissions by 2050 and a path to get there. The Act also established the Committee on Climate Change (CCC) to ensure that emissions targets are evidence-based and independently assessed. The CCC's Adaptation Committee advises on these climate change risks and assesses progress towards tackling them. The Climate Change Act commits the UK government by law to reducing greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050. This includes reducing emissions from the devolved administrations (Scotland, Wales and Northern Ireland), which currently account for about 20% of the UK's emissions. The 100% target was based on advice from the CCC's 2019 report, 'Net Zero – The UK's contribution to stopping global warming'. <p>government departments responsible for climate change are:</p> <ul style="list-style-type: none"> Department for Energy Security and Net Zero (DESNZ) – leading on policy for reducing emissions (mitigation) DESNZ is responsible for ensuring secure energy and promoting action on climate change in the UK and internationally. Department for Environment and Rural Affairs (Defra) – leading on domestic adaptation policy (adaptation) - Defra is responsible for developing the National Adaptation Programme to address the risks set out in the most recent UK Climate Change Risk Assessment. <p>(Scotland, Wales and Northern Ireland):</p> <ul style="list-style-type: none"> Create climate change policy for their devolved area. Help to implement UK-wide policies. <p>As well as being covered by the Climate Change Act, Scotland, Wales and Northern Ireland have separate climate change policies.</p> <p>Government policy on reaching Net Zero by 2050 The Government committed to a 100% reduction of greenhouse gas emissions by 2050 compared with 1990 levels. This is referred to as the net zero target. These policies were updated in March 2023 with a suite of publications under the policy paper, Powering Up Britain that included the Powering Up Britain: Net Zero Growth Plan.</p> <p>Other policy documents include:</p> <ul style="list-style-type: none"> > Green Finance Strategy, March 2023 > British energy security strategy, April 2022 > Transport decarbonisation plan, July 2021 > Industrial decarbonisation strategy, March 2021 > Hydrogen strategy, August 2021 > Heat and Buildings Strategy, October 2021

Country/City	UK/London
	<p>> Energy net zero white paper, December 2020 Source: UK parliament UK Wireless Infrastructure Strategy This strategy sets out a policy framework to help deliver the government's priority of growing the economy and to ensure the UK benefits from advances in wireless connectivity for the next decades.</p>
Technology	<p>IoT, AI, 5G, sensors and electronics systems, geospatial and blockchain, Smart energy, smart building and housing, Data analytics, Smart infra, smart governance, smart mobility, smart health Electric cars The UK government have committed to a plan for 100% electric vehicle dominance by 2035, with a ban on the sale of petrol and diesel cars coming into effect in 2030.</p> <ul style="list-style-type: none"> • Rishi Sunak unveiled 'Powering Up Britain – The Net Zero Growth Plan' in April 2023 • Ministers committed to ban the sale of new pure petrol and diesel cars by 2030
Implementation	No information
Challenges and solutions good examples	No information
Date Source	<p>Climate Change Committee https://www.theccc.org.uk/what-is-climate-change/a-legal-duty-to-act/#:~:text=The%202050%20target,(net%20zero)%20by%202050.</p> <p>Smart Cities Council https://www.smartcitiescouncil.com/article/smart-cities-council-launches-uk#:~:text=HUB%2C%20Aurecon%20and%20GHD%20among,and%20digital%20transformation%20software%20innovator%2C</p> <p>UK Parliament (smart cities) https://post.parliament.uk/research-briefings/post-pn-0656/</p> <p>Smart Cities Council https://www.smartcitiescouncil.com/country/united-kingdom</p> <p>Siemens https://www.siemens.com/uk/en.html</p> <p>IBM https://www.ibm.com/uk-en</p> <p>Cisco https://www.cisco.com/site/uk/en/index.html</p> <p>Government policy on reaching Net Zero by 2050 https://commonslibrary.parliament.uk/research-briefings/cdp-2023-0124/</p> <p>Net Zero Law https://netzeroclimate.org/sectors/law/</p> <p>UK Wireless Infrastructure Strategy https://www.gov.uk/government/publications/uk-wireless-infrastructure-strategy/uk-wireless-infrastructure-strategy#chapter-1--approach-and-scope</p> <p>Switch to Electric cars https://www.thisismoney.co.uk/money/cars/article-11923751/So-switch-electric-car-need-know.html</p>
Memo	<p>The UK Government has a range of policies aimed at reducing greenhouse gas emissions which cause climate change. The Government's main climate change policy document is the Net Zero Strategy (Build Back Greener) which was published on 19 October 2021 (updated April 2022). It set out policies and proposals for decarbonising all sectors of the UK economy to meet the Government's net zero target by 2050. The Net Zero Strategy builds on the Government's Ten-point plan for a green industrial revolution which was published on 18 November 2020.</p>
London	City Level
Policy/ Vision	<p>London's vision as a smart city is a collaborative, connected and responsive city. It integrates digital technologies and uses citywide data to respond to citizen's needs, enhancing the quality and performance of urban services such as energy, mobility and utilities in order to reduce resource consumption, wastage and overall costs.</p>
Organizational Structure	No information
System	<p>■ Smarter London Together- Smart City Roadmap this roadmap is intended to be a flexible digital masterplan for the city. It sets out how the city want to collaborate with the capital's boroughs and services, from transport for London to NHS, it addresses the Mayor's commitment to better digital services, open data, connectivity,</p>

Country/City	UK/London
	<p>digital inclusion, cyber-security, innovation, and City Hall's plan for the growth of our city to more than 11 million residents by 2040. The Roadmap is based on ideas from citizens, civil society, the tech community and people who work in public services.</p> <ul style="list-style-type: none"> ■ The Smart London Board is the city mayor's top line-up of academics, business representatives, infrastructure providers, and ICT and energy companies. It helps the Greater London Authority to shape and implement its strategy for how to apply technology to all areas of city policy (transport, energy, social and infrastructure policy). Smart technology and city data are becoming increasingly prominent in the urban planning discourse. ■ London Infrastructure Plan 2050 Focuses on how technology and data can influence the future design and efficient operation of the city's assets, and how the related regulatory and market issues should be tackled. In parallel, it has developed the London DataStore, a hub for the city's growing ecosystem, which has generated numerous examples of how data can be used to manage and plan city operations.
Technology	AI, IoT and 6G, energy efficiency in buildings, energy systems integration, mobility & transport
Implementation Method	<p>Sharing Cities</p> <ul style="list-style-type: none"> • Urban sharing platform • Smart lamp post • Smart parking • Ev car sharing • eLogistics • Shared eMobility • eBike sharing • Building retrofit • Citizen engagement • Sustainable management • Smart street lighting • Clean fuels and fueling infrastructure <p>Over the last two decades, London has made important strides towards being a smart city, including:</p> <p>Data:</p> <p>London is leading the way when it comes to citizen data. <u>TfL has a large database on transport</u> that is publicly accessible.</p> <p>Transport:</p> <p>All of these smart city technologies are now part of London's everyday life. This is most evident in transport: People will check into buses and underground trains with their phones or even their smartwatches, there is curb-side electric vehicle charging in many streets, and mobile apps such as <u>Go Jauntly</u> promote healthy walking routes around the city. the city has long been fighting the double challenge of congestion and road traffic pollution. It was the first large city to introduce congestion charging in 2003. In 2019, London created a <u>restricted Ultra Low Emission Zone (ULEZ)</u> in the city centre, which covers all areas within the North and South Circular Roads. London's many surveillance cameras enforce the scheme. From May 2024, it will cost 15 GBP a day to enter central London plus additional charges depending on the exact location. This should raise around 400 million GBP a year, which could be reinvested in public transport and road repairs. By 2030, the city plans to implement a "<u>per mile</u>" charge based on the distance driven. In addition, a <u>Superloop</u> of express buses around the city is being planned.</p> <p>Security:</p> <p>Security is another aspect of London's smart city strategy: 5G networks provide vast amounts of real-time data and allow for quick data processing, which helps in traffic monitoring, policing, and law enforcement. A large network of sensors, cameras, drones, and robotics helps to keep the city safe.</p> <p>Environment and green energy:</p> <p>The smart city technologies in place in London also play an important role in the city's goal of achieving Net Zero by 2030: By monitoring traffic and tackling congestion, air quality in London is improving drastically. London is also looking for innovative ways to create greener energy. For example, the city has implemented new technologies that reuse residual heat from the underground system. This energy could meet up to 38% of the city's heating needs.</p> <p>Citizen participation:</p> <p>City Hall is also working towards a future city with more opportunities for public engagement, for example through the Talk London engagement series, the Make London crowdfunding campaign, the Planning Datahub, or the High Streets Data Service with information on neighbourhood economies. The goal is to easily answer questions for Londoners such as "Where can I charge my electric vehicle?" or "Where can I report fly-tipping?".</p> <p>London's Chief Digital Officer six priorities:</p>

Country/City	UK/London
	<ul style="list-style-type: none"> ■ Digital Access for All, including digital inclusion and digital skills programs, ■ A new city data platform to better use the city's collective data legally, ethically, and securely; ■ A new Emerging Technology Quarter to guide and inform the trialing and deployment of new technologies; ■ Scaling Green Tech to ensure the widespread adoption of green innovation; ■ Open Innovation with the tech sector through high-value and status competitions around the Green New Deal; ■ Common digital platforms to serve Londoners better, such as Talk London and Make London. <p>In the future, London will be relying more than ever on its businesses. Public-private partnerships will bring improvements to Londoners' quality of life in the areas of energy, environment, transport, and healthcare.</p>
Challenges and good practices	<p>In the most recent smart city index, London has risen the rankings, to successfully achieve the top spot. In recent years, London has established a number of advanced smart city initiatives. These include the Civic Innovation Challenge (an incubator platform to help startups develop solutions to address urban issues), and the Connect London program (which is responsible for the city's advanced 5G network and fiber-optic coverage). And, with the city's heavy investments into AI, IoT and 6G, these solutions are only set to get more advanced.</p> <p>The challenge for London's smart city undertakings is the sheer scale of the city: Its population is set to reach 10 million people by 2030 with an urban area of 1,500 km² (more than 14 times the size of Paris). Greater London's public services will address several problems in areas such as health and transport.</p>
Data Source	<p>London Infrastructure Plan 2050 https://www.london.gov.uk/programmes-strategies/better-infrastructure/infrastructure-policy/london-infrastructure-plan-2050</p> <p>Smart City London: Europe's Smartest City https://www.beesmart.city/city-portraits/london-europes-smartest-city</p> <p>Top 10 leading global Smart Cities https://mobile-magazine.com/articles/top-10-leading-global-smart-cities</p> <p>Transport for London https://tfl.gov.uk/info-for/open-data-users/our-open-data</p>

Data Collection on Smart Cities Developed Countries

Country/City	USA/Chicago
Policy/Vison	<p>Basic Concept and Vision</p> <p>A "Global Hub of Innovation and Technology" was the growth vision set forth by the former Mayor of Chicago when he took office in 2011. Expanding on this growth vision, in 2013 the City of Chicago developed the City of Chicago Tech Plan, a strategy for becoming an "Advanced City Accelerating Opportunity, Inclusion, Engagement, and Innovation through Technology," a comprehensive vision of the future created by advanced technology The new mayor's 2019 There have been no major changes since he took office, and the city continues to emphasize diversity and an inclusive smart city, as well as policies to attract tech companies and encourage the birth of startups.</p> <ul style="list-style-type: none"> • The vision is set forth in the Chicago Tech Plan, developed in 2015, as a leading-edge city where technology accelerates opportunity, inclusion, engagement, and innovation. • The use of technology is reducing costs, improving services, civic engagement, increasing service and economic access, improving skills, increasing better job opportunities, and increasing the STEM workforce. • Chicago's citizens and businesses are digitally connected and engaged, forming the foundation of its technological strength. Building on that foundation, the city is growing through effective, efficient, and open executive government, civic innovation, and a growing technology sector.
Organizational Structure	<p>Key organizations include</p> <ul style="list-style-type: none"> • Mayor of Chicago, Department of Innovation & Technology (DoIT), City of Chicago Along with the Chief Technology Officer (CTO) and Chief Information Officer (CIO), the City of Chicago's technology leadership has created a Chief Data Officer (CDO) to oversee the City's Open Data Portal, Advanced Analytics The Chief Data Officer (CDO) oversees the City's Open Data Portal, Advanced Analytics Team, and Data and Business Intelligence Team, forming a structure to lead the strategic use of data. A specialized department, the Department of Innovation and Technology (DoIT) (now merged with the Finance Department), supports implementation. • City Tech Collaborative, World Business Chicago (nonprofit partnership organization) In 2017, the Smart Chicago Collaborative (SCC) and City Digital merged to create the City Tech Collaborative, charged with advancing the "Chicago Technology Plan" to realize the Mayor's vision. The organization's predecessor, the Smart Chicago Collaborative (SCC), was founded in 2011 by the City of Chicago and the MacArthur Foundation and Trust with the goal of improving life in Chicago through the transformative power of technology. SCC has taken a leadership role across sectors to provide the resources necessary for Chicago's digital transformation, investing in digital infrastructure and developing programs and applications to make high-speed internet more accessible and beneficial to all, and paving the way for the city's digital transformation. City Digital was also founded in 2015 as a multi-enterprise collaboration for cross-sector innovation in transportation, urban infrastructure, water and sanitation, and energy management, developing technologies and conducting pilots for mapping Chicago's underground infrastructure, among other The organization has been involved in the development of technology and pilot projects for underground infrastructure mapping in Chicago. <p>City Tech is a consortium of members that combines tools and ideas from private companies, municipalities, startups, civic organizations, research institutions, community organizations, and other partners to collaborate and promote the development of inclusive, market-impactful, and The consortium facilitates the development of technology-enabled urban solutions that have a significant impact on the marketplace.</p> <ul style="list-style-type: none"> • Prominent universities and research institutions such as the University of Chicago and Northwestern University The following organizations that support urban innovation are also active in Chicago, creating a smart city ecosystem. • Incubate organizations: Typical examples include 1871 (operates a co-working space on a membership fee basis and supports numerous startups), mHUB (specializes in things such as robotics, digital devices, sensors, medical devices, and smart buildings), MATTER (specializes in healthcare and life sciences) etc. • Finance sector including venture capital • Universities and research institutions: University of Chicago, University of Illinois, Northwestern University, DePaul University, Loyola University, Argonne Institute, etc. • Business Industry Support: P33 (a nonprofit organization launched in 2018 to develop a plan with the goal of developing Chicago as a world-class tech hub by 2033 and to serve as a support organization to help make that happen)

Country/City	USA/Chicago
	<ul style="list-style-type: none"> • Various non-profit organizations (LISC Chicago, iBio, Chicago Biomedical Consortium, The Clean Energy Trust, etc.) • A series of Tech companies, entrepreneurs and investors
Technology	<p>The City of Chicago has positioned the promotion of ICT infrastructure development as a cornerstone of its policy, and is promoting the installation of broadband networks throughout the city and free Wi-Fi in public spaces. In addition, the city has created an open data portal and a map-based visualization platform for big data, creating an environment that enables the development of various applications based on the use of open data. In addition to promoting the demonstration and rollout of smart street lighting and IoT sensor networks, ITS, smart communities in economically disadvantaged areas, and microgrid demonstrations are being developed.</p> <p>1) OpenGrid Since 2012, the City of Chicago, led by the Department of Innovation and Technology (DoIT) and in collaboration with the University of Chicago, Argonne National Laboratory, and the University of Illinois at Chicago Port, has identified 450 datasets from 15 key departments within the city's administrative branch, including police, traffic, and fire. In 2013, the City of Chicago released WindyGrid, a home-grown system that integrates open data and displays it on maps in real time. After 18 months of development, in 2017, WindyGrid was launched as a system that can share information with citizens and external organizations, and be used by other local governments. The system is now available for use by other local governments as well, WindyGrid was updated and OpenGrid was released. OpenGrid was also developed by DoIT, but leveraged the cloud-based open-source data hub at the University of Chicago's Urban CCD (Urban Centre for Computation and Data). The software to utilize the data was pre-created by Smart Chicago (later City Tech), a local firm with experience in big data and cloud computing projects, laying the groundwork to promote innovation through the use of open data.</p> <p>2) The Allay of Things (AoT) The AoT project is an IoT demonstration project that collaborates between scientists, universities, government and local communities to collect urban environmental, infrastructure and activity data for research and public use Proposed in 2013 and funded by the National Science Foundation, on-site installation and data collection began in 2019; in 2021 The AoT technology was developed by Argonne National Laboratory for sensor-based environmental science and smart city research. and uses an open software and hardware platform of advanced wireless centers with edge computing capabilities. These data are provided through the aforementioned open grid, which provides opportunities for innovation through IoT use, which is essential for smart cities.</p>
Implementation	<p>City Tech's program is based on a methodology for rapid innovation and results, with three axes: city solutions, resident engagement, and thought leadership. The City Innovation theme will change sequentially, but the common objective is to use sensing networks, advanced analytics, and urban design to create highly effective solutions at the interface of Built Environments, Digital Infrastructure, and public and private services.</p> <p>Smart Lighting Program The City of Chicago's Smart Lighting Program, one of the largest outdoor LED lightings retrofit projects in the U.S., began in 2017 with the goal of replacing approximately 270,000+ high-pressure sodium luminaires with LED fixtures over a four-year period ending October 2021. It is estimated that this will save the city \$10 million per year through increased energy efficiency, longer life of the luminaires, and more efficient maintenance, and it has been reported that electricity bills have actually been cut in half. The City of Chicago collaborated with the Pacific Northwest National Laboratory's Advanced Lighting Team to implement this project, which was funded by the U.S. Department of Energy's Office of Building Technologies. Implemented by the Chicago Infrastructure Trust, the city's major infrastructure project implementation agency, and supported by the city's Transportation Department and Innovation & Technology Department, the four-year project was completed on schedule and included replacement of existing streetlights as well as new streetlights on 275 blocks. In addition to the replacement with LEDs, the City of Chicago was unique in this program in that it simultaneously installed a Wi-Fi lighting control and remote monitoring management system. In addition, routing optimization, GIS, and various automations optimized work sequencing, eliminated paper forms, reduced outage times, and significantly improved service levels, including reliability and maintenance.</p>
Challenges and solutions.	the Smart City Challenge Trends and Priorities
Data Source	the Smart City Challenge Trends and Priorities in the USA (page 5) https://www.transportation.gov/sites/dot.gov/files/docs/78SCCApplcationsOverview.pdf

Appendix 3 Meeting Memo

UN-Habitat

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region	
Date and Time	January 17, 2024 / 16:30-17:45	
Place of Meeting	Online Meeting	
Attendees	[UN-Habitat]	Martino Miraglia, Caroline Kienast-Von Einem, Claudia Garcia Zaragoza
	[yec]	Kudo, Shimomura, Hoshi, Nisa, Morgane
Topic 1. UN-Habitat's Guidance on Sustainable Development Goals, Smart Cities, and Global Frameworks <ul style="list-style-type: none"> UN-Habitat emphasizes the global adoption of the Sustainable Development Goals (SDGs) and suggests that when evaluating smart cities, it is beneficial to align the assessment with the SDGs. UN-Habitat recommends linking the performance of a smart city to specific SDGs to enhance the evaluation process. Additionally, UN-Habitat highlights the importance of considering Agenda 2063, the African Union's roadmap for African countries, when focusing on sub-Saharan Africa. UN-Habitat clarifies that they don't have a single framework dedicated solely to smart cities but incorporates smart and digital aspects into various existing frameworks. UN-Habitat notes the limitations of the global urban monitoring framework in capturing all dimensions of city development comprehensively. UN-Habitat suggests viewing JICA Study Team's work as a spin-off from the global urban monitoring framework, highlighting that the dimension of smart cities is relatively weak within the framework. UN-Habitat mentions a recent initiative, the Quality of Life Initiative, focusing on measuring the population's quality of life in cities. The Quality of Life initiative specifically emphasizes community living standards, providing a more holistic approach to urban development assessment. UN-Habitat highlights another set of indicators called the Key Performance Indicators for Smart Sustainable Cities (KPIs for SSC) released by the United Nations Economic Commission for Europe (UNECE). UN-Habitat recommends looking into and cross-referencing these indicators. Furthermore, UN-Habitat points out the importance of understanding how different countries in the region have customized or nationalized global agendas and frameworks. UN-Habitat suggests checking if countries have developed their own smart cities guidelines or frameworks, as many nations tend to adapt global frameworks to their local contexts. 		
Topic 2. UN-Habitat's Insights on Community Engagement and Sustainable Development Reporting <ul style="list-style-type: none"> UN-Habitat discusses UN-Habitat's approach to transparency exercises as a means of engaging communities in sustainable development. UN-Habitat highlights the success of the voluntary local reviews, specifically citing the case of Mwanza, a city in Tanzania. In this example, two months of community consultations were conducted to gather perceptions on the city's progress toward SDGs, awareness levels, and priorities. The gathered information was then translated into recommendations for future actions in Mwanza. 		

- UN-Habitat notes two key takeaways from the Mwanza case study. First, communities play a vital role in collecting data when there are gaps. Second, community perceptions sometimes differ from official data, and their priorities may not align with those identified by city authorities. UN-Habitat emphasizes the two-way processing involved, where communities actively contribute to defining and localizing sustainable development while also being engaged in understanding global concepts. UN-Habitat adds an interesting point about the learning process, noting that only 30% of the 200 community members UN-Habitat spoke to had heard of the sustainable development goals, illustrating the importance of ongoing communication and education.
- While strongly recommending community involvement for elevated results and conclusions, UN-Habitat acknowledges that it's not always mandatory. Some cities may face constraints or already have efficient data collection structures in place. The approach is flexible, with agreements tailored to each city's strategy, objectives, and preferences for the engagement exercise.
- UN-Habitat discusses two approaches to community engagement in reporting exercises. First, they sometimes leverage existing consultation mechanisms within cities, capitalizing on established ways of engaging with communities. Second, when these mechanisms are weak or unresponsive, UN-Habitat notes the creation of new consultation channels. UN-Habitat mentions that establishing new consultations can be more challenging, as it involves reaching out and engaging with communities without the benefit of pre-existing networks and knowledge.

Topic 3. UN-Habitat's Approach to Measuring Community Participation Levels

- UN-Habitat explains that there isn't a consolidated framework for measuring community participation levels, but they use various indicators. The first set of indicators focuses on the existence of structural mechanisms for community consultation at the city level. The second set involves a quantitative analysis of community participation in decision-making processes, combining measurable quantitative indicators with qualitative insights.

Topic 4. UN-Habitat's Mission: Connecting Frameworks to SDGs for Global Urban Development

- UN-Habitat outlines the overarching goal of connecting various frameworks - such as smart cities, the global monitoring framework, and quality of life - to SDGs. UN-Habitat emphasizes the importance of the SDGs as a global agenda, providing a common language for cities worldwide. The objective is not just for comparison but to facilitate communication and exchange of experiences among cities across regions like Sub-Saharan Africa, Asia Pacific, and Europe. By linking different frameworks back to the SDGs, the aim is to assess how territories or cities are performing against these global development goals.

Topic 5. UN-Habitat on the Significance of 'Spin-Offs' in Urban Development Frameworks

- UN-Habitat explains the concept of a "spin-off" in the context of urban development frameworks. They clarify that broader frameworks, such as SDGs and the global urban monitoring framework, attempt to capture various dimensions of sustainable urban development. The term "spin-off" is used to describe a situation where a specific city might have unique priorities based on political decisions or specific interests. For instance, one city may focus on measuring access to basic services, while another might emphasize climate action.

- UN-Habitat suggests that a "spin-off" is necessary when cities have a technical and political interest in a specific dimension of their development, such as becoming a smart city.

Topic 6. UN-Habitat's Focus on Urban Challenges in Voluntary Local Reviews

- UN-Habitat discusses how the challenges faced by different cities are a crucial consideration for the activities, especially in the context of Voluntary Local Reviews (VLRs) assessing urban development challenges and solutions. UN-Habitat notes that these challenges form the core of the assessment, aligning with the focus of various indicator frameworks.
- UN-Habitat mentions attempts to compile trends and insights from the numerous published VLRs worldwide, highlighting challenges due to varying publication years. UN-Habitat expresses the intention to delve deeper into data analysis to draw more comprehensive conclusions from the wealth of data collected through VLRs.

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region	
Date and Time	January 23, 2024 / 19:00-20:00 (JST)	
Place of Meeting	Online Meeting	
Attendees	[UN-Habitat]	Edlam Yemeru (Chief of Knowledge and Innovation Branch), Isabel Wetzel (Program Management Officer), Hazel Kuria (Project Officer)
	[yec]	Kudo, Shimomura, Hoshi, Nisa, Morgane
Topic 1. UN-Habitat's Approach to Smart City Development and General Remarks <ul style="list-style-type: none"> • UN-Habitat emphasizes their relevance and potential as a key partner in smart city development and digital urban transformation. • UN-Habitat adopts a people-centered approach, asserting that smart city development should prioritize people over technology. This philosophy aligns with the global Sustainable Development Goals (SDGs) and the New Urban Agenda. • UN-Habitat's outlines five pillars in their approach: (1) community empowerment: focused on empowering and targeting communities, (2) accessibility and equity: addressing the growing digital divide in cities and communities, (3) responsible data management: emphasizing accountability and governance for smart city development, (4) trust: safeguarding public trust in smart city development, and (5) capacity: enhancing the capacity of the public sector and users. • Governance is highlighted as crucial for ensuring that people remain the primary priorities in smart city development, with a focus on empowerment and engagement to avoid leaving anyone behind. • UN-Habitat actively participates in global advocacy, capacity building, and projects worldwide to assist local and national governments in smart city development. This involves the development of strategies, capacity building through training, and advocacy for people-centered approaches. • In June 2023, during the second session of the UN-Habitat Assembly, 193 countries requested the development of international guidelines on people-centered smart cities. A global working group, including a representative from JICA, is actively working on defining core principles and values for people-centered smart city development, establishing a crucial framework for smart-city development indicators and KPIs. • UN-Habitat seeks partnerships in various areas, including data and practices related to smart city indicators. JICA is recognized as a potential partner, and UN-Habitat is open to collaboration on tools, solutions, and data in projects globally or in specific regions. Immediate opportunities for collaboration include thematic focus areas, an alliance of mayors for digital cooperation, and plans to establish a world smart cities hub, emphasizing data, indicators, and best practices. 		
Topic 2. UN-Habitat's Insights on KPIs and Indicators <ul style="list-style-type: none"> • UN-Habitat recognizes the need for developing indicators and KPIs for smart city development, globally and in Africa. UN-Habitat summarizes their people-centered smart cities approach, emphasizing that their KPIs and indicators are specifically aligned with the five pillars of this approach. 		

- UN-Habitat mentions the forthcoming release of a global assessment, the World Smart Cities Outlook, and invites the JICA Study Team to consider sharing their analysis and findings for possible inclusion in the World Smart Cities Outlook¹.
- Emphasizing the significance of regionally tailored indicators and KPIs, UN-Habitat mentions their ongoing smart city projects in South Africa, Namibia, Botswana, and Ghana, aligning with their established presence and work in the Africa region.

Topic 3. UN-Habitat's Insights on the Global Urban Monitoring Framework

- UN-Habitat explains that the Global Urban Monitoring Framework is developed by their branch, the same branch overseeing smart city work. While the framework includes some indicators on smart city development, it is not exhaustive. UN-Habitat clarifies that they use the framework as a core starting point for their data work. When UN-Habitat needs to explore smart city indicators more comprehensively, they incorporate additional indicators both within and outside the urban monitoring framework.

Topic 4. UN-Habitat's Approach to Smart City Development and General Remarks (2)

- UN-Habitat emphasizes the multifaceted nature of smart city development, clarifying that infrastructure is just one component.
- UN-Habitat collaborates with various UN entities on infrastructure, governance, skills, and regulations, considering global standards. UN-Habitat underscores its global network and ongoing partnership with JICA.
- UN-Habitat addresses the critical question of measuring the positive impact of smart city development, emphasizing its interconnectedness with job creation, skills enhancement, and economic upgrades. UN-Habitat stresses the importance of data, advocating for impact and assessment indicators to convince low-income countries of the urgency and benefits of embracing smart city initiatives.
- UN-Habitat emphasizes their step-by-step approach in the absence of sufficient data on smart city activities. Acknowledging the lack of consolidated data and the early stage of smart city development in many areas, UN-Habitat discusses the importance of a comprehensive framework. UN-Habitat highlights the development of guidance, such as playbooks and the People-Centered Smart Studies program, offering adaptable guidance for governments worldwide. The focus is on foundational steps and principles before delving into advanced technologies. UN-Habitat responds to the interest expressed by JICA Study Team in a roadmap, emphasizing the relevance of clear KPIs and indicators for the African continent.

Topic 5. Concluding Remarks

- UN-Habitat suggests concluding the discussion by emphasizing the crucial link between smart city development in Africa and the acceleration of economic transformation. UN-Habitat emphasizes the importance of demonstrating how smart city initiatives can contribute to higher productivity sectors, job creation, poverty reduction, and addressing urban-rural inequality. Emphasizing the African Union's focus on digital transformation, UN-Habitat highlights the significance of aligning JICA's infrastructure work with economic growth in the continent.

¹ “The World Smart Cities Outlook will seek to dive deep into the current landscape of smart cities and digitalization across the globe. From exploring prevailing trends, challenges, regional diversity, to uncovering untapped opportunities, the study aspires to be a factual bedrock for the development of the guidelines on smart cities. The aim is to identify key drivers and enablers to build cities that are not only technologically advanced but also sustainable, inclusive, and respectful of human rights.” <https://unhabitat.org/join-us/calls/call-for-proposals-for-the-world-smart-cities-outlook>

- UN-Habitat proposes exploring collaboration opportunities and expresses interest in incorporating findings from JICA's study into the World Smart Cities Outlook. UN-Habitat plans to update Mr. Yukinari Tanaka², a Senior Director at JICA, on the ongoing conversation and engagement with JICA projects.

² Japanese representative who is part of UN-Habitat Experts Working Group to develop the International Guidelines on People-Centered Smart Cities.

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region	
Date and Time	January 31, 2024 / 17:00-18:00 (JST)	
Place of Meeting	Online Meeting	
Attendees	[UN-Habitat] [yec]	Agata Aleksandra Krause Kudo, Shimomura, Hoshi, Nisa, Morgane
<p>Topic 1. Connecting Smart Cities and Quality of Life</p> <ul style="list-style-type: none"> UN-Habitat discusses the evolution of smart cities from technology-driven to people-centered approaches, focusing on improving quality of life. UN-Habitat emphasizes the need to understand, conceptualize, and measure quality of life, considering both subjective and objective aspects. UN-Habitat has reviewed 50 quality of life indices, finding few related to cities and even fewer encompassing subjective experiences. UN-Habitat expresses its ambition to guide initiatives on quality of life and seeks to connect their methodology with smart city frameworks for a more comprehensive approach that addresses both people and infrastructure aspects. UN-Habitat will provide a set of indicators and a measurement framework for assessing quality of life at the city level. UN-Habitat sees potential in combining this with smart city evaluation metrics, as many already include human-centric and quality of life considerations. UN-Habitat expresses interest in exploring opportunities for a more comprehensive view of quality of life in smart cities by integrating these frameworks. <p>Topic 2. UN-Habitat's Quality of Life Index</p> <ul style="list-style-type: none"> UN-Habitat describes a research and innovation project for a quality of life index, currently in the finalization stage. UN-Habitat explains the structure of the quality of life index, consisting of a global layer with 21 indicators applied universally and a local layer with up to 35 indicators chosen by the city. UN-Habitat emphasizes the impact of the project, testing it in 11 pilot cities globally (Canada, Mexico, Ecuador, Ethiopia, Serbia, Malaysia, India, Australia, Tahiti, etc.) and aiming to connect data with practice and policy. UN-Habitat highlights the interface between quality of life indicators and SDGs, both in terms of shared indicators and alignment with the Urban Monitoring Framework. UN-Habitat expresses the belief that applying the quality of life framework can provide valuable insights into the strengths, weaknesses, challenges, and opportunities for cities. The ultimate goal is to support SDG measuring and monitoring, bridging the gap between data and policy. <p>Topic 3. UN-Habitat's Insights on Indicator Selection Methodology</p> <ul style="list-style-type: none"> UN-Habitat suggests that cities should ideally choose around 10-12 indicators from the local layer for feasibility during the testing phase of the index. The goal is to empower local governments in a city-centered process, providing guidelines and examples while leaving the final decision on indicators to the cities. UN-Habitat emphasizes the specificity and flexibility of the local layer, allowing cities to tailor the index to their unique contexts. 		

- UN-Habitat outlines their method for selecting indicators, developed in collaboration with cities through workshop-style sessions. UN-Habitat employs a theory of trend approach, starting with understanding the challenges cities face and working backward to select indicators related to those challenges. This method ensures quality assurance and encourages openness about challenges, making discussions more fruitful.
- UN-Habitat emphasizes the collaborative nature of the decision-making process, involving various city departments to mitigate the risk of a single-person-centric approach. UN-Habitat notes that city commitment to the process, including allocating resources, signals an honest engagement in building on the indicators, avoiding a false investment.

Topic 4. Connecting SDGs and Quality of Life

- UN-Habitat explains that SDG targets and indicators are designed for countries and sectors, making it challenging to directly apply them to cities. Instead, UN-Habitat uses Urban Monitoring Frameworks (UMFs) as a city-level mirror of SDGs. Their methodological framework aligns with UMFs, combining global and local layer indicators, as well as subjective and objective indicators for quality of life considerations.
- UN-Habitat acknowledges the limitations of SDGs at the city level and aims to improve measuring and monitoring by testing new ways to collect data, addressing data gaps in SDG 11 related to cities. UN-Habitat also contributes to the SDG localization process, connecting SDGs with quality of life considerations to bridge gaps in discourse, policy, and implementation.
- UN-Habitat emphasize the importance of action at the local level to achieve SDGs and use SDG language to support these processes.

Topic 5. Overview of Global Indicators

- UN-Habitat mentions the unavailability of the complete set of global indicators due to the report not being publicly accessible.
- However, UN-Habitat provides examples, such as indicators related to health (burden of communicable and non-communicable diseases, life expectancy), safety, housing conditions, air quality (P.M. 2.5 concentration), and access to basic services like electricity, water, sewage, and high-speed broadband. There are a total of 21 indicators, but the release is pending as the report is still in the finalization process.

Topic 6. Concluding Remarks

- UN-Habitat suggests planning a follow-up by understanding specific needs from JICA regarding their smart city project. UN-Habitat inquires about JICA's existing methodological framework for assessing smart cities, both quantitatively and qualitatively. UN-Habitat is interested in JICA's objectives regarding the integration of smart city data with quality of life considerations. Proposing a follow-up meeting to delve deeper into the conversation, UN-Habitat also considers involving a technical team member to offer additional insights into the quality of life index.

Senegal

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 22, 2024 / 11:00-12:30
Place of Meeting	Délégation générale à la Promotion des Pôles urbains de Diamniadio et du Lac Rose (DGPU) Office
Attendees	<div>[DGPU] Dieynaba DIOP</div> <div>[JICA] Caroline DIOUF</div> <div>[yec] Kudo, Shimomura, Hoshi, Nisa</div>

Topic 1. About Diamniadio Smart City Plan

- The initiative to build Diamniadio City was started in 2015. Diamniadio is a new city whose objective is to decongest Dakar while stimulating economic growth. The local government in Dakar City recognized the issues faced in the urbanization process and willing to implement a new city with a new approach and advanced technology to overcome these problems. Diamniadio City serves as a model for building a city that addresses issues such as urbanization, internet access, and sustainable development.
- DGPU has collaborated with various stakeholders, including construction companies and telecommunications operators, to ensure the necessary infrastructure is being constructed and internet access is provided to the region. The aim is to establish a new benchmark for long-term sustainability and achieve the city's goals, serving as a pilot project for future developments in other cities.
- Diamniadio City has established a partnership with the Institute of Electrical and Electronics Engineers (IEEE) to develop a Smart City (SC) that aligns with IEEE's expertise (ICT) and standards.
- Diamniadio City is currently in its early stages and remains largely undeveloped. However, its strategic location in the central part of other smaller cities provides an opportunity to implement new developments and overcome previous issues faced in Dakar City. This includes addressing transportation challenges, improving street lighting, waste management, and finding solutions for excess rainfall leading to water accumulation on roads and drainage issues.
- To achieve their goals, DGPU is implementing various solutions, which are:
 1. Develop digital base in a territorial scale
 2. Establish an intelligent and multimodal transport system
 3. Optimize the territory resources to improve its efficiency and strengthen its resilience capacity
 4. Promote smart building
 5. Create smart communities to promote living together, citizen participation and social integration
 6. Limit negative externalities produced by human activities.
- DGPU also actively engaging with citizens to share information and gather their input, as people are beginning to reside in the city. The initial focus is on ensuring internet access, improving transportation systems, and implementing environmentally friendly practices.
- Overall, the development of Diamniadio City aims to address the shortcomings of previous urbanization efforts in Dakar and establish a sustainable and technologically advanced city.

Topic 2. Challenges in Diamniadio Smart City Development

- The biggest challenge in Diamniadio City development is providing internet access. Previously, telecom companies were responsible for providing internet access, but now it is the responsibility of the city administration (DGPU). Additionally, financial issues have been a challenge, as well as getting people to accept the changes for implementing new city concept development. This new mechanism (SC) is unfamiliar to the citizens, so it takes time to gain their acceptance.
- Regarding citizen participation, all stakeholders are involved in the Diamniadio City project. DGPU started by having three-day meetings with citizen and related stakeholders to discuss different projects. The first project is related to infrastructure, particularly internet access, through a partnership between the government and the private sector. Currently, there is a partner ready to finance the project for a certain period of time, and after that, the responsibility will be handed over to the DGPU. The second project is related to the environment: video surveillance (it has not started yet). These two projects are interconnected, as the first project provides a solution for the second project where internet access is necessary for the video surveillance implementation.

Topic 3. Reasons for implementing a Smart City in Diamniadio instead of Dakar

- The initiative to develop Diamniadio as a Smart City did not start from the national government but from the local authority. They recognized that Diamniadio being a new city, presented an opportunity to implement smart solutions. The process began in 2015 and has since gained momentum. The needs and requests for a Smart City were specific to Diamniadio. As a result, there are now many startups and competitions focused on implementing smart solutions in Diamniadio.
- The development of Diamniadio Smart City follows the urban development plan of Diamniadio City. The Smart City concept is integrated into the overall plan for the city's development (there is no specific Master Plan for Diamniadio SC development).

Topic 4. About possibility of collaboration with JICA

- Diamniadio SC is open to all donors. There is a need for support in the second phase of the project because it is a global project. There are many sub-projects waiting for financial assistance in Diamniadio SC. The aim is to find smart solutions for Diamniadio that can be implemented in other cities. The project is constantly seeking new solutions.
- The government is open to any ideas and solutions including capacity building.
- Since Diamniadio is a new city, it does not have a large population yet. In the two ongoing projects mentioned above, efforts are being made to ensure 5G coverage throughout Diamniadio.

Topic 5. About responsibility of DGPU

- DGPU is responsible for all aspects of the project including planning, coordination, and implementation of various projects. DGPU collaborates with other government departments, local authorities, private sector, and international partners to ensure the successful development of Diamniadio.
- Concerns were raised regarding the financial aspect of the project. Projects with a budget exceeding 5 billion should be the responsibility of the local government.
- After the infrastructure development finished, DGPU currently uncertain about who will be responsible for the service delivery. It is possible that the government will establish a new organizational structure to handle the service delivery.
- After the Diamniadio development completed, it was clarified that the government currently has no plans to relocate people from Dakar to Diamniadio. The government respects the choice of the population and allows them to decide where to live based on housing and other accessibility factors.

List of Attendance

Date: 2024 / 1 / 22

Place: DGPU

[illegible]

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 22, 2024 / 13:30-14:30
Place of Meeting	La Société d'Aménagement et de Promotion des Côtes et Zones Touristiques du Sénégal (SAPCO) Office
Attendees	[SAPCO] Mouhamadou Moustapha [JICA] Caroline Diouf [yec] Kudo, Shimomura, Hoshi, Nisa

Topic 1. About Role of SAPCO

- SAPCO clarified that their responsibility includes the settlement development, promotion of sea-side areas and touristic zones. This involves infrastructure development such as roads, electricity, water supply, and waste management. SAPCO also collaborates with the public sector to develop hotels and sports facilities to promote tourism.
- SAPCO emphasized that while the option of developing Smart Cities (SC) is available, it is not their main goal. Their main goal is to attract investors from around the world. They aim to maximize profits for investors by incorporating smart solutions in areas such as transport, security, water, and waste management.
- SAPCO strives to make these areas smart right from the beginning of the development process. It was noted that upgrading already constructed areas to become SC is challenging. Therefore, SAPCO aims to implement smart solutions at the beginning of the construction process rather than retrofitting existing infrastructure. The main objective of SAPCO is to upgrade the coast and touristic zones to attract investors. For instance, SAPCO mentioned a project in the seaside area called "Delta du Salone" which focuses on implementing innovative approaches. SAPCO highlighted their efforts to upgrade the areas and attract big international events. They mentioned that in 1975, the supervision areas covered 600 hectares, and now they are working step by step to transform these areas into green city.

Topic 2. Collaboration between SAPCO and Local Government in Infrastructure Development

- Regarding target area of SAPCO project, the designated coastal zones under the responsibility of SAPCO, they provided details on the specific areas, such as Saly area covering 600 hectares, the Moyen area covering 400 hectares (where Akon City is located).
- The collaboration between SAPCO and the local government in infrastructure development was discussed. SAPCO highlighted that the government owns 98.5% of the designated areas, making them the most important stakeholders. The local government is involved in every step of the development process, from the beginning to the end. They play a crucial role in increasing employment opportunities in these areas for the local population. For example, the construction of hotels in some areas has resulted in the employment of over 1,000 people. SAPCO emphasized that their focus goes beyond infrastructure development, they actively contribute to the economic growth of the region by providing employment opportunities.
- SAPCO highlighted their commitment to integrating maximum participation from the local population in the economic growth of the areas. They prioritize this aspect

immediately after construction is completed. Their goal is to ensure that the local community benefits from the economic opportunities generated by the projects.

Topic 3. SAPCO insight on SC development

- The decision-making process regarding the designation of each area as a SC or a green city was addressed. SAPCO clarified that within their working process, it is not mandatory to develop SC. However, given the current trend and to remain competitive, they open to develop SC. The decision to designate an area as a SC or a green city is made based on various factors and considerations.
- SAPCO clarified that their current initiative on SC, they are working towards upgrading Saly to a SC. They are currently focusing on implementing smart public lighting and smart waste management systems.
- The waste management system focuses on smart management to generate electricity from waste and promote recycling. They utilize a smart system for waste collection. If they produce excess energy, they sell it to the national energy provider. It is not allowed to produce and sell energy locally.
- SAPCO have a Master Plan for Saly. The plan was developed by an international consultant from Tunisia. SAPCO conducted a tender process to select a consultant for the implementation of the plan. Typically, consultants from Europe and North Africa, specifically Tunisia, Morocco, and Nigeria, apply for the projects.
- About the availability of companies that can supply smart technologies, SAPCO explained that they can find smart technologies locally, but in their tender process, they prefer an international tender.
- About the focus on ICT or DX in SAPCO initiatives SAPCO indicated their interest in ICT and DX technologies, but currently do not have specific initiatives in place. They prioritize data security and privacy. If there are regulations that ensure the protection of personal data, they would welcome them. They mentioned the "*La Commission de Protection des Données Personnelles*" in relation to data protection committee.

Topic 4. Discussion on attracting investors and development of infrastructure

- About the most important factors to attract investors, SAPCO explained that if investors are interested in Senegal, they will come forward. SAPCO collaborates with the government to provide financial advantages and incentives to attract investors.
- About the service delivery process after construction of infrastructure, SAPCO assured that they will take charge of everything related to service delivery after construction.
- About the concession or contract system for projects on government land, SAPCO explained that it is very difficult for private entities to be involved in government's land projects. SAPCO being part of the government, make it easier to secure projects.
- About increasing employment in the areas where SAPCO is in charge, SAPCO explained that it is not mandatory to achieve this aspect. However, in the Master Plan they can make estimations for the number of employment opportunities, but all recruitment falls under the jurisdiction of the special work inspection office in Senegal. There is no regulation to include this aspect in the development, but private stakeholders involved in a project must comply with environmental and social regulations.

Topic 5. Discussion on evaluation system of SC

- About the evaluation system for the SC and green city, SAPCO explained that they have Key Performance Indicators (KPIs) for evaluation, and there is a department within SAPCO responsible for managing the evaluation process. They studied and benchmarked systems in other countries, such as Morocco and France. They specifically

mentioned Nice city in France as a reference. The evaluation system is tailored to meet the specific needs of the project. Other countries were not considered due to budget constraints and language barriers.

- About consideration on the Sustainable Development Goals (SDGs), SAPCO stated that the SDGs are not specifically considered in the evaluation system. However, the project needs to meet certain project criteria, including environmental certification and sustainability

List of Attendance

Date: 2024 / 1 / 22

Place: Sapco office

[illegible]

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 26, 2024 / 15:30-16:30
Place of Meeting	Société de Gestion des Infrastructures publiques des pôles urbains de Diamniadio et du Lac Rose (SOGIP) Office (Public infrastructure management company for the urban centers of Diamniadio and Lac Rose)
Attendees	[SOGIP] Mamadou Faye Safietou Seye Sall [yec] Kudo, Shimomura, Hoshi, Nisa

Topic 1. About SOGIP

- SOGIP is a governmental company specializing in infrastructure development in Diamniadio and La Rose. They are financed by the government and generate revenue by exploiting areas for development. Every year, they receive loans from the government and identify new areas for developing facilities such as stadiums, hotels, parking lots, and markets.
- Currently, SOGIP is focused on improving internet coverage in Diamniadio. They also have plans to construct additional infrastructure in the area.
- About the relationship between SOGIP and DGPU (Directorate General of Urban Planning), it was mentioned that all matters related to real estate fall under the jurisdiction of DGPU. When SOGIP requires land for development, they approach DGPU, which is the land provider while SOGIP takes care of the construction.
- Regarding control over SOGIP's development activities, it was clarified that DGPU does not have direct control over SOGIP. They are separate entities. However, there is collaboration between SOGIP and other similar companies which are involved in the construction of ministerial offices and UN buildings in Diamniadio.
- SOGIP has plans to build infrastructure, including an international hospital in Diamniadio, which include internet coverage. They do not have an area designated for building a hospital, but there is a location near the Radisson Hotel where they intend to construct one.
- In terms of the railway system, it was explained that railway development falls under the jurisdiction of xxxx, and the current railway system connects Dakar to Diamniadio. There is plan for the second phase development to extend it to the airport.
- When asked about the relationship with other government entities, it was mentioned that the new urban pole of Diamniadio is not directly linked to the city hall of Diamniadio. Instead, it falls under the direct responsibility of the government. The city hall of Diamniadio has its own specific services, while DGPU and SOGIP take on the responsibilities that would typically be handled by the city hall.
- SOGIP is not involved in the creation of the Master Plan (MP) for Diamniadio.
- About the incomplete constructions in Diamniadio and the need to attract people to live there, SOGIP expressed optimism, stating that several companies are increasing their developments in the area. As an urban extension of Dakar, they expect people to move to Diamniadio. The government's decision to relocate ministries to the area is aimed at encouraging this migration.
- About the target population for Diamniadio, it was mentioned that SOGIP does not have that information and suggested that DGPU may have it.

- In addition to public facilities, SOGIP has plans to build schools in the area. Currently, there are three high schools and private schools. They also plan to establish a university, currently there is a university in the area called the Institute for Petroleum and Gas.

Topic 2. About Diamniadio Development

- About the problems in Dakar that Diamniadio aims to solve, SOGIP mentioned that the issue of overcrowding in Dakar, and the construction of a new city (Diamniadio) with different infrastructure aims to address this problem.
- Regarding smart city development, SOGIP aims to build high-rise buildings and achieve full internet coverage. They have goals related to internet coverage and are working towards achieving them with projects such as the Petrosen 1 Tower and SOGIP 1 Tower.
- SOGIP and DGPU share a vision to make Diamniadio a modern and model city for Senegal. The main challenge they face is funding, as they have previously relied on government funds but now aim to promote larger projects through public-private partnerships (PPP). While they have skilled human resources, the main issue lies in securing funding for their initiatives.
- About incentives to attract private sectors, it was explained that although there is no special program, SOGIP aims to establish win-win partnerships with private companies.
- When asked if SOGIP has deployed its technical team to DGPU (Directorate General of Urban Planning), it was clarified that SOGIP is a relatively new company, established 8 years ago, while DGPU was formed in 2012.
- SOGIP mentioned that there is another project for an urban pole around the Dayam City, which follows a similar procedure as Diamniadio.
- Regarding the timeline for completing Diamniadio, it was stated that it is under the responsibility of the government and the exact timeframe is uncertain. Typically, it takes centuries to build a city. Other African countries, such as Rwanda, have visited Diamniadio to learn from its sport infrastructure and replicate it in their own countries. Rwanda is using a similar procedure for its exploitation.

Topic 3. About Future Support

- JICA may support the development of smart cities in Senegal and inquired about the roles of various entities in this development. SOGIP expressed openness to any opportunities from JICA and mentioned that JICA could assist DGPU with public services, which aligns with SOGIP's focus on transportation, waste management, and internet coverage.
- Regarding infrastructure management training, the roles of SOGIP and DGPU in environmental management and the various developments within Diamniadio, it was explained that while SOGIP has plans to improve the urban pole of Diamniadio, DGPU is responsible for all matters related to real estate.

Topic 4. About the Infrastructure Service Provider

- Concerning the operation and maintenance of solar panel infrastructure, it was mentioned that the National Agency for Renewable Energy is responsible. SOGIP clarified that they are responsible for building the infrastructure and also its operation and maintenance.
- About the ownership of the facilities, it was stated that all infrastructure built by SOGIP belongs to the Senegalese government. Legally, the name of SOGIP is associated with the infrastructure, but it is under the ownership of the government.

- Regarding revenue, it was explained that SOGIP does not give revenue directly to the government. Instead, the revenue is used for maintenance and the construction of future projects.
- About data management, it is responsibility of the government, not SOGIP. However, SOGIP has plans to work with HUAWEI to implement data management for all its infrastructure assets.
- About the security measures SOGIP gave example about the stadium which has 50,000 seats. It was explained that there is a system in place to oversee the arena for security reasons. This system allows them to monitor the number of people in the stadium through video surveillance, which requires proper internet connectivity.
- About the internet infrastructure, it was mentioned that the internet is based on the mobile network provided by ORANGE. They also have fiber optic infrastructure operated by ORANGE.

List of Attendance

Date: 2024/1/24

Place: S O G I P

[illegible]

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 25, 2024 / 10:00-10:30
Place of Meeting	Dakar City Hall Office
Attendees	[Dakar City] Ngouda Sall [yec] Kudo, Shimomura, Hoshi, Nisa
<p>Topic 1. About Role of Dakar City on Smart City Plan</p> <ul style="list-style-type: none"> Dakar is an attractive city with a budget of 50 billion CFA, 35 billion of which is allocated for city functioning (including smart city) and social activities to support vulnerable individuals. Ngouda Sall visited cities in France, Dubai, and Casablanca to learn about smart city initiatives. Ngouda Sall did not participate in the 2016/2017 Master Plan (MP) of Greater Dakar formulation supported by the JICA. <p>Topic 2. About Issue and Challenges in Dakar City</p> <ul style="list-style-type: none"> One of the most important issues in Dakar is traffic, as 72% of cars in Senegal are located in Dakar. To address this issue, the city is seeking smart solutions such as developing a train system and a Bus Rapid Transit (BRT) system. They also plan to build a second road to alleviate traffic congestion. Currently efforts to implement metro WiFi in Dakar, providing internet access in schools and other public places are being in placed. However, the technology is not yet ready, and companies like IBM, Google, and Microsoft are participating in this initiative. Additionally, the Economic Community of West African States (ECOWAS) has set a law requiring all data to be stored within the countries of the region. Political stability in Senegal is seen as an asset, as the government aims to attract maximum investment. <p>Topic 3. Smart City in Dakar</p> <ul style="list-style-type: none"> Regarding the strategy and vision for smart city development in Dakar, there is a plan to turn Dakar into a smart city. They are currently considering how to proceed and are seeking opportunities to collaborate with organizations. They aim to create a model for Senegal that can be replicated in other countries around the world. They also mentioned the need for assistance in implementing fiber optic infrastructure using tunnels to avoid cables in the ground. The city has plans to improve the lives of its citizens, including a competition to award innovative technological solutions. They have digitized administrative documents and plan to implement digital formats in schools as well. 	

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 25, 2024 / 12:30-13:30
Place of Meeting	Ministry of Territorial Communities, Planning and Territorial Development (MCTDAT) Office
Attendees	<div> [MCTDAT] Pape Ngorthiad Modou Ndoeye Balla Diop Ngom Abdurrahman Sene Momor Gueye Binetou Ly </div> <div> [JICA] Hiroshi Yoshikawa Caroline Diouf </div> <div> [yec] Kudo, Shimomura, Hoshi, Nisa </div>
<p>Topic 1. About Role of the Ministry</p> <ul style="list-style-type: none"> The ministry currently does not have any specific projects related to Smart City (SC). However, there are ongoing initiatives for SC under the Regional Planning Department. The focal point for these initiatives is the National Plan for Territorial Planning and Development (PNADT). Additionally, a local development agency is actively involved in SC endeavors, including projects such as e-territories and the observatory of territories. <p>Topic 2. About Urban Development</p> <ul style="list-style-type: none"> It is mentioned that a comprehensive city planning before the development is important and currently 600 cities have schemes and plans for the city development. They highlight a lack of knowledge within the ministry regarding the existing infrastructure, population distribution, and other critical factors. The “<i>Hiérarchie fonctionnelle des établissements humains</i>” inside PNADT is presented as a scheme that aims to understand the territory, delineating the roles of different organizations, promoting growth, and facilitating a balanced distribution of people and infrastructure on a national level. Furthermore, it is suggested that the scheme can be instrumental in selecting cities for the implementation of new projects or initiatives. They express a willingness to collaborate with partners for the enhancement of the scheme. The only city that has actively initiated Smart City efforts is Diamnadio, and the ministry is actively participating in implementing technology in this city. There is ongoing discussions and planning with the World Bank (WB) for a SC plan which is part of the PNADT initiative. This collaboration with the WB is expected to provide insights into the requirements for implementing SC initiatives. <p>Topic 3. About Urban Issues and Challenges</p> <ul style="list-style-type: none"> A comprehensive approach to city categorization is outlined, including (1) international cities like Dakar, (2) balanced cities, (3) regional cities, (4) secondary cities, and (5) localities. Regarding the urban development challenges, particularly emphasis on Dakar's rapid growth leading to issues such as flooding, waste management, healthcare access, and other social needs. 	

- Transportation-related projects, such as the Regional Express Train (TER) and Bus Rapid Transit (BRT), are highlighted as efforts to address mobility challenges. Housing emerges as a major concern, with the informal sector expanding into non-housing areas, and some localities lacking development plans, leading to unplanned constructions.
- It is acknowledged that illegal occupations contributing to issues like flooding, particularly in Dakar, where many areas lack of proper infrastructure. Urbanization is identified as a continual challenge, with plans such as "100,000 housing" aiming to accommodate the growing population. Mobility issues, including air pollution due to the concentration of industrials and cars in Dakar are also mentioned.

Topic 4. About Coordinating Body

- Regarding human resources capacity in Dakar, the ministry allocates some funds to cities and the cities have their own programs and implement the program by their own, but they still have difficulties to provide services to the population. Along with the funds, the ministry also has programs such as (1) Promovilles (program to modernize cities in Senegal) and (2) Puma (emergency program to modernize rural areas), to improve living conditions of the population. But, the absence of private sector involvement in these programs is emphasized.
- The ministry participating in the council for the development of the urban pole of Diamnadio. The ministry conducts discussion and gives all necessary information, advice, recommendation, etc to DGPU. Additionally, there is another entity namely Municipal Development Agency under the supervision of the ministries.
- In response to a query from JICA about the demand for public services due to urbanization, coordination issues among utilities are acknowledged. While there is no overarching coordination structure, steering committees and technical committees are established for major projects. The decentralization model in Senegal, allowing local governments to implement projects independently, is also discussed in the context of coordination challenges.

List of Attendance

Date: 2024/1/25

Place: ~~MCTA~~ MCTDAT

Name	Organization	Title	Telephone	Email
Hoshi Takehiro	JICA Consultant Team	Expert		
Pape NGORTHIAO	MCTADT	Directeur Cooperation decenral		
Modou NDOYE	ETS MCTADT	Conseiller Technique		
Hiroshi YOSHIKAWA	JICA	Adjoint au Représentant Résident		
Caroline DIOLF	JICA	chargée de projet		
✶ Balla Drop Ngom	MCTADT	Conseiller Technique		
Boulouar Bill	MIRCAB	MIRCAB		
Abdoulaye SENE	DAT/MCTADT	Directeur		
Momor Gueye	MCTADT 1	Conseiller Technique		
Bintou Ly	MCTADT / DAT	Agent DASH		
KUDO Hirofashi	JICA Consultant Team	Team Leader		
SHIMOMURA Akihiko		Expert		
KHAIRUN Nisa				

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Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 25, 2024 / 15:00-16:00
Place of Meeting	Ministry of Urban Planning, Housing and Public Hygiene. Directorate General of Urban Planning and Architecture (DGUA) Office
Attendees	<div>[DGUA] Youssopha Mane</div> <div>[JICA] Hiroshi Yoshikawa</div> <div> Caroline Diouf</div> <div>[yec] Kudo, Shimomura, Hoshi, Nisa</div>
<p>Topic 1. About Diamniadio City Development</p> <ul style="list-style-type: none"> The population growth in Dakar has led to issues related to infrastructure, as everything is concentrated in the area called Plateau. To address this, Diamniadio City was built as an urban pole to decongest Dakar. The goal is to transfer some activities and population from Dakar to Diamniadio. There are a total of 6 urban poles near Dakar, with Diamniadio and Daga Kholpa being the main ones. The planning and development of these urban poles require significant funding, and currently, there are difficulties in implementing the plans due to financial constraints. DGUA emphasized the need for qualified agents to properly carry out the implementation work. DGUA have received a small amount of funding, ranging from 100 to 200 million CFA, which is insufficient for the required urbanization work. They are working on overcoming urbanization challenges and have national policies in place for urbanization. The support they currently receive is primarily from the United Nations regarding housing. DGUA also mentioned a program for urban planning in Daga Kholpa, which is chosen due to its favorable geographic situation near the airport and the new harbor to be built in Dayam City. Collaboration with other ministries, such as the Ministry of Environment and the Tax Office is important. DGUA follows laws and regulations to ensure effective collaboration with these ministries. It was explained that Diamniadio City has some different zones, such as industrial, housing, and administration. The focus is on balancing the development in Diamniadio with what already exists in Dakar. The emphasis is on housing and infrastructure programs, including the 100,000-housing initiative, which aims to create suitable areas for housing and prevent the growth of slum areas. The nature of Diamniadio City is described as a city that will generate economic growth and provide housing opportunities. <p>Topic 2. About Future Support</p> <ul style="list-style-type: none"> When asked about support from JICA, it was mentioned that DGUA is in charge of Daga Kholpa and the other 3 urban poles, while the Directorate General of Urban Planning (DGUP) oversees Diamniadio and La Rose. Both urban poles are considered important, with Diamniadio already under construction and Daga Kholpa waiting for development. The plan is to make Daga Kholpa an economic and logistic center, particularly due to its proximity to the future port and Dayam airport. DGUA mentioned that planning and 	

implementing the urban development requires significant funding and they need support on this matter.

- DGUA stated that the aim of the urban plan was to develop these 2 cities as smart cities.
- When questioned about the size of the development targets, it was explained that they will be based on the facilities and infrastructure constructed in the city.

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 26, 2024 / 10:00-11:00
Place of Meeting	Ministry of Communications, Telecommunications, and Digital Economy (MCTEN) Office
Attendees	[MCTEN] Aissatou J. Ndiaye Sy Diot Anadou Nalick Falou Thiam
	[JICA] Yuko Singh Suwa Caroline Diouf
	[yec] Kudo, Shimomura, Hoshi, Nisa

Topic 1. About Smart City Initiative

- MCTEN has elaborated an initiative for smart cities (SC) that is linked to the Directorate General of Urban Planning (DGUP) and the overall strategy of Senegal. The strategy includes the installation of video surveillance and WiFi spots throughout Dakar. DGUP is responsible for managing the development inside Diamniadio and other areas. The SC project implementation in Diamniadio is underway, but it is unclear if DGUP has already installed any technology there.
- In addition to the video surveillance project, there is another organization which is the meteorological agency that focuses on air quality.
- MCTEN agreed with the prominent position of Dakar in the matrix of SC development shown by yec (refer to the presentation file by yec).
- About the vision considered by the ministry, it was explained that the ministry handles all telecommunication facilities and emphasizes the importance of providing services to citizens. The strategy is developed through collaboration with public and private entities, and after installation, it becomes the responsibility of those entities to implement it. However, there is no specific SC project to build in MCTEN.
- About the difference between the strategy for SC and the digital Senegal strategy, MCTEN clarified that they are different, with the digital Senegal strategy encompassing larger national strategies for SC development, artificial intelligence, and infrastructure.

Topic 2. About Citizen Participation

- Regarding stakeholders, it was clarified that they include NGOs and associations, but not the community itself. The involvement of the community comes when they want to develop something specific.
- MCTEN listens to the general public in order to provide good services. They have policies and action plans in place, where the policy focuses on the overall development image and the action plan outlines the specific development steps. MCTEN identifies the needs of the population and develops public services in ICT related matters based on those needs. MCTEN collaborates with various organizations, such as the Ministry of Agriculture to provide information on when to plan seeds.
- When asked about the existence of a committee to gather citizen input, it was mentioned that it is possible to implement such a committee. Sport associations and other think tanks are involved to achieve the strategy's goals.
- MCTEN mentioned that services like bus information are not yet implemented. The government aims to make public services more accessible to all.

Topic 3. About Future Support

- About the need for capacity development in terms of SC, it was stated that they do not require additional capacity development at the moment.
- Regarding ICT installation in Diamniadio, it was explained that Senegal already has telephone coverage and access to the internet throughout the country. Diamniadio currently has full coverage of telecom and internet services. The focus now is on ensuring that citizens have the necessary tools, such as smartphones, to access information. There is also a policy in place to provide one laptop per university student.
- When asked about support from the United Nations Development Programme (UNDP) to promote the Senegal digital strategy, the interviewee expressed their hope that JICA can develop a project in collaboration with the government.

List of Attendance

Date: 2024/1/26

Place: Ministry of Telecommunication

Name	Organization	Title	Telephone	Email
KUDO Hiroyasu	JICA Consultant Team	Team Leader	+81 90 3541 0618	tk.kudo@jica.go.jp
SHIMOMURA Akihito	"	Expert		
KHAIRUN Nisa	"	"		
HOSHI Takehiro	"	"		
Laroline DIOUF	JICA Senegal	chargée Programme		
Yuko SINGH-SUWA	"	conseillère de formulation de projets		
DIOP ANADOM NALICK	JICA SENEVAL	CHARGÉ DE PROGRAMME		
Assafou Jeanne N d'ingé	ICTN/STIC	Directrice des Technol de l'Information		
Falou Thiam	MCIN/CFP	Coordonnatrice Cellule Edu de l'IP		

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region	
Date and Time	January 26, 2024 / 15:30-16:30	
Place of Meeting	Rufisque City Hall Office	
Attendees	[Rufisque City]	Diene Saliou Isseu Toure Bineta Gueye Aly Diagne Ngom Sidy Mbaye [yec] Kudo, Shimomura, Hoshi, Nisa
<p>Topic 1. About Issue and Challenges in Dakar City</p> <ul style="list-style-type: none"> One of the major issues in Rufisque is mobility, with significant traffic congestion. Additionally, the city is experiencing rapid population growth without sufficient infrastructure, particularly in suburban areas where access to social facilities is challenging. To address these issues, there is a long-term plan in place to improve mobility. They also mentioned the issue of flooding during the rainy season. The major reason for flooding is illegal housing in suburban areas and the high groundwater level (the city is situated inside a curve (like a bowl) that causes water to flow into the city during heavy rains). Efforts are being made to overcome these challenges and improve the overall livability and functionality of Rufisque. <p>Topic 2. About Smart City Initiative</p> <ul style="list-style-type: none"> There haven't been any specific smart city initiatives implemented yet in Rufisque. However, they conducted a survey using smartphones to count the number of housing units, which was done for the tax office to determine the number of households. In terms of mobile coverage, Rufisque has full coverage and there is a data center operated by ORANGE. While optical fiber and internet services are available, the coverage for 4G is not yet complete. The city relies on mobile networking for internet access. Currently, the digital process for citizen data is locally stored, with certification and official documents kept centralized in the city hall. There is a government-initiated process for declaring births and deaths, and without a birth certificate, individuals may face difficulties accessing education. There are plans to build a data center to collect all citizen information, including birth certificates, addresses, and geolocation data. However, the challenge lies in integrating these separate databases, which requires facilities, budget, internet coverage, and technical expertise. The benefits of having a data center include improved access to digitalization, such as allowing people to register births from hospitals without visiting the city hall. It can also benefit in waste collection, security surveillance, parking management, and overall information centralization for the city. 		

- They emphasized the importance of all cities starting smart city initiatives to improve the quality of life. They have attended international seminars in Morocco and the United States to learn more about smart city initiatives.

Topic 3. About Diamniadio and Rufisque City

- When discussing the function difference between Diamniadio and Rufisque, it is explained that Rufisque is a historical city in Senegal, with public services established during the French occupation that still remain today. Rufisque representing the ancient city and Diamniadio representing the modern city.
- In terms of job opportunities, Rufisque has limited industries, with only one cement industry and other commercial activities - mainly informal sectors are available. Many people commute from Rufisque to Dakar for work, and some companies like ORANGE have offices in Rufisque, attracting a portion of the population for working.
- One of the main challenges faced by Rufisque is balancing the budget, as Diamniadio receives more funding for development. The historical value of Rufisque makes it difficult for the local authority to attract investment. However, there have been efforts to bring in private investments, and special programs have been initiated to address this issue.
- The historical value of Rufisque has potential for tourism. The city has ancient buildings dating back to the colonial period, some of which have been standing since 1890. Rufisque has played a significant role in historical events in Senegal, including discussions of the country's independence were took place in this city.
- There is inventory of historical city sites and collaboration with stakeholders to increase tourism. They mentioned the construction of a House of Art in collaboration with Nantes City in France, which will serve as a cultural asset for music, paintings, and more.
- Overall, efforts are being made to enhance Rufisque's potential and increase its attractiveness as a tourist destination while addressing the economic challenges it faces.

Topic 4. Others

- Regarding donor support, they have not received any. However, the Agence Française de Développement (AfD) has assisted in creating an urban development plan for 2035. The mayor, who previously served in the national assembly, has shown strong leadership in guiding the city.
- Regarding follow-up after the completion of the city master plan, there are no specific action plans in place, but the information is shared with other donors besides the AfD. Some teams update the plans every five years.

List of Attendance

Date: 2024 / 1 / 26

Place: Rufisque city

Name	Organization	Title	Telephone	Email
KUDO Hiroyasu	JICA Consultant Team	Team Leader		
SHIMOMURA Akihiro	"	Expert		
KHAIYUN Nisa	"	"		
Hosaka Takahiro	"	"		
Yoko Gueye	Ville de Rufisque	Team		
Diene Salion	Ville de Rufisque	IT Manager		
ISSEN TOURE	Ville de Rufisque	Directrice de la planification		
Bineta Gueye	Ville de Rufisque	Point Focal PACASEN		
Aly Diagne HGM	Ville de Rufisque	Manager/CPM		
Lidy NGAYE	Ville de Rufisque	J. G		

☆

Rwanda

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 30, 2024 / 10:00-11:30
Place of Meeting	Telecom House
Attendees	<div> <div>[MINICT, RISA]</div> <div>Antoine Sebera</div> <div>Alice Higiyo</div> <div>Alain Kamanzi</div> <div>Sosthene Bwigenge</div> </div> <div> <div>[yec]</div> <div>Kudo, Shimomura, Hoshi, Nisa</div> </div>

Topic 1. Smart City in Rwanda

- In 2017, Smart Africa developed a smart city blueprint for Rwanda. The blueprint includes frameworks for smart living, smart transport, and other relevant strategies. The next step needed is to move forward with the implementation of these frameworks.
- To monitor the implementation of the smart city initiatives, existing studies are being utilized as a basis for building strategies. However, adjustments and adaptations are necessary to align with future development. Smart city hub is being developed for master plan coordination among the coordinating bodies.
- The national vision for Rwanda is becoming a high middle-income country by 2035 and a high-income country by 2050. The smart city initiatives aim to align with this vision by positioning the country as a logistic hub and focusing on sectors like finance and tourism.

Topic 2. Urban issues and challenges

- Urban and land use: The land authorities have various tools and systems in place to address urban issues, there are also master plans for the city. There is a model village that showcases well-constructed sites, which is a positive step towards reducing informal settlements. Challenges in the implementation process include issues related affordable housing, energy efficiency, water treatment, and maintaining cleanliness in the city.
- Infrastructure: Transportation is also a significant concern, and policies and incentives are being explored to promote mobility and the use of electric vehicles. There is a need for more roads and utilities to improve infrastructure in the city. Additionally, there is also limited access to ICT services.
- Environmental impact: Environmental impact and climate change are important considerations, particularly in regards to managing floods and addressing the increasing population in cities. Coordination efforts involve various ministries, partner organizations, the city of Kigali, and six secondary cities. The secondary cities, such as Musanze, have specific focuses, such as tourism, that are being taken into account in the smart city planning. Access to energy and water is not a major problem, but there may be challenges in terms of management and quality rather than supply.
- For monitoring the challenges and how people benefit from the initiatives in overcome the challenges is done at the city level. This includes conducting citizen satisfaction surveys and engagement surveys, as well as co-creating and conducting workshops with citizens for different projects. To address monitoring challenges, there is a plan to establish a coordination center or a command center as a priority. This center will monitor the feasibility and implementation of projects. The Smart City Hub strategy also

includes a policy lab, which serves as a platform to test and validate policy implementation approaches.

- About monitoring and setting benchmarks for impact to citizen, it is still challenging as many policies are still under development. In the initial phase of the master plan, there was a focus on infrastructure development, making it difficult to measure the impact of initiatives. However, we have conducted an inventory of projects and initiatives and have developed indicators in four key areas: smart mobility, smart community, smart infrastructure, and smart living.

Topic 3. The implementation of Smart City in Rwanda

- The implementation process is overseen by a steering committee consisting of key stakeholders, followed by a technical committee responsible for decision-making. Academic institutions and different associations are also involved in the process, with more than 12 institutions collaborating to discuss the feasibility, priorities, and implementation of digitalization in various sectors.
- In terms of projects that have already been implemented, several notable initiatives include (1) a smart waste management system in 6 sites which providing real-time information to citizens about waste collection; (2) a smart parking management system is also being developed, allowing people to easily find available parking spots and introducing cashless payment options; (3) environmental sensors are being used to monitor air pollution, and the data is used by the city on implementing solutions to analyze pollution levels; (4) public security measures; (5) digitizing urban planning processes; (6) introducing cashless payment options within the city; (7) implementing flood detection systems, and (8) using drones for various purposes, such as ambulance services to bring blood and urban planning to monitor the land use.
- Overall, the smart city initiatives in Rwanda aim to promote economic growth, enhance quality of life, and address environmental challenges through the implementation of various projects and strategies.
- In terms of partnerships in the smart city implementation, the private sector has played a significant role in smart mobility initiatives, such as cab-sharing and electric motorbikes. E-commerce is predominantly led by the private sector, while tap-and-go cashless transportation is led by the government with some public-private partnership models. International and national private firms have been involved in various projects, including drone testing from the US to develop policy frameworks. The use of drones example is for delivering blood to areas with difficult mountainous terrains. Collaborations with financial institutions, such as SoftBank, have also been established.
- Overall, while there have been challenges in monitoring impact, efforts have been made to develop indicators and collaborate with various stakeholders to advance smart city initiatives in Kigali.

Topic 3. Issues and challenges to accelerate more smart city initiatives

- Sustainable financing system: After pilot projects, there is often a challenge in scaling up the initiatives to other cities. Finding sustainable funding mechanisms is crucial for the expansion of smart city projects.
- Capacity of human resources: Developing homegrown solutions requires a strong pool of skilled professionals. Innovation centers, incubators, and accelerators in Kigali play a role in nurturing smart city technologies and fostering local talent.
- Capacity building in infrastructure: Enhancing infrastructure, particularly in areas such as mobility, renewable energy, and waste management, is essential for transforming cities into smarter and more sustainable environments. This includes constructing new roads,

implementing rapid bus transit systems, and improving liquid and solid waste management.

- Increased partnership with academia: Collaborating with academic institutions is vital for researching local problems and finding innovative solutions for implementation in smart cities.
- Shifting towards a people-centered approach: The assessment of smart city initiatives revealed the need to focus on the needs and demands of citizens and private sectors. This involves creating collaboration platforms, documenting challenges, and publishing the outcomes. It also includes acting as a social research hub to benchmark against global standards and connecting the right needs with the right innovators.
- Digital infrastructure challenges: While there is high coverage of fiber optic networks, there are still challenges in terms of digital infrastructure for smart cities in Kigali. The city of Kigali owns a platform for telecommunication management and is investing in IoT sensors and ICT solutions. The command center brings all data together, and various mobile apps for smart waste management and smart parking are already in use. Digitalization is seen as a crucial factor in the development of Kigali as a smart city.

List of Attendance

Date: 2024 / 1 / 30

Place: RISA

Name	Organization	Title	Telephone	Email
KUDO Hiroyasu	JICA Consultant Team	Team Leader		
SHIMONAKA Akihiro	"	"		
KHAJIRUN Nisa	"	"		
HOSHI Takahiro	"	"		
Alain Kamanzi	RISA	ET Analyst		
Sosthène BNIGENGE	MINICT	Smart Cities & Community Outreach Specialist		
ALICE HIGIRO	MINICT	Project Director		
Antoine Seberg	RISA	Chief Government Innovation Officer		

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region
Date and Time	January 30, 2024 / 14:00-15:00
Place of Meeting	Ministry of Infrastructure Office
Attendees	[MINISFRA] Eric Hakizimana [JICA] Ozawa Ken [yec] Kudo, Shimomura, Hoshi, Nisa

Topic 1. Smart City in Rwanda

- We are struggling in understanding the concept of smart city, as common people often see it as ICT-based. However, the government agencies view it at the political level, as a framework for doing things. While the policy aspect of smart city is well-understood in Rwanda, there is a need for coordination with different ministries. A clear definition of smart city is necessary.

Topic 1. Urban issues and challenges

- Urban and land use: There are district towns in every district, and each requires a different concept of smart city. Land use master plans have been developed for 24 districts, and while urban planning is considered good, the main challenge lies in the implementation. Shifting the focus from weak urban planning to the improvement of implementation, linking it to smart city initiatives is suggested. Additionally, there is still unplanned development in the periphery of cities
- Infrastructure development: Informal settlements and inadequate access to reliable energy and water are major issues. Around 75% of the population has access to energy, while access to water is still below 30%. The use of ICT services is limited, with approximately 600 services delivered through a service delivery platform, indicating the need for improvement.
- Other challenge includes coordination (as a key issue). While there is a master plan in place, sprawl still exists, indicating a lack of coordination. The need for joint assignments and better communication and cooperation between organizations involved in smart city initiatives is necessary.
- Enforcement was identified as another challenge. While there are good laws, regulations, and programs, enforcement is still a concern. Administrative arrangements and frameworks are needed to ensure effective enforcement.
- Investment and data sharing were also challenging. There is a need for a policy framework for data sharing and data protection, as well as a centralized source of data for better access. Additionally, there is a lack of staff capacity and knowledge in implementing smart city initiatives, particularly in terms of digital solutions. The need to shift the perception of smart city from being solely ICT-focused is necessary.

Topic 3. The implementation of Smart City in Rwanda

- Each ministry has its own mandate, and Rwanda Information Society Authority (RISA) is the coordinator for ICT. The ICT department operates under the mandate of RISA.
- About citizen perception of smart city initiatives, the Rwanda Government Scorecard, specifically the 10th edition has been published, it includes indicators for good governance and service delivery. In terms of ICT perception, the score was reported as

74.59%. This data is collected through surveys conducted by the Rwanda Government for their annual report, which assesses how people rate the leadership.

- Citizens are able to pay for water and electricity services using their phones. There is a need for improvement in helping citizens become more familiar with using applications and ICT solutions. With two million households in Rwanda, implementing applications for all would be costly. However, feedback from consumers indicates that they are happy to have access to initiatives that make their lives easier.
- We do not directly connect with the public at the directive level, local government institutions are responsible for communication and gathering feedback from the public at the implementation level.
- About ongoing smart city projects led by the private sector and government incentives and how to attract private investment, the government is in the process of revising the Public-Private Partnership (PPP) law. The aim is to ensure that private entities can participate as investors.
- About coordination between the Ministry of ICT and other ministries, for example during the development of the Land Use Master Plan, an integrated approach is taken where all ministries raise their concerns and contribute to the plan. However, when it comes to the smart city master plan, there are differences. The development of ICT is progressing rapidly and changing dynamically. While some aspects are considered in the Land Use Master Plan, such as planning for road infrastructure for public transportation, challenges still exist for other smart city facilities due to the fast pace of change in the ICT sector.

List of Attendance

Date: 2024 / 1 / 30

Place: Ministry of Infrastructure

[illegible]

Minutes of Meeting

Project Name	Data Collection Survey on Smart City Development in the African Region		
Date and Time	February 1, 2024 / 13:30-14:30		
Place of Meeting	Oasis Park		
Attendees	[RISA] [yec]	Dr. Rene Kudo, Shimomura, Hoshi, Nisa	
Topic 1. Smart City in Rwanda			
<ul style="list-style-type: none">Rwanda has developed a Smart City Master Plan with 27 initiatives, aiming to make the city smart. In terms of service delivery, Rwanda is considered better than other countries in Africa, but still progressing. We are currently developing an African Smart Sustainable Index, which ranks cities based on their smart city initiatives. Kigali, the capital of Rwanda, is ranked number one in this index.Various categories in the index are used, such as economic performance, logistics, and the level of acceleration in implementing smart city initiatives. While Rwanda ranks well in certain areas, there are areas for improvement, such as investment in research and development compared to Nairobi, and the efficiency of logistics services.We involve in several smart city projects, including drone delivery and the use of blockchain, IoT, and artificial intelligence (AI) technologies.There are working groups (WG) at different layers of smart city initiatives, where ideas are shared and projects are updated. These working groups include representatives from the public, private, police, and hospital sectors.In terms of citizen involvement, citizens can report problems by taking photos, but there is currently no direct involvement of citizens in collecting opinions or feedback on smart city initiatives. In addition, there is also task forces with designated chairs, co-chairs, and secretaries, and leading institutions responsible for implementing different aspects of smart city initiatives.About monitoring and evaluation, there is a system in place to evaluate and monitor the impact of projects, especially those funded by donors. Information is collected before and after project implementation to assess their effectiveness.			

Appendix 4 Answer to the Questionnaire

Senegal

Questionnaire

This questionnaire is prepared to gather the most recent information on the status of your country in smart city initiatives, which is a major focus of this JICA survey in sub-Saharan Africa. Please respond to the following questions.

Name of respondent: DGPU / Gueye Dieynaba DIOP (Madam)

Title: Head of the Smart City Unit

Contact information: e-mail:

Phone:

1. Urban issues and approaches to solving them

Please state urban issues from 5 aspects; (1) urban and land use, (2) infrastructure development, (3) environmental impact, (4) socioeconomic, and (5) governance, and approaches to solving those issues.

Table -1 Urban Issues and Approaches to Solving Them*

Aspect	Issues	Approach to solving those issues
Urban and land use,	Controlling urbanization	Urban planning with the creation of new sustainable and smart cities
Infrastructure development	Responding to immediate connectivity	Establishing a digital foundation in Diamniadio (PPP, fiber optics, wifi, and IoT connectivity)
Environmental impact	Developing solutions to make the city more sustainable and resilient	A comprehensive project, Diamniadio, a sustainable and smart city
Socioeconomic	Developing employment and growth	Creating projects that fit into a highly profitable framework in the short and long term
Governance	Developing an innovative ecosystem	Establishing a set of stakeholders involving all smart city stakeholders

* Dakar city issues

2. Vision/strategy/plan for smart city development

(1) Setting of vision/strategy/plan for smart city development

Please describe the existing vision/strategy/plan for enhancement of smart city development or situation of preparation, and provide related documents if any.

- Decision note.

(2) Consistency with other relevant plans

What vision for smart city development is presented in existing urban planning and digitalization strategies?

- The National Strategy for the Development of Smart Cities and Communities (SNDVCI) is implemented by the Ministry of Digital Economy and Telecommunications (MENT) in collaboration with the Smart Africa Alliance.

3. Organization(s) responsible for initiating smart city development

Please state organization(s) responsible for initiating smart city development (national/sub-national level)

Administrative Level	Organization	Mandate
National	MENT/DGPU	Creation City
Sub-national		

4. Cooperation/collaboration with stakeholders

(1) Cooperation/collaboration with private sector and academia

Please describe the current situation of cooperation/collaboration with private sector and academia for enhancement of smart city development.

- Support for students at ENEA* and Cheikh Anta Diop University (dissertations and articles on smart cities).

* *École nationale d'économie appliquée* or National School of Applied Economics

(2) Citizen participation/co-creating

Please describe the current situation of citizen participation/co-creating in enhancement of smart city development.

- Organization of exchange meetings.

5. Institutional framework for smart city development

(1) Legal systems for enhancement of smart city development

Please describe enabling environment for realizing/accelerating smart city development (existing legal systems related to smart city development).

- A national strategy for the development of smart cities in Senegal, roadmap for the smart city strategy.

(2) Support of smart city development initiated by private sector

Please describe enabling environment which supports the private initiatives of smart city development/introduction of smart technologies to solve the urban issues/realization of leapfrog effect in urban development (such as deregulation in specific zones, special treatment with service providers, subsidies, etc.).

- Smart service providers, digital startups.

6. Introduction of technologies

Please describe technologies that have been introduced or that will contribute to solving the urban issues identified or improving the quality of life in the urban area.

- Smart solutions in the fields of water, sanitation, lighting, mobility, and the environment.

7. Issues/obstacles that hinder the smart city development initiatives

Please describe issues/obstacles/bottlenecks that hinder enhancement of smart city development.

- The delay in the realization of infrastructure and development networks (VRD*), the financing of smart solutions.

* *Voirie et réseaux divers* or Roads and Utility Services / External Works

8. External supports

(1) Existing/on-going external supports for enhancement of smart city development

Please describe the existing/on-going external supports for enhancement of smart city development

- FASEP* fund for innovation and demonstration projects.

**Fonds d'études et d'aides au secteur privé* or Fund for studies and assistance to the private sector.

(2) Needs of support for enhancement of smart city development

Please describe the needs of support for enhancement of smart city development, such as creation of smart city masterplan for specific city, building a team dedicated to smart city development, promotion of DX for better urban management, etc.

- Funding for initial smart city solutions, support for project management assistance throughout the project development process, from strategy to implementation.

Questionnaire

This questionnaire is prepared to gather the most recent information on the status of your country in smart city initiatives, which is a major focus of this JICA survey in sub-Saharan Africa. Please respond to the following questions.

Name of respondent: Youssoupha MANE

Title: Director of Urban Planning and Regulation

Contact information: e-mail: [REDACTED]

Phone: [REDACTED]

1. Urban issues and approaches to solving them

Please state urban issues from 5 aspects; (1) urban and land use, (2) infrastructure development, (3) environmental impact, (4) socioeconomic, and (5) governance, and approaches to solving those issues.

Table -1 Urban Issues and Approaches to Solving Them*

Aspect	Issues	Approach to solving those issues
Urban and land use	<p>Peri-urbanization and Urban Sprawl: In many Senegalese cities, unplanned urban sprawl is observed, leading to inefficient use of available land. This results in the loss of valuable agricultural land and an increase in costs associated with the expansion of urban services. Urban sprawl leads to a loss of biodiversity and areas designated for agriculture and livestock, which are essential for the food supply of cities.</p> <p>Irregular and anarchic land occupations: Slums and unplanned residential areas are developing, often without basic infrastructure, creating problems of overcrowding, unsanitary conditions, and difficulties in accessing public services.</p> <p>Etc.</p>	<p>The government of Senegal has become aware of the challenges posed by peri-urbanization and urban sprawl, along with their associated issues, which create significant problems related to facilities, infrastructure, management, and even mobility.</p> <p>The approach adopted by administrative and local authorities to address these phenomena involves several levels, including urban land use planning and the implementation of a policy to monitor and control land use.</p> <ul style="list-style-type: none"> For the metropolitan region of Dakar, an Urban Development Master Plan (PDU) for Dakar and its surroundings by 2035 was developed in 2016. This PDU for Dakar and its surroundings is complemented by several Detailed Urban Plans (PUD) in different zones of the Dakar metropolitan area, especially in the suburbs and peripheral areas: Pikine-Guédiawaye-Rufisque-Diamniadio-Lac Rose-Bambilor-Daga Kholpa-Diass. The Zero Slum Program (PROZEBID), with its components of 100,000 housing units and Urban

Aspect	Issues	Approach to solving those issues
		<p>Renewal, helps make sites ready for development, optimize space utilization, and address existing unsanitary housing.</p> <ul style="list-style-type: none"> • The existence of a National Program for Urban Planning and Urban Risk Management aims to combat flooding, produce planning documents, restructure, and regularize irregular zones or neighborhoods across the country. • The development of the National Urbanization Policy, a spatial planning document, will set major guidelines for the urbanization and land use process. • Several urban planning documents (PDU, SDAU, PUD) are currently being developed to address the low coverage rate of planning tools at the level of municipalities and local authorities, which stands at 18%. <p>Several reforms or measures are taken by the Government to ensure legal security and land management: "land reform," "the law on maritime domain," the "YATAAL" Program of the Directorate General of Taxes and Domains includes two components: expanding the domestic tax base and managing domains; the Cadastral Identification Number (NICAD) for identification, security, and location of plots through georeferencing from geodetic markers implanted throughout the national territory; Location Visa (to ensure the physical availability of the plot and to determine if it is suitable for hosting the projected infrastructure or equipment).</p> <p>Senegal has implemented a structure with a repressive purpose, the Directorate of Surveillance and Control of Land Occupation (DSCOS), responsible for ensuring the policing of land occupation primarily in urban and peri-urban areas.</p> <ul style="list-style-type: none"> • Senegal has developed a comprehensive policy in the framework of land planning with the

Aspect	Issues	Approach to solving those issues
		<p>adoption of the National Land Development and Territorial Development Plan (PNADT), elaborated by the National Land Development Agency. The agency has also developed a Master Plan for Land Development and Territorial Development (SDADT) covering the triangle zone of Dakar-Thiès-Mbour.</p> <p>Since 1994, Senegal has experimented with the development of Zones of Concerted Development (ZAC) on the outskirts of Dakar. In recent years, a program for creating ZACs has been popular, with the existence of nineteen (19), including ten (10) priority ZACs across the entire national territory.</p> <p>In 2014, Senegal also launched the promotion and development of Urban Poles, including:</p> <ul style="list-style-type: none"> • The Urban Poles of Diamniadio (under construction) and Lac Rose (under study) in the Dakar region, developed by the General Delegation for Urban Poles; • Twenty-seven (27) Urban Poles, including ten (10) priority ones from the Directorate of Urban Poles Promotion (DPPU), across the national territory, currently under study, including: • The Urban Poles of Deni Biram Ndao and Yene in the Dakar region; • The Urban Pole of Daga Kholpa currently under implementation in the Thiès region. <p>The Urbanism and Construction Codes, adopted by the National Assembly on December 20, 2023, will serve as reference documents for land planning and occupancy.</p>
Infrastructure development	Insufficient Infrastructure: Many Senegalese cities face challenges related to the lack of basic infrastructure, including roads, water supply systems, sanitation, and energy.	<p>Senegal has opted for the densification of its network of service facilities and structuring infrastructure.</p> <p>Several large-scale infrastructures have</p>

Aspect	Issues	Approach to solving those issues
	<p>Ineffective Urban Transport: Issues with traffic congestion and the absence of efficient public transport systems contribute to transportation difficulties and impact the quality of life for citizens.</p> <p>Etc.</p>	<p>been implemented to facilitate urban and interurban mobility, as well as in the sports and leisure domains.</p> <ul style="list-style-type: none"> • Senegal has constructed several kilometers of highways connecting Dakar and its suburbs, as well as Dakar and the religious city of Touba. • Additionally, the Dakar-Mbour highway section has been put into operation, and the Mbour-Kaolack section is currently under construction. • The construction of a Regional Express Train (TER) between Dakar and Diamniadio, which is operational, and the Dakar AIBD section is in progress. • The construction of a Regional Express Train (TER) that serves the daily transportation needs of thousands of users. • The establishment of a public transport network connecting Dakar, the capital, and other municipalities in the suburbs over a distance of more than 15 kilometers. • The government has undertaken the construction of more than 22 overpasses to facilitate urban mobility on major arteries (national road and toll highway) in the Dakar metropolitan area. • The state has implemented a significant Modernization of Cities program (Promovilles) contributing to the development of road infrastructure in several beneficiary municipalities, public lighting, facility construction, green space development, and municipal equipment.
<p>Environmental impact</p>	<p>Degradation of the Urban Environment: Rapid urbanization can lead to environmental degradation, including the loss of green spaces, air and water pollution, as well as the destruction of natural ecosystems.</p>	<p>Senegal has air quality measurement tools through the Ministry responsible for the environment.</p> <p>The General Directorate of the Living Environment and Public Hygiene, through its sub-directorates (Directorate for the Fight against Obstructions, Directorate of</p>

Aspect	Issues	Approach to solving those issues
	<p>Vulnerability to Climate Change: Urban areas in Senegal are often located in regions vulnerable to the effects of climate change, such as rising sea levels and extreme weather events, exposing them to flooding.</p>	<p>Urban Landscapes and Public Spaces, Directorate of Cleanliness and Public Hygiene, Directorate of Awareness and Institutional Partnership), works on improving the living environment through programs and projects such as the National Program for the Fight against Obstructions (PNLE); Zero Waste Program; Urban Renovation Project-Green Cities with High Labor Intensity (PRO-HIMO); Project for the Promotion of Integrated Management and Economy of Solid Waste in Senegal (PROMOGED); Project for the Development of City Entrances.</p> <p>The government has established an effective and professionalized urban waste management system through the National Integrated Waste Management Company (SONAGED) and PROMOGED. These two entities ensure almost nationwide coverage of urban waste management. Today, there is a fully digitalized system for the collection, treatment, and transformation of waste.</p> <p>Several provisions in environmental, water, and sanitation codes contribute to the preservation of natural resources, urban ecosystems, etc.</p> <p>Urban areas have been prone to recurrent flooding since 2005. Senegal adopted the Decennial Program to Combat Flooding 2012-2022, which, through the Stormwater Management Project (PROGEP I and II) and the Integrated Flood Management Program (PGIIS), has implemented significant flood control infrastructure in major cities, particularly Dakar and its suburbs, and has created interactive mapping tools for a better understanding of flood-prone areas.</p> <p>There has also been a massive relocation of populations from flood-prone areas to new resettlement areas. Over 4,500 households have benefited from social housing constructed as part of the relocation of flood</p>

Aspect	Issues	Approach to solving those issues
		victims, with more than 2,000 people relocated from flood-prone areas.
Socioeconomic	<p>Socio-economic inequalities: Rapid urbanization can exacerbate inequalities, with marked disparities in terms of access to education, healthcare, decent employment, and housing.</p> <p>Urban unemployment: Urban areas may face challenges related to unemployment, particularly among the youth, contributing to social problems such as crime and social exclusion.</p>	<p>To address urban inequalities, the state has developed the concept of territorialization of public policies for equity and social justice. To materialize this concept, significant programs are implemented to strengthen the capacities of local authorities, enhance their infrastructure, equip them, and improve their knowledge of their territory.</p> <p>Among these various programs are the Program for the Modernization of Senegal's Cities (PROMOVILLES), the Emergency Communal Development Program (PUDC), the Emergency Program for Modernization of Axes and Border Territories (PUMA), the Xeeyou Ndaw Yi program (Youth Employability), the Support Program for Municipalities and Agglomerations of Senegal (PACASEN), and rural PACASEN.</p> <p>Several projects and programs contribute to the fight against urban poverty and youth unemployment in the city.</p>
Governance	<p>Ineffective Urban Planning: Challenges in urban planning can lead to unsustainable growth, zoning problems, and difficulties in implementing public policies.</p> <p>Corruption and Mismanagement: Corruption issues and inefficient resource management can hinder urban development, compromising the quality of public services provided to citizens.</p>	<p>The government's approach is to establish effective urban planning tools. In this context, it has recently adopted the Law on the Revision of the new Urban Planning and Construction codes.</p> <p>Aware of the situation in several municipalities, including those resulting from the reform of the third decentralization act, which designates former rural communities as municipalities, the state, through the DGUA, has launched the National Urban Planning Program.</p> <p>The new urban planning code has introduced innovations in planning documents, their scope, intervention scales, and the development process. The goal is to have effective, easily applicable, and consensus-based urban planning tools for better land use management throughout the territory.</p>

2. Vision/strategy/plan for smart city development

(1) Setting of vision/strategy/plan for smart city development

Please describe the existing vision/strategy/plan for enhancement of smart city development or situation of preparation, and provide related documents if any.

In the context of improving urban development, a strategic urban planning, the Urban Development Plan (PDU) for Dakar and its surroundings by 2035 has been developed to address urban issues and challenges.

Based on this participatory planning, a strategic vision has been defined. Thus, Dakar is described as **"a city of hospitality characterized by a comfortable living environment, easy communication, and innovative creation that will be inclusive, sustainable, competitive, and supportive."** Indeed, this vision aligns with Sustainable Development Goal 11, "Make cities inclusive, safe, resilient, and sustainable."

For the improvement of the smart city, considerations must be given to disaster risks related to climate change, security issues, environmental aspects such as green and open spaces, and parks, in addition to improving mobility through an intelligent transportation system to achieve a sustainable smart city.

The vision for the future smart city of Daga Kholpa is:

- To help balance the growth of the Dakar agglomeration;
- To support the activities of the Blaise Diagne International Airport (AIBD);
- To contribute to the growth of the Diamniadio Urban Hub, which has already taken on the characteristics of a smart city.

The vision for urban development in Senegal is outlined in the Emerging Senegal Plan (PSE), the sole reference document for Senegal's public policies.

The Ministry responsible for Urban Planning, Housing, and Public Hygiene (MULHP) has adopted its Sectoral Policy and Development Letter (LPSD), which, in coherence with the Emerging Senegal Plan (PSE), outlines the vision for urban development as follows: **"Inclusive, resilient, and sustainable urban development for an Emerging Senegal by 2035."**

(2) Consistency with other relevant plans

What vision for smart city development is presented in existing urban planning and digitalization strategies?

Senegal has a Senegal Digital Strategy SN2025: The "Senegal Digital 2025" (SN2025) strategy was developed in 2016 as part of the implementation of the Emerging Senegal Plan (PSE) to serve as a catalyst for the modernization of the economy and the improvement of competitiveness. Digital technology is indeed one of the driving sectors of the economy and contributes to the GDP growth of all other economic sectors.

In its Strategic Action Plan, the General Delegation for Urban Poles of Diamniadio and Lac Rose (DGPU) is developing interesting Smart City experimentation activities in the urban hub of Diamniadio.

Strategies are defined, including the creation of a comfortable environment and a set of policies, easy communication, promotion of innovative creation, urban development management, environmental management, and the enhancement of inclusivity.

The vision of the smart city thus incorporates the aspect of sustainability and is defined to strengthen the quality of life for the population and improve the business environment to reduce the impact on the environment, hence a sustainable smart city.

3. Organization(s) responsible for initiating smart city development

Please state organization(s) responsible for initiating smart city development (national/sub-national level)

Administrative Level	Organization	Mandate
National	State/Ministries	<ul style="list-style-type: none">• General Directorate of Urban Planning and Architecture (DGUA);• National Agency for Territorial Planning (ANAT);• Municipal Development Agency (ADM);• Senegal Digital Agency SA• Senegalese Space Studies Agency (ASES)• ...
Sub-national	Local Authorities	<ul style="list-style-type: none">• Local Authorities

4. Cooperation/collaboration with stakeholders

(1) Cooperation/collaboration with private sector and academia

Please describe the current situation of cooperation/collaboration with private sector and academia for enhancement of smart city development.

The Ministry responsible for Urban Planning, Housing, and Public Hygiene is the driving force in implementing city policy and sustainable urban development.

There are various platforms for interaction with stakeholders from the academic and private sectors. However, these relationships, though they exist, are not always formalized. Typically, interactions involve a user communicating with a public service official.

The Ministry receives numerous private sector entities that come forward with solutions, encouraged by the evolving partnership framework defined by the government. With laws governing Public-Private Partnerships (PPPs) and public procurement, there are opportunities for the private sector. Spontaneous offers and partnership agreements are possible for implementing innovative technological programs and projects essential for sustainable urban development.

Moreover, there are collaborative frameworks between different government agencies for specific projects within the scope of their respective missions. For example, the Municipal Development Agency (ADM) collaborates with the General Directorate of Urban Planning and Architecture (DGUA) in developing Urban Development Plans (PDU) and Urban Development Programs (PUD).

In collaboration with academic institutions, there are various joint initiatives on specific projects, although they may not be as comprehensive. Nevertheless, in the formulation of public policies, the administration relies heavily on work conducted by academics. Conversely, many academics draw inspiration from government programs to conduct their studies, produce scientific articles, and conduct strategic monitoring on various implemented public policies.

Both academics and the private sector are stakeholders in the improvement of urban development. Therefore, their involvement, including consultation, in the planning and development of smart cities remains important for knowledge transfer. Formal cooperation frameworks with academic institutions are to be built, strengthened, and consolidated.

(2) Citizen participation/co-creating

Please describe the current situation of citizen participation/co-creating in enhancement of smart city development.

The concept of smart city is known to the Senegalese government. However, it is currently in its experimental phase with some infrastructure development, urban transport management, and infrastructure management. It is expected to evolve into a strategic sector with the advancement of information technology. The potential for implementation is very real, especially with the development of digital infrastructure in Senegal.

Some citizen initiatives are visible, particularly with grassroots organizations and certain associations involved in specific projects, but overall, they remain marginal and underdeveloped.

The potential is significant. The younger generation is increasingly open to technology and the digital economy in Senegal, a country equipped with state-of-the-art infrastructure. This presents a cooperative opportunity, especially within the framework of the National Urban Planning Program.

Citizen consultation is an integral part of improving smart city development. A participatory approach should be prioritized to ensure ownership. Local authorities, through their municipal councils, and the population are at the heart of the elaboration of Master Plans, validation, or implementation of programs and projects that concern them. The creation of a smart city must be done in a participatory and inclusive manner.

5. Institutional framework for smart city development

(1) Legal systems for enhancement of smart city development

Please describe enabling environment for realizing/accelerating smart city development (existing legal systems related to smart city development).

Senegal has recently adopted two new urban planning and construction codes.

The development of smart cities requires the implementation of laws and regulatory texts, notably the urban planning and construction codes, which incorporate aspects related to climate change and the integration of energy efficiency.

Senegal also has a telecommunications code, a law on cybersecurity, and a law on the protection of personal data. This set of tools forms the basis of an institutional development framework for the development of smart cities.

(2) Support of smart city development initiated by private sector

Please describe enabling environment which supports the private initiatives of smart city development/introduction of smart technologies to solve the urban issues/realization of leapfrog effect in urban development (such as deregulation in specific zones, special treatment with service providers, subsidies, etc.).

- Existence of Territorial Development Strategic Frameworks (PNADT);
- Ongoing development of the National Urbanization Policy (PUN);
- Creation of Urban Hubs;
- Establishment of Special Economic Zones;
- Existence of digital infrastructure;
- Public-Private Partnership (PPP) law providing opportunities for spontaneous offers;

6. Introduction of technologies

Please describe technologies that have been introduced or that will contribute to solving the urban issues identified or improving the quality of life in the urban area.

Technology is becoming crucial, if not indispensable, in the current era where urban space must be rethought to address urban issues through digital integration.

In this regard, Information and Communication Technologies (ICT) are taken into account, especially in the urban planning sector, through Geographic Information Systems (GIS), TeleDAC, and intelligent transportation systems to enhance urban mobility with state-of-the-art infrastructure: the Regional Express Train (TER) and Bus Rapid Transit (BRT).

Senegal has fiber optic infrastructure;

Senegal will soon launch its satellite into orbit;

Technologically, there is 4G, and soon there will be 5G.

7. Issues/obstacles that hinder the smart city development initiatives

Please describe issues/obstacles/bottlenecks that hinder enhancement of smart city development.

Lack of funding for the development of specific plans for smart cities and their implementation, non-application of the guidelines of existing plans, and a lack of ownership of the plans by the population.

In addition to this:

- Compartmentalization of stakeholders;
- Absence of a coordination mechanism and implementation framework for the Smart City Program;
- Complexity of the legal framework and lack of understanding of the system by stakeholders;

8. External supports

(1) Existing/on-going external supports for enhancement of smart city development

Please describe the existing/on-going external supports for enhancement of smart city development

The Japan International Cooperation Agency (JICA) financed the Urban Master Plan (PDU) of Dakar and its surroundings, with the pilot project being the Urban Hub of Daga Kholpa.

The Stormwater Management and Climate Change Adaptation Project (PROGEP), launched in 2012 and funded by the World Bank, consists of two phases, 1 and 2, within the framework of sustainable urban development. The operational structures include the General Directorate of Urban Planning and Architecture (DGUA), the Municipal Development Agency (ADM), and the Directorate of Environment and Classified Establishments (DEEC).

UN-Habitat is presenting smart city projects in the context of rapidly growing cities in Senegal.

Prospective financing from the French Development Agency (AFD), the African Development Bank (AfDB), and the Islamic Development Bank (IDB) is conceivable for other smart city projects, involving the implementation with funding for infrastructure and equipment to make them operational.

(2) Needs of support for enhancement of smart city development

Please describe the needs of support for enhancement of smart city development, such as creation of smart city masterplan for specific city, building a team dedicated to smart city development, promotion of DX for better

urban management, etc.

The General Directorate of Urban Planning and Architecture is the driving force behind the state's urban planning policy. It contributes to defining and implementing the city's policy. The development of smart cities must be supported by the state and development partners.

Support for the development of smart cities involves upgrading structures in terms of skills, technologies, logistics, and also in legal organization. Efforts are being made to adapt and upgrade methods and tools for urban planning to integrate smart city concepts.

Financial support for the development of smart city development plans;

Support or a need for training for human resources in the field of planning and urban management focusing on sustainable smart cities.

Questionnaire

This questionnaire is prepared to gather the most recent information on the status of your country in smart city initiatives, which is a major focus of this JICA survey in sub-Saharan Africa. Please respond to the following questions.

Name of respondent: Aissatou J. Ndiaye SY

Title: Director of ICT

Contact information: e-mail:

Phone:

1. Urban issues and approaches to solving them

Please state urban issues from 5 aspects; (1) urban and land use, (2) infrastructure development, (3) environmental impact, (4) socioeconomic, and (5) governance, and approaches to solving those issues.

Table -1 Urban Issues and Approaches to Solving Them*

Aspect	Issues	Approach to solving those issues
Urban and land use	How to strengthen formal land occupation?	Implement land regularization programs to integrate informal areas into the urban fabric in a planned and sustainable manner
Infrastructure development	How to address the issue of insufficient drinking water infrastructure?	Modernize water supply networks and promote sustainable water resource management
Environmental impact	How to solve the problem of urban biodiversity degradation?	Incorporate planned green spaces into urban design and advocate for the preservation of natural areas within the city
Socioeconomic	How to reduce urban unemployment?	Support local entrepreneurship, facilitate vocational training, and encourage community economic initiatives
Governance	Ensuring coordination between municipal services.	Establish effective coordination mechanisms between municipal services to ensure integrated management of urban issues

2. Vision/strategy/plan for smart city development

(1) Setting of vision/strategy/plan for smart city development

Please describe the existing vision/strategy/plan for enhancement of smart city development or situation of preparation, and provide related documents if any.

In 2022, Senegal adopted a national strategy with the objective of developing a common path for the successful development and implementation of smart cities and communities in Senegal. This initiative aim to enhance urban services for citizens while promoting digital transformation in a financially sustainable manner.

The vision of this strategy is as follows: "A smart city or community in Senegal is one that is connected to ICT, improving the quality of life for its citizens by organizing and optimizing urban services that meet the needs of citizens in an affordable, accessible, and sustainable manner."

(2) Consistency with other relevant plans

What vision for smart city development is presented in existing urban planning and digitalization strategies?

- **Plan for an Emerging Senegal (PSE) - *Plan Sénégal Emergent (PSE)***
- **Senegal Digital Strategy SN2025 - *Stratégie Sénégal Numérique SN2025***
- **National Data Strategy - *Stratégie Nationales des Données***
- **National Strategy on Artificial Intelligence - *Stratégie Nationale sur l'Intelligence Artificielle***

3. Organization(s) responsible for initiating smart city development

Please state organization(s) responsible for initiating smart city development (national/sub-national level)

Administrative Level	Organization	Mandate
National	Ministry of Communication, Telecommunications and Digital (MCTN)	
Sub-national		

4. Cooperation/collaboration with stakeholders

(1) Cooperation/collaboration with private sector and academia

Please describe the current situation of cooperation/collaboration with private sector and academia for enhancement of smart city development.

In the implementation of Senegal's national strategy for the development of smart cities, collaboration between the private sector and the academic world is envisaged, as they are key stakeholders.

(2) Citizen participation/co-creating

Please describe the current situation of citizen participation/co-creating in enhancement of smart city development.

This aspect is also taken into account in the implementation of Senegal's national strategy for the development of smart cities.

5. Institutional framework for smart city development

(1) Legal systems for enhancement of smart city development

Please describe enabling environment for realizing/accelerating smart city development (existing legal systems related to smart city development).

In Senegal, there are plans to update the legal framework for ICT to accommodate the evolution of the sector and regulate new technologies.

(2) Support of smart city development initiated by private sector

Please describe enabling environment which supports the private initiatives of smart city development/introduction of smart technologies to solve the urban issues/realization of leapfrog effect in urban

development (such as deregulation in specific zones, special treatment with service providers, subsidies, etc.).

No information on my end.

6. Introduction of technologies

Please describe technologies that have been introduced or that will contribute to solving the urban issues identified or improving the quality of life in the urban area.

- **Artificial Intelligence**
- **Internet of Things (IoT)**
- **Blockchain**
- **Data Analysis and Exploitation**
- **Etc.**

7. Issues/obstacles that hinder the smart city development initiatives

Please describe issues/obstacles/bottlenecks that hinder enhancement of smart city development.

Insufficient financial resources.

8. External supports

(1) Existing/on-going external supports for enhancement of smart city development

Please describe the existing/on-going external supports for enhancement of smart city development

No information on my end.

(2) Needs of support for enhancement of smart city development

Please describe the needs of support for enhancement of smart city development, such as creation of smart city masterplan for specific city, building a team dedicated to smart city development, promotion of DX for better urban management, etc.

- **Popularization of the existing national strategy**
- **Operationalization of the strategy's roadmap**

Questionnaire

This questionnaire is prepared to gather the most recent information on the status of your country in smart city initiatives, which is a major focus of this JICA survey in sub-Saharan Africa. Please respond to the following questions.

Name of respondent: Isseu TOURE FATY

Title: Rufisque City

Contact information: e-mail:

Phone:

1. Urban issues and approaches to solving them

Please state urban issues from 5 aspects; (1) urban and land use, (2) infrastructure development, (3) environmental impact, (4) socioeconomic, and (5) governance, and approaches to solving those issues.

Table -1 Urban Issues and Approaches to Solving Them

Aspect	Issues	Approach to solving those issues
Urban and land use	<ul style="list-style-type: none"> Urban mobility Unplanned occupation Urban sprawl Central neighborhoods are better off than peripheral ones 	<ul style="list-style-type: none"> Having a detailed urban development plan allows for understanding land use and regulating its utilization. This provides a more detailed approach to urban planning.
Infrastructure development	<ul style="list-style-type: none"> Deficiency in transportation, telecommunications, water, and sanitation networks, especially in peripheral areas 	<ul style="list-style-type: none"> Developing a long-term strategic plan that takes into account the specific needs of the population. Allocating financial resources judiciously, prioritizing projects with a significant impact on the territory. Incorporating advanced technological solutions to enhance the efficiency of infrastructure.
Environmental impact	<ul style="list-style-type: none"> Pollution Coastal erosion Flooding Waste management 	<ul style="list-style-type: none"> Integrate sustainable practices to minimize environmental impact and promote resilience to climate change. For example: Territorial Climate Energy Plans (PCET), solar streetlights.
Socioeconomic	<ul style="list-style-type: none"> Lack of basic socio-economic infrastructure. For example: hospitals, health centers, high schools 	<ul style="list-style-type: none"> Implement policies aimed at reducing inequalities in education, health, and employment. For instance, in education, the city of Rufisque has invested 150 million this year.
Governance	<ul style="list-style-type: none"> Lack of transparency in public assets 	<ul style="list-style-type: none"> Ensure effective project management, including monitoring and evaluation.

2. Vision/strategy/plan for smart city development

(1) Setting of vision/strategy/plan for smart city development

Please describe the existing vision/strategy/plan for enhancement of smart city development or situation of preparation, and provide related documents if any.

Interconnectivity of infrastructures used by human or material resources.

(2) Consistency with other relevant plans

What vision for smart city development is presented in existing urban planning and digitalization strategies?

Ensure centralized management of all urban facilities.

3. Organization(s) responsible for initiating smart city development

Please state organization(s) responsible for initiating smart city development (national/sub-national level)

Administrative Level	Organization	Mandate
National	<i>Sénégal Numérique</i> (Senegal Digital)	State Agency
Sub-national	<i>Sénégal Numérique</i> (Senegal Digital)	State Agency

4. Cooperation/collaboration with stakeholders

(1) Cooperation/collaboration with private sector and academia

Please describe the current situation of cooperation/collaboration with private sector and academia for enhancement of smart city development.

No collaboration yet.

(2) Citizen participation/co-creating

Please describe the current situation of citizen participation/co-creating in enhancement of smart city development.

No participation.

5. Institutional framework for smart city development

(1) Legal systems for enhancement of smart city development

Please describe enabling environment for realizing/accelerating smart city development (existing legal systems related to smart city development).

ARTP* regulations.

*** *Autorité de Régulation des Télécommunications et des Postes* (Regulatory Authority for Telecommunications and Posts)**

(2) Support of smart city development initiated by private sector

Please describe enabling environment which supports the private initiatives of smart city development/introduction of smart technologies to solve the urban issues/realization of leapfrog effect in urban development (such as deregulation in specific zones, special treatment with service providers, subsidies, etc.).

6. Introduction of technologies

Please describe technologies that have been introduced or that will contribute to solving the urban issues identified or improving the quality of life in the urban area.

Transportation, communication, and information networks through shared connectivity infrastructures.

7. Issues/obstacles that hinder the smart city development initiatives

Please describe issues/obstacles/bottlenecks that hinder enhancement of smart city development.

Cities with a strong cultural vocation, environmental issues, etc.

8. External supports

(1) Existing/on-going external supports for enhancement of smart city development

Please describe the existing/on-going external supports for enhancement of smart city development

Establish partnerships, such as with JICA.

(2) Needs of support for enhancement of smart city development

Please describe the needs of support for enhancement of smart city development, such as creation of smart city masterplan for specific city, building a team dedicated to smart city development, promotion of DX for better urban management, etc.

Rwanda

Questionnaire

This questionnaire is prepared to gather the most recent information on the status of your country in smart city initiatives, which is a major focus of this JICA survey in sub-Saharan Africa. Please respond to the following questions.

Name of respondent: Ministry of ICT and RISA

Title:

Contact information: e-mail:

Phone:

1. Urban issues and approaches to solving them

Please state urban issues from these 5 aspects

Aspect	Issues	Approach to solving those issues
Urban and land use,	High gross density	Kigali master plan which provides guidelines on plans and regulations to guide land use and development for different uses like residential, commercial, public facilities, etc. To achieve this, different tools and strategies were implemented such as E-building permit management information system.
Infrastructure development		
Environmental impact	REMA (2020) reported that transport is the main source of emissions in Rwanda, especially the City of Kigali.	- Strategic paper for e-mobility adaptation was produced in 2021 setting the vision for the country's e-mobility plans, including the incentives needed to increase adoption of e-mobility (charging infrastructures, purchase of e-vehicles or spare parts, charging tariff, among others). In 2022, and 2023 these incentives were heavily benefited from by the private sector especially for motorbikes and private cars but not in public transport. - Different initiatives aim at reduction of transport emissions like high tax to importation of used moto vehicles, and mandatory moto-vehicle inspection
Socioeconomic	Limited number of public parks	The Government has initiative of increasing public and car-free spaces in the city of Kigali, currently there are less than 5 spaces available in the City of Kigali.
Governance		

2. Vision/strategy/plan for smart city development

a) Setting of vision/strategy/plan for smart city development

Please describe the existing vision/strategy/plan for enhancement of smart city development or situation of preparation, and provide related documents if any.

ANS: The Smart City Rwanda Master Plan's vision is to ensure that Rwandan cities and communities can be drivers for economic and sustainable development across 3 key pillars;

- **Smart governance and planning:** inclusive data-led management and planning
- **Smart and efficient services & utilities:** efficient community-based infrastructure and services
- **Localization innovation for socio-economic development:** promotion of the local innovation community by enhancing their skills, capacity, financing and market expansion opportunities

The realization of this has been done through different models such as:

- **The technological model** which is based on formulating a framework for new economic opportunities, enhancing the startup ecosystem, testing new technologies in 'urban beta-sites', and seeing the city as a hub of knowledge and experience. Within this model, global companies are encouraged to pilot their solutions within city borders
- **The collaborative model** This model is based on small scale solutions that reach out and engage communities and neighborhoods, innovative municipal workers and motivated and engaged citizens that work towards mutual ownership. E.g: Publishing Challenges, Policy Lab

https://www.minict.gov.rw/fileadmin/user_upload/minict_user_upload/Documents/Strategies/Smart_City_Rwanda_Masterplan.pdf

b) Consistency with other relevant plan

This Masterplan is built upon the country's Vision 2050 and aligns with the existing urbanization policy, the Green growth and digitalization strategies

3. Organization(s) responsible for initiating smart city development

Please state organization(s) responsible for initiating smart city development (national/sub-national level)

Administrative Level	Organization	Mandate
National	Ministry of ICT and Innovation	Developing an enabling policy environment for Smart cities
Sub-national	Rwanda Information Society Authority	Implementing and coordinating the implementation of smart city initiatives

4. Cooperation/collaboration with stakeholders

a) Cooperation/collaboration with private sector and academia

Please describe the current situation of cooperation/collaboration with private sector and academia for enhancement of smart city development

ANS: we established the Smart City Hub which has a purpose of creating a space where challenges and pain points can be co-identified with citizens, the private sector, research institutions, and the government to empower the creation of impactful solutions. This is implemented by consortium of (3) institutions (MINICT, RISA, ICT-Chamber).

Smart City Hub objectives (3):

- Create a demand-driven agenda
- Be the source of research, knowledge, and connections
- Provide smart city solution to identified challenges

b) Citizen participation/co-creating

Please describe the current situation of citizen participation/co-creating in enhancement of smart city development

ANS:

- Under the Smart city hub, we have what we call “**Smart City Connect**”: An initiative or channel through which we aim is to promote knowledge sharing and spark co-creation, curation of a problem pool, and support innovation amongst smart cities actors.

Through these connections, citizens, leaders, and institutions, among others who share a common interest can not only share knowledge and experiences with each other but also co-design new solutions and innovations.

In addition, this approach aims to provide a space and opportunity for networking, allowing them to develop interpersonal relationships that may benefit them in other aspects of their lives.

- We are also in the process of developing a citizen engagement portal to enhance the local government’s governance structures that interface with citizens for public service delivery. Additionally, this will be a complimentary tool to the e-government portal (Irembo) that currently provides more than 100 government services online

5. Institutional framework for smart city development

a) Legal systems for enhancement of smart city development

Please describe enabling environment for realizing/accelerating smart city development (existing legal systems related to smart city development)

ANS:

- **Regulatory Sandboxes (Eg: RURA):** a framework that encourages the use of new technologies in different regulated sectors like financial services, mobility, etc. to improve operational and citizens’ engagement capabilities by leveraging analytics and cloud computing.

RURA has created the Regulatory sandbox, which is a specially tailored regulatory framework that provides a controlled environment for participants to develop and test innovative technology solutions without immediately being subject to all the regulatory requirements that would otherwise apply to licensed/authorized entities.

This framework is applied:

- To companies/startups with tech-based solution untested on the market, to enable the application developers/owners to live-test the solution or product in a controlled environment, scope and scale without complying full suite of regulatory requirements.
- To those with technology products already in the market, but wish to continue researching and developing it, and to live-test and offer any product enhancements, variations or new features on a limited roll-out basis within the confines of the Regulatory sandbox.

- **Public Procurement for Innovation:** a new instrument to promote the innovation ecosystem and government acquisition of technology solutions from the private sector to fast track digitization of public services. This tool aims to curb barriers to participation in public procurement for startups to enable them to compete fairly with larger companies.

b) Support of smart city development initiated by private

Please describe enabling environment which supports the private initiatives of smart city development/introduction of smart technologies to solve the urban issues/realization of leapfrog effect in urban development (such as deregulation in specific zones, special treatment with service providers, subsidies, etc.)

ANS:

- Available funds to support startups through different Innovation Hub programs in collaboration with Development Partners
- The Rwanda Innovation Fund (RIF) see via link below;
(<https://projectsportal.afdb.org/dataportal/VProject/show/P-RW-G00-001>)
- **Kigali Innovation City:** a joint venture to co-develop and co-finance with private sector investors. KIC will provide supportive and accessible innovation infrastructure, including an incubator and office space, for technological firms across various stages of growth within the Special Economic Zone providing additional opportunities for synergies in emerging technologies.
- **Smart City Hub:** Please refer to previous answers on role of the hub to support smart city actors
- **Hanga Hubs:** Innovation hubs established in secondary cities, which will incubate tech based startups and nurture innovation from ideation to investable startups

6. Introduction of technologies

Please describe technologies that have been introduced or that will contribute to solving the urban issues identified or improving the quality of life in the urban area.

ANS:

Introduced: Internet of Things (Waste management, Environment, mobility, etc..), Block chain (Land transfer), Geo-fencing (CCTV), Artificial Intelligence (Covid-19 response), GPS (in mobility), GIS (Masterplans online)

To be Introduced: Digital twin (environment, and urban planning), big data analytics

7. Issues/obstacles that hinder the smart city development initiatives

- **Financing:** no dedicated budget to smart city development
- **Lack of Smart City Public Digital Infrastructure:** a digital infrastructure with multi-layer technology that enables straightforward provisioning, management, and automation of connected devices, ease of integration, and big data analytics within smart city space (e.g: Smart city Command center)

8. External Support

- a) Existing/on-going external supports for enhancement of smart city development

Donor	Project Name	Components
Smart Africa Secretariat	Smart waste management system	6 smart waste sites (bins fitted with IoT sensors for real-time monitoring)
	Smart City Communities Command and Control Center	feasibility study
GIZ	Smart City Hub	Consultancy for strategy development, Office spaces
	Smart waste system	Developed a local smart waste monitoring system
JICA	Traffic Monitoring System	Feasibility study, centralized system, capacity building

b) Needs of support for enhancement of smart city development

- Need for public digital infrastructure will bring in benefits like:
 - **Smart and Efficient Services and Utilities:** Digitization of data and sharing of data in one platform will contribute to effective services to the citizens, better planning of utilities, and predicting demand based on historical data.
 - **Smart Governance and Planning:** with the platform capabilities to receive, intelligently integrate & share consolidated information dashboard to better predict outcomes, this will provide ease in governance and coordination with different departments. Planning for new initiatives will be made easier with the help of centralized data availability
 - **Institutionalizing data-driven decision making:** for regular operations, in crisis, decision making across all levels of the city functionaries will become easy due to availability of live data.
- Need for secondary cities smart city roadmaps: one of the ways to reduce high rate of rural to urban migration is by transforming other cities into smart cities, therefore there is need for them to have respective smart city roadmaps that detail their vision and action points.
- Urban and Infrastructure Planning digital solution
- Need for funds to conduct capacity building in emerging technologies (IoT, and AI) through the smart city hub to enhance local skills for smart city development.

Questionnaire

This questionnaire is prepared to gather the most recent information on the status of your country in smart city initiatives, which is a major focus of this JICA survey in sub-Saharan Africa. Please respond to the following questions.

Name of respondent: Eric HAKIZIMANA

Title: Spatial Development Framework

Contact information: e-mail: Phone:

1. Urban issues and approaches to solving them

Please state urban issues from 5 aspects; (1) urban and land use, (2) infrastructure development, (3) environmental impact, (4) socioeconomic, and (5) governance, and approaches to solving those issues.

Table -1 Urban Issues and Approaches to Solving Them

Aspect	Issues	Approach to solving those issues
Urban and land use,	Uncontrolled urban expansion	Master plans for land use and development were elaborated at the national and district levels.
Infrastructure development	Infrastructure that are not resistant to climate change effects and lack of information on where they are located, especially underground.	Ministerial instructions have been issued requiring each level of infrastructure in the country to have a database of infrastructure that shows its location (x,y,z). There is also a strategy for sustainable infrastructure development
Environmental impact	Storm water management and Flooding	Green Growth and Climate resilience strategy which aims to reduce disaster risk vulnerability to the impacts of climate change.
Socioeconomic	Informal settlement and low level of off-farm jobs (The employment sector is dependent on agriculture)	An informal settlement upgrading strategy was elaborated. The Government is putting in place measures to improve the economy through having a large number of skilled people.
Governance	Institutional structures still appear to be for rural development and lack of accurate data to be used in decision making	A City Management office will be established to monitor urban development at the district levels. A piloting project of Urban Dynamic Map (UDM), as one of many initiatives in pipeline, is now undergone in five districts aims to solve the issue of accurate and real-time data.

2. Vision/strategy/plan for smart city development

(1) Setting of vision/strategy/plan for smart city development

Please describe the existing vision/strategy/plan for enhancement of smart city development or situation of preparation, and provide related documents if any.

The Smart Rwanda 2020 Masterplan which is under revision. Its vision is transform Rwanda from an agrarian economy to a knowledge-based society.

(2) Consistency with other relevant plans

What vision for smart city development is presented in existing urban planning and digitalization strategies? Throughout the formulation of policies and strategies, numerous consultations occur to ensure the effective coordination of policy actions. The smart city component in urban planning is integrated in a similar manner to other sectors such as health, education, and infrastructure, as part of the overall consideration.

3. Organization(s) responsible for initiating smart city development

Please state organization(s) responsible for initiating smart city development (national/sub-national level)

Administrative Level	Organization	Mandate
National	Ministry of ICT and Innovation Ministry of Infrastructure	The Ministry of ICT and Innovation is mandated to monitoring and evaluate the implementation of national policies, strategies and programs to promote technology and communication, developing and disseminating policies, strategies and programs for ICT and Innovation. The daily business of the Ministry of ICT is run through two key departments - the Digital Government Transformation and the Innovation and Business Development. Also, The Ministry runs a programme dubbed Innovation and ICT Private sector development. Follow the links below to learn more about the work of the Ministry. The Ministry of Infrastructure is mandated to promote urbanization and infrastructure development.
Sub-national		

4. Cooperation/collaboration with stakeholders

(1) Cooperation/collaboration with private sector and academia

Please describe the current situation of cooperation/collaboration with private sector and academia for enhancement of smart city development.

In the implementation of the Smart City master plan, Step 2 involves the leadership of the private sector team, which adapts depending on the identified challenges. Furthermore, ongoing initiatives have been and continue to be developed through a stakeholder process that includes the private sector, academia, and civil society.

(2) Citizen participation/co-creating

Please describe the current situation of citizen participation/co-creating in enhancement of smart city development.

When digital solutions are developed, they address the needs of citizen. Consultations are undertaken, and it has been acknowledged that our leadership approach is citizen-centric.

5. Institutional framework for smart city development

(1) Legal systems for enhancement of smart city development

Please describe enabling environment for realizing/accelerating smart city development (existing legal systems related to smart city development).

There are many regulations that help in the implementation of the smart city domain depending on the category but most of them are covered in Law N°24/2016 of 18/06/2016 Governing Information and Communication Technologies

(2) Support of smart city development initiated by private sector

Please describe enabling environment which supports the private initiatives of smart city development/introduction of smart technologies to solve the urban issues/realization of leapfrog effect in urban development (such as deregulation in specific zones, special treatment with service providers, subsidies, etc.).

While there is alignment between policies and strategies, particularly in facilitating and supporting the private sector's development, there is a notable advantage in the field of ICT. Apart from the government of Rwanda's tax exemption program for ICT infrastructure, a fund was also established in 2023. Presidential order n° 025/01 of 12/05/2023 governing Universal Access Fund. For more info you can visit MINICT Web <https://www.minict.gov.rw/laws>

6. Introduction of technologies

Please describe technologies that have been introduced or that will contribute to solving the urban issues identified or improving the quality of life in the urban area.

Various technologies, spanning administrative, commercial, and social spheres, are interconnected with urban issues. For instance, platforms like Irembo offer over 100 government services, while BPMIS facilitates building permit issuance. Additionally, innovations such as the Urban Dynamic Map aid in monitoring urban development activities, while others are being developed to track informal settlement eradication efforts. Notably, technologies providing accurate weather information play a crucial role in mitigating problems arising from climate change and heavy rains. The array of available technologies underscores their significance in addressing urban challenges...

7. Issues/obstacles that hinder the smart city development initiatives

Please describe issues/obstacles/bottlenecks that hinder enhancement of smart city development.

Financial stability (Implementing smart city solutions often requires significant investment in infrastructure, technology deployment, and maintenance, which can strain municipal budgets), competitive business ecosystem, lack of adequate capacity (education system, innovation, digital literacy, and career skills), integration / interoperability (Integrating various smart technologies and systems from different institutions is still complex due to interoperability issues, leading to mismanagement of resources and duplication).

8. External supports

(1) Existing/on-going external supports for enhancement of smart city development

Please describe the existing/on-going external supports for enhancement of smart city development

Donor	Project Name	Components
In the promotion of ICT, there exist various key players and development partners. Currently, within MININFRA, we are joined by Enabel as a partner in this endeavor. While each sector has its own development partners, all efforts are coordinated under the Ministry of Finance.	Urban Economic Development initiative (UEDi)	Development of Urban Dynamic Map

(2) Needs of support for enhancement of smart city development

Please describe the needs of support for enhancement of smart city development, such as creation of smart city masterplan for specific city, building a team dedicated to smart city development, promotion of DX for better urban management, etc.

I recognize the need for increased effort in coordinating various initiatives across different institutions to improve system integration.

**Appendix 5 Participant List of the Knowledge Sharing Seminar on
Smart City Initiatives in Asia and Africa**

Participant List

Country/ Affiliation	Name		Organization	Position	Participation for site visit
	Surname	First Name			
Côte d'Ivoire	Bruno	Nabagné Koné	Ministry of Construction, Housing and Urbanism	H.E. Minister	
	Kouman	Kra	Ministry of Construction, Housing and Urbanism	General Director of Urbanism and Land	
	Hubert	Yomafou	Ministry of Construction, Housing and Urbanism	Director of Urbanism	○
	Eric	N'zue	Ministry of Construction, Housing and Urbanism	Studies Officer	
	Zahé Amos	Zahe Bi	Ministry of Construction, Housing and Urbanism	Deputy Director	
	Martinien Venceslas	Diahou	Ministry of Construction, Housing and Urbanism	Studies Officer	
	Fory Jacques	Koko	Ministry of Construction, Housing and Urbanism	Project coordinator	○
	Koffi	Attahi	Greater Abidjan Urban Mobility Authority	Managing Director, Abidjan Urban Planning and Forecasting Agency (AUPA)	
	Konan Jean Thierry	N'zi	District Autonome d'Abidjan,	Director of Transport and Urban Mobility	
	Augustin Ake	Gbangbi	District Autonome d'Abidjan,	IT Director	
	Aristide	Gahie	Greater Abidjan Urban Mobility Authority	Director of Planning	
	Sekana	Doumbia	Ministry of Transport	Sub-director	
	Georges	Bouhoussou	Ministry of Transport	Projects Director	
	Gnoléba	Koupo	Association of approved architect Ivory Coast	Vice-President of the Ordre des Architectes	
	Loukou	N'goran	Ministry of Digitization	Applications and Development Deputy Director	
	Sali	Sanou	Prime minister Cabinet	Economic and Infrastructure Advisor	
	Konan	Bobou	RECS International Inc.	SDUGA-2 Coordinator/Urban Planner	○
Cambodia	Yun	Linne	Siem Reap Province	Deputy Governor	○
	Ikeda	Ryohei	Japan International Cooperation Agency	Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap, Expert	○
Kenya	Shariff	Ali Abdulrahman	Mombasa County Government	County Chief Officer - Lands, Urban Housing & Planning	○
Laos	Phommathat	Khamphonemisay	Ministry of Public Work and Transport	Director of Department of Housing and Urban Planning	○
Nigeria	Modibbo	Mohammed Nasir	Federal Capital Development Authority	Assistant Director in Urban and Regional Planning Department	○
Rwanda	Hakizimana	Eric	Ministry of Infrastructure	Spacial Development Framewor Specialist, Urbanization, Human Settlement and Housing Development Department.	○
Senegal	Mane	Youssouph	Ministry of Urbanism, Buildings and Public Hygiene	Director of Sustainable Urban Development, Urban Planning and Regulation	○
Tanzania	Kalugendo	Fanuel Osbert Shio	Dar es Salaam Rapid Transit	System Planning and Design Manager	○

Uganda	Mugarura	Martha Nyakato	Ministry of Lands, Housing and Urban Development	Assistant Commissioner for Urban Development	○
Zambia	Musonda	Mildor	Chibombo Town Council	Environmental Planner	○
JICA	Tanaka	Yukinari	Japan International Cooperation Agency	Senior Director	○
	Goto	Tetsuji	Japan International Cooperation Agency	Senior Advisor	○
	Akiba	Takuya	Japan International Cooperation Agency	Associate Expert	○
	Wakabayashi	Motoharu	Japan International Cooperation Agency Côte d'Ivoire Office	Chief Representative	
	Ozawa	Akira	Japan International Cooperation Agency Côte d'Ivoire Office	Chief of Infrastructure Department	
	Yamazaki	Hitomi	Japan International Cooperation Agency Côte d'Ivoire Office		○
	Kuwahata	Mitsuko	Japan International Cooperation Agency Côte d'Ivoire Office		
	Bile	Arnaud	Japan International Cooperation Agency Côte d'Ivoire Office	Program Officer	○
	Manima	Taisuke	Japan International Cooperation Agency Kenya Office	Representative	○
	Ozawa	Ken	Japan International Cooperation Agency Rwanda Office	Project Formulation Advisor on Infrastructure	○
	Muhambe	Ivan	Japan International Cooperation Agency Uganda Office	Senior Program Officer	○
International Organization	Cheickhou	Balde	Africa Development Bank	Principal Urban Development Officer	
	Stephan	Atchia	Africa Development Bank	Urban Development Division	
	Mursal Ardale	Abi	Africa Development Bank	urban development specialists	
	Vivien	Deparday	World Bank	Senior Urban Development Specialist	
	Laurence	Kakoubra	World Bank	Public works engineer	
	Anna	Fangeaux	French Development Agency	Assistant Manager	
	Agathe	Girard	French Development Agency	Infrastructure Project Manager	
Secretariat	Kudo	Hiroyasu	Yachiyo Engineering Co., Ltd.	Project Leader	
	Shimomura	Akihiro	Yachiyo Engineering Co., Ltd.	Expert	○
	Khairun	Nisa	Yachiyo Engineering Co., Ltd.	Expert	○
	Hoshi	Takehiro	Yachiyo Engineering Co., Ltd.	Expert	

**Appendix 6 Presentation Material of the Knowledge Sharing
Seminar on Smart City Initiatives in Asia and Africa**

Presentation Material_Uganda





SUSTAINABLE URBANISATION AND
HOUSING PROGRAMME

REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT

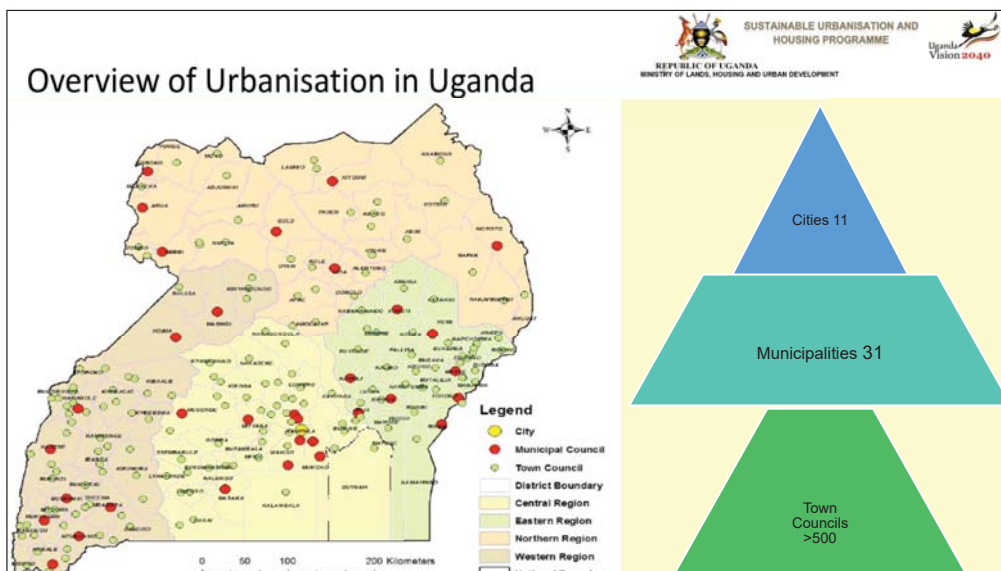



**PRESENTATION AT KNOWLEDGE SHARING
WORKSHOP ON SMART CITIES IN AFRICA AND ASIA,
ABIJAN IVORY COST**

PERSPECTIVES FROM UGANDA

MARTHA MUGARURA
ASSISTANT COMMISSIONER URBAN DEVELOPMENT
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT


FEBURARY 2024






SUSTAINABLE URBANISATION AND
HOUSING PROGRAMME

REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT



Urban Issues





REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT

SUSTAINABLE URBANISATION AND
HOUSING PROGRAMME




Uganda
Vision 2040

VISION OF NATIONAL URBAN POLICY

1. Guide on effective management of urban system
2. Improve economic performance
3. Environment and sustainability concerns
4. Enhance urban competitiveness
5. Meets the needs of Urban Residents








REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT


SUSTAINABLE URBANISATION AND
HOUSING PROGRAMME




Uganda
Vision 2040

CASE STUDIES


1. Kampala Capital City Authority
 - ☐ Automation of city services ; Revenue Management System (e-Citie)
 - ☐ Smart Permits, licenses, development planning and building construction
 - ☐ Traffic Control Centre
 - ☐ Street Naming
 - ☐ House numbering guidelines KCCA (2017)
 - ☐ Land Information System (LIS)





REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT

SUSTAINABLE URBANISATION AND
HOUSING PROGRAMME



Uganda
Vision 2040


CASE STUDIES

AirQO research based entity Makerere University

- ☐ Evidence based studies to inform policy on air quality management
- ☐ Low-cost air quality sensors
- ☐ Digital solutions for air quality data gaps
- ☐ decision makers
- ☐ Awareness of air quality issues for better health outcomes

Collaborative and co-creation for implementation involving academia, government ministries, departments, and agencies, cities/municipalities, and communities.

Digital roadmap



Challenges

- ❑ Prioritization
- ❑ Delayed adoption of Technology
- ❑ Inadequate human capital development in ICT use
- ❑ Governance issues (transparency, accountability, equity, fairness and efficiency)
- ❑ Urban planning and management
- ❑ Vandalism of infrastructure
- ❑ COVID-19 disrupted the progress made to realize climate city initiatives
- ❑ Large informal sector that doesn't appreciate the importance of smart interventions;
- ❑ Data governance challenges; sharing, quality and backup

Opportunities for Smart Cities for Uganda

- ❖ Smart transportation (Public Transport, Intelligent Transport Systems, NMT)
- ❖ Smart energy (institutional and household level)
- ❖ Smart waste management (waste recycling, upcycling, green jobs etc)
- ❖ Smart education (e-learning, online study)
- ❖ Environmental awareness

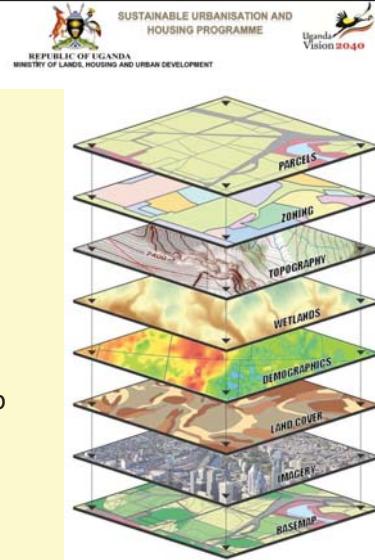


Opportunities

- ❖ National Strategy on smart city development; comprehensive smart city Indicators; urban safety, access to internet use, use of cleaner energy, Public Transport and non-motorized transport facilities, Urban air quality monitoring, e-learning, smart health care
- ❖ Use of ICT in spatial planning and management of cities; to profile slums and informal settlements; support to urban councils in land use regulatory framework; regular assessment of performance in Land Use compliance
- ❖ Scale up deployment of information system based services ie. Land information system, IRAS, valuation system
- ❖ Implementation of city databases linked to national databases
- ❖ National level interventions to uplift society (increased incomes) and combined efforts between national and urban councils and city dwellers.

Strategies

- ☐ Integration of Information systems
- ☐ Collaborative and strategic partnerships
- ☐ Co-creation of smart interventions for implementation involving academia, government ministries, departments, and agencies, cities/municipalities, and communities.
- ☐ Digital roadmap
- ☐ Enhance governance frameworks to support to an enabling environment
- ☐ Investment in physical infrastructure; city wide planning and implementation



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2nd OECD Roundtable on Smart Cities and Inclusive Growth
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3. House Numbering Guidelines- KCCA (2017)
<https://www.kcca.go.ug/media/docs/House%20Numbering%20Guides.pdf>
4. National Urban Policy
5. Digital transformation road map for Uganda
<https://www.ict.go.ug/programmes/digital-transformation-roadmap/>
6. Connecting systems of secondary cities; Cities Alliance



Asanteni

Presentation Material_Zambia

CURRENT URBAN ISSUES AND SMART INITIATIVES IN ZAMBIA (LUSAKA CITY)

Country: Zambia

Date: 28th February, 2024 – 1st March 2024

Presenter: Mildor Musonda (Environmental Planner, MLRD).

National Flag:



COUNTRY PROFILE/OVERVIEW

- Zambia, officially known as the Republic of Zambia, is a land locked country located in Southern Africa. Zambia shares borders with Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, Namibia, Angola and Congo . D. R.



CONT'

- The country is known for its diverse landscape, which includes the famous Victoria Falls, as well as rivers, lakes and various national parks. Zambia's economy is largely based on copper mining and agriculture, with the country being one of the largest copper producers in the world.



Zambia Statistics Agency - Quality Statistics for Development

- Zambia's urban development is governed by The Urban and Regional Planning Act of 2015. The Local Government Act and the Land Act serve as supplementary tools in that regard. Rapid population growth and urbanization has made our cities fail to meet the needs of their residents, and hence affected the quality of life that an average urban dweller enjoys.

OVERVIEW OF URBAN ISSUES

- 1. Rapid Urbanization: Zambia has experienced significant urban growth due to rapid influx of people into urban areas, leading to strain on urban infrastructure/ urban planning and service provision.
- 2. Inadequate Infrastructure: many urban areas in Zambia, including the capital city Lusaka, face challenges related to inadequate infrastructure for suitable water supply, sanitation, housing shortage and transportation. the demand for affordable housing in the urban areas far exceeds the available supply. This has led to unplanned settlements.
- 3. Traffic Congestion: Urban centers like Lusaka grapple with traffic congestion, leading to increased travel times, pollution and decreased productivity. Inadequate road infrastructure and public transportation systems contribute to this issue.

CONT.'

- 5. Solid Waste Management: Urban areas such as Lusaka, face a lot of challenges in solid waste management. With inadequate collection and disposal systems in the Local government, leading to environmental pollution and health hazards that also lead to outbreaks such cholera (mostly in Lusaka).
- 6. limited Access to Basic Services: Many urban residents in Zambia lack access to basic services such as healthcare, education and reliable electricity. This is also due to the fact that most settlements are unplanned.

CONT.'

- **Efforts Done to Mitigate** : The Zambian government in partnership with JICA are working on the Comprehensive Regional Development Plan to help re-plan the great Lusaka city for sustainable development.
- Furthermore, efforts to address these urban issues have been reflected in Zambia's National Urban Policy, which aims at guiding urban development. The Eighth National Development Plan (8NDP) together with the formulation of Integrated Development Plan (IDP) have outlined strategies to promote sustainable urban development and improve living conditions in urban areas. These have increased focus on sustainable urban development and implementation of smart initiatives to address the urban issues.

SMART CITY INITIATIVES

- In Zambia, several smart initiatives have and are still being implemented in various sectors to improve efficiency, sustainability and innovation.
- 1. **Smart Agriculture:** - the use of innovative technologies such as precision agriculture, drones and satellite imagery for crop monitoring and management.
- - implementation of smart irrigation systems to optimize water usage and improve agricultural productivity.
- - adoption of mobile application for access to market information, weather forecast and agriculture best practices.
- 2. **Smart Healthcare:** - integration of telemedicine and mobile health applications to provide healthcare services in remote areas.
- - implementation of electronic health records to improve patient care and streamline health information management.

CONT.'

- - use of mobile technology for health education e.g. education on cholera preventions, disease surveillance and vaccination campaigns e.g. Covid 19.
- The introduction of NHIMA which is the national health insurance formed by an ACT of parliament to help alleviate and provide basic health care to every Zambian.
- 3. **Smart Education:** - introduction to e-learning platforms and digital education resources to enhance access to quality education such as ischool initiatives which promotes the implementation of smart classroom technologies to improve teaching and learning experiences e.g. the use of computers/tablets in class lessons. This also promotes digital literacy and computer skills among students and educators.

CONT'

- 4. **Smart Technology:** - deployment of smart city initiatives to improve urban infrastructure, transportation and public services.
- - development of digital payment systems to improve access to financial services, fostering innovation and entrepreneurship in the country.
- 5. **Smart Energy:** - Expansion of renewable energy projects, including solar and hydroelectric power generation, to increase access to clean and sustainable energy.
- - implementation of smart grid technologies to improve energy distribution and management.
- 6. **Smart Governance:** - integration of e-government platforms such the Government Bus is meant to provide efficient and transparent government services to citizens and businesses.
- - use of digital platforms for citizen engagement, feedback collection and participation in decision making processes.

EXAMPLE OF SUCCESSFUL SMART CITY PRACTICES IMPLEMENTED

- 1. Lusaka South Multi-Facility Economic Zone (LS-MFEZ) and Chibombo Multi-Facility Economic Zone (C-MFEZ): -these two big projects represent a significant development of projects designed to promote economic growth and industrialization. Both these projects integrate elements of smart infrastructure and urban planning to create a sustainable and modern economic zone.
- 2. Smart Zambia Initiatives: - The Zambian government has been making strides in e-government services to improve access to public services and streamline administrative processes, e.g. online business registration, digital payment systems and electronic service delivery with the aim to enhance government efficiency and transparency.

CHALLENGES

- The realization of smart city initiatives in Zambia has been accompanied by various challenges both current and anticipated.
- 1. **Infrastructure and Connectivity**: - insufficient infrastructure and connectivity pose a challenge in implementing smart city technologies particularly in urban areas like Lusaka.
- - Upgrading existing infrastructure to support advanced technologies such as smart grids, intelligent transportation systems and sensor systems requires substantial investments and resources.
- 2. **Data Privacy and Security**: - data privacy and security concerns are paramount in the implementation of smart city initiatives. The collection, storage and utilization of vast data is a big challenge hence it raises risks of cyber attacks and unauthorized access.

CONT.'

- 3. – **Financial Resources**: - the financing of smart city projects in urban areas such as Lusaka is a significant challenge, as the implementation of advanced technologies and infrastructure upgrade often demands substantial financial resources.
- - Securing funding from both public and private sources as well as exploring innovative financing mechanisms, is crucial for sustaining long term smart city initiatives.
- 4. – **Stakeholder Collaboration**: - most stakeholders in Zambia including government entities, private sector organizations, technology vendors and citizens have different agendas, priorities and interests. Hence, bringing a lot of challenges for multiple stakeholders to collaborate on smart city projects.
- 5. **Regulatory and Policy Framework**: - the regulatory environment has not fully evolved to accommodate the deployment of new technologies and address legal and ethical consideration.

CONT.'

- 6. – **Environmental Sustainability:** - Balancing technological advancement with environmental sustainability is a great challenge in smart city initiatives projects. Striking a balance between resource efficiency, energy conservation and environmental impact mitigation is crucial for the long term sustainability of smart city initiatives
- - implementing eco-friendly and resilient infrastructure, as well as promoting sustainable urban planning and design, is essential for mitigating environmental challenges associated with rapid urbanization and technological advancement.
- 7. **Citizen Engagement and Trust:** - Building trust among citizens and ensuring their active participation in smart city initiatives is a challenge, but it is fundamental for their success. Therefore, effective communication, education and feedback mechanism are crucial for promoting citizen engagement and creating sense of ownership.

CLOSING REMARKS

- These smart initiatives in Zambia so far, reflect that the country's clear goal is commitment to embracing modern technologies and innovative solutions to address various challenges and drive sustainable development. By leveraging these smart initiatives, Zambia aims to enhance productivity, improve service delivery and create opportunities for economic growth and social development.
- Therefore, Zambia is still open to improving and learning from other countries that have advanced in urban smart city initiative systems development.
- I do encourage your full feedback and suggestions on all that has been presented here, this will help us learn and know what needs to be improved or adopted by my government and its people.


REFERENCES

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- 2. Urban and Regional Planning Act of 2015.
- 3. Zambia Statistics Agency (Lusaka)- Quality Statistics for Development.
- 4. Eighth National Development Plan (8NDP) – 2022-2026.
- 5. Smart Zambia Institute Lusaka.
-

Presentation Material_Nigeria

**FEDERAL REPUBLIC OF NIGERIA**





THE KNOWLEDGE SHARING SEMINAR ON SMART CITY INITIATIVES IN ASIA AND AFRICA (NIGERIA AS A CASE STUDY)

FEBRUARY 2024

PRESENTED BY
MODIBBO MOHAMMED NASIR

DEPARTMENT OF URBAN AND REGIONAL PLANNING
FEDERAL CAPITAL DEVELOPMENT AUTHORITY, ABUJA

COUNTRY OVERVIEW

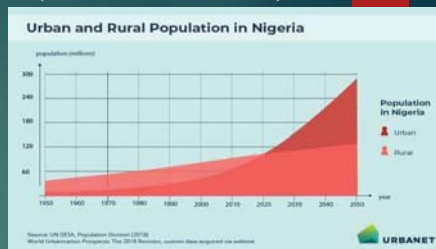
- ▶ Nigeria is the most populous country in Africa (Over 200 million people).
- ▶ The Country occupies a Land area of 923,769 sq km .
- ▶ Nigeria became Independent in 1960 and saw a 1967-70 civil war
- ▶ The country is a Multi-ethnic State inhabited by more than 250 ethnic groups speaking over 500 distinct languages, with different religious affiliations.
- ▶ The country is divided into Six (6) Geo-political Zones with Thirty-Six (36) states altogether including FCT (North West, North Central, North East, South West, South East and South South).
- ▶ Nigeria has Seven Hundred and Seventy-four (774) Local Government Areas.
- ▶ Nigeria 1999 Constitution as amended and the Urban and Regional Planning Law (URPL) of 1992, specifies each Local Government Headquarters and Settlement with a population of 10,000 and above is an Urban Area.
- ▶ Proportion of its population are living in Cities and Towns. This phenomenon has brought forth many challenges.

OVERVIEW OF URBAN ISSUES (CHALLENGES)

- a. Rapid Population Growth (Population Explosion)
- i. Increased demand for Infrastructure.
 - ii. Over stretched and Strained Resources
 - iii. Environmental Degradation
 - iv. Inadequate Service Delivery



Lagos Traffic Congestion



Flooding in Kaduna Urban Metropolis

- b. Poverty
- c. Emergence of Slums and Squatters Settlements
- d. Poor Urban Management and Ineffective control policies.
- e. Increased demand for Housing.
- f. Inefficient Solid and Liquid Waste Management.
- g. Demand for Utility and Services such as Schools, Hospitals, Telecommunication, Clean water.
- h. Environmental Pollution.
- i. Inefficient Transportation System.



Squatter Settlement, Abuja



Urban Slum in Minna



Indiscriminate Waste Disposal, Lokoja

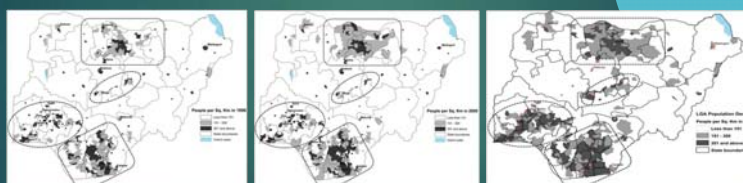


Port-Harcourt Green House Gas

“ The rapid growth of Nigeria’s urban area in the North East and North Central is causing desertification, deforestation, flood and erosion, pollution, housing congestion leading to slums and unsanitary situations, loss of biodiversity, and all forms of deplorable physical conditions and insecurities.” – A World Bank Report.(Urbanization Research Nigeria, 2015)

IMPACTS

- ▶ According to Jiboye (2003), the Industrial and Technological hub of Nigeria's cities of Lagos, Kano, Kaduna, and Port Harcourt is generating a loss of Biodiversity and Greenhouse Warming, Salinization of Agricultural Land, Air and Water Pollution, Environmental Decay, Insanitation, Overcrowding, Housing Congestion, Crime and Violence, and several other demeaning situations as such it affects the general environmental sustainability at large.



Source: URN (2015)

Figure A, B, and C: People per Square Kilometer in 1990, 2000 and 2006

MITIGATING EFFORTS FOR URBAN ISSUES

1. Ambitious Urban Development Programmes such as Urban Renewal Programmes and National Housing Policy and now the possible adoption of the Smart City Initiatives towards enhancing Urban Development and Management.
2. Implementation of key Urban Planning Initiatives and Policies to guide Urban Development and improve quality of life.
 - a. National Urban Development Policy; Promotes sustainable urban development, optimize land use and enhance the physical, economic, social and environmental qualities of urban areas.
 - b. National Building Code; Sets standards and regulations for constructions, ensuring safety, accessibility and functionality in urban buildings and infrastructure.
 - c. Slum Upgrading Initiatives; This initiatives aims to improve living condition and provide basic amenities to slum dwellers.
 - d. Urban Transportation Policies; Through implementations of policies and projects like the Lagos Rail Mass Transit and Bus Rapid Transport System (BRT) and the Metro Light Rail in Abuja, Lagos and Port-Harcourt

SMART CITY INITIATIVES

The Nigeria Smart City Initiative (NSCI) was launched in Abuja, Nigeria on 8th August, 2017. The summit was to initiate sound actionable strategies for transforming Nigerian major urban centers from traditional dysfunctional cities to modern, efficient, responsive ones capable of satisfying the needs of present and future generations of Nigerians. NSCI would rely heavily on the application of ICT and other Smart Technologies in the operations and management of those cities.

The Objectives Of this Initiative Includes; -

- a) To provide enhanced and inclusive economic growth by creating a conducive business environment, startup ecosystems, attracting people and investments.
- b) To improve the quality of life of their residents through adequate planning and the provision of core and ICT infrastructure
- c) To ensure a clean and sustain- able environment and application of 'Smart Solutions' that increase the efficient use of resources and limit the negative impact on the environment.
- d) To achieve a sustainable and resilient development
- e) To create a sustainable management mechanism for preparing, financing, implementing and managing smart cities in the state.

SUPERVISING ORGANIZATIONS

The drivers of this initiative in Nigeria are the Federal Government Ministries through the supervision of the National Information Technology Development Agency, (NITDA), in partnership with NGOs, and CBOs.

TECHNOLOGIES / IMPLEMENTATION STRATEGIES

1. The Introduction to e-governance System in the Nigeria Public Services
2. The establishment of the Nigeria ICT Roadmap 2017 -2020
3. The establishment of National Board for Technology Incubation (NBTI) and Technology Hubs.
4. The establishment of the Nigerian Digital Literacy Council
5. The establishment of the National Information Technology Agency (NITDA)
6. And the establishment of the Academic and other Institutional Support System such as the Africa Regional Institute for Geospatial Information Science and Technology AFRIGIST, National Space Research and Development Agency (NSRDA), Federal School of Surveying FSS and hundreds of polytechnics and universities offering courses of training that develops the capacity and manpower need for the realization of Nigeria Smart Cities Initiative.

CASE STUDIES OF SMART CITY INITIATIVE PRACTICE IN NIGERIA

In Nigeria, before the Smart City Initiative was launched, Abuja and Lagos had been practicing the concept. This was because of their resolve and disposition to compete in the Global Urban Arena. Because of the already established initiatives in the application of ICT and Smart Technologies in the Administration, development, and management of the cities of Lagos and Abuja, the NSCI adopted them as models to champion the initiative to other states in the country.

Currently, the Nigeria States practicing smart City initiatives include:

- Lagos State Smart City Initiative
- FCT, Abuja Smart City Initiative
- Niger State Smart City Initiative

LAGOS STATE SMART CITY INITIATIVE

Lagos State has been going digital (ICT) before the launch of the initiative in 2017 in Nigeria.

“In a quest to leverage technology to improve the State's infrastructure, transportation, and waste management systems the development of smart cities is a promising solution to the numerous urbanization challenges the State is being confronted with (Sanwo-Olu, 2021)”.

In quest of this, the Lagos State Government commenced the installation of

- Free Wi-fi Infrastructures across the City,
- Toll-free Emergency Services, and
- Ambulances stationed to respond to crises.

Other ongoing projects to go smart include the construction of the

- a. Lekki Deep Sea Port
- b. Eko Atlantic City
- c. The Dangote Refinery
- d. Municipal Waste Management, and Urban Greenery
- e. The Lagos State Home Ownership Mortgage Scheme (Lagos HOMS)
- f. The Lagos State Bus Rapid Transit (BRT)
- g. The Lekki Free Trade Zone (LFTZ)



Source: African Development Bank Group (2023) Figure: Artist impressions of Eko Atlantic city



Dangote Refinery, Lagos



Lekki Deep Sea Port



Lagos State Homes Ownership Scheme



Lekki Free Trade Zone



Waste Management

ABUJA SMART CITY INITIATIVE

The initiative of Abuja becoming a Smart City was conceived in August 2017 when the initiative was launched.

Following the potential endowments of Abuja of becoming a smart city the organizer of the summit made it one of the models for other states of the federation to comply.

This was followed as a result of the government of Rwanda hosting an international conference on smart cities 3 Months before the Abuja Summit (May 2017).

These international gatherings of diverse stakeholders from the built environment, ICT, city managers, and policymakers, have not only aimed at promoting the idea of smart city in Sub-Saharan Africa. but also getting city governments and relevant bodies to commit to making cities smarter as in the case of the Federal Capital Territory (FCT) in particular.

These includes;

- Abuja Geographic Information System
- Julius Berger Nigeria LTD
- The International Airlines Companies
- The International Telecommunication Companies
- The International Agricultural Companies
- The International Oil Companies
- The International Construction Companies
- The International Trade Centers



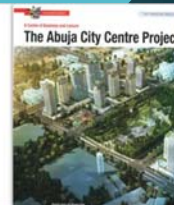
Abuja World Trade Centre (AWTC)

- A mega project worth billions of Dollars, and driven primarily by global economic flows into the city
- Began in 2011 and still on going
- Over 20 floors, the tallest building in the city



Chickason Project: Abuja City Centre Project (ACC)

- Mega project Worth Billions of Dollars (\$ 2.75 Billions)
- Driven primarily by multinational and indigenous actors



Other potentials for the smart city initiative in Abuja are:

- The Development of the Abuja Technology Village
- Implementation of the Abuja Automotive Village Project
- The Jabi Lake Waterfront City
- Skyscraper City and Mixed Development

CHALLENGES OF SMART CITIES IN NIGERIA

- a) Lack of Political will
- b) Poverty
- c) Lack of Public Awareness / Public Partnership.
- d) Urban Planning Challenges
- e) Inadequate Critical Infrastructure
- f) Low Broadband Penetration
- g) Digital Divide and Literacy
- h) Institutional Challenges / Issues

STRATEGIES OF OVERCOMING CHALLENGES

- a) Identify and remove obstacles affecting firms and businesses.
- b) Prepare and implement appropriate physical development plans.
- c) Upgrade existing urban services through the use of ICT technologies.
- d) Establish new smart urban services such as smart street lights, smart transportation, etc., to improve the residents' quality of life.
- e) Establish IoT systems in an integrated fashion.
- f) Ensure good urban governance and the provision of basic infrastructure and service in all settlements.
- g) Build a digital system of governance and administration through e-payments, e-procurement etc.
- h) Speed up the digitalization of government process
- i) Undertake training and capacity building needs assessment for building smart cities
- j) Establish and build partnerships/collaboration to support adequate and timely implementation.

CONCLUSION

It is important to note, when planning a smart city it is necessary to consider the culture, economic and social preference of the people in order to achieve the desired results. Therefore, Governments is required to look inwards in formulating, preparing and implementing plans that are sustainable, which will in turn bring positive impact across all divides.

Thank You

Presentation Material_Cote d'Ivoire



REPUBLIQUE DE CÔTE D'IVOIRE
Union-discipline-travail



MINISTÈRE DE LA CONSTRUCTION,
DU LOGEMENT ET DE L'URBANISME

URBAN INITIATIVES FOR A SMART SUSTAINABLE CITY



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FEBRUARY 2024



PRESENTATION CONTENTS

- 1- COUNTRY OVERVIEW
- 2- OVERVIEW OF URBAN PLANNING ISSUES
- 3- SMART CITY INITIATIVES
- 4- CASE STUDY: SIGFU
- 5- CHALLENGES
- 6- CLOSING REMARKS

I. COUNTRY OVERVIEW

1. Introducing the characteristics of your country and city

Geographical location:

- African state, west of the Gulf of Guinea
- Area: **322,462 km²**,
- Hot, humid climate
- Savannah vegetation (north) and equatorial forest (south)
- Numerous waterways (lagoons, rivers)

Demographic situation

- Population: **29,389,150** in 2021
- Population growth rate: **2.9%/year**
- Urbanization rate: **over 50%**, reflected in Abidjan
- Abidjan accounts for: **21.5%** of the total population
- Official language: **French**

Economic situation

- Annual economic growth: **over 7%**
- Agriculture (**30%**), Industry (**20%**) and Services (**50%**)
- WAEMU GDP (**32%**)
- Second largest port in Africa (PAA) after Durban
- The currency is the **CFA franc (XOF)**

Administrative and political organization

- Decentralized entities: Districts, Departments, S/Ps, Villages
- Decentralized authorities: Regions (31) and Communes (201)
- Autonomous Districts: **Abidjan** (the economic capital) and **Yamoussoukro** (political capital)



II. OVERVIEW OF PLANNING ISSUES

1. Issues (Urbanization assets)

- Recent accelerating urbanization (**15%** in 1960 to **42.5%** in 1998, rising to **52.2%** in 2021)
- The urbanization process is governed by laws and regulations (codes, decrees, by-laws, etc.).
- The number of cities has risen from 10 to 512, including those with more than 100,000 inhabitants, from 8 in 1998 to 17 in 2021.
- The types of urban planning documents are :
 - ▶ Provisional urban planning documents (SDU, PUD, SS, PUD),
 - ▶ Operational urban planning documents (Subdivision, Restructuring, Renovation, Remembrement),
 - ▶ Urban planning documents (CU, PC, CC, RGU, RPU)
- Several towns (regional capitals) have PUDs, while others are in progress.

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II. OVERVIEW OF PLANNING ISSUES

1. Issues (causes and manifestations of urban crises)

Despite the measures put in place, urban crises still persist, manifesting themselves in a number of ways:

- ▶ urban sprawl (housing estates and anarchic occupation of spaces) ;
- ▶ the proliferation of precarious neighborhoods or shantytowns ;
- ▶ degradation and inadequacy of basic socio-collective facilities and infrastructure (education, health, electricity, safety, roads, sanitation, drainage, etc.) ;
- ▶ Degradation of the urban environment (pollution, nuisance) ;
- ▶ Traffic congestion (traffic jams, accidents).

Most of these crises are linked to :

- ▶ strong population growth
- ▶ meetint ever-increasing needs of populations for basic socio-economic facilities and infrastructure
- ▶ insecurity and land conflicts
- ▶ the absence (**78%** of towns), obsolescence (**12%** of towns) or low level of completion (**10%** of towns) of urban planning documents

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III. SMART CITY INITIATIVES

In response to technological change and the new paradigms of sustainable development, the government has undertaken a number of reforms that take sustainability criteria into account. These include:

1. Adopted laws and regulations

Urban planning

- Loi n°2020-624 du 14 août 2020 instituant Code de l'Urbanisme et du Domaine Foncier Urbain: With this text, Côte d'Ivoire has a single law to organize and regulate matters relating to urban planning and urban land tenure.
- Décret n°2019-220 du 13 mars 2019 instituant un système de référence terrestre, un système de référence altimétrique et un système de représentation plane aims to unify and harmonize the various geodetic references used in Côte d'Ivoire.
- Décret n°2019-221 du 13 mars 2019 relatif à l'identifiant unique du foncier en Côte d'Ivoire institues a unique identification number, assigned to any land parcel located in Côte d'Ivoire regardless of its legal nature.
- Côte d'Ivoire's National Urban Policy adopted by the Council of Ministers in February 2020

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III. SMART CITY INITIATIVES

1. Adopted laws and regulations

In terms of housing

- Ordinance n°2021-858 of December 15, 2021 instituting **parafiscal** taxes on certain **building materials** for the financing of social housing, and its ratification bill.
- Law n°2019-576 of June 26, 2019 instituting the Construction and Housing Code
- Decree n°2021-864 of December 15, 2021 transforming SICOGL into a state-owned company called Agence Nationale de l'Habitat (ANAH).

Urban mobility

- Loi n° 2014-812 du 16 décembre 2014 d'orientation du transport intérieur, création de l'Autorité de la Mobilité Urbaine dans le Grand Abidjan (AMUGA), spatial reorganization of urban transport networks to ensure multimodal complementarity, restructuring of informal transport both in terms of actors and means of transport

Risk prevention

- Ratification in February 1993 of the Convention on Wetlands of International Importance: Grand-Bassam RAMSAR site for the wise use of wetlands
- Decree no. 2021 -583 of October 06, 2021 setting the terms and conditions for the management and use of Ecologically Sensitive Areas

III. SMART CITY INITIATIVES

2. Structuring projects implemented

Urban planning and housing

► Projet d'opérationnalisation du Schéma Directeur d'Urbanisme du Grand Abidjan (**SDUGA 2040**). Its purpose is to partially revise the Schéma Directeur d'Urbanisme for the 2040 horizon (adjusting the SDUGA 2030, integrating and making consistent all sectoral policies, particularly in terms of housing, mobility, commercial development, drinking water, the environment and sanitation), to put in place mechanisms to make the implementation of this territorial planning document effective and to strengthen the capacities of the Ministries and organizations concerned

- Project to draw up Detailed Urban Plans (PUD) for the 10 Urban Units of the SDUGA
- Project to draw up Master Urban Plans (PUD) and Detailed Urban Plans (PUD) for regional capitals
- Project to draw up Master Urban Plans (PUD) for 80 localities (Departmental and Sub-Prefectural capitals)
- Project to build 16,000 social and economic housing units

III. SMART CITY INITIATIVES

2. Structuring projects implemented

Land and urban management

- Project to set up an Integrated Urban Land Management System (**SIGFU**);
- Projet d'Adressage du District d'Abidjan (**PADA**);
- Project to compile a directory of toponyms and odonyms for roads and places in the District of Abidjan.

Road infrastructure and urban mobility

- Abidjan bypass construction project (Y4)
- Project to build 3 interchanges in Abidjan (Ecole de Police, Riviera 3, Riviera Palmeraie junctions)
- Construction of an interchange at Carrefour Akwaba
- Project to design the IT platform for managing truck flows at the Port of Abidjan
- Abidjan Urban Mobility Project (PMA)
- Abidjan Urban Transport Project (PTUA)

IV. CASE STUDY: SIGFU

PROJECT OBJECTIVES

Setting up an Integrated Urban Land Management System (SIGFU)



Speed up the process of issuing administrative acts



Secure urban land tenure in Côte d'Ivoire



Improve Côte d'Ivoire's business environment

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IV. CASE STUDIES

1. SIGFU

I) Objectives and missions

The main objectives are to

- control and monitor the management of land and urban data
- secure land transactions for third-party users of MCLU services by making them immutable, transparent and unforgeable
- offer a permanent construction monitoring service to detect sites under construction, identify unauthorized sites and facilitate the work of field teams in their control, sanction and reporting missions.

The main tasks are

- Set up a system for digital processing of requests for land deeds at all stages of the procedure
- Organize services and automate case processing
- Simplify procedures and give users a clear overview of the steps they have taken
- Connecting all players in the land chain via a digital platform
- Reduce processing times
- Pooling expense settlement points
- Encourage paperless payment methods

SIGFU

IV. CASE STUDIES

1. SIGFU

II) Planned actions

- ▶ Set up the foundation: Web portal for sharing information and services: the data catalog
- ▶ Set up distribution and sharing tools: Data download tool
- ▶ Set up data flows (API)
- ▶ Implement data enhancement tool: Analysis module for decision support (dataviz): data visualization on a map (2D and 3D)

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IV. CASE STUDIES

2. Géoportail de l'urbanisme: WebSIG

As part of the project to operationalize the Schéma Directeur d'Urbanisme d'Grand Abidjan à l'Horizon 2040 (SDUGA 2040), which aims to put in place mechanisms to strengthen the effectiveness of the implementation of this territorial planning document and the capacities of the ministries and organizations concerned, a pilot project has been selected for Outcome 2 of the project.

With this in mind, the Pilot Project aims to :

1. [Technical Aspect] Creation of a Geoportal (WebSIG) for consulting approved urban planning documents and their regulations;
2. [Institutional Strengthening] Prepare the DGUF/MCLU for the future deployment of the Geoportal to all urban plans in Côte d'Ivoire and free access to all citizens,

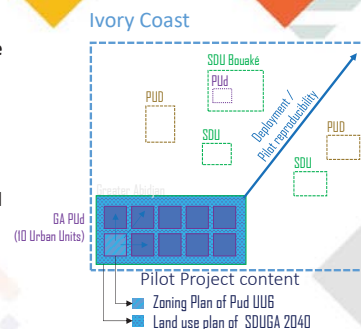
The eventual deployment of the pilot's experience, in open access, will enable **the digital transformation of the public sector in the field of urban planning** (accessibility to the public, efficiency and internal management of services thanks to the automation of tasks, leading to savings in public expenditure).

IV. CASE STUDIES

2. 1- Presentation of the WebSIG project

The pilot project consists in the creation of **an online Geoportal** on which can be consulted:

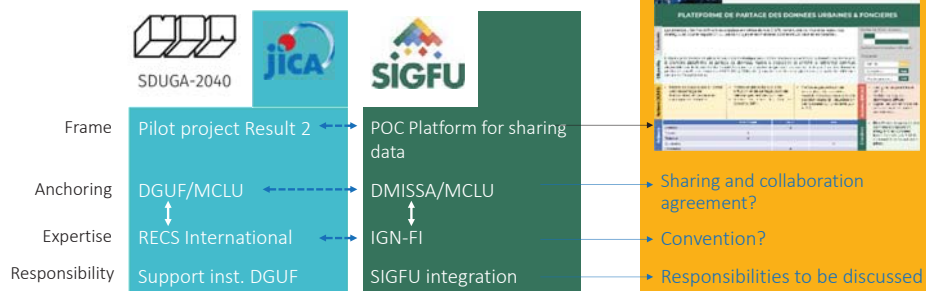
- The status of current planning documents
- Information on the SDUGA 2040 and its Master Land Use Plan
- Information on the PUD of UU6, its zoning plan and associated regulations



IV. CASE STUDIES

2. 2- WebGIS project: duo piloting: SDUGA 2040/SIGFU synergy

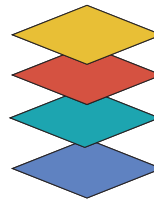
The Pilot Project relies on the synergy between the SDUGA-2040 Project (JICA, DGUF/MCLU, RECS International) and the SIGFU Project (DMISSA/MCLU, IGN-FI).



IV. CASE STUDIES

2. 2- WebSIG project: 4 levels of information

4 layers of information
(depending on zoom level):



A. Monitoring of plan development status

Scale: Greater Abidjan for the pilot project

B. SDUGA / PUD / SDU

Scale: Greater Abidjan for the pilot project

C. Detailed urban plan zoning

Scale: Urban Unit 6 for the pilot project

D. Planning & other regulations

Scale: Urban block

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02 Examples of similar renderings

Geoportal for urban planning in France

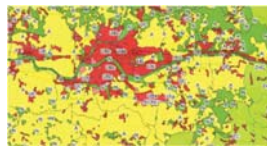
<https://www.geoportail-urbanisme.gouv.fr/map/>

Type of planning document and status of preparation



- Reglement national d'urbanisme
- Plan local d'urbanisme
- Plan d'occupation des sols
- Carte communale
- Plan de sauvegarde et de mise en valeur
- Plan local d'urbanisme intercommunal

Simplified zoning for local town planning schemes



- Zone urbaine
- Zone à urbaniser, ouverte
- Zone à urbaniser, bloquée
- Zone agricole
- Zone naturelle et forestière

PLU and urban planning regulations on a parcel-by-parcel basis



DOCUMENTS D'URBANISME

Parcelle couverte par le Plan Local d'Urbanisme Intercommunal (PLU) COMMUNAUTÉ D'AGGLOMERATION METROPOLITAIN, dans la procédure de mise à jour approuvée le 16/02/2021

Zone classée UA, Zone Urbaine : centre-ville, centrebourg, hameaux

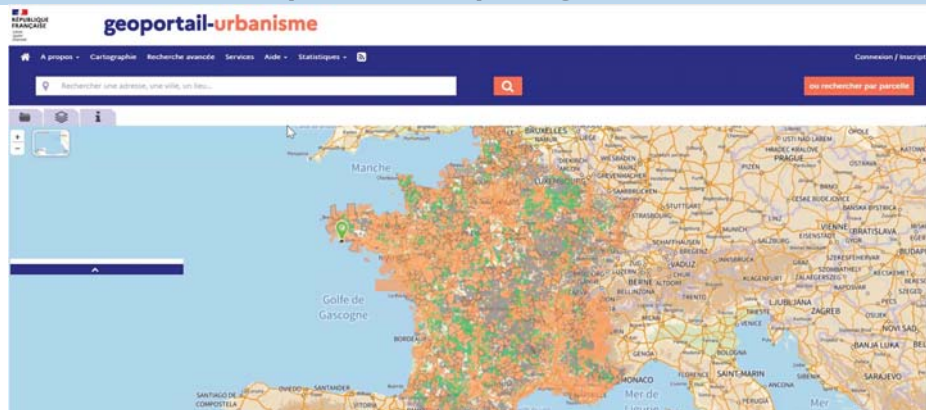
Ensemble des pièces jointes :

Télécharger l'archive complète

17

02 Examples of similar renderings

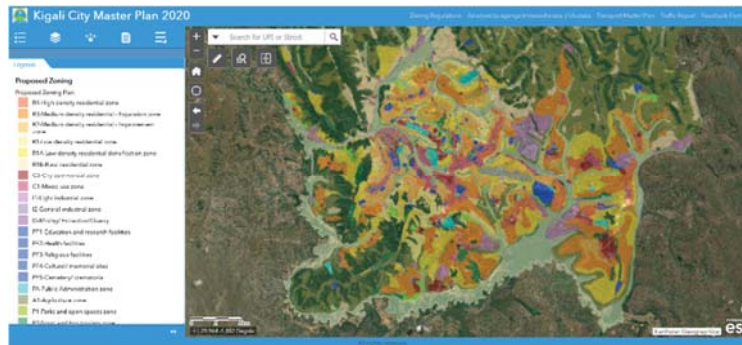
Geoportal for urban planning in France



18

02 Examples of similar renderings

Geoportal of Kigali - Rwanda

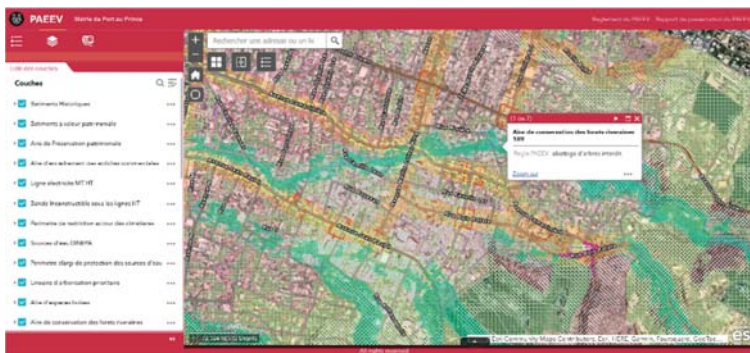


- Observe the zoning plan and building regulations.
- Overlay with plot plan with lot number reference
- Attachment to a tool for issuing and monitoring building permits

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02 Examples of similar renderings

Port au Prince - Haiti



- Simple geoportal for visualizing urban data
- Among the information available: zoning plan with regulations
- It is only a consultation tool, not a management tool.

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V. CHALLENGES

- Controlling land use (urban sprawl and uncontrolled occupation)
- Land security (access to land ownership)
- Combating precarious urban conditions (proliferation of shantytowns and precarious neighborhoods, inadequate basic urban services)
- Upgrading urban equipment and infrastructure (smart and innovative networks)
- Urban mobility (inadequate or inappropriate transport mechanisms or means, traffic congestion, intelligent transport systems)
- Preservation of the urban environment and quality of life (pollution, waste management, risks of flooding, landslides and natural disasters, etc.)

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VI. CLOSING REMARKS / CONCLUSION

Côte d'Ivoire is one of the most urbanized countries on the African continent.

However, the results of this urbanization remain mixed, given the current issues and challenges facing the country.

The United Nations' New Urban Agenda 2030 for Sustainable Development and many other global development programs and agreements provide opportunities for governments to promote the harmonious and sustainable development of their cities and territories.

That's why we're convinced that the reforms and structuring projects undertaken by the Ivorian government will serve as a lever for the country's structural transformation around smart, sustainable cities.

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THANK YOU

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Presentation Material_Senegal



REPUBLIQUE DU SENEGAL
Un Peuple – Un But – Une Foi





MINISTRY OF URBAN PLANNING, HOUSING AND PUBLIC HYGIENE

GENERAL DIRECTION OF URBAN PLANNING AND ARCHITECTURE

Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa
From February 28 février to March 1, 2024 (Abidjan, Cote d'Ivoire)

Presented by: Youssoupha MANE,
Director of Planning and Regulation/ General
Direction of Urban Planning and Architecture

February 20th to March 1st, 2024

1

Summary

I/ COUNTRY OVERVIEW

II/ OVERVIEW OF URBAN ISSUES

III/ IMPACTS OF URBAN ISSUES

IV/ SOLUTIONS PROVIDED

VI/ STUDIES AND PRACTICES OF SUCCESSFUL SMART CITIES: CASE STUDIES IMPLEMENTED IN THE COUNTRY

VII/ URBAN POLE OF DAGA KHOLPA: FROM URBAN PLANNING TO EXECUTION - BASIC FRAMEWORK OF URBAN STRUCTURE

VIII/ IMPLEMENTATION OF PRIORITY PROJECTS OUTLINED IN THE URBAN DEVELOPMENT PLAN (UDP) FOR DAKAR AND ITS SURROUNDINGS BY 2035

VIII/ CURRENT CHALLENGES ENCOUNTERED AND CONSTRAINTS

CONCLUSION


2

I/ COUNTRY OVERVIEW

Senegal, one of the West African states, is situated in the westernmost part of the African continent between 12°20' and 16°40' north latitude and 11°20' and 17°30' west longitude. Covering an area of 196,722 km², it is bordered to the west by the Atlantic Ocean, to the north by Mauritania, to the east by Mali, and to the south by Guinea Conakry and Guinea-Bissau. As of 2023, its population is estimated at 18,032,473 inhabitants, with an annual growth rate of 2.9%. Men account for 50.6%, and women for 49.4%.

Administratively, Senegal is divided into:

- 14 regions (Dakar, Diourbel, Fatick, Kaolack, Kolda, Louga, Matam, Saint-Louis, Tambacounda, Thiès, Ziguinchor, Kaffrine, Kédougou, Sédhiou);
- 46 departments and 557 municipalities.



The State's public policy on urban planning is prepared and executed by the MULHP, relying on a legal framework encompassing urban planning and construction codes.

The DGUA is tasked with implementing the State's urban development policy, specifically focusing on promoting sustainable cities, determining the purpose and planning of their spaces, and managing them in collaboration with local authorities.

In the realm of urban planning, the documentation coverage rate for cities or municipalities is set at 18% in 2023. Within the context of sustainable urban development, the urban planning sector is considering the integration of smart cities, introducing new initiatives or paradigms to be embraced in an era where technology takes precedence. Examples of such emerging urban areas include new cities (smart cities) or urban hubs like Diamniadio and Daga-Kholpa.

3

III/ OVERVIEW OF URBAN ISSUES

The main urban issues have been identified for each sector:

- ✓ **Urban Development:**
Mono-polar urban structure characterized by a high and excessive concentration of business, activities, and services in the city center (the plateau), limited urban mobility, frequent traffic congestion, uncontrolled urban development, limited housing options, and significant disparities among localities in accessing urban services.
- ✓ **Economic Development:**
Economic activities in sectors such as agriculture, fishing, industry, tourism, craftsmanship, etc., are hampered by insufficient productivity, declining terrestrial and marine resources, and a lack of infrastructure for production, exploitation, and transformation.
- ✓ **Natural Environment:**
Recurrent deforestation, insufficient green spaces, nearly non-existent public gardens, and sensitive wild wetland areas. There is an increase in air, water, and soil pollution.
- ✓ **Infrastructure:**
Inadequate public transportation services, insufficient road capacity, limited handling capacity of the Dakar port hindered by the long-standing halt of the Dakar-Bamako railway, inadequate coverage of the sanitation network, excessive dependence on a single external water source (Lake Guiers), and persistent flood risks.

These problems are linked to insufficient and non-appropriation of urban planning in our cities.

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III/ IMPACTS OF URBAN ISSUES

- ➡ **High demographic growth:** 2.9% per year, with a population of 18,032,473 inhabitants in 2033 and 92 individuals/km²
- ➡ **Significant urbanization in Senegalese cities:** the urbanization rate has successively increased from 23% in 1960, 39% in 1988, 41% in 2002, to 45% in 2013 and 49% in 2023.
- ➡ **Substantial urban sprawl:** this has led to the establishment of informal settlements in areas unsuitable for housing, covering 30 to 40% of the space in our cities.
- ➡ **Dakar's macrocephaly:**
 - Occupies 0.3% of the national territory.
 - 4,146,594 inhabitants in 2023.
 - Urbanization rate of 96.4%.
 - Population density of 7,277 inhabitants per km².
 - Concentration of socio-economic, administrative, and service activities in the city center.

5

IV/ SOLUTIONS PROVIDED

Plans and strategies for sustainable urban development aligned with SDG 11 have been developed:

- ➡ **Act III of decentralization** emphasizes comprehensive communalization, intensifying the trend toward widespread urbanization.
- ➡ **The Emerging Senegal Plan** confirms the significance of urban planning and the housing sector, including social housing through the 100,000 Housing Program led by the Ministry responsible for urban planning.
- ➡ Adherence to the guidelines of the **National Territorial Planning and Development Plan (PNADT)**.
- ➡ **Sectoral Urban Policy Letter:**
 - Transformation of the current mono-polar structure into a multi-polar structure by creating urban hubs (Diamniadio and Daga-Kholpa), allowing the opening up of new areas for urbanization in an integrated manner (concentration of housing, activities, and services). This approach also considers sustainability in urban planning, as exemplified by the Urban Master Plan for Dakar and its surroundings by 2035.
 - National Program for Urban Planning and Urban Risk Management in Senegal (PNPUS).
 - National Urbanization Policy.

6

IV/ SOLUTIONS PROVIDED

Initiatives : Urban Development Plan of Dakar and neighboring area for 2035

The Urban Development Plan (PDU) integrates resilience into all aspects of the city, along with sustainability, through a vision and sustainable urban planning.

“A City of Hospitality”

A City of Hospitality characterized by:

- ✧ **A comfortable living environment.**
- ✧ **Easy communication.**
- ✧ **Innovative creation.**

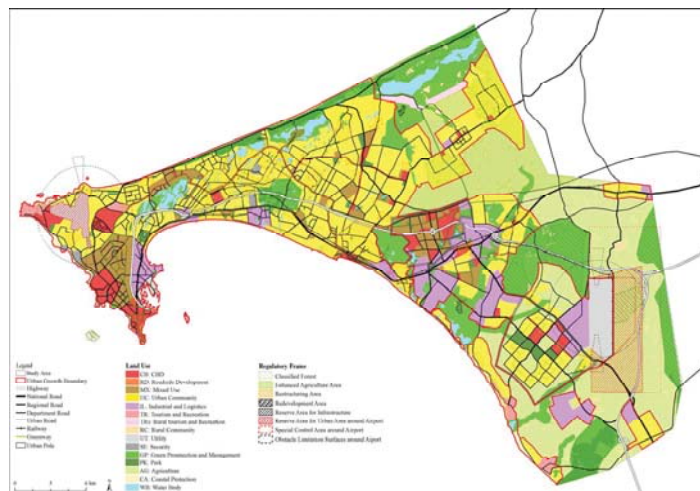
This city will be inclusive, sustainable, competitive, and strongly supported.

Sustainable urban planning is grounded in four major principles:

- Sustainable urban development
- Compact cities connected by a modern transport network
- Resilient and robust cities
- Dynamic cities with active interactions between information, goods, and populations

7

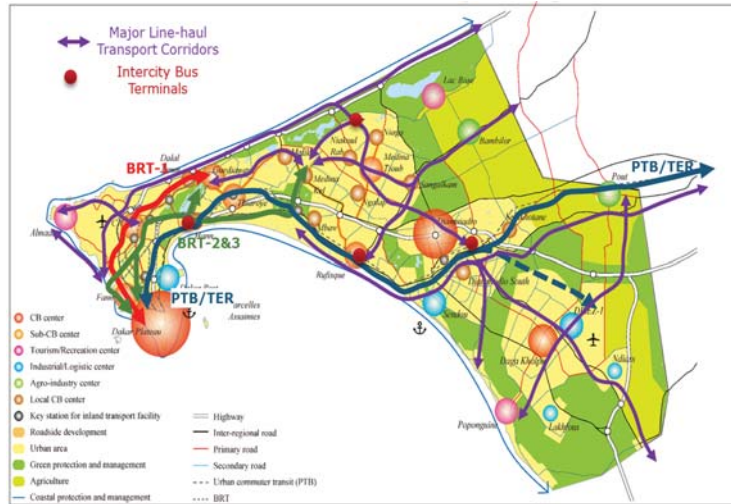
LAND USE PLAN FOR 2035



URBAN TRANSPORT / MAJOR CORRIDORS



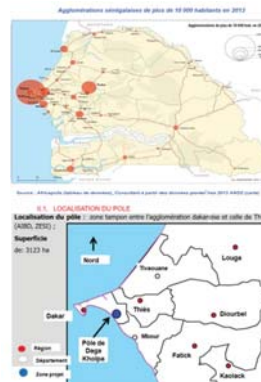
PUBLIC TRANSPORTATION NETWORK



VI/ STUDIES AND PRACTICES OF SUCCESSFUL SMART CITIES: CASE STUDIES IMPLEMENTED IN THE COUNTRY

PRESENTATION OF THE PROJECT AREA

New smart cities or urban hubs, such as Diamniadio and Daga Kholpa, are currently being implemented by the Senegalese government through a public policy for sustainable urban development. As an example, the urban hub of Daga-Kholpa was chosen from numerous other areas based on the following criteria: fundamental principles, development-related criteria, control-related criteria, and the promotion of capacity building and participation of local communities (source: JICA Study Mission).



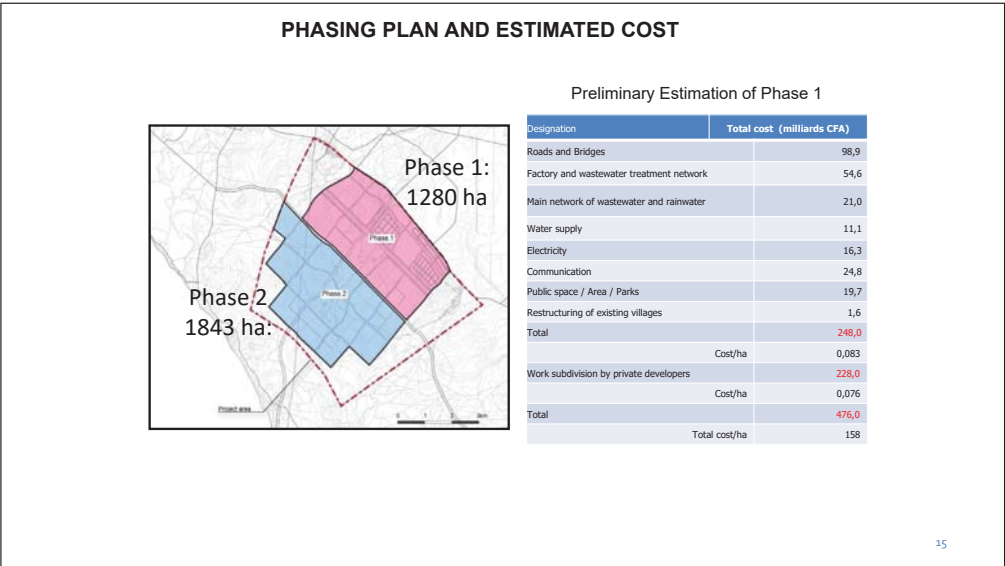
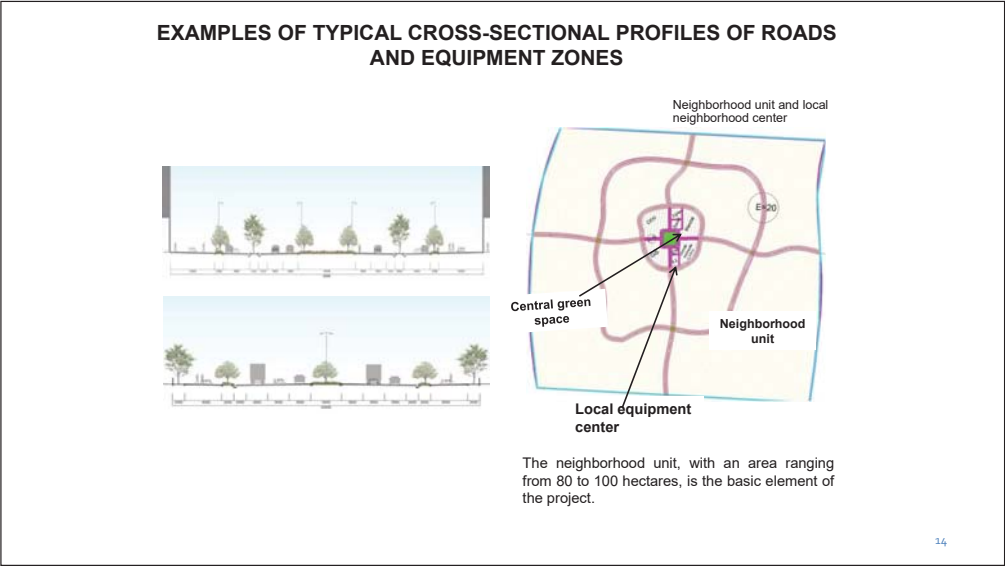
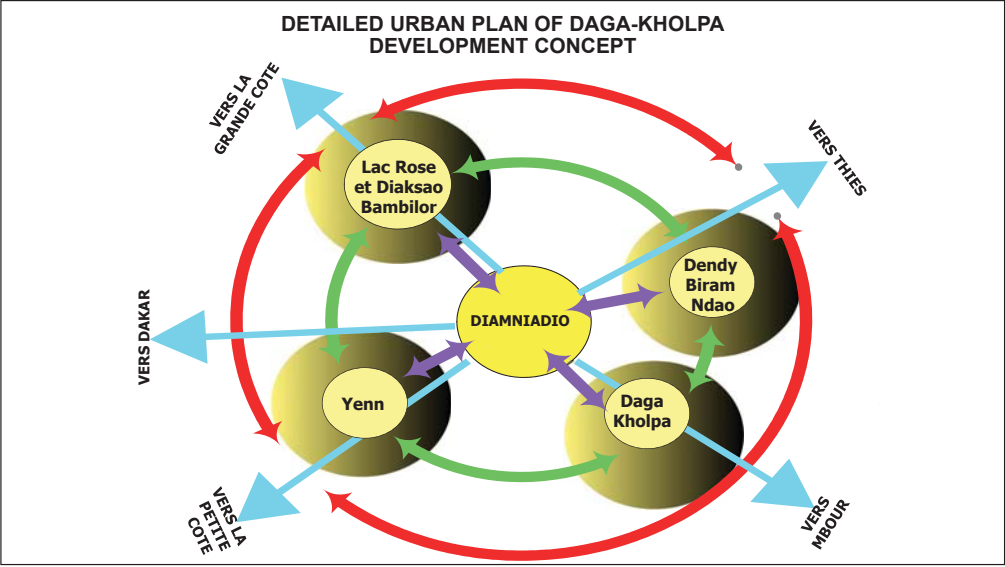
VI/ URBAN POLE OF DAGA KHOLPA: FROM URBAN PLANNING TO EXECUTION – BASIC FRAMEWORK OF URBAN INFRASTRUCTURE

Development Concept

- Green and Ecological City
- Attractive Working and Living Environment (compact city)
- Harmonized Occupation between New and Old
- Competitive Business Centers arranged in central hubs

Concept of Urban Structure

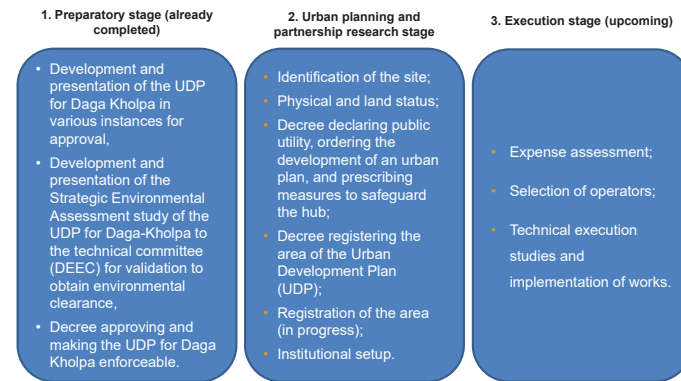
- Symbolic urban structure as an international crossroads city
- Aesthetics of an attractive urban center (axes and corridors)
- Competitive industrial zone with green spaces and high-tech infrastructure
- Urban structure focused on mass public transportation and active transportation (pedestrians, two-wheelers)
- Spatial formulation emphasizing green and unbuilt spaces (network and activities in the central park)
- Urban Mixity



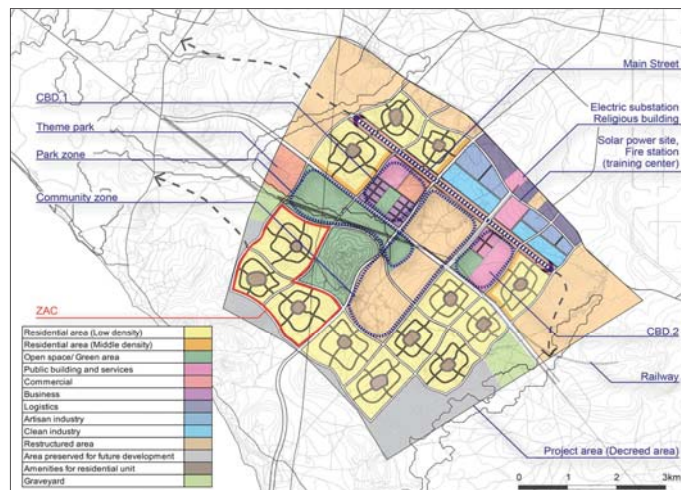
IMPLEMENTATION STATUS

Conduct studies, develop large hosting frameworks, and promote the hub to the national and international private sector.

Three stages



DAGA-KHOLPA LAND USE PLAN



CHARACTERISTICS OF THE LAND USE PLAN

- Unsuitable areas for urban development are avoided (as indicated in the previous slide).
- The coexistence of a modern urban area, existing villages, and green zones is achieved.
- There are East-West and North-South axes served by inter-city arteries.
- A central road runs from East to West and is served by the BRT (Bus Rapid Transit).
- Small and medium-sized industries, as well as logistics industries, are supposed to be in the light industrial and logistics zone.
- A theme park is planned at the front of Daga-Kholpa towards the West.
- The railway line to AIBD is supposed to be extended to Daga-Kholpa in the form of a loop returning to Diamniadio.

VII/ IMPLEMENTATION OF PRIORITY PROJECTS OUTLINED IN THE URBAN DEVELOPMENT PLAN (UDP) FOR DAKAR AND ITS SURROUNDINGS BY 2035

Selected Projects and Study

- Enhance the three bottlenecks on the additional lane (Northern Bypass) and two bottlenecks at intersections on the Front de Terre road (Notation).
- Improve access to the Baux Maraîchers station to restore its original function as a multi-modal station by addressing traffic congestion in the vicinity.
- Study appropriate methods for waste treatment, including the disposal system, incineration system, and compost recycling system.

Implementation

- Improvement of urban mobility through the construction of modern transport infrastructure (TER, BRT) integrating technology.
- Construction of a flyover to alleviate bottlenecks on the additional lane (Northern Bypass) and two bottlenecks at intersections on the Front de Terre road.
- Enhance access to the Baux Maraîchers station to restore its original function as a multimodal station by addressing traffic congestion in the vicinity.



VIII/ CURRENT CHALLENGES ENCOUNTERED AND CONSTRAINTS




- Insufficient funding allocated to urban planning, implementation, and operationalization of the concerned areas, especially smart cities.
- Lack of quality training for human resources in the field of urban planning at the central administration and local government levels.
- Limitations on the use of technology for processing certain files, particularly in the field of telebuilding permit requests (TELEDAC), covering only the Dakar region and facing connectivity issues.
- Inadequacy of logistical means and equipment, such as high-resolution GPS used for data collection and digitization.

Conclusion



- ✓ Securing land parcels for projects involving urban hubs, planned development areas, and the 100,000 Housing initiative.
- ✓ Development of urban planning documents for their rational and adequate implementation.
- ✓ Activation of Public-Private Partnerships for the execution of earthworks, road infrastructure, various networks, and basic facilities.



Presentation Material_Lao



Overview of Smart City in Lao PDR



Department of Housing and Urban Planning, MPWT, Lao PDR
Presented by: Mr. Khamphonemisay PHOMMATHAT
Program: The Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa
Date: February 2024, Abidjan, Republic of Côte d'Ivoire



Country Overview of Lao PDR




Area:
2,368,000 sq km
Capital City:
Vientiane
Another Big Cities :
Luangprabang
Kayson
Pakse



Some Country facts


 7.43M POPULATION*	 37% URBAN POPULATION*	 3.2% URBAN POPULATION GROWTH*
 2025 EXPECTED YEAR TO GRADUATE FROM LDC STATUS*	 2,566 USD GDP PER CAPITA*	 2.5% ANNUAL GDP GROWTH*
 0.607 HUMAN DEVELOPMENT INDEX*	 68.5 LIFE EXPECTANCY*	 81.7% PERCENT OF 15-64 YEAR OLDS IN LABOR FORCE*

Source: UN-HABITAT, Country Report 2023, Laos




Overview of Urban Issues


1. Rapid Urbanization (Challenge)


URBANIZATION RATE

2015



2025



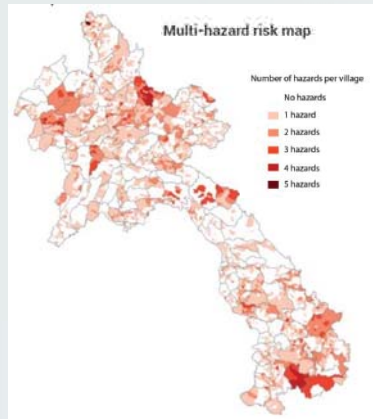
	Rate of change of the urban pop.(%)			Level of urbanization (%)			
	1995-2005	2005-2015	1995-2015	1995	2005	2015	2025
South-Eastern Asia	3.21	2.63	2.92	34.6	41.3	47.6	53.3
Brunei Darussalam	2.89	2.02	2.45	68.6	73.5	77.2	79.7
Cambodia	3.18	2.38	2.78	17.3	19.2	20.7	23.6
Indonesia	3.87	2.87	3.37	36.1	45.9	53.7	60.3
Lao People's Democratic Republic	6.28	5.36	5.82	17.4	27.4	38.6	47.7
Malaysia	4.00	2.86	3.43	55.7	66.6	74.7	80.1
Myanmar	2.27	2.41	2.34	25.5	28.9	34.1	39.8
Philippines	1.74	1.22	1.48	48.3	46.6	44.4	44.9
Singapore	2.55	2.23	2.39	100.0	100.0	100.0	100.0
Thailand	3.20	3.22	3.21	30.3	37.5	50.4	60.4
Timor-Leste	2.94	3.83	3.38	22.5	26.3	32.8	38.6
Viet Nam	2.18	3.03	3.10	22.2	27.3	33.6	39.9

UN-Habitat, World Cities Report 2016: Urbanization and Development. Emerging Futures, Annex I.

Overview of Urban Issues



2. Climate Change (Challenge)



46% of settlements
or around **3M** people
impacted by one or more
climate change related
hazard



600K people
affected by two tropical
cyclones in 2018, causing
the country its most costly
floods in a decade

Source: UN-HABITAT, Country Report 2023, Laos

Overview of Urban Issues



3. Common Urban Issues



Urban Sprawl



Urban Flood



Air Pollution



Traffic Congestion



Fire Hazard



Solid Waste

Overview of Urban Issues

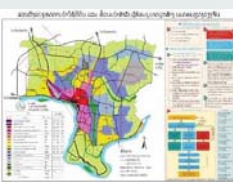


4. Major Efforts to mitigate the urban issues



Urban Planning

- 148 towns across the country has its own urban master plan
- Strategic target toward 2030: Revision of urban master plan of 45 towns



Legislations

- Urban Planning Law
- Construction Law
- Housing Law (ongoing)
- National Housing and Urban Development Strategy (2023- 2030)
- National Progress Report on the Implementation of the New Urban Agenda
- Building Code (ongoing)
- National Smart City Strategy (ongoing)
-etc



Urban Development Projects

- Greater Mekong Sub Region Corridor Town Development (GMS1, GMS2 and GMS 4)
- Pakse Urban Environmental Improvement Project
- Urban Environment Investment Improvement Project, Louang Prabang.
-etc



Capacity Building

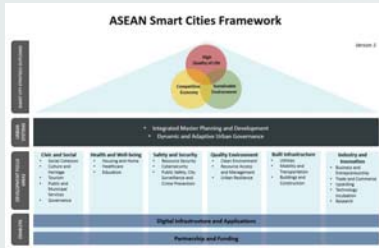
- Encourage central and local staff to apply for training course being supported by various organizations: JICA, KOICA, World Bank, ADB ...etc.
- Organize training and seminar to strengthen the capacity of local authorities.
- Organize National Urban Forum for exchanging experiences and hearing public opinions for making a better cityetc.



Smart City Initiatives



1. Member of ASEAN Smart City Network



Source: ASEAN Main Portal Website

ASEAN Smart Cities Network (ASCN) established At the 32nd ASEAN Summit on 28 April 2018

The ASCN aims to:

- Facilitate cooperation on smart cities development.
- Catalyse bankable projects with the private sector.
- Secure funding and support from ASEAN's external partners.



Vientiane Capital and Louangprabang has been selected as two pilot cities from Laos which totally included 26 cities from 10 ASEAN Countries.

The DG of Department of Housing and Urban Planning has been appointed as National Representative instead of ASEAN Department MOFA since 2023.

The late of July 2024, Lao PDR will host the Annual ASEAN Smart City Network Meeting and the DG of Department of Housing and Urban Planning is going to be the chair of the meeting.

Smart City Initiatives



Smart City Framework

Participative financing
Long term urban renewal
Smooth and multimodal transports
Linked, cost effective and resilient roads and infrastructure.
Integrated urban planning and development.
Geo-spatial information system

Performance base employment Central command station
Online public services and feedback
Public participation
Accountability and openness

Smart urban governance

Smart Urban Planning and Development

Healthy living

Adequate, affordable and on demand housing
Community cohesiveness
Cultural identity
Personal and public safety
Online health services



Clean environment

Waste management
Waste water treatment
Natural based water management
Green areas
Green buildings
Clean energy

Productive professional

Professional accreditation system
Transparent and on merit recruitment
Urban sector research and development
Distant and part time learning opportunities.

Attractive investment opportunities
Formal construction industries
Incentives for job creation
Centralized and online job announcement

Smart City Initiatives



3. Implementing Smart City studies for city level



Vientiane Capital

Luang Prabang City

Kaysone City

Pakse City



Vientiane Capital

Luang Prabang City



Symbol Explanation

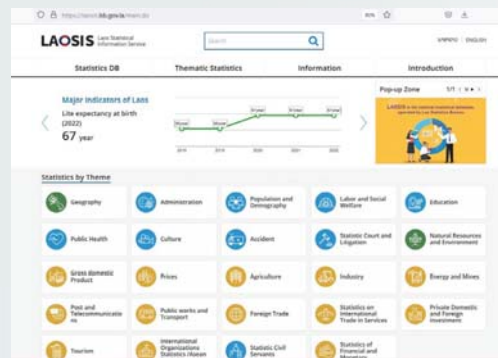
Ongoing

Completed

Smart City Initiatives



4. Developing the national statistical database (LAOSIS)



Source: <https://laosis.lsb.gov.la/info/intro.do>

LAOSIS is the national statistical database, operated by Lao Statistics Bureau. As a gateway for Laos's official statistics, LAOSIS offers a convenient one-stop service to full range of major Laos statistics.



Smart City Initiatives

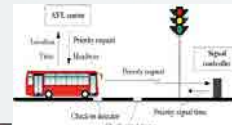


5. Applying ITS for Vientiane Sustainable Urban Transport Project (VSUTP), BRT

Traffic Management System: BRT priority



- 22 terminals
- Electric power
- Expand Transport Project
- Electronic parking charges
- The project's impact will be a new frontier in the main area of Vientiane that is environmentally friendly and pedestrian friendly.



Early Green: Phase If the signal is red when the bus approaches, the system will cut the red phase short and turn the signal into green so that the bus can pass through the intersection faster.

Green Phase Extension: If the signal is green when the bus approaches the intersection, the system will extend green phase until the bus passes through the intersection.

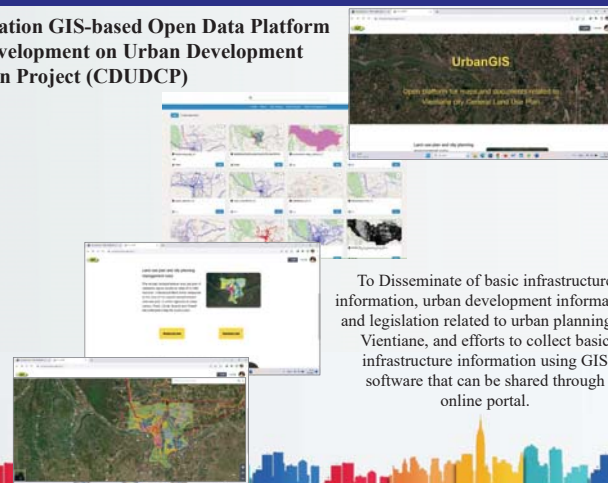
Case Studies/Practices



1. Vientiane Integrated Urban Information GIS-based Open Data Platform Under JICA Support: Capacity Development on Urban Development Control and Promotion Project (CDUDCP)



source: <https://virgo.mpw.gov.la/#/>



To Disseminate of basic infrastructure information, urban development information and legislation related to urban planning in Vientiane, and efforts to collect basic infrastructure information using GIS software that can be shared through online portal.

Case Studies/Practices

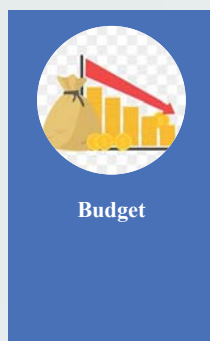


2. Developing a Green City Action Plan for Vientiane Capital City using IFC Advanced Practices for Environmental Excellence in Cities (APEX) tools (ongoing technical assistant project)

The overall objective of the Project is to develop a green city action plan for Vientiane Capital City by applying IFC's APEX tools. IFC's APEX Green Cities initiatives support cities in emerging economies to accelerate the implementation of ambitious and transformative policy actions and investments that significantly contribute to the transition to low carbon and resource-efficient urban growth pathways. The Project centers on the APEX software, which uses locally gathered and embedded peer data to estimate a city's environmental footprint across four key sectors: built environment and energy, transportation, waste, and water.



Challenges



Budget



Human Resources
and Legislations



Public and Private
Cooperation



Research and
Development

Conclusion



We still have a long way to creating a comprehensive smart city with highly efficient management and monitoring by the government and public sector. However, we are trying to lay a solid foundation by promoting the use of technology to solve various urban issues as smart solutions which we could learn and gain experience. Furthermore, smart is not all about technology, but about human-centered planning. We have to consider the uniqueness of culture to create an inclusive society. In addition, it should also take nature conservation into account in order to use natural resources sustainably.


Our country is at the initial stage of smart cities. The experience of the countries participating in this seminar will deepen our understanding and provide valuable lessons for future challenges. At the same time, I am honored and pleased to hear the suggestions from the representatives of the countries represented at this seminar.

Thank You for Your Attention
ຂອບໃຈ





Presentation Material_Cambodia

Introduction of Siem Reap Smart (Cambodia)



1. Overview of the country and the Province
2. Urban Issues
3. Smart City Initiatives
4. Cases Study
5. Challenges

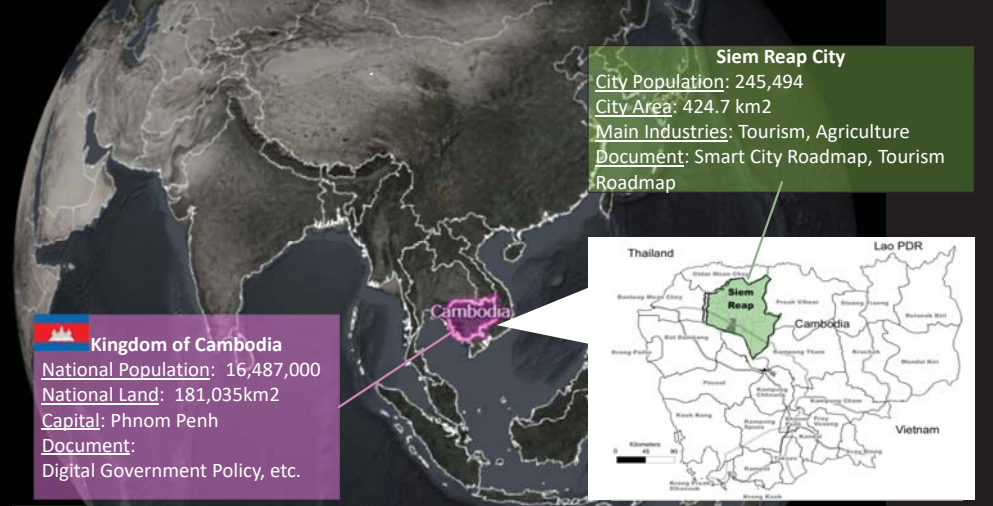




Speaker: Mr. Yun Linne, Deputy Governor of Siem Reap Province
February 2024


1. Overview of the country and the Province

2



Kingdom of Cambodia
National Population: 16,487,000
National Land: 181,035km²
Capital: Phnom Penh
Document: Digital Government Policy, etc.

Siem Reap City
City Population: 245,494
City Area: 424.7 km²
Main Industries: Tourism, Agriculture
Document: Smart City Roadmap, Tourism Roadmap



Siem Reap welcomes mil4lion tourists a year in the city of 240 000 people.




Issues

- Strengthening promotion as a tourist city
- Improving the convenience of tourism
- Improving the satisfaction with local experiences

Source: Khmer Times

19 Major Issues by Smart City Data Collection Survey

Administrative Organizations 	 1. Needs for administrative organization structures for cross-sectoral collaboration	Tourism 	 9. Needs to strengthen promotion as a tourist city
	 2. Needs for a smart city promotion unit		 10. Needs to improve the convenience of tourist behavior
	 3. Needs for an organizational basis for multi-stakeholder collaboration		 11. Needs to improve the attractiveness of local experiences at tourist attractions
Legal systems Business support 	 4. Needs to clarify and ease the complex legal procedures	Mobility 	 12. Needs for comfort against traffic congestion and on-street parking
	 5. Needs for active promotion of private smart city business		 13. Needs for optimized road maintenance
Data management 	 6. Needs for improvement of hardware and ICT circumstances	Security 	 15. Needs for more safety against risks of traffic accidents and crimes
	 7. Needs for multi-sectoral data sharing and utilizing		 16. Needs for more safety against disasters (fire, flood, etc.)
	 8. Needs for open data system, data security, and regulations	Waste 	 17. Needs for enlightenment towards environmentally friendly actions
			 18. Needs for enforcement of the public initiative
			 19. Needs for engineering of infrastructure

During COVID-19, the Royal Government of Cambodia carried out a road infrastructure improvement project for Siem Reap



New Issues

- Need to consider the treatment of new equipment such as CCTV camera including regulation, information sharing etc.

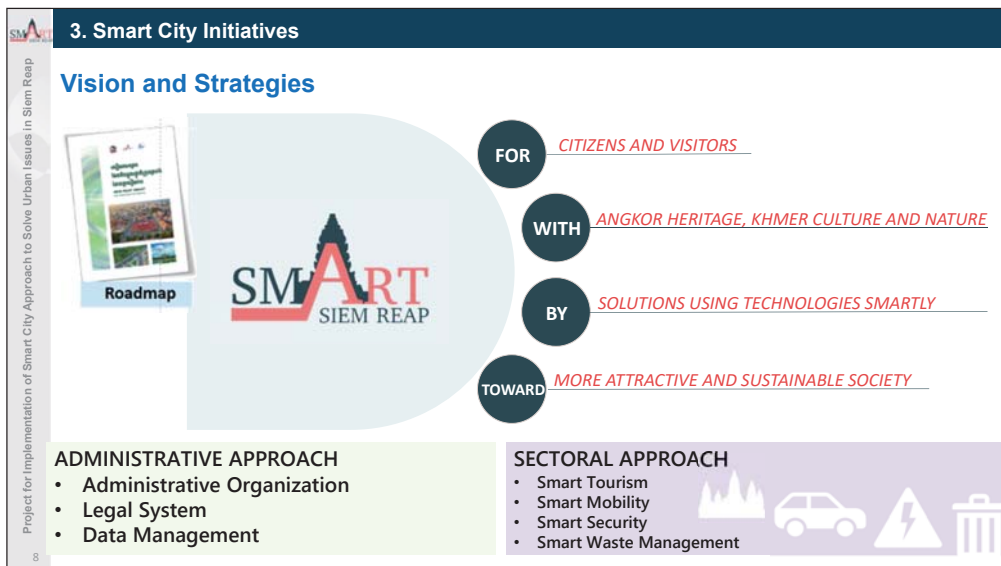
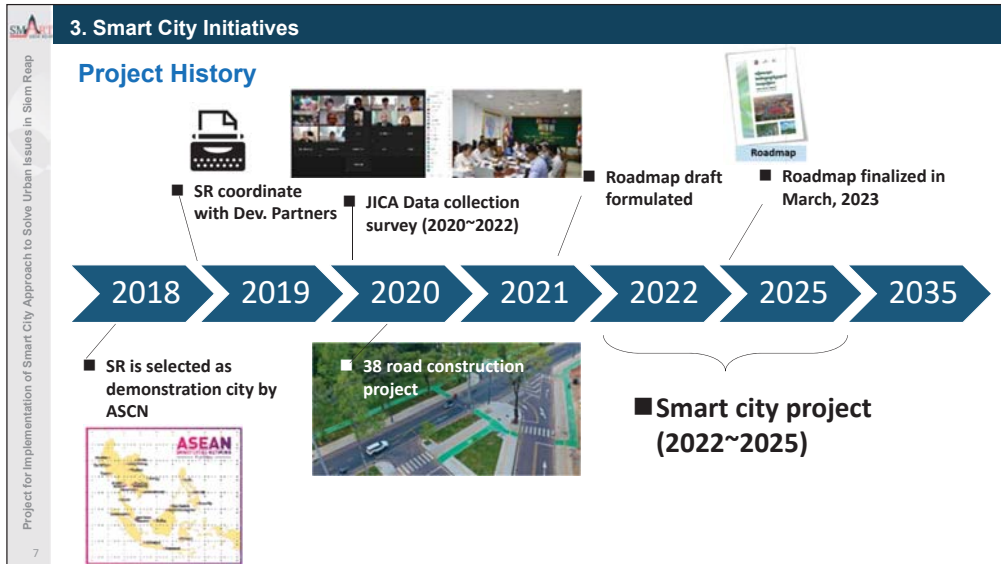
Source: MPWT

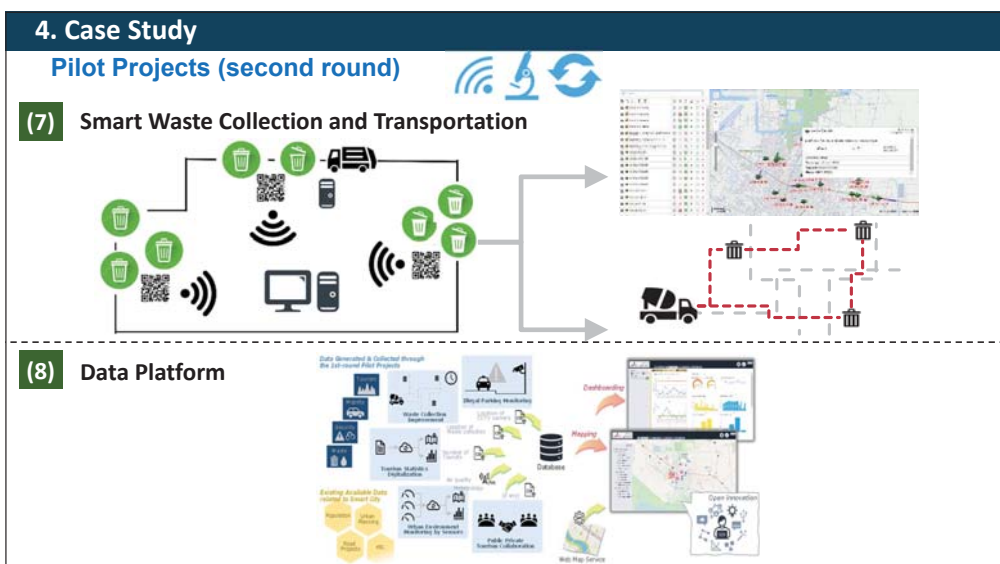
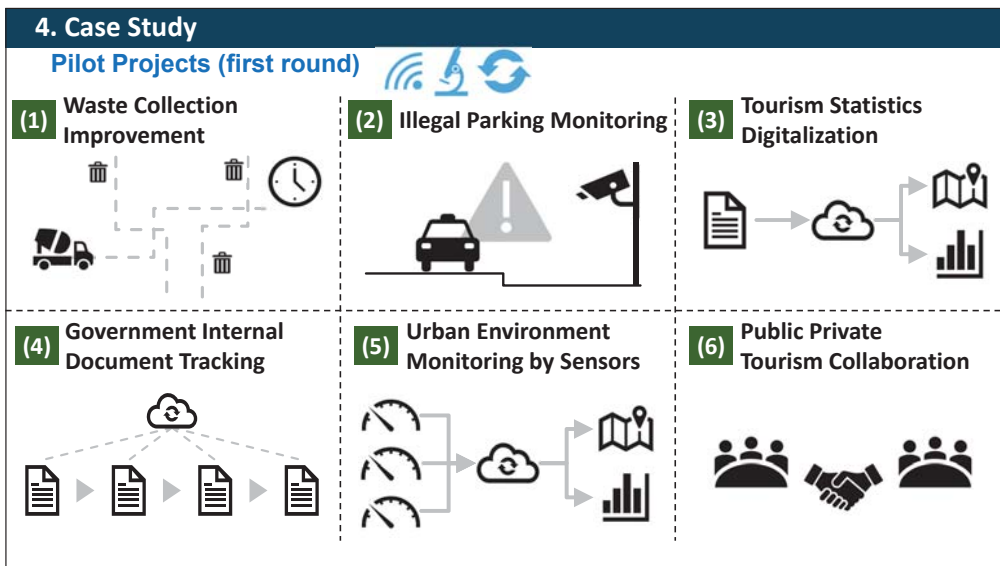
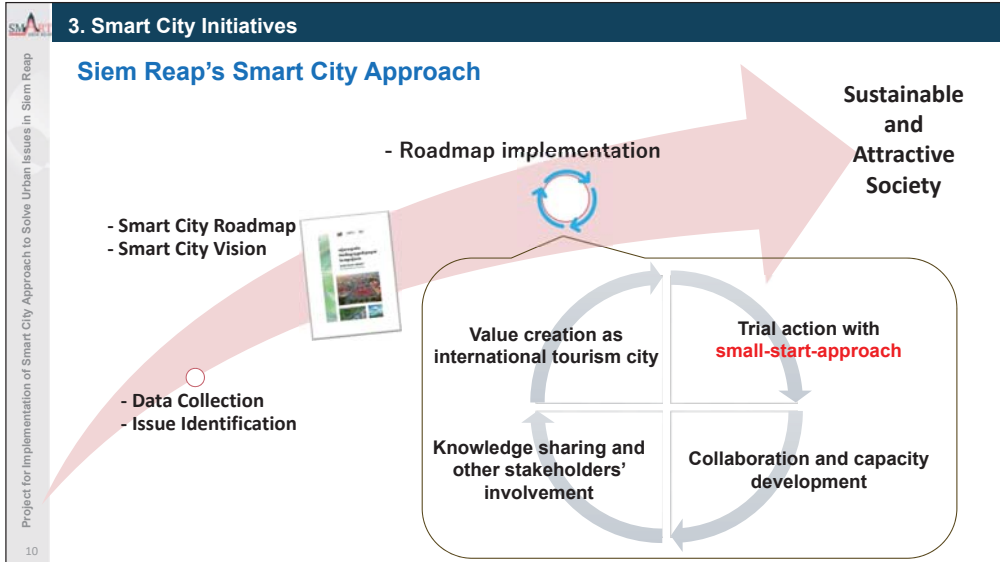
3. Smart City Initiatives

ASEAN Smart City Network

- In 2018, the ASEAN Smart Cities Network (ASCN) framework document was adopted at the ASEAN Summit.
- Siem Reap was selected as Cambodia's Smart City Demonstration City among 26 ASEAN cities

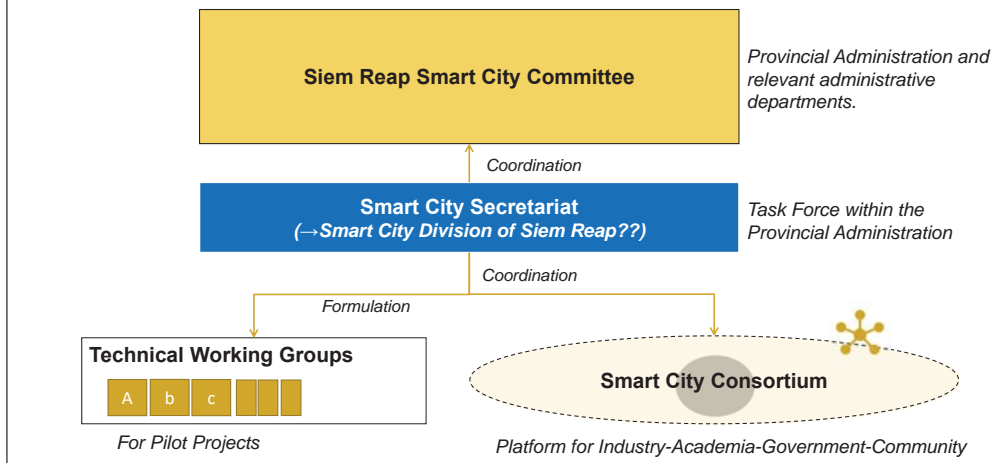






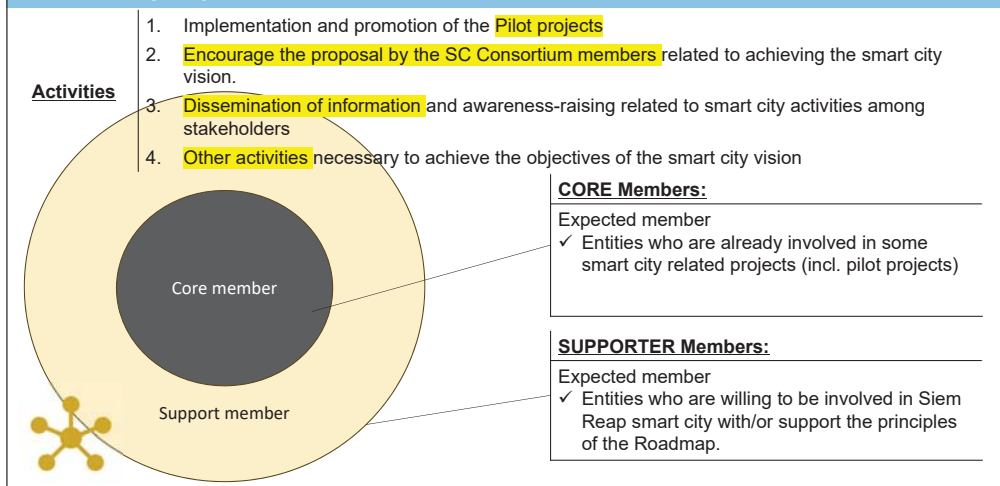
4. Case Study

Smart City Implementation Structure



4. Case Study

Smart City Implementation Structure (cont.)



5. Challenges for Smart City Development


(Countermeasures)

1. Difficulty in identifying the implementing body and ensuring its budgeting	<ul style="list-style-type: none"> Prepare the periodic "action plan" based on the smart city plans Discuss of more specific timeline and main implementing body
2. Technical Language (terminology) Issues	<ul style="list-style-type: none"> Coordinate with the central government Build consensus among stakeholders
3. Difficulty in aligning with other national/local plans/initiatives	<ul style="list-style-type: none"> Establish a mechanism to update information within smart city related organizations
4. Uncertainty of private stakeholders' actions	<ul style="list-style-type: none"> Create the implementation plan Implement the dialog with the private sectors
5. Time consuming for piloting activities	<ul style="list-style-type: none"> Formulate a detailed timeline with a margin Start small Allow for failure
6. Need for periodic budget and its uncertainty	<ul style="list-style-type: none"> Study the appropriate budget size through pilot projects. Create a budget plan.
7. Importance of a capacity development plan for officials	<ul style="list-style-type: none"> Provide serious training on technology and management skills
8. Importance of Public Relations	<ul style="list-style-type: none"> Conduct multi-stakeholder workshops

Thank you!
សូមអរគុណ



Presentation Material_Tanzania




Transforming the Public Transport in Dar es Salaam City, TANZANIA

Presented at:
The Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa.

By:
Ir. Fanuel O.S. Kalugendo
Director of Transport Development
Dar Rapid Transit Agency (DART)

February 2023



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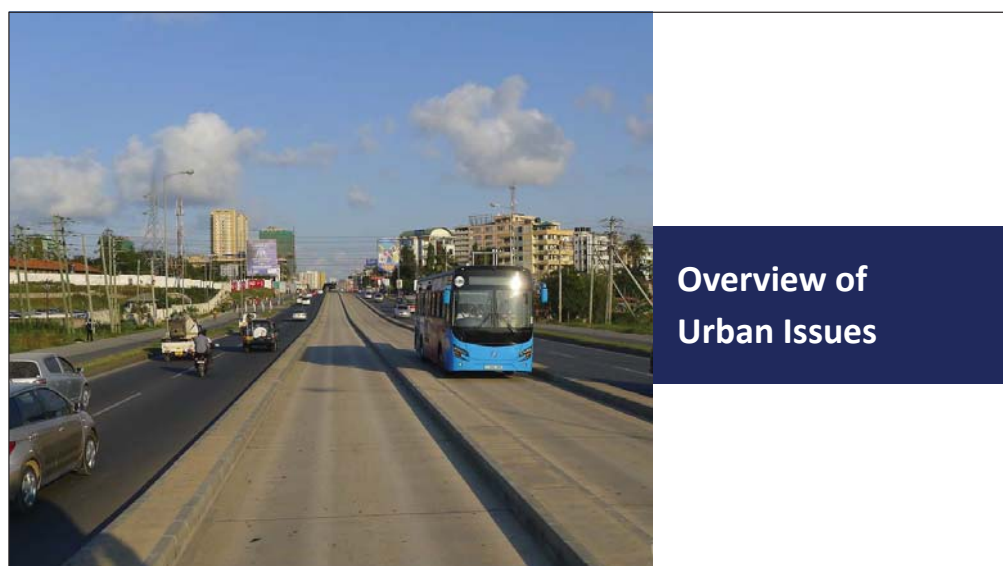
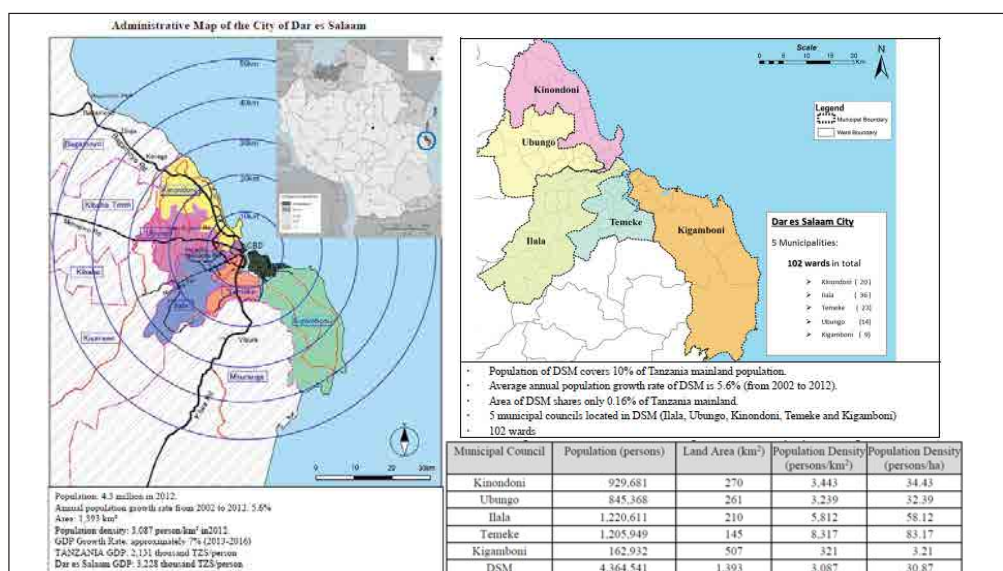
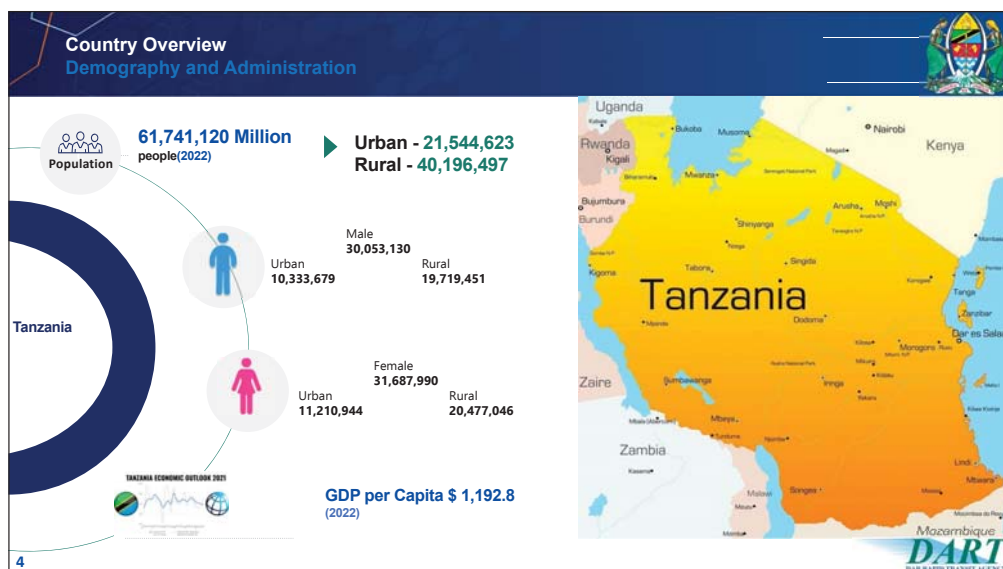


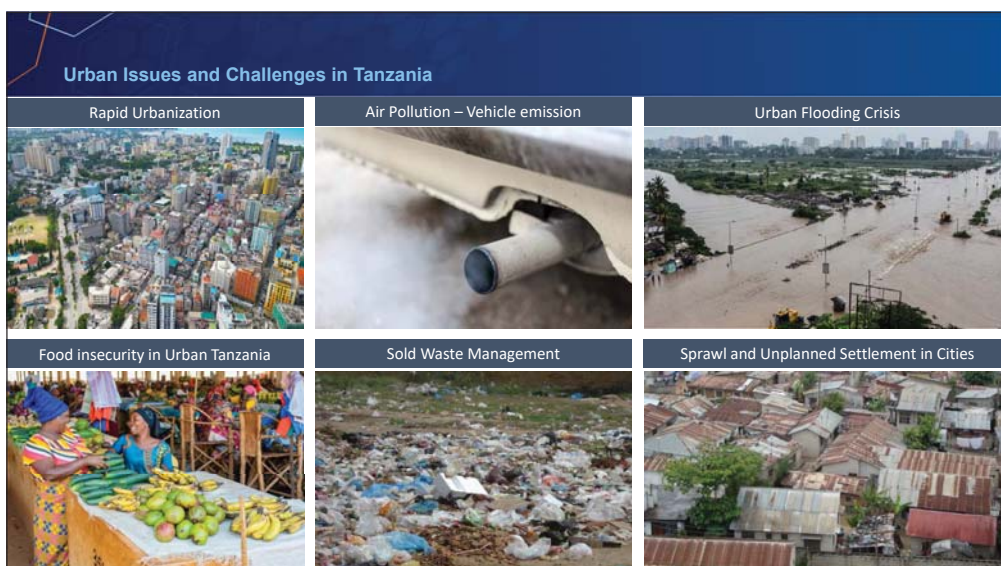
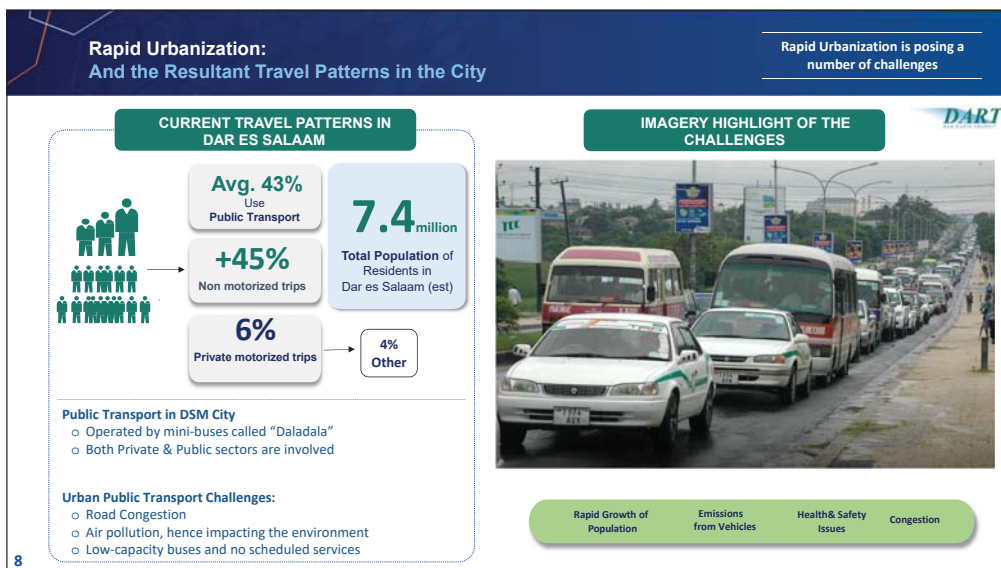


- 1.Country Overview
- 2.Overview of Urban Issues
- 3.Smart City Initiatives
- 4. Case Studies/Practices
- 5. Challenges
- 6.Conclusion



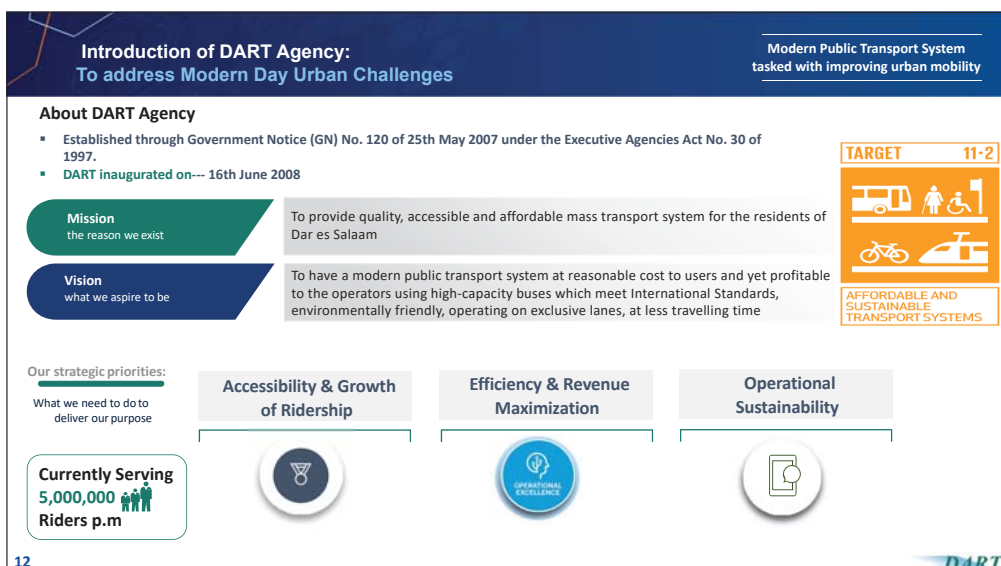
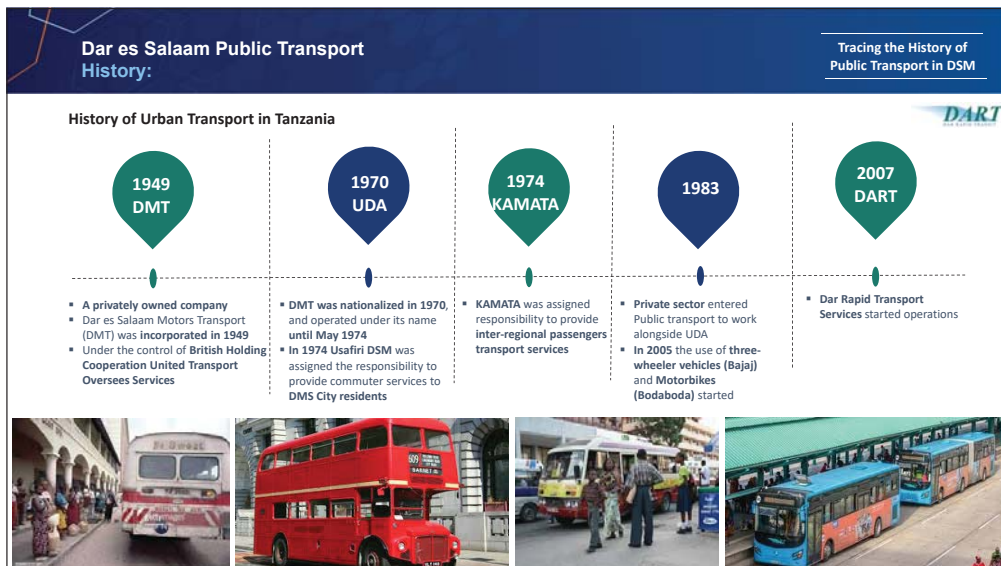
Country Overview





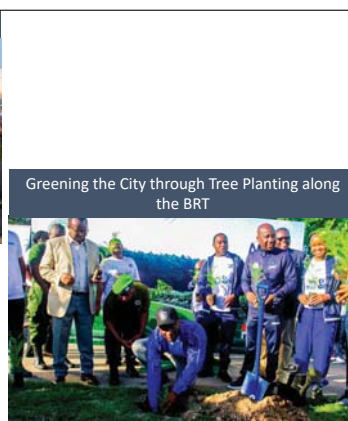
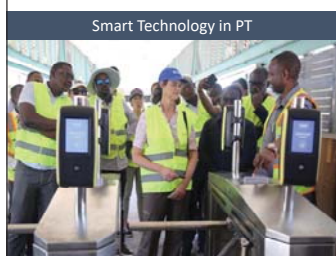


The DART Agency





Smart City Initiatives



Government e-Services

Automation of Government Services – Online services Through the Government Website.

 Agriculture	 Constitutional and Legal Affairs	 Defence and Security	 Education
 Energy	 Environment	 Finance and Taxation	 Foreign Affairs
 Health	 Information and Communication	 Labour and Employment	 Land and Settlements
 Livestock and Fisheries	 Minerals	 Social Development	 Tourism and Natural Resources
 Trade and Investment	 Transport and Infrastructure	 Water	



Overall Socio-Economic Impact:

Tackling traffic congestion and improving mobility

Proven track record of solid performance results

Social, Environmental and Economic Impacts of Dar Rapid Transit

Initially, **34%** of monthly Income was spent on Transport

+10m people
Megacity status by 2030

Can transport **28,000** passengers per direction @ hr.

Capacity: **+400k** passengers/ day

+2/3 Reduction in Travel Time

Improves resources and productive time

Improves quality of life

Reduction in fuel consumption. Fuel consumption is 3.5x higher in congested traffic

Reduction in Carbon emissions

Reduced peak hour travel time from **90 min** in 2015 to **avg. 20 min**

19

Implementation of Intelligent Transport System (ITS) for the city of Dares Salaam

Implement leading intelligent transport systems (ITS) in support of the Dares Salaam Transportation Strategic Plan to ensure that mobility, socio-economic welfare and the return on investment in transport infrastructure, is maximized and sustained.

SUSTAINABILITY

Citywide transportation agencies are committed to developing ITS projects that are sustainable from an economic as well as environmental perspective. It will focus on meeting current needs whilst ensuring it is not compromising its ability to meet the needs of future generations.

ACCOUNTABILITY

Citywide transportation agencies ensure that full life cycle costs for ITS projects are considered, all revenues and costs are taken into account and that the agency actions will be transparent to the public.

COOPERATION

Citywide transportation implementing agencies invest in ITS projects that improve the transportation system collectively. Agencies are committed to cooperate across traditional modal silos and jurisdictional boundaries to enable this.

FRUGALITY

Citywide transportation agencies implement ITS projects in a careful and responsible way to ensure that funds are spent in a resourceful, innovative and non-wasteful manner. The ITS programme should not blindly follow international trends, but consider ways of doing more with less as well as using the opportunity to leapfrog technology, given the existence of few legacy systems.

EQUITY

Citywide transportation role players seek to develop a balanced ITS programme that addresses challenges across all modes of passenger transport as well as taking cognisance of the importance of freight movement across the city. Furthermore, it aims to minimise adverse social, economic or environmental impacts across classes such as income, race, age and geography.

ITS PRIORITY AREA	GOAL
Transit Management	Continued investment in the citywide BRT systems with emphasis on tools and systems that provide for connectivity and operations of the system. Emphasis is placed on improvement of the efficiency of the BRT operations, the ability to direct service changes in real-time to improve system performance, address safety of the system as well as ensure performance-based management of these services.
Traveler Information	Providing a citywide traveller information service that will increase awareness and information on travel choices and reliability. This will assist in reducing congestion by being informed of network status and choices on how and when to travel.
Transport Data Central Management	Development of a state-of-the-art data management centre to collect, manage and communicate extensive data generated by the transportation system and related areas. Utilise the centre for real-time operational management as well as on-going planning activities.
Arterial Management	Development of arterial management systems, improve signal timing and coordination as well as improving competitiveness of travel as well as reducing travel times on the roadway network.
Parking Management	Provide measures to improve information regarding available parking and have access to information to manage provision and pricing thereof.
Multimodal Integration	Achieve effective management of the transportation network and improve the efficiency of the transportation system through integrated operations and management. This will result in reduced congestion and travel time during the daily commute.
Electronic Payment Systems	Support initiatives to expand the use of automated payment systems for transit systems (such as BRT and ferries) and parking to provide for integrated multimodal fare systems.
Commercial Vehicle Operations	Provide electronic systems to commercial vehicles in moving freight to assist in regulating the operations and activities to improve knowledge regarding position of heavy vehicles, manage overload control and roadside operations in general.
Communications Network	Ensuring that a robust telecommunications network is in place that supports the transmission of field data to a central hub, as well as inter-agency data exchange.

Conclusion

21

Optimizing BRT Operation in Dar es Salaam



Improving Safety of Road Users



Giving Space to the public and promoting Active Mobility



Development of Urban Green Infrastructure



THANK-YOU



Presentation Material_Kenya



KENYA PRESENTATION

Knowledge Sharing Seminar on Smart City Initiatives (ABIDJAN, IVORY COAST)

Date: February 2024

Presenter: Eng. Ali Shariff

CHIEF OFFICER URBAN PLANNING – COUNTY GOVERNMENT OF MOMBASA- KENYA

Country Overview

- Approx area of 582,646 km² with Nairobi as capital
- Country population of about 54 million people
- Urban population of about 15 million and projected to be half of population by 2050 (Habitat, 2023) <https://unhabitat.org/kenya>
- Decentralized administration with 47 county governments
- GDP of USD 113.42 Billion USD
- Has five major cities
- Nairobi (696.1km²) and Mombasa (287 sq.km²) are main cities; both contributing over 31% to country's GDP



Urban Setup and Issues

Counties mandated to undertake urban management and planning of their areas under Schedule 4 of Constitution of Kenya, 2010; County Government Act, 2012; Urban Areas and Cities Act, 2019 (Amendment); and Physical and Land Use Planning Act, 2019

Classification of Urban Areas

1. **Market Centre**-pop of at least 2,000 and basic urban services
2. **Town**-pop of at least 10,000 and intermediate services
3. **Municipality**-pop of at least 50,000 responsible for planning administered by a board and advanced urban services
4. **City**-pop of at least 250,000, responsible for physical and economic planning, enhanced advanced services, administered by a board except for city counties i.e. Nairobi and Mombasa

"Urban Areas and Cities Act, 2019 (Amendment)"

National Plans

- National Spatial Plan
- National Physical and Land Use Development Plan

County Plans

- County Spatial Plans
- County Physical and Land Use Development Plan
- Local Physical and Land Use Development Plan
- Integrated Urban Development Plans
- Land Use Plans
- Building and Zoning Plans

National & County Collaborative Plans

- i. Inter-County Plans
- ii. Special Area Plans

Note: Cabinet Secretary for Land & Physical Planning has National planning authority administered by Director General of Physical and Land Use Planning

Respective County Executive Committee Member (CECM) has County planning authority administered by County Director of Physical and Land Use Planning

Urban Issues

County Governments in Kenya are mandated to undertake development control with policy and budgetary support from the national government.

Challenges



Urban Informality mostly driven by lack of security of tenure



Urban Flooding associated with poor drainage and uncoordinated land use planning



Fragmented Land Use Patterns resulting from inadequacies in development control and urban planning

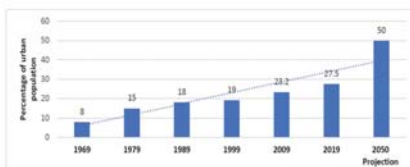
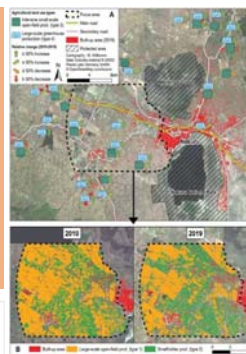


Low levels of investment in public infrastructure due to low financial capacity

Political Economy

Impacts of Challenges

- ❖ Urban Sprawl/inordinate development
- ❖ Lack of open spaces
- ❖ Increased poverty
- ❖ Loss of agricultural land
- ❖ Traffic congestion
- ❖ Emissions
- ❖ Displacement
- ❖ Land Fraud/lack of security of tenure
- ❖ Prevalence of urban heat island effect
- ❖ Urban decay
- ❖ Urban inequality and vulnerability
- ❖ Inefficient waste management



Source: Kenya National Bureau of Statistics Census reports (1969,1979,1989,1999,2009,2019).

1. Maximilian Willkomm, Alexander Follmann & Peter Dannenberg (2021)

2. Source: <https://tomorrowcities.org/tomorrows-nairobi>

3. Urban economic growth in Africa: A case study of Nairobi City County, Kenya

Mitigation Efforts



Affordable Housing Program

Plan to construct 500,000 affordable housing units in five (5) years

KISIP

1. Integrated settlement upgrading through tenure regularization and infrastructure upgrading
2. social-economic inclusion planning
3. Institutional capacity development for slum upgrading
4. Project management and coordination



Shimo la Tewa Site-Mombasa

Constructed Wetlands Technology as Decentralized Sewer Plants piloted in Mombasa with the aim of providing affordable way of treating sewer waste



Prioritizing Climate Action

Smart City

A smart city uses information and communications technology (ICT) to enhance its livability, workability and sustainability.

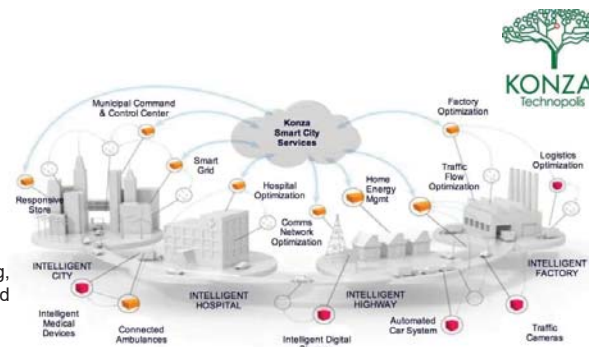
Examples of ICT-based city solutions

Energy/utilities/water	Healthcare	Transport
<ul style="list-style-type: none"> - "Smart metering" systems <ul style="list-style-type: none"> · Real-time usage metering savings – 10-15% energy - "Smart distribution" systems <ul style="list-style-type: none"> · Intelligent networked transmission/distribution · Real-time network condition monitoring 	<ul style="list-style-type: none"> - Remote systems for diagnostics and treatment <ul style="list-style-type: none"> · Enhance patient experience and penetration of direct care · Improve emergency responses 	<ul style="list-style-type: none"> - Intelligent transport systems <ul style="list-style-type: none"> · Direct traffic flow based on real-time information - Automatic systems for reducing congestion <ul style="list-style-type: none"> · Dynamic demand handling · Systems like carsharing, multi-modal transport scheduling, etc.
Education	Housing	Public safety and security
<ul style="list-style-type: none"> - Systems for interactive two-way content delivery to students and teachers <ul style="list-style-type: none"> · Monitoring systems · Remote access · Access to quality content 	<ul style="list-style-type: none"> - Intelligent real estate solutions that manage building energy efficiency, security, utility supply, etc. <ul style="list-style-type: none"> · Reduce total cost of ownership over building life cycle · Provide environmentally sustainable properties 	<ul style="list-style-type: none"> - Intelligent systems <ul style="list-style-type: none"> · Citywide monitoring, sensor tracking, alerting, controls - Dynamic resource management systems <ul style="list-style-type: none"> · Quick emergency response

Kenya Smart City Initiatives in Kenya-KONZA Smart city Flagship Project

Initiative fact sheet

- ❖ Kenya Vision 2030 Flagship Project
- ❖ Government Led
- ❖ Covers over 400 acres
- ❖ 60kms south-east from Nairobi
- ❖ Powered by ICT
- ❖ 800 Million USD committed
- ❖ Offers data centers, manufacturing, retail, schools, hospitals, hotel and convention centers, entertainment



Smart City Goals and Expected Outcomes

Goals

1. People centered
2. Equity
3. Safety
4. Sustainability

Expected Outcomes

1. Improved living
2. Enhanced mobility
3. Better economies
4. Inclusive governance
5. Environmental protection and safeguards

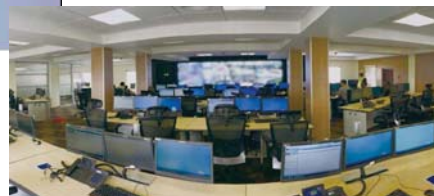
Smart City Implementation Strategy in Kenya



Technologies Being Utilized



KENET National Broadband Network Coverage



Development of Konza Smart City

- Conceptualized and approved in 2008 as a Vision 2030 project
- Catered for Business Processing Outsourcing (BPO) and Information Technology Enabled Services (ITE)
- Commissioned in 2009
- Phase 1 Master Plan developed in 2012
- Groundbreaking in 2013
- Infrastructure and parcel guidelines beginning 2014
- Roadworks and earthworks commence in 2015
- Power and Internet connection in 2016
- Commitment on the data center in 2017
- Major Infrastructure works begins in 2018
- First complex building complete in 2019



Improvements brought by Konza Smart City

- ❖ Hosts the national data center & disaster recovery data center
- ❖ An enabler of advancing Kenya's digital economy i.e. Open University of Kenya which is web-based is domiciled at Konza
- ❖ Site for Special Economic Zone

Potential of Smart Cities in Kenya

- i. Integration of smart-city services in existing cities
- ii. Advance urban sustainability in Kenyan cities
- iii. Wide roll-out of ICT infrastructure across the country
- iv. Enhanced urban service-delivery

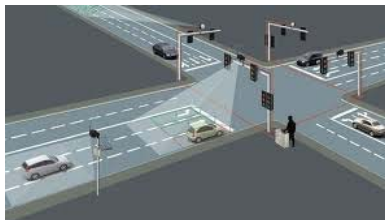
Challenges

1. Financial constrains and limited government support
2. Policy and legislative gaps
3. Limited technical capacity to execute smart-city planning
4. Slow progress in transitioning into a digital economy

SMART CITY INITIATIVES IN MOMBASA

A. THE MOMBASA ITS

- This project is expected to mitigate traffic congestion in Mombasa
- The project is funded by JICA through the grant aid program
- The project will include installation of CCTV Cameras, a data center and a traffic control room.
- Approximately 22 intersections to be improved and traffic signals to be installed.
- The project is expected to start in 2025 and to be completed by 2027 subject to signing of Grant Agreement between the Government of Kenya and Government of Japan




B. THE MOMBASA SMART CITY PROJECT

This project is to be done by County Government of Mombasa to address the following issues;

- Illegal construction
- Insecurity
- Revenue Enhancement

The CCTV's will be installed in public purpose areas like beaches, amusement parks, next to the Likoni channel, markets and on busy roads.





Republic of Rwanda
Ministry of Infrastructure

SMART CITIES

By Eric HAKIZIMANA
Spatial Development Framework Specialist
Urbanization Sector Wide Approach - USWAp

RWANDA

competitive and information-rich knowledge-based economy

Density / 2022



- Total Pop: 13,246,394
- Urban Pop: 27.9%
- Density: 503 Per/Km2

Projection / 2052

- Total Pop: 23.4M
- Urban Pop: 16.8M~72%





ICT / 2022

- 78% of Households have mobile telephones.
- Service delivery through ICT: 74.59%
- 22% of private households have members with access to the internet.

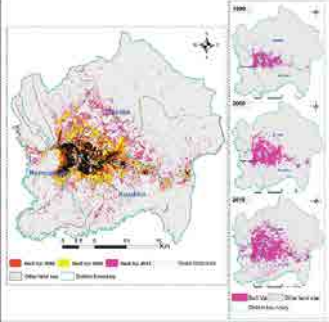


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URBAN ISSUES

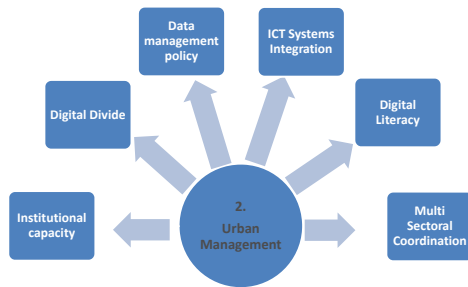


1. Population growth coupled with urban expansion



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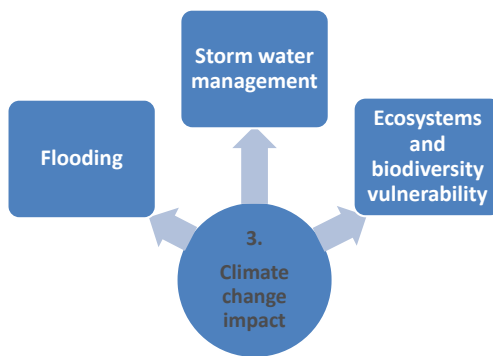
URBAN ISSUES



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URBAN ISSUES



2/19/2024

5

UNPACKING "SMART CITY CONCEPT"

"A smart city in Rwandan Context:
It is one that leverages the power of;
Technology, data and innovation
to improve the quality of life of
residents, and to coordinate and
integrate urban management
sectors."



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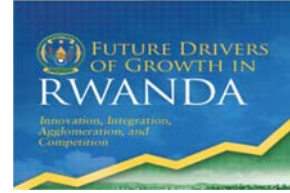
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THE VISION

7 Years Government Programme: National Strategy for Transformation (NST1)

2017-2024

Vision: To accelerate sustainable and inclusive socio-economic transformation by leveraging tech & innovation

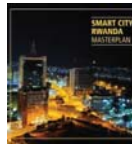


ICT as a cross-cutting enabler for development

Innovation an essential driver for high growth

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By ensuring inclusive data-led management and planning, efficient community-based infrastructure and services and localized and shared innovation, Rwandan cities can be drivers for economic and sustainable development.

Rwanda Smart Cities Master Plan

PILLARS	BUILDING BLOCKS	ACTION INITIATIVES
1 Smart governance and planning	A Data-led urban planning and management	1 GIS-based urban management platform
		2 Cross-ministry finance and project management platform
	B Smart policies and regulations	3 Multi-stakeholder urban cities programme
		4 Dynamic data-led master planning
2 Smart and efficient services and utilities	C Public engagement and open data	5 Enabling environments for urban technology testing
		6 Data strategies including open data, privacy and cybersecurity
	D Shared local infrastructure	7 Free internet zones in strategic and residential areas
		8 Digital citizen engagement tools
3 Localized innovation for social and economic development	E Efficient, demand-based services	9 Ensure citizen engagement tools are accessible to all
		10 Digitally monitor and manage utility infrastructure
	F Sustainable and resilient resource management	11 Explore smart micro grids based on the prosumer model
		12 Introduce regulatory frameworks for virtual power plants and other demand-based management systems
	G Education, innovation and digital literacy	13 Promote smart data-led 'open-to-door' mobility solutions
		14 Collaborative multi-ministry open data platform for e-services
	H Localized and challenge-based financial opportunities	15 Digital access points for rural villages
		16 Use sensor networks to collect environmental data
	I Digital transformation of financial services	17 Smart and resilient buildings and neighbourhood pilot projects
		18 Designate some public buildings as smart and green buildings and educational labs
		19 Innovation in education, from primary school to higher education
		20 ICT skill training in education, for local authorities and the general public
		21 Provide a national fund for startups and innovation accelerators
		22 Establish innovation teams in ministries and local authorities
		23 Promote local digital business platforms
		24 Create collaborative community co-working spaces and digital excellence centers
		25 Establish collaborative urban innovation labs with academia, community and industry
		26 Introduce a one-stop e-payment platform for all life-time services
		27 Enable electronic due-diligence and business loan systems for SMEs

8

10 STEPS FOR BUILDING SMART CITIES IN RWANDA



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SOME Existing Initiatives



Aerial image of CMU-Africa at Kigali Innovation City in Kigali, Rwanda



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Case Study– IREMBO

- ❑ Irembo was launched in July 2015
- ❑ Meaning: Gateway or door in the local Kinyarwanda language
- ❑ Digitized over 100 public services
- ❑ Making it easier for over 8 million Rwandans and foreigners to access them.

Advantages:

1. Saved Government from incurring losses due to corruption implicated in the former manually-offered services.
2. Irembo has provided a platform that offers these services in transparency.
3. The platform has cut down on the time spent by public to get these services



Target:

Introduce at least 200 more public services on the online public portal Irembo by the end of this fiscal year (2023/2024).

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PRIORITIES IN PIPELINE – urban dynamic map (UDM)



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PRIORITIES IN PIPELINE



Smart C5 – €2.5M



Smart Water Monitoring - €300K



IoT Network platform - €300k



Digital Transit Mapping - €300K



Mbaza Portal- €500k



- €1M

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SHARE WITH US YOUR EXPERIENCE...

Energy

Water and Sanitation

Housing

Transport



- ☐ Improving the reliability of the national electric grid through proactive fault detection, diagnosis and repair.
- ☐ Reducing water loss (non-revenue water) from 40% to 5% towards universal access to clean water by 2030, through demand-driven pressure management and proactive detection of leakages and pipe bursts in the distribution network.
- ☐ Promoting sustainable urbanization through early detection and warning of informal settlements.
- ☐ Optimization of traffic flow in Kigali city to reduce waiting time by from 30 minutes to 15 minutes through intelligent traffic routing.

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THANK YOU!

Matériel de présentation_Ouganda



 SUSTAINABLE URBANISATION AND HOUSING PROGRAMME
REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT



PRÉSENTATION AU SÉMINAIRE DE PARTAGE DE CONNAISSANCES SUR LES VILLES INTELLIGENTES EN AFRIQUE ET EN ASIE

ABIDJAN, CÔTE D'IVOIRE

PERSPECTIVES DE L'UGANDA


MARTHA MUGARURA


COMMISSAIRE ADJOINTE AU DÉVELOPPEMENT URBAIN

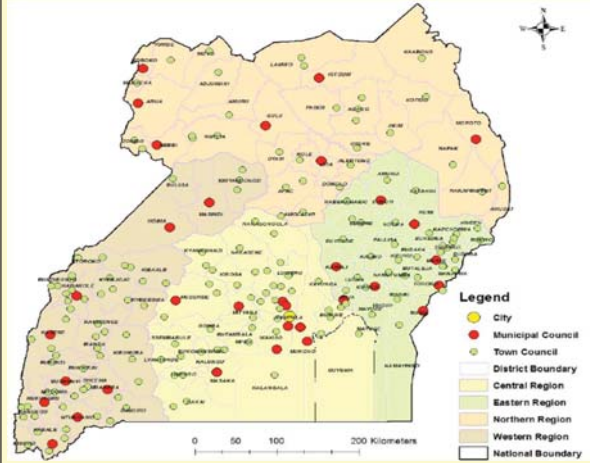
Ministère de l'aménagement du territoire, du logement et du développement urbain

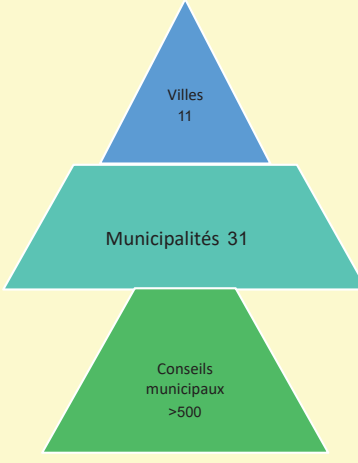
FÉVRIER 2024

PRÉSENTATION DE L'URBANISATION EN OUGANDA


 SUSTAINABLE URBANISATION AND HOUSING PROGRAMME
REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT














PROBLÈMES URBAINS

 SUSTAINABLE URBANISATION AND HOUSING PROGRAMME
REPUBLIC OF UGANDA
MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT





VISION DE LA POLITIQUE NATIONALE URBAINE

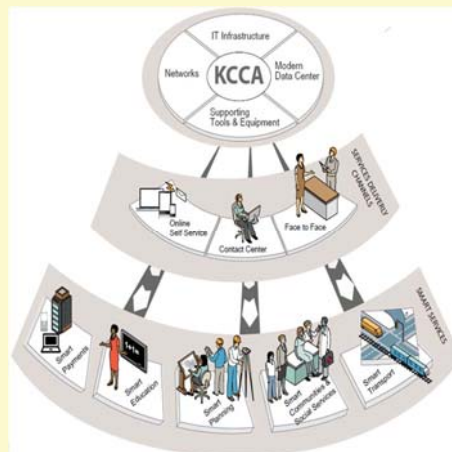
1. Guide pour une gestion efficace du système urbain
2. Améliorer la performance économique
3. Préoccupations environnementales et de durabilité
4. Renforcer la compétitivité urbaine
5. Répondre aux besoins des résidents urbains



ÉTUDES DE CAS

1. Autorité de la ville-capitale de Kampala

- ☐ Automatisation des services urbains ; Système de gestion des revenus (e-Citie)
- ☐ Permis intelligents, licences, planification du développement et construction de bâtiments
- ☐ Centre de contrôle du trafic
- ☐ Nomination des rues
- ☐ Directives de numérotation des maisons de la KCCA (2017)
- ☐ Système d'information foncière (SIF)



ÉTUDES DE CAS

Entité de recherche AirQO de l'Université Makerere

- ☐ Études basées sur des preuves pour éclairer la politique en matière de gestion de la qualité de l'air
- ☐ Capteurs de qualité de l'air à faible coût
- ☐ Solutions numériques pour combler les lacunes dans les données sur la qualité de l'air
- ☐ Décideurs
- ☐ Sensibilisation aux problèmes de qualité de l'air pour de meilleurs résultats en matière de santé

Collaboration et co-création pour la mise en œuvre impliquant le milieu académique, les ministères, les départements et les agences gouvernementaux, les villes/municipalités et les communautés.

Feuille de route numérique



DÉFIS

- ☐ Priorisation
- ☐ Adoption tardive de la technologie
- ☐ Développement insuffisant du capital humain dans l'utilisation des TIC
- ☐ Problèmes de gouvernance (transparence, responsabilité, équité, justice et efficacité)
- ☐ Planification et gestion urbaines
- ☐ Vandalisme des infrastructures
- ☐ La COVID-19 a perturbé les progrès réalisés pour concrétiser les initiatives de « Smart City »
- ☐ Un secteur informel important qui ne comprend pas l'importance des interventions intelligentes
- ☐ Problèmes de gouvernance des données (partage, qualité et sauvegarde)

OPPORTUNITÉS POUR LES “SMART CITIES” EN OUGANDA

- ❖ Transport “smart” (transports publics, systèmes de transport intelligents, modes de transport non motorisés)
- ❖ Énergie “smart” (niveau institutionnel et domestique)
- ❖ Gestion “smart” des déchets (recyclage des déchets, surcyclage, emplois verts, etc.)
- ❖ Éducation “smart” (apprentissage électronique, études en ligne)
- ❖ Sensibilisation à l'environnement

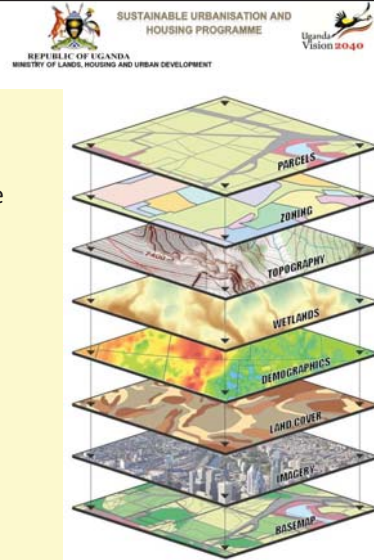


OPPORTUNITÉS

- ❖ Stratégie nationale de développement des villes intelligentes, indicateurs complets des villes intelligentes, sécurité urbaine, accès à l'utilisation d'Internet, utilisation d'énergies plus propres, transports publics et installations de transport non motorisé, surveillance de la qualité de l'air urbain, apprentissage électronique, soins de santé intelligents.
- ❖ Utilisation des TIC dans la planification spatiale et la gestion des villes, profilage des bidonvilles et des établissements informels, soutien aux conseils urbains dans le cadre réglementaire de l'utilisation des terres, évaluation régulière de la conformité à l'utilisation des terres.
- ❖ Expansion du déploiement des services basés sur les systèmes d'information (système d'information foncière, iRAS platform, système d'évaluation).
- ❖ Mise en œuvre de bases de données urbaines liées aux bases de données nationales.
- ❖ Interventions au niveau national pour améliorer la société (augmentation des revenus) et efforts conjoints entre les autorités nationales, les conseils urbains et les habitants des villes.

STRATÉGIES

- ☐ Intégration des systèmes d'information
- ☐ Partenariats collaboratifs et stratégiques
- ☐ Co-crédation d'interventions intelligentes pour la mise en œuvre impliquant le milieu académique, les ministères, les départements et les agences gouvernementaux, les villes/municipalités et les communautés.
- ☐ Feuille de route numérique
- ☐ Amélioration des cadres de gouvernance pour favoriser un environnement propice
- ☐ Investissement dans les infrastructures physiques, planification et mise en œuvre à l'échelle de la ville.



LISTE DE RÉFÉRENCES

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3. House Numbering Guidelines- KCCA (2017) <https://www.kcca.go.ug/media/docs/House%20Numbering%20Guides.pdf>
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6. Connecting systems of secondary cities; Cities Alliance



Asanteni

Matériel de présentation_Zambie

PROBLÈMES URBAINS ACTUELS ET INITIATIVES INTELLIGENTES EN ZAMBIE (VILLE DE LUSAKA)

Pays: Zambie

Date: 28 Février, 2024 – 1^{er} Mars 2024

Présentateur: Mildor Musonda (Planificateur Environnemental, Ministère du Développement local et rural).

Drapeau National:



PRÉSENTATION DU PAYS

- La Zambie, officiellement connue sous le nom de République de Zambie, est un pays enclavé situé en Afrique australe. La Zambie partage des frontières avec la Tanzanie, le Malawi, le Mozambique, le Zimbabwe, le Botswana, la Namibie, l'Angola et la République démocratique du Congo.



PRÉSENTATION DU PAYS

- Le pays est connu pour son paysage diversifié, qui comprend les célèbres chutes Victoria, ainsi que des rivières, des lacs et divers parcs nationaux. L'économie de la Zambie repose principalement sur l'exploitation minière du cuivre et l'agriculture, le pays étant l'un des plus grands producteurs mondiaux de cuivre.
- Le développement urbain en Zambie est réglementé par la loi sur l'aménagement urbain et régional de 2015. La loi sur le gouvernement local et la loi foncière sont des outils complémentaires. La croissance rapide de la population et de l'urbanisation a conduit nos villes à ne pas répondre aux besoins de leurs habitants, impactant ainsi la qualité de vie des citoyens moyens.

PRÉSENTATION DES PROBLÈMES URBAINS

- 1. Urbanisation rapide: la Zambie a connu une croissance urbaine significative en raison de l'afflux rapide de personnes dans les zones urbaines, entraînant une pression sur les infrastructures urbaines, la planification urbaine et la prestation de services.
- 2. Infrastructures inadéquates: de nombreuses zones urbaines en Zambie, y compris la capitale Lusaka, sont confrontées à des défis liés à des infrastructures inadéquates pour l'approvisionnement en eau, l'assainissement, la pénurie de logements et les transports. La demande de logements abordables dans les zones urbaines dépasse largement l'offre disponible, ce qui a conduit à la formation de quartiers informels et spontanés.
- 3. Congestion routière: les centres urbains tels que Lusaka luttent contre la congestion routière, entraînant des temps de déplacement accrus, de la pollution et une productivité réduite. Les infrastructures routières insuffisantes et les systèmes de transport public inadéquats contribuent à ce problème.

PRÉSENTATION DES PROBLÈMES URBAINS

- 4. Gestion des déchets solides: les zones urbaines, comme Lusaka, sont confrontées à de nombreux défis en matière de gestion des déchets solides. En raison de systèmes de collecte et d'élimination inadéquats au sein du gouvernement local, cela entraîne une pollution environnementale et des risques pour la santé, provoquant notamment des épidémies telles que le choléra (principalement à Lusaka).
- 5. Accès limité aux services de base: de nombreux résidents urbains en Zambie n'ont pas accès à des services de base tels que les soins de santé, l'éducation et une électricité fiable. Cela est également dû au fait que la plupart des zones d'habitation ne sont pas planifiées.

PRÉSENTATION DES PROBLÈMES URBAINS

- **Mesures d'atténuation:** le gouvernement zambien, en partenariat avec la JICA, travaille sur un Plan de Développement Régional pour contribuer à la restructuration de Lusaka en faveur d'un développement durable.
- De plus, les efforts visant à résoudre ces problèmes urbains se reflètent dans la Politique Urbaine Nationale de la Zambie, qui vise à orienter le développement urbain. Le Huitième Plan de Développement National (8PND), conjointement avec la formulation du Plan de Développement Intégré (PDI), ont défini des stratégies pour promouvoir un développement urbain durable et améliorer les conditions de vie dans les zones urbaines. Cela a renforcé la focalisation sur un développement urbain durable et la mise en œuvre d'initiatives intelligentes pour faire face aux problèmes urbains.

INITIATIVES DE VILLE INTELLIGENTE OU “SMART CITY”

- En Zambie, plusieurs initiatives intelligentes ont été mises en œuvre et le sont encore dans divers secteurs afin d'améliorer l'efficacité, la durabilité et l'innovation.
- 1. **Agriculture “Smart”**: - utilisation de technologies innovantes telles que l'agriculture de précision, les drones et les images satellites pour la surveillance et la gestion des cultures.
- - mise en œuvre de systèmes d'irrigation intelligents pour optimiser l'utilisation de l'eau et améliorer la productivité agricole.
- - adoption d'applications mobiles pour accéder aux informations sur le marché, aux prévisions météorologiques et aux meilleures pratiques agricoles.
- 2. **Santé “Smart”**: - intégration de la télémédecine et des applications de santé mobiles pour fournir des services de santé dans les zones éloignées.
- - mise en œuvre de dossiers de santé électroniques pour améliorer les soins aux patients et rationaliser la gestion des informations de santé.

INITIATIVES DE VILLE INTELLIGENTE OU “SMART CITY”

- - utilisation de la technologie mobile pour l'éducation à la santé, par exemple l'éducation sur la prévention du choléra, la surveillance des maladies et les campagnes de vaccination, par exemple contre la Covid-19.
- L'introduction de la NHIMA, qui est l'assurance maladie nationale formée par une loi du parlement pour aider à soulager et à fournir des soins de santé de base à chaque Zambien.
- 3. **Éducation “Smart”**: - introduction de plates-formes d'apprentissage en ligne et de ressources éducatives numériques pour améliorer l'accès à une éducation de qualité, comme les initiatives ischool qui promeuvent la mise en œuvre de technologies intelligentes en classe pour améliorer les expériences d'enseignement et d'apprentissage (ex: utilisation d'ordinateurs/tablettes dans les cours). Cela favorise également la littératie numérique et les compétences informatiques parmi les étudiants et les éducateurs.

INITIATIVES DE VILLE INTELLIGENTE OU “SMART CITY”

- 4. – **Technologie “Smart”**: - déploiement d'initiatives de ville intelligente pour améliorer l'infrastructure urbaine, les transports et les services publics.
- - développement de systèmes de paiement numériques pour améliorer l'accès aux services financiers, favorisant l'innovation et l'entrepreneuriat dans le pays.
- 5. **Énergie “Smart”**: - expansion des projets d'énergie renouvelable, y compris la production d'énergie solaire et hydroélectrique, pour augmenter l'accès à une énergie propre et durable.
- - mise en œuvre de technologies de réseau intelligent pour améliorer la distribution et la gestion de l'énergie.
- 6. **Gouvernance “Smart”**: - intégration de plates-formes de gouvernement électronique telles que le « Gouvernement Bus » visant à fournir des services gouvernementaux efficaces et transparents aux citoyens et aux entreprises.
- - utilisation de plates-formes numériques pour l'engagement citoyen, la collecte de feedback et la participation aux processus décisionnels.

EXEMPLE DE PRATIQUES RÉUSSIES DE VILLE INTELLIGENTE MISES EN ŒUVRE

- 1. Zone Économique Multifonctionnelle de Lusaka Sud (LS-MFEZ) et Zone Économique Multifonctionnelle de Chibombo (C-MFEZ) : - ces deux grands projets représentent un développement significatif de projets conçus pour promouvoir la croissance économique et l'industrialisation. Les deux projets intègrent des éléments d'infrastructure intelligente et de planification urbaine pour créer une zone économique durable et moderne.
- 2. Initiatives Smart Zambia : - le gouvernement zambien a réalisé des progrès dans les services gouvernementaux électroniques pour améliorer l'accès aux services publics et rationaliser les processus administratifs, par exemple l'enregistrement en ligne des entreprises, les systèmes de paiement numériques et la prestation électronique de services dans le but d'améliorer l'efficacité et la transparence gouvernementales.

DÉFIS

- La réalisation des initiatives de ville intelligente en Zambie s'est accompagnée de divers défis actuels et anticipés.
- 1. **Infrastructure et Connectivité** : - une infrastructure insuffisante et une connectivité limitée posent un défi dans la mise en œuvre des technologies de ville intelligente, en particulier dans les zones urbaines comme Lusaka.
- - La modernisation de l'infrastructure existante pour prendre en charge des technologies avancées telles que les réseaux intelligents, les systèmes de transport intelligents et les systèmes de capteurs nécessite des investissements substantiels et des ressources.
- 2. **Confidentialité et Sécurité des Données**: - les préoccupations relatives à la confidentialité et à la sécurité des données sont primordiales dans la mise en œuvre des initiatives de ville intelligente. La collecte, le stockage et l'utilisation de vastes données posent un grand défi, d'où des risques d'attaques cybernétiques et d'accès non autorisés.

DÉFIS

- 3. – **Ressources Financières**: - le financement des projets de ville intelligente dans les zones urbaines telles que Lusaka est un défi significatif, car la mise en œuvre de technologies avancées et la modernisation de l'infrastructure demandent souvent des ressources financières substantielles.
- - Obtenir un financement à la fois auprès de sources publiques et privées, tout en explorant des mécanismes de financement innovants, est essentiel pour soutenir les initiatives de ville intelligente à long terme.
- 4. – **Collaboration des Parties Prenantes**: - la plupart des parties prenantes en Zambie, y compris les entités gouvernementales, les organisations du secteur privé, les fournisseurs de technologies et les citoyens, ont des ordres du jour, des priorités et des intérêts différents. Ainsi, cela pose de nombreux défis pour la collaboration de multiples parties prenantes sur les projets de ville intelligente.
- 5. **Cadre Réglementaire et Politique**: - l'environnement réglementaire n'a pas encore pleinement évolué pour accueillir le déploiement de nouvelles technologies et aborder les considérations légales et éthiques.

DÉFIS

- 6. – **Durabilité Environnementale:** - équilibrer l'avancement technologique avec la durabilité environnementale est un grand défi dans les projets d'initiatives de ville intelligente. Trouver un équilibre entre l'efficacité des ressources, la conservation de l'énergie et l'atténuation de l'impact environnemental est crucial pour la durabilité à long terme des initiatives de ville intelligente.
- - La mise en œuvre d'une infrastructure respectueuse de l'environnement et résiliente, ainsi que la promotion d'une planification urbaine et d'une conception durables, sont essentielles pour atténuer les défis environnementaux liés à l'urbanisation rapide et à l'avancement technologique.
- 7. **Engagement Citoyen et Confiance:** - Construire la confiance parmi les citoyens et garantir leur participation active aux initiatives de ville intelligente est un défi, mais c'est fondamental pour leur réussite. Par conséquent, une communication efficace, l'éducation et un mécanisme de rétroaction sont cruciaux pour promouvoir l'engagement citoyen et créer un sentiment d'appropriation.

REMARQUES DE CLÔTURE

- Ces initiatives intelligentes mises en œuvre en Zambie reflètent jusqu'à présent que le pays a clairement pour objectif de s'engager dans l'adoption de technologies modernes et de solutions innovantes pour relever divers défis et promouvoir un développement durable. En tirant parti de ces initiatives intelligentes, la Zambie vise à améliorer la productivité, à renforcer la prestation de services et à créer des opportunités de croissance économique et de développement social.
- Par conséquent, la Zambie reste ouverte à l'amélioration et à l'apprentissage auprès d'autres pays qui ont progressé dans le développement de systèmes d'initiatives de villes intelligentes.
- Je vous encourage donc à partager vos commentaires et suggestions complets sur tout ce qui a été présenté ici. Cela nous aidera à comprendre ce qui doit être amélioré ou adopté par mon gouvernement et son peuple.

RÉFÉRENCES

- 1. Zambia Institute of Planners – Lusaka
- 2. Urban and Regional Planning Act of 2015.
- 3. Zambia Statistics Agency (Lusaka)- Quality Statistics for Development.
- 4. Eighth National Development Plan (8NDP) – 2022-2026.
- 5. Smart Zambia Institute Lusaka.

Matériel de présentation_Nigéria

**LA RÉPUBLIQUE FÉDÉRALE DU NIGERIA**





**SÉMINAIRE DE PARTAGE DE CONNAISSANCES SUR LES INITIATIVES
DE VILLES INTELLIGENTES EN ASIE ET EN AFRIQUE
(LE NIGERIA COMME ÉTUDE DE CAS)**

FÉVRIER 2024

**PRÉSENTÉ PAR
MODIBBO MOHAMMED NASIR**

DÉPARTEMENT D'URBANISME ET D'AMÉNAGEMENT DU TERRITOIRE
AUTORITÉ DE DÉVELOPPEMENT DE LA CAPITALE FÉDÉRALE, ABUJA

PRÉSENTATION DU PAYS

- ▶ Le Nigeria est le pays le plus peuplé d'Afrique. Il compte plus de 200 millions d'habitants..
- ▶ Le pays occupe une superficie de 923 769 km².
- ▶ Le Nigeria est devenu indépendant en 1960 et a connu une guerre civile de 1967 à 1970.
- ▶ Le pays est un État multiethnique habité par plus de 250 groupes ethniques parlant plus de 500 langues distinctes, avec différentes affiliations religieuses.
- ▶ Le pays est divisé en six (6) zones géopolitiques avec un total de trente-six (36) États, y compris le Territoire de la capitale fédérale (Nord-Ouest, Centre-Nord, Nord-Est, Sud-Ouest, Sud-Est et Sud-Sud).
- ▶ Le Nigeria compte sept cent soixante-quatorze (774) zones de gouvernement local.
- ▶ La Constitution de 1999 du Nigeria telle que modifiée et la Loi sur l'urbanisme et l'aménagement régional de 1992 précisent que chaque siège de gouvernement local et chaque établissement ayant une population de 10 000 habitants et plus est considéré comme une zone urbaine.
- ▶ Une proportion importante de sa population vit dans des villes et des zones urbaines. Ce phénomène a engendré de nombreux défis.

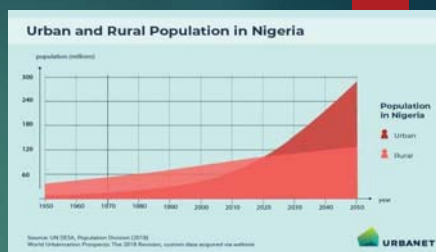
PRÉSENTATION DES PROBLÈMES URBAINS

a. Croissance rapide de la population
(explosion démographique)

- Augmentation de la demande en infrastructures
- Ressources limitées et sous pression
- Dégradation de l'environnement
- Prestation inadéquate de services



Congestion du trafic à Lagos



Inondations dans la métropole urbaine de Kaduna

- b. Pauvreté
- c. Émergence de bidonvilles et de colonies de squatters
- d. Mauvaise gestion urbaine et politiques de contrôle inefficaces
- e. Augmentation de la demande en logements
- f. Gestion inefficace des déchets solides et liquides
- g. Forte demande de services publics (écoles, hôpitaux, télécommunications, eau potable).
- h. Pollution environnementale
- i. Système de transport inefficace



Colonie de squatters, Abuja



Bidonville urbain à Minna



Élimination indiscriminée des déchets à Lokoja

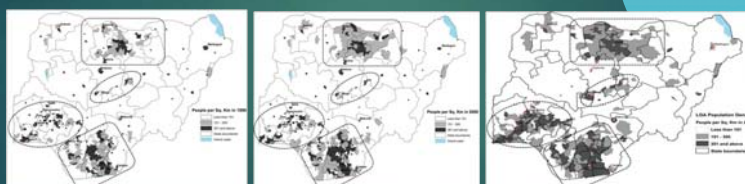


Émissions de gaz à effet de serre à Port-Harcourt

"La croissance rapide des zones urbaines du Nord-Est et du Centre-Nord du Nigeria entraîne la désertification, la déforestation, les inondations et l'érosion, la pollution, la congestion du logement conduisant à des bidonvilles et des situations insalubres, la perte de biodiversité et toutes formes de conditions physiques et d'insécurité déplorables." - Rapport de la Banque mondiale (Recherche sur l'urbanisation au Nigeria, 2015)

IMPACTS

- Selon Jiboye (2003), le pôle industriel et technologique des villes nigériennes de Lagos, Kano, Kaduna et Port Harcourt génère une perte de biodiversité et un réchauffement climatique d'origine anthropique, une salinisation des terres agricoles, une pollution de l'air et de l'eau, une dégradation environnementale, une insalubrité, une surpopulation, une congestion du logement, la criminalité et la violence, ainsi que plusieurs autres situations dégradantes qui affectent globalement la durabilité environnementale.



Source: URN (2015). Figures A, B et C: Nombre de personnes par kilomètre carré en 1990, 2000 et 2006.

EFFORTS D'ATTÉNUATION DES PROBLÈMES URBAINS

1. Programmes ambitieux de développement urbain tels que les programmes de renouvellement urbain et la politique nationale du logement, et maintenant l'adoption possible des initiatives « Smart City » visant à améliorer la gestion et le développement urbains.
2. Mise en œuvre d'initiatives clés en urbanisme et de politiques pour orienter le développement urbain et améliorer la qualité de vie.
 - a. **Politique nationale de développement urbain:** elle favorise le développement urbain durable, optimise l'utilisation des terres et améliore les qualités physiques, économiques, sociales et environnementales des zones urbaines.
 - b. **Code national du bâtiment:** il établit des normes et des réglementations pour les constructions, garantissant la sécurité, l'accessibilité et la fonctionnalité des bâtiments et des infrastructures urbaines.
 - c. **Initiatives d'amélioration des bidonvilles:** ces initiatives visent à améliorer les conditions de vie et à fournir des commodités de base aux habitants des bidonvilles.
 - d. **Politiques de transport urbain:** à travers la mise en œuvre de politiques et de projets tels que le système de transport en commun par rail à Lagos, le système de transport en bus rapide (BRT) et le métro léger à Abuja, Lagos et Port-Harcourt.

LES INITIATIVES « SMART CITY »

L'initiative « Nigeria Smart City Initiative » (NSCI) a été lancée à Abuja, au Nigeria, le 8 août 2017. Le sommet avait pour objectif d'initier des stratégies concrètes pour transformer les principaux centres urbains du Nigeria, passant de villes traditionnelles dysfonctionnelles à des villes modernes, efficaces et réactives, capables de satisfaire les besoins des générations présentes et futures de Nigériens. La NSCI s'appuiera fortement sur l'application des TIC et d'autres technologies intelligentes dans les opérations et la gestion de ces villes.

Les objectifs de cette initiative incluent :

- a. Fournir une croissance économique améliorée et inclusive en créant un environnement commercial propice, des écosystèmes de démarrage, attirant des personnes et des investissements.
- b. Améliorer la qualité de vie de leurs résidents grâce à une planification adéquate et à la mise en place d'infrastructures de base et des TIC.
- c. Assurer un environnement propre et durable et l'application de "solutions intelligentes" qui accroissent l'utilisation efficace des ressources et limitent l'impact négatif sur l'environnement.
- d. Réaliser un développement durable et résilient.
- e. Créer un mécanisme de gestion durable pour la préparation, le financement, la mise en œuvre et la gestion des villes intelligentes dans l'État.

ORGANISATIONS DE SUPERVISION

Les moteurs de cette initiative au Nigeria sont les ministères du gouvernement fédéral, supervisés par l'Agence nationale de développement des technologies de l'information (NITDA), en partenariat avec des ONG et des organisations communautaires.

TECHNOLOGIES / STRATÉGIES DE MISE EN ŒUVRE

1. Introduction du système de gouvernance électronique dans les services publics nigériens
2. Établissement de la Feuille de route des TIC du Nigeria 2017-2020
3. Création du Conseil national pour l'incubation technologique (NBTI) et des centres technologiques
4. Création du Conseil nigérian de la littérature numérique
5. Création de l'Agence nationale de développement des technologies de l'information (NITDA)
6. Création du système de soutien académique et institutionnel, tel que l'Institut Régional Africain des sciences et technologies de l'information géospatial (AFRIGIST), l'Agence nationale de recherche et de développement spatial (NASRDA), l'École fédérale d'arpentage (FSS), ainsi que des centaines d'écoles polytechniques et d'universités proposant des cours visant à développer les compétences et répondre aux besoins en main-d'œuvre pour la concrétisation de l'Initiative des Villes Intelligentes au Nigeria.

ÉTUDES DE CAS SUR LA PRATIQUE DE L'INITIATIVE « SMART CITY » AU NIGERIA

Au Nigeria, avant le lancement de l'Initiative « Nigeria Smart City Initiative », Abuja et Lagos avaient déjà mis en pratique le concept. Cela était dû à leur détermination et à leur volonté de rivaliser sur la scène urbaine mondiale. En raison des initiatives déjà établies dans l'application des TIC et des technologies intelligentes dans l'administration, le développement et la gestion des villes de Lagos et d'Abuja, la NSCI les a adoptées comme modèles pour promouvoir l'initiative auprès des autres États du pays.

Actuellement, les États du Nigeria qui mettent en œuvre des initiatives de ville intelligente comprennent :

- L'Initiative « Smart City » de l'État de Lagos
- L'Initiative « Smart City » de la Capitale Fédérale, Abuja
- L'Initiative « Smart City » de l'État de Niger

L'INITIATIVE « SMART CITY » DE L'ÉTAT DE LAGOS

L'État de Lagos s'est engagé dans la voie du numérique (TIC) avant le lancement de l'initiative en 2017 au Nigeria.

"Dans une quête d'utilisation de la technologie pour améliorer les infrastructures de l'État, les systèmes de transport et de gestion des déchets, le développement de villes intelligentes est une solution prometteuse aux nombreux défis liés à l'urbanisation auxquels l'État est confronté (Sanwo-Olu, 2021)".

Dans cet optique, le gouvernement de l'État de Lagos a entrepris l'installation de :

- Infrastructures Wi-Fi gratuites à travers la ville,
- Services d'urgence gratuits, et
- Ambulances stationnées pour répondre aux crises.

D'autres projets en cours comprennent la construction de :

- a. Le port en eau profonde de Lekki
- b. La ville d'Eko Atlantic
- c. La raffinerie Dangote
- d. La gestion des déchets municipaux et des espaces verts urbains
- e. Le schéma de prêt hypothécaire pour la propriété domiciliaire de l'État de Lagos (Lagos HOMS)
- f. Le système de transport rapide par bus de l'État de Lagos (BRT)
- g. La Zone de libre-échange de Lekki (LFTZ)



Source : Groupe de la Banque africaine de développement (2023)

Illustration de la ville d'Eko Atlantic



La raffinerie Dangote, Lagos



Le port en eau profonde de Lekki



Le schéma de prêt hypothécaire pour la propriété domiciliaire de l'État de Lagos (Lagos HOMS)



La Zone de libre-échange de Lekki (LFTZ)



La gestion des déchets

L'INITIATIVE « SMART CITY » D'ABUJA

L'initiative d'Abuja pour devenir une ville intelligente a été lancée en août 2017.

En considération du potentiel d'Abuja à devenir une ville intelligente, les organisateurs du sommet en ont fait un modèle pour les autres États de la fédération.

Cette décision a été influencée par le fait que le gouvernement du Rwanda avait organisé une conférence internationale sur les villes intelligentes trois mois avant le sommet d'Abuja (mai 2017).

Ces rassemblements internationaux, réunissant divers intervenants du secteur de la construction, des technologies de l'information et de la communication, des gestionnaires de ville et des décideurs politiques, visent non seulement à promouvoir l'idée de ville intelligente en Afrique subsaharienne, mais aussi à encourager les gouvernements des villes et les organismes pertinents à s'engager dans la création de villes plus intelligentes, comme c'est le cas pour le Territoire de la capitale fédérale.

Cela comprend :

- Système d'information géographique d'Abuja
- Julius Berger Nigeria LTD
- Les compagnies aériennes internationales
- Les compagnies de télécommunication internationales
- Les compagnies agricoles internationales
- Les compagnies pétrolières internationales
- Les compagnies de construction internationales
- Les centres commerciaux internationaux



Abuja World Trade Centre (AWTC)
• A mega project worth billions of Dollars, and driven primarily by global economic flows into the city
• Began in 2011 and still on going
• Over 20 floors, the tallest building in the city



Chickason Project: Abuja City Centre Project (ACC)
• Mega project Worth Billions of Dollars (\$ 2.75 Billions)
• Driven primarily by multinational and indigenous actors



Autres potentiels pour l'initiative « Smart City » à Abuja :

- Le développement du Village de Technologie d'Abuja
- La mise en œuvre du projet du Village Automobile d'Abuja
- La “Jabi Lake Waterfront City”
- “Skyscraper City” et Développement Mixte

DÉFIS DES VILLES INTELLIGENTES AU NIGÉRIA

- a) Manque de volonté politique
- b) Pauvreté
- c) Manque de sensibilisation publique / Partenariat public
- d) Défis de l'urbanisme
- e) Infrastructure insuffisante
- f) Faible pénétration du haut débit
- g) Fracture numérique et analphabétisme
- h) Défis institutionnels / Problèmes

STRATÉGIES POUR SURMONTER LES DÉFIS

- a) Identifier et éliminer les obstacles qui affectent les entreprises.
- b) Élaborer et mettre en œuvre des plans de développement physique appropriés.
- c) Améliorer les services urbains existants grâce à l'utilisation des TIC.
- d) Établir de nouveaux services urbains intelligents tels que l'éclairage intelligent des rues, les transports intelligents, afin d'améliorer la qualité de vie des résidents.
- e) Mettre en place des systèmes IoT de manière intégrée.
- f) Assurer une bonne gouvernance urbaine ainsi que la mise en place d'infrastructures et de services de base pour tous.
- g) Établir un système numérique de gouvernance et d'administration grâce aux paiements électroniques, à la passation de marchés électronique, etc.
- h) Accélérer la numérisation des processus gouvernementaux.
- i) Mener des évaluations des besoins en formation et renforcement des capacités pour la création de villes intelligentes.
- j) Établir et développer des partenariats/collaborations pour soutenir une mise en œuvre adéquate et opportune.

CONCLUSION

Il est essentiel de souligner que lors de la planification d'une ville intelligente, il est nécessaire de prendre en considération la culture ainsi que les préférences économiques et sociales des habitants afin d'atteindre les résultats souhaités. Par conséquent, les gouvernements sont tenus de se pencher sur des approches internes pour formuler, préparer et mettre en œuvre des plans durables, générant ainsi des impacts positifs dans tous les domaines.

Merci

Matériel de présentation_Cote d'Ivoire



REPUBLIQUE DE CÔTE D'IVOIRE
Union-discipline-travail



MCLU
MINISTÈRE DE LA CONSTRUCTION,
DU LOGEMENT ET DE L'URBANISME

LES INITIATIVES URBAINES POUR UNE VILLE INTELLIGENTE ET DURABLE



M.YOMAFU HUBERT
Directeur de l'Urbanisme et du Développement Urbain

FEVRIER 2024



PLAN DE PRESENTATION

- 1- VUE D'ENSEMBLE DU PAYS
- 2- VUE D'ENSEMBLE DES QUESTIONS D'URBANISME
- 3- INITIATIVES DE VILLES INTELLIGENTES
- 4- ETUDE DE CAS PRATIQUES: SIGFU
- 5- DEFIS
- 6- MOT DE FIN

SIGFU

MCLU
MINISTÈRE DE LA CONSTRUCTION,
DU LOGEMENT ET DE L'URBANISME

I. VUE D'ENSEMBLE DU PAYS

1. Présentation des caractéristiques de votre pays et de votre ville

Situation géographique:

- Etat africain, à l'Ouest du Golf de Guinée
- Superficie de **322 462 km²**,
- Climat chaud et humide
- Végétation de savane (au Nord) et de forêt de type équatorial (au Sud)
- Nombreux cours d'eau (lagune, fleuves et rivières)

Situation démographique

- Population: **29 389 150 habitants** en 2021
- Rythme de croissance démographique : **2,9% /an**
- Taux d'urbanisation : **plus de 50 %** dont Abidjan en est le reflet
- Abidjan concentre : **21,5%** de la population totale
- Langue officielle: **Français**

Situation économique

- Croissance économique annuelle : **plus de 7%**
- Agriculture (**30 %**), Industrie (**20 %**) et les Services (**50 %**)
- PIB de l'UEMOA (**32%**)
- Deuxième plus grand port d'Afrique (PAA) après Durban
- La monnaie est le **franc CFA (XOF)**

Organisation administrative et politique

- Entités déconcentrées: Districts, Département, S/P, Villages
- Collectivités décentralisées: Régions (31) et Communes (201)
- Districts Autonomes: **Abidjan** (la capitale économique) et **Yamoussoukro** (capitale politique)



II. VUE D'ENSEMBLE DES QUESTIONS D'URBANISME

1. Problématique (Atouts de l'urbanisation)

- Urbanisation récente, mais accélérée (15% en 1960 à 42,5% en 1998, puis à 52,2% en 2021)
- Le processus d'urbanisation est encadré par des dispositifs législatifs et réglementaires (Codes, Décrets, Règlements, etc.)
- Le nombre de villes est passé de 10 à 512 dont celles de plus de 100 000 habitants est passé de 8 en 1998 à 17 en 2021.
- Les types de documents de planification urbaine sont :
 - Documents d'urbanisme prévisionnel (SDU, PUD, SS, PUD),
 - Documents d'urbanisme opérationnel (Lotissement, Restructuration, Rénovation, Remembrement),
 - Documents d'urbanisme réglementaire (CU, PC, CC, RGU, RPU)
- Plusieurs villes (Chefs-lieux de Régions) sont dotés de PUD tandis que d'autres sont en cours

II. VUE D'ENSEMBLE DES QUESTIONS D'URBANISME

1. Problématique (causes et manifestations des crises urbaines)

Malgré les dispositifs mis en place, des crises urbaines subsistent toujours et se manifestent entre autres par :

- l'étalement urbain (lotissements et occupations anarchiques des espaces) ;
- la prolifération des quartiers précaires ou bidonvilles ;
- la dégradation et l'insuffisance d'équipements et d'infrastructures socio-collectifs de base (éducation, santé, électricité, sécurité, voirie, assainissement, drainage, etc.) ;
- Dégradation de l'environnement urbain (pollution, nuisance) ;
- Congestion de la circulation (embouteillage, accidents).

Ces crises sont pour la plupart liées :

- à la forte croissance démographique
- aux besoins sans cesse croissants des populations en matière d'équipements et d'infrastructures socio-économiques de base
- l'insécurité et conflits fonciers
- l'absence (78% des villes), la caducité (12% des villes) ou le faible niveau de réalisation (10% des villes) des documents d'urbanisme

III. INITIATIVES DE VILLES INTELLIGENTES

Face aux mutations technologiques et aux nouveaux paradigmes de développement durable, l'Etat a engagé un certain nombre de réformes qui prennent en compte les critères de durabilité. On peut citer entre autres :

1. Lois et règlements adoptés

En matière d'urbanisme

- Loi n°2020-624 du 14 août 2020 instituant Code de l'Urbanisme et du Domaine Foncier Urbain. Avec ce texte, la Côte d'Ivoire s'est dotée d'une loi unique qui a pour objet d'organiser et de réglementer les matières relevant de l'urbanisme et du domaine foncier urbain.
- Décret n°2019-220 du 13 mars 2019 instituant un système de référence terrestre, un système de référence altimétrique et un système de représentation plane vise à unifier et harmoniser les références géodésiques diverses utilisées en Côte d'Ivoire.
- Décret n°2019-221 du 13 mars 2019 relatif à l'identifiant unique du foncier en Côte d'Ivoire institue un numéro d'identification unique, attribué à toute parcelle foncière située en Côte d'Ivoire quelle que soit sa nature juridique.
- La Politique Nationale de ville en Côte d'Ivoire adoptée en Conseil des Ministres en février 2020

III. INITIATIVES DE VILLES INTELLIGENTES

1. Lois et règlements adoptés

En matière de logement

- Ordonnance n°2021-858 du 15 décembre 2021 instituant des taxes parafiscales sur certains matériaux de construction au profit du financement du logement social, ainsi que son projet de loi de ratification.
- Loi n°2019-576 du 26 juin 2019 instituant Code de la Construction et de l'Habitat
- Décret n°2021-864 du 15 décembre 2021 portant transformation de la SICOI en une Société d'Etat dénommée Agence Nationale de l'Habitat (ANAH).

En matière de mobilité urbaine

- Loi n° 2014-812 du 16 décembre 2014 d'orientation du transport intérieur, création de l'Autorité de la Mobilité Urbaine dans le Grand Abidjan (AMUGA), réorganisation spatiale des réseaux de transport urbain pour assurer une complémentarité multimodale, restructuration du transport informel aussi bien au niveau des acteurs qu'au niveau des moyens de transport)

En matière de prévention des risques

- Ratification en février 1993, de la Convention relatives aux zones humides d'importance internationale: Site RAMSAR de Grand-Bassam pour l'utilisation rationnelle de la zone humide
- Décret n° 2021 -583 du 06 octobre 2021 fixant les modalités de gestion et d'usage des Zones Ecologiques Sensibles

III. INITIATIVES DE VILLES INTELLIGENTES

2. Projets structurants mis en œuvre

En matière d'urbanisme et habitat

- Projet d'opérationnalisation du Schéma Directeur d'Urbanisme du Grand Abidjan (SDUGA 2040). Il a pour objet de réviser partiellement le Schéma Directeur d'Urbanisme pour l'horizon 2040 (ajuster le SDUGA 2030, intégrer et mettre en cohérence l'ensemble des politiques sectorielles, notamment en matière d'habitat, de mobilité, d'aménagement commercial, eau potable, d'environnement et d'assainissement), de mettre en place des mécanismes pour rendre efficace la mise en œuvre de ce document de planification territoriale et de renforcer les capacités des Ministères et organismes concernés
- Projet d'élaboration des Plans d'Urbanisme de détails (PUD) des 10 Unités Urbaines du SDUGA
- Projet d'élaboration des Plans d'Urbanisme Directeur (PUD) et de détails (PUD) des Chefs-lieux de Région
- Projet d'élaboration des Plans d'Urbanisme Directeur (PUD) de 80 localités (Chefs-lieux de Départements et de Sous-Préfectures)
- Projet de réalisation de 16 000 logements sociaux et économiques

III. INITIATIVES DE VILLES INTELLIGENTES

2. Projets structurants mis en œuvre

En matière de gestion foncière et urbaine

- Projet de mise en place d'un Système Intégré de Gestion du Foncier Urbain (SIGFU);
- Projet d'Adressage du District d'Abidjan (PADA);
- Projet d'élaboration du répertoire des toponymes et odonymes des voies et lieux du District d'Abidjan.

En matière d'Infrastructures routière et de mobilité urbaine

- Projet de construction de la voie de contournement d'Abidjan (la voie Y4)
- Projet de Construction de 3 Echangeurs à Abidjan (Carrefours Ecole de Police, Riviera 3, Riviera Palmeraie)
- Projet de Construction d'un Échangeur au Carrefour Akwaba.
- Projet de Conception de la plateforme informatique de gestion des flux de camion au port d'Abidjan
- Projet de Mobilité Urbaine d'Abidjan (PMA)
- Projet des Transports Urbains d'Abidjan (PTUA)

IV. ETUDE DE CAS PRATIQUES: SIGFU

OBJECTIFS DU PROJET

Mise en place d'un Système Intégré de Gestion du Foncier Urbain (SIGFU)



Accélérer le processus de délivrance des actes administratifs



Sécuriser le foncier urbain en Côte d'Ivoire



Améliorer l'environnement des affaires en Côte d'Ivoire

SIGFU

MCLU
MINISTÈRE DE LA CONSTRUCTION,
DU LOGEMENT ET DE L'URBANISME

IV. ETUDE DE CAS PRATIQUES

1. Le SIGFU

I) Objectifs et missions

Les principaux objectifs visés sont:

- maîtriser et de contrôler la gestion qui est faite des données foncières et urbaines
- sécurisation les transactions foncières vis à vis des tiers usagers des services du MCLU en les rendant immuables, transparentes et infalsifiables
- offrir un service permanent de suivi des constructions afin de détecter les sites en construction, d'identifier les sites non autorisés et de faciliter le travail des équipes de terrain, dans ses missions de contrôle, de sanction et de reporting.

Les principales missions sont:

- Mettre en place un dispositif de traitement numérique des demandes d'actes en matière foncière à toutes les étapes de la procédure
- Organiser les services et automatiser le traitement des dossiers
- Simplifier les procédures et donner à l'utilisateur une visibilité sur le suivi des démarches engagées
- Relier via une plateforme digitale, l'ensemble des acteurs de la chaîne foncière
- Réduire les délais de traitement des dossiers
- Mutualiser les points de règlement des frais
- Encourager les modes de paiement dématérialisés

IV. ETUDE DE CAS PRATIQUES

1. Le SIGFU

II) Les actions envisagées

- Mettre en place le socle : portail web de partage de l'information et de services: le catalogue de données
- Mettre en place les outils de diffusion et de partage : outil de téléchargement des données
- Mettre en place les flux de données (API)
- Mettre en place l'outil de valorisation des données : module d'analyse pour aide à la décision (dataviz): visualisation des données sur une carte (2D et 3D)

IV. ETUDE DE CAS PRATIQUES

2. Le Géoportail de l'urbanisme : WebSIG

Dans le cadre de projet d'opérationnalisation du Schéma Directeur d'Urbanisme d Grand Abidjan à l'Horizon 2040 (SDUGA 2040) visant à mettre en place des mécanismes pour renforcer l'efficacité de la mise en œuvre de ce document de planification territoriale et les capacités des Ministères et organismes concernés, un projet pilote a été retenu pour le Résultat 2 dudit projet.

Dans cette perspective, le Projet Pilote vise à :

1. [Aspect Technique] Création d'un Géoportail (WebSIG) de consultation des documents d'urbanisme approuvés et de leurs règlements ;
2. [Renforcement Institutionnel] Préparer la DGUF/MCLU au déploiement futur du Géoportail à tous les plans urbains de Côte d'Ivoire et au libre accès à tous les citoyens,

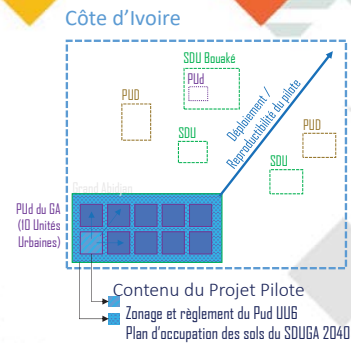
Le déploiement éventuel de l'expérience du pilote, en accès ouvert, permettra d'engager la **transformation digitale du secteur public dans le domaine de l'urbanisme** (accessibilité au public, efficacité et gestion interne des services grâce à l'automatisation des tâches, menant à des économies des dépenses publiques)

IV. ETUDE DE CAS PRATIQUES

2. 1- Présentation du projet WebSIG

Le projet pilote consiste en la création d'un **Géoportail en ligne** sur lequel peuvent être consultées:

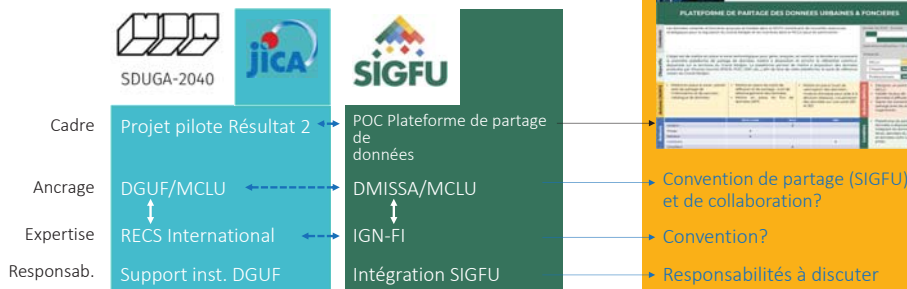
- Le statut des différents documents d'urbanisme en cours
- Les informations sur le SDUGA 2040 et son Plan Cadre d'Occupation des Sols
- Les informations sur le PUD de l'UU6, son plan de zonage et la réglementation associée



IV. ETUDE DE CAS PRATIQUES

2. 2- Projet WebSIG: Pilotage en duo: synergie SDUGA 2040/SIGFU

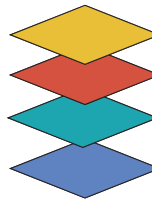
Le Projet Pilote appuie son pilotage sur la synergie rendue possible entre le Projet SDUGA-2040 (JICA, DGUF/MCLU, RECS International) et le Projet SIGFU (DMISSA/MCLU, IGN-FI).



IV. ETUDE DE CAS PRATIQUES

2. 2- Projet WebSIG: 4 niveaux d'information

4 couches d'information
(selon le niveau de zoom):



A. Suivi du statut d'élaboration des plans

Echelle: Grand Abidjan pour le projet pilote

B. SDUGA / PUD / SDU

Echelle: Grand Abidjan pour le projet pilote

C. Zonage du plan d'urbanisme de détail

Echelle: Unité Urbaine 6 pour le projet pilote

D. Règlement d'urbanisme & autres

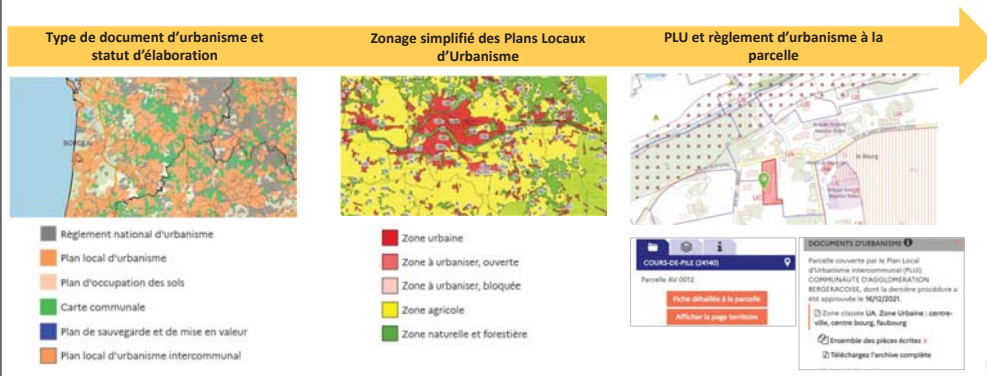
Echelle: Ilot urbain

16

02 Exemples de rendus similaires

Géoportail de l'urbanisme en France

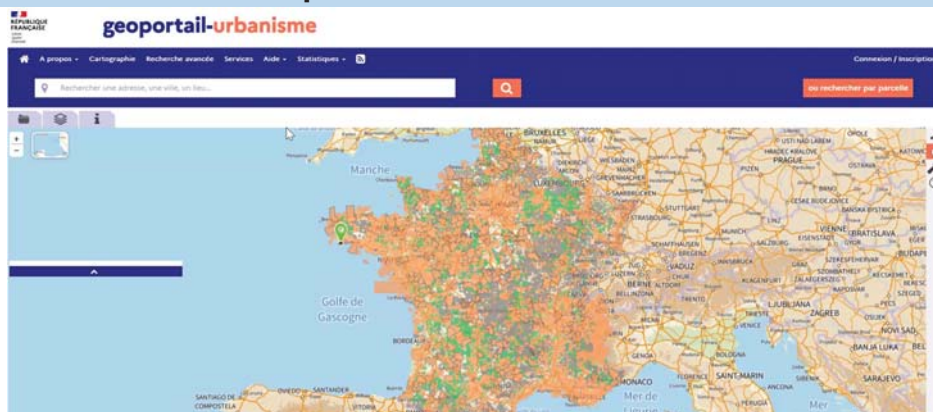
<https://www.geoportail-urbanisme.gouv.fr/map/>



17

02 Exemples de rendus similaires

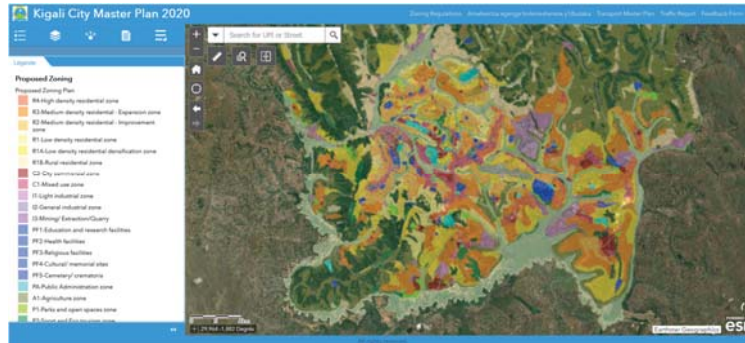
Géoportail de l'urbanisme en France



18

02 Exemples de rendus similaires

Géoportail de Kigali - Rwanda



- Observation du plan de zonage et des règles de construction.
- Superposition avec le plan parcellaire avec référence du n° de lot
- Rattachement à un outil de délivrance et de suivi de l'instruction des permis de construire

19

02 Exemples de rendus similaires

Port au Prince – Haïti



- Géoportail simple qui permet de visualiser des données urbaines
- Parmi les informations accessibles : plan de zonage avec règlement
- Il s'agit seulement d'un outil de consultation, et non pas de gestion

20

V. DEFIS

- La maîtrise et le contrôle des occupation des sols (l'étalement urbain et occupation anarchiques des espaces)
- La sécurité foncière (l'accès à la propriété foncière)
- La lutte contre la précarité urbaine (prolifération des bidonvilles ou quartiers précaires, insuffisances des services urbains de base)
- La mise à niveau des équipements et infrastructures urbaines (réseaux intelligents et innovants)
- La mobilité urbaine (Insuffisance ou inadaptation des mécanismes ou moyens de transports, congestion de la circulation, système de transports intelligents)
- La préservation de l'environnement urbain et du cadre de vie (pollution, gestion des déchets, risques d'inondation, de glissement et de catastrophes naturels, etc)

SIGFU

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MINISTÈRE DE LA CONSTRUCTION,
DU LOGEMENT ET DU URBANISME

VI. MOT DE FIN / CONCLUSION

La Côte d'Ivoire est l'un des pays les plus urbanisés du continent africain.

Mais le bilan de cette urbanisation reste mitigée eu égard aux enjeux et défis actuels que connaît le pays.

Toutefois, le Nouvel Agenda Urbain 2030 des Nations-Unies pour le Développement Durable ainsi que bien d'autres programmes et accords de développement mondial, constituent des opportunités aux Gouvernants pour promouvoir le développement harmonieux et durable de leurs villes et territoires.

C'est pourquoi, nous sommes convaincus que les réformes et projets structurants engagés par l'Etat ivoirien, serviront de levier de transformation structurelle du pays autour des villes intelligentes et durables.

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MERCI

SIGFU

Matériel de présentation_Senegal



REPUBLIQUE DU SENEGAL
Un Peuple – Un But – Une Foi





MINISTERE DE L'URBANISME
DU LOGEMENT ET DE L'HYGIENE PUBLIQUE

DIRECTION GENERALE DE L'URBANISME ET DE
L'ARCHITECTURE

séminaire de partage des connaissances sur les initiatives en matière de
villes intelligentes en Asie et en Afrique
du 28 février au 1^{er} mars 2024 (Abidjan en Côte d'Ivoire)

Présenté par: Youssoupha MANE,
Directeur de la Planification Urbaine et de la
Réglementation/Direction Générale de
l'Urbanisme et de l'Architecture

Du 28 février au 1^{er} mars 2024

1

Plan de la Présentation

I/APERCU DU PAYS
II/APERCU DES PROBLEMES URBAINS
III/L'IMPACT DU PROBLEME
IV/SOLUTIONS APPORTEES
V/ETUDES/PRATIQUES/DE VILLES INTELLIGENTES REUSSIES: CAS
PRATIQUES DE MISE EN ŒUVRE DANS LE PAYS
VI/PÔLE URBAIN DE DAGA KHOLPA: DE LA PLANIFICATION URBAINE A
SON EXECUTION/CADRE DE BASE DE LA STRUCTURE URBAINE
VII/REALISATION DE PROJETS PRIORITAIRES RETENUS DANS LE PDU DE
DAKAR ET SES ENVIRONS HORIZON 2035
VIII/DEFIS ACTUELS RENCONTRES ET CONTRAINTES
CONCLUSION

2

I/Aperçu du Pays


Le Sénégal, un des Etats de l'Afrique de l'ouest est situé dans la partie la plus occidentale du continent africain entre 12°20' et 16°40' de latitude nord et 11°20' et 17°30' de longitude ouest.

S'étendant sur 196722 km2, il est limité à l'Ouest par l'océan Atlantique, au Nord par la Mauritanie, à l'Est par le Mali et au Sud par la Guinée Conakry et la Guinée-Bissau.

En 2023, sa population est estimée à 18 032 473 habitants soit un taux d'accroissement annuel de 2,9%. Les hommes enregistrent un taux de 50,6% et les femmes 49,4%.

Sur le plan administratif, le Senegal compte:

- 14 régions (Dakar, Diourbel, Fatick, Kaolack, Kolda, Louga, Matam, Saint-Louis, Tambacounda, Thiès, Ziguinchor, Kaffrine, Kédougou, Sédhiou);
- 46 départements et 557 communes.



Dans le cadre de la planification urbaine, le taux de couverture en document de d'urbanisme pour les villes ou communes est de 18% en 2023. Dans un contexte de développement urbain durable, des villes intelligentes sont en train d'être pris en compte par le secteur de l'urbanisme, des initiatives ou de nouveaux paradigmes à adopter dans un contexte où la technologie s'impose. Exemple de nouvelles villes (smarts cities) ou de pôles urbains de Diannadiou ou Daga- Kholpa.

3

II/Aperçu des problèmes urbains

Les principaux problèmes urbains ont été identifiés pour chaque secteur:

✓ **Développement urbain:**

Structure urbaine mono-polaire, caractérisée par une forte concentration excessive des affaires, des activités et des services en centre ville (le plateau), la mobilité urbaine réduite, les embouteillages fréquents, le développement urbain incontrôlé, les offres limitées de logements, disparité importante entre localités en matière d'accès aux services urbains.

✓ **Développement économique:**

Les activités économiques des secteurs de l'agriculture, de la pêche, de l'industrie, du tourisme, de l'artisanat, etc..., sont faibles en raison de l'insuffisance de la productivité, de la diminution des ressources terrestres et marines et du manque d'infrastructures de production, d'exploitation et de transformation.

✓ **Environnement naturel:**

Déforestation récurrente, insuffisance des espaces verts, quasi inexistence des jardins publics et zones humides à l'état sauvage sensibles, augmentation de la pollution de l'air, de l'eau et des sols.

✓ **Infrastructures:**

Services de transport public inadéquats, insuffisance de la capacité des routes, capacité limitée du port de Dakar en matière de manutention entravée par l'arrêt depuis des années du chemin de fer Dakar-Bamako, l'insuffisance de la couverture du réseau d'assainissement, trop forte dépendance de la zone d'une seule ressource d'eau externe (lac de Guiers), risques d'inondations persistants.

Ces problèmes sont liés à une insuffisance et à une non appropriation de la planification urbaine dans nos villes.

4

III/ L'Impact du Problème

- ➡ **forte croissance démographique:** 2,9%/an avec une population de 18 032 473 habitants en 2033 et 92 habits/km².
- ➡ **forte urbanisation des villes sénégalaises:** le taux d'urbanisation est passé successivement de 23% en 1960, 39 % en 1988, 41 % en 2002 et à 45,2% en 2013 et 49% en 2023.
- ➡ **étalement urbain important:** avec comme conséquences l'érection de quartiers irréguliers dans des zones impropres à l'habitat sur 30 à 40% de l'espace de nos villes.
- ➡ **macrocéphalie de Dakar :**
 - 0,3% du territoire national;
 - 4 146 594 habitants en 2023
 - Taux d'urbanisation de 96,4%
 - 7277 habitants au km²
 - Concentration de activités socio-économiques, administratives, services dans le centre-urbain.

5

IV/Solutions apportées

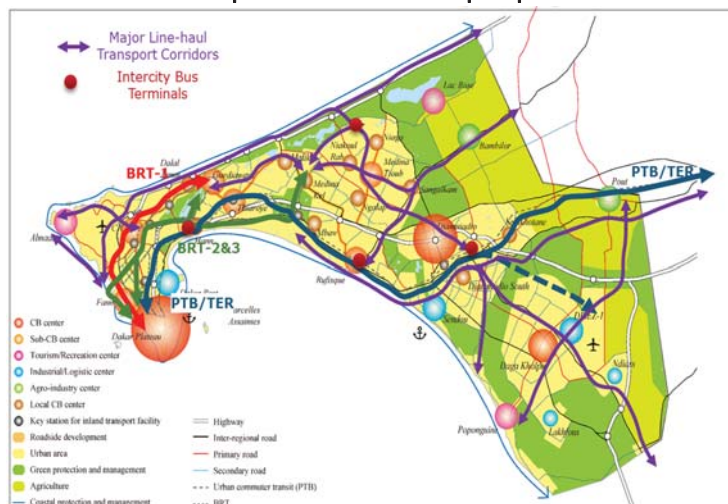
Des plans et stratégies de développement urbain durable adaptés à l'ODD11 ont été élaborés:

- ➡ **Acte III de la décentralisation** consacrant la communalisation intégrale accentuant les tendances à une urbanisation généralisée;
- ➡ **Plan Sénégal Emergent** confirmant l'importance de la planification urbaine et du secteur de l'habitat dont l'habitat social à travers le Programme 100000 logement piloté par le ministère en charge de l'urbanisme;
- ➡ Respect des orientations du **Plan National d'Aménagement et de Développement territorial (PNADT)**;
- ➡ **Lettre de politique sectorielle de l'urbanisme:**
 - Transformation de la structure mono polaire actuelle en une structure multipolaire: par la création de pôles urbains (Diamniadio et Daga-Kholpa) permettant l'ouverture à l'urbanisation de nouvelles zones sur un mode intégré (concentration à la fois des logements, des activités et des services) mais aussi une prise en compte de la durabilité dans la planification urbaine (à l'exemple du Plan Directeur d'Urbanisme de Dakar et ses environs horizon 2035);
 - Programme national de Planification urbaine et Gestion des Risques urbains au Sénégal (PNPUS);
 - Politique Nationale d'Urbanisation.

6



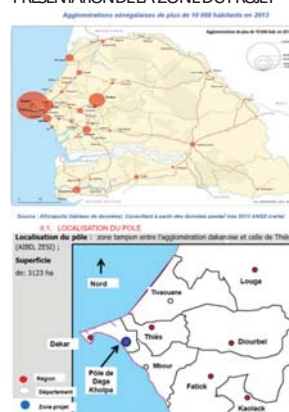
Principales routes de transport public



V/Etudes/Pratiques/ de villes intelligentes reussies : cas pratiques de mise en oeuvre dans le pays

De nouvelles villes intelligentes (Smarts cities) ou Pôles urbains comme Diamniadio et Daga Kholpa sont en phase de mise œuvre par l'Etat du Sénégal à travers une politique publique du développement urbain durable: Exemple du pôle urbain de Daga-Kholpa: sélectionné parmi tant d'autres zones à la base des critères suivants: principes fondamentaux; critères liés au développement; critères liés au contrôle; promouvoir le renforcement des capacités et la participation des Collectivités locales (source: Mission d'étude de la JICA)

PRESENTATION DE LA ZONE DU PROJET



VI/Pôle urbain de Daga-Kholpa : de la planification urbaine à son exécution Cadre de base de la Structure Urbaine

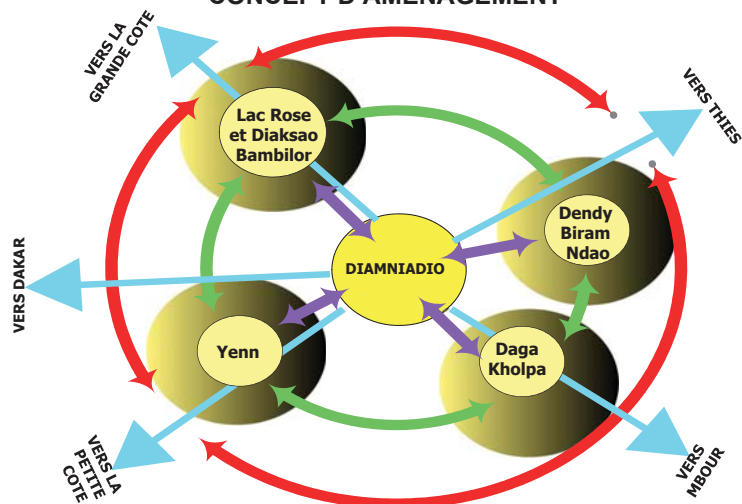
Concept de Développement

- Ville verte et écologique
- Cadre de travail et de vie attrayant (ville compacte)
- Occupation harmonisée entre les nouvelles et les anciennes
- Centres d'affaires compétitifs disposés en pôles centraux

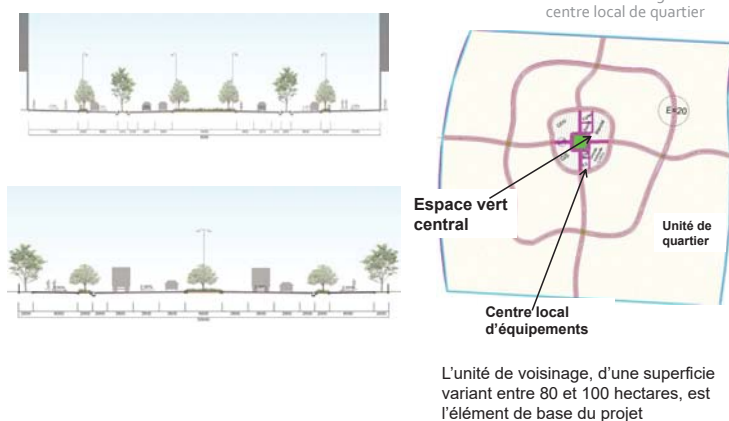
Concept de la Structure Urbaine

- Structure urbaine symbolique en tant que ville-carrefour internationale
- Esthétique du centre urbain attractif (axes et corridors)
- Zone industrielle compétitive avec des espaces verts et des infrastructures de haute technologie
- Structure urbaine axée sur le transport public de masse et sur le transport actif (piétons, deux roues)
- Formulation spatiale mettant l'accent sur les espaces verts et les espaces non bâtis (réseau et les activités parc central)
- Mixité urbaine

PLAN D'URBANISME DE DETAILS DE DAGA-KHOLPA CONCEPT D'AMENAGEMENT

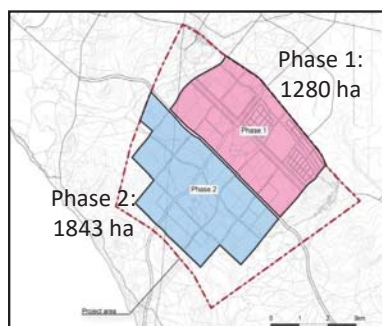


Exemples de profils en travers type des voies et zones d'équipements



14

Plan de Phasage et coût estimatif



Estimation préliminaire de la phase 1

Désignation	Coût total (milliards CFA)
Routes et ponts	98,9
Usine et réseau de traitement des eaux usées	54,6
Réseau principal d'eaux usées et pluviales	21,0
Approvisionnement en eau	11,1
Electricité	16,3
Communication	24,8
Espace public/Espace /Parcs	19,7
Restructuration des villages existants	1,6
Total	248,0
Coût/ hectare	0,083
Subdivision du travail par des promoteurs privés	228,0
Coût/hectare	0,076
Total	476,0
Coût total/ hectare	158

15

ETAT DE MISE EN ŒUVRE

Réaliser les études, aménager de grandes trames d'accueil et assurer la promotion du pôle auprès du secteur privé national et international.

◆ Trois étapes

1. Etape préparatoire (déjà réalisée)

- identification du site;
- état des lieux physique et foncier;
- décret déclarant d'utilité publique, ordonnant l'élaboration d'un plan d'urbanisme et prescrivant des mesures de sauvegarde du pôle ;
- décret d'immatriculation de l'assiette de la zone du PUD ;
- immatriculation de l'assiette (en cours);
- montage institutionnel.

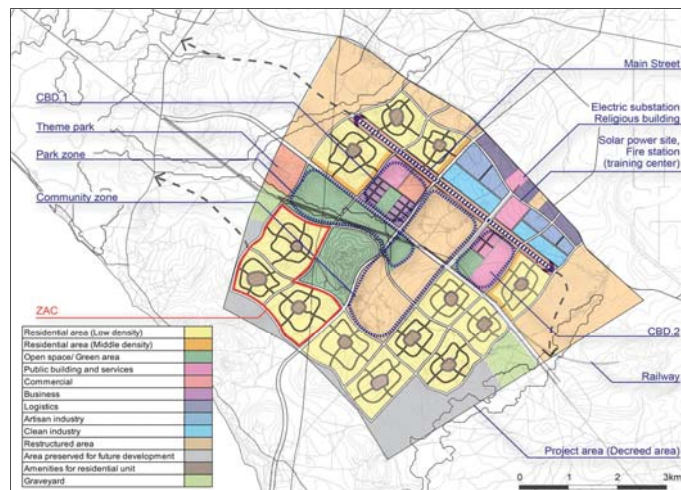
2. étape d'études d'urbanisme et Recherche de Partenariat

- élaboration et présentation du PUD de Daga Kholpa dans les différentes instances pour approbation,
- élaboration et présentation de l'étude d'Evaluation Environnementale Stratégique du PUD de Daga-Kholpa au comité technique (DEEC) pour validation en vue de disposer du quitus environnemental,
- décret approuvant et rendant exécutoires le PUD de Daga Kholpa

3. étape d'exécution (en perspective)

- Évaluation des impenses;
- choix des opérateurs;
- études d'exécution techniques et réalisation des travaux

PLAN D'OCCUPATION DU SOL DE DAGA-KHOLPA



CARACTÉRISTIQUES DU PLAN D'OCCUPATION DU SOL

- Les zones non adaptées pour le développement urbain sont évitées (comme indiqué dans la diapositive précédente);
- La co-existence de zone urbaine moderne, villages existants, zone verte est réalisée;
- Il y a des axes Est-Ouest et Nord-Sud desservis par des artères inter-villes;
- Une voie centrale part de l'Est vers l'Ouest et est desservie par le BRT;
- Les petites et moyennes industries et les industries logistiques sont supposées être dans la zone industrielle légère et logistique;
- Un parc à thème est prévu comme sur la devanture de Daga-Kholpa vers l'Ouest;
- La ligne ferroviaire vers AIBD est supposé être prolongée jusqu'à Daga Kholpa sous forme de boucle qui revient sur Diamniadio.

VII/Réalisation de projets prioritaires retenus dans le PDU de Dakar et ses environs horizon 2035

Projets choisis et Etude

- Améliorer les trois goulots d'étranglement sur la route de la VDN (Voie de Dégagement Nord) et deux goulots d'étranglement aux carrefours sur la route du Front de Terre (Notation)
- Améliorer l'accès à la gare des Baux Maraîchers pour recouvrer sa fonction originale de gare multimodale par la résolution de l'embouteillage dans les environs.
- Etudier les méthodes adéquates de traitement des déchets, y compris le système d'élimination, système d'incinération et système de recyclage en composte

Réalisation

- Amélioration de la mobilité urbaine par la réalisation des infrastructures de transport moderne (TER, BRT) intégrant la technologie
- Construction de autopont en vue d'améliorer les goulots d'étranglement sur la route de la VDN (Voie de Dégagement Nord) et deux goulots d'étranglement aux carrefours sur la route du Front de Terre
- Améliorer l'accès à la gare des Baux Maraîchers pour recouvrer sa fonction originale de gare multimodal par la résolution de l'embouteillage dans les environs.



VIII/Défis actuels rencontrés et contraintes

- Financement insuffisant consacré à la planification urbaine, à la mise en œuvre et à l'opérationnalisation des zones concernées notamment les villes intelligentes;
- Manque de formations de qualité des ressources humaines dans le domaine de la planification urbaine au niveau de l'administration centre et des collectivités territoriales;
- Limite sur l'utilisation de la technologie pour le traitement de certains dossiers particulièrement dans le domaine de la télé demande d'autorisation de construire (TELEDAC), couvrant seulement la région de Dakar et qui reste confrontée au problème de connexion du réseau;
- Insuffisance de moyens logistiques, de matériels tels que les GPS de haute résolution utilisés pour la collecte ainsi que la numérisation des données.

Conclusion

- ✓ Sécurisation des assiettes foncières devant abriter les projets de pôles urbains, de zones d'aménagement concerté et des 100 milles Logements;
- ✓ Elaboration des documents de planification urbaine pour leur mise en œuvre rationnelle et adéquate;
- ✓ Activation du Partenariat Public Privé pour la réalisation des travaux de terrassement, d'aménagement de la voirie et réseaux divers, des infrastructures et des équipements de base.



Matériel de présentation_Laos



La ville intelligente en République démocratique populaire lao



Département de l'Habitat et de l'Urbanisme, MPWT, Laos
Présenté par: M. Khamphonemisay PHOMMATHAT
Programme: Séminaire de partage des connaissances sur les initiatives de villes intelligentes en Asie et en Afrique
Date: Février 2024, Abidjan, République de Côte d'Ivoire

Présentation du pays



Superficie:
2,368,000 sq km
Capitale:
Vientiane
Autres grandes villes:
Luangprabang
Kayson
Pakse


Quelques faits sur le pays

 7,43M POPULATION	 37% POPULATION URBAINE	 3.2% CROISSANCE DE LA POPULATION URBAINE
 2025 ANNÉE PRÉVUE POUR OBTENIR LE STATUT DE PMA	 2,566 USD PIB PAR HABITANT	 2.5% CROISSANCE ANNUELLE DU PIB
 0.607 INDICE DE DÉVELOPPEMENT HUMAIN	 68.5 ESPÉRANCE DE VIE	 81.7% % DE PERSONNES DE 15 À 64 ANS DANS LA POPULATION ACTIVE

Source: UN-HABITAT, Country Report 2023, Laos

Présentation des problèmes urbains

1. Urbanisation rapide (défi)



TAUX D'URBANISATION

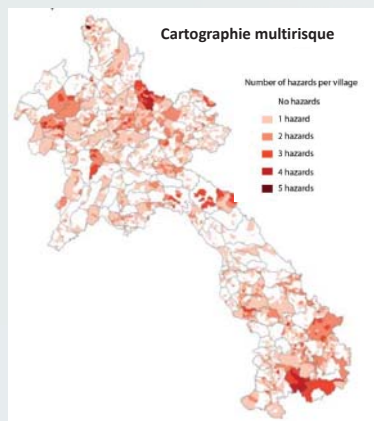
2015: 38.6%

2025: 47.7%

	Taux de changement de la population urbaine (%)			Niveau d'urbanisation (%)			
	1995-2005	2005-2015	1995-2015	1995	2005	2015	2025
South-Eastern Asia	3.21	2.63	2.92	34.6	41.3	47.6	53.3
Brunei Darussalam	2.89	2.02	2.45	68.6	73.5	77.2	79.7
Cambodia	3.18	2.38	2.78	17.3	19.2	20.7	23.6
Indonesia	3.87	2.87	3.37	36.1	45.9	53.7	60.3
Lao People's Democratic Republic	6.28	5.36	5.82	17.4	27.4	38.6	47.7
Malaysia	4.00	2.86	3.43	55.7	66.6	74.7	80.1
Myanmar	2.27	2.41	2.34	25.5	28.9	34.1	39.8
Philippines	1.74	1.22	1.48	48.3	46.6	44.4	44.9
Singapore	2.55	2.23	2.39	100.0	100.0	100.0	100.0
Thailand	3.20	3.22	3.21	30.3	37.5	50.4	60.4
Timor-Leste	2.94	3.83	3.38	22.5	26.3	32.8	38.6
Viet Nam	2.18	3.03	3.10	22.2	27.3	33.6	39.9

UN-Habitat, World Cities Report 2016: Urbanization and Development. Emerging Futures, Annex I.

Présentation des problèmes urbains



2. Changement climatique (défi)



46 % des établissements humains, soit environ **3 millions** de personnes, ont été touchés par un ou plusieurs risques liés au changement climatique



600 000 personnes touchées par deux cyclones tropicaux en 2018, provoquant les inondations les plus coûteuses du pays en une décennie

Source: UN-HABITAT, Country Report 2023, Laos

Présentation des problèmes urbains



3. Problèmes urbains courants



Extension urbaine



Congestion du trafic



Inondation urbaine



Risque d'incendie



Pollution de l'air



Gestion des déchets solides

Présentation des problèmes urbains

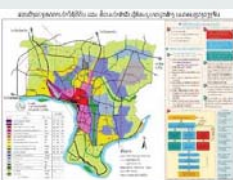


4. Principaux efforts pour atténuer les problèmes urbains



Urbanisme

- 148 villes à travers le pays ont leur propre plan directeur urbain
- Objectif stratégique d'ici 2030 : Révision du plan directeur urbain de 45 villes



Législations

- Loi sur l'Urbanisme
- Loi sur la Construction
- Loi sur le Logement (en cours)
- Stratégie Nationale du Logement et du Développement Urbain (2023-2030)
- Rapport National sur la Mise en Œuvre du Nouvel Agenda Urbain
- Code du Bâtiment (en cours)
- Stratégie Nationale des Villes Intelligentes (en cours)
-etc



Projets de développement urbain

- Projet de Développement Urbain des Villes du Corridor du Grand Mékong (GMS1, GMS2 et GMS 4)
- Projet d'Amélioration Environnementale Urbaine de Pakse
- Projet d'Investissement dans l'Amélioration de l'Environnement Urbain, Louang Prabang.
-etc



Renforcement des Capacités

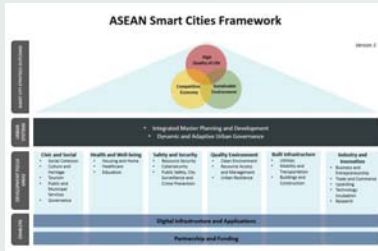
- Encourager le personnel central et local à participer aux cours de formation soutenus par diverses organisations: JICA, KOICA, Banque Mondiale, ADB, etc.
- Organiser des formations et des séminaires pour renforcer les capacités des autorités locales.
- Organiser un Forum Urbain National pour échanger des expériences et recueillir les opinions publiques en vue d'une meilleure ville
-etc.



Initiatives de Ville Intelligente



1. Membre du Réseau des Villes Intelligentes de l'ASEAN



Source: ASEAN Main Portal Website



Le Réseau des Villes Intelligentes de l'ASEAN (ASCN) a été établi lors du 32^e Sommet de l'ASEAN le 28 avril 2018.

L'ASCN vise à :

- Faciliter la coopération dans le développement des villes intelligentes.
- Catalyser des projets bancables avec le secteur privé.
- Obtenir des financements et un soutien des partenaires externes de l'ASEAN.



Vientiane Capital et Louangprabang ont été sélectionnées comme deux villes pilotes du Laos, faisant partie des 26 villes au total issues de 10 pays de l'ASEAN.

Le Directeur Général du Département du Logement et de l'Urbanisme a été nommé Représentant National à la place du Département de l'ASEAN du MAE depuis 2023.

À la fin de juillet 2024, la RDP Lao accueillera la Réunion Annuelle du Réseau des Villes Intelligentes de l'ASEAN et le Directeur Général du Département du Logement et de l'Urbanisme présidera la réunion.

Initiatives de Ville Intelligente



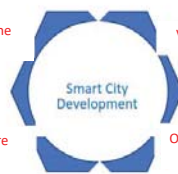
Cadre pour une Ville Intelligente

Financement participatif
Renouvellement urbain à long terme
Transports fluides et multimodaux
Routes et infrastructures connectées, rentables et résilientes
Urbanisme et développement intégrés
Système d'information géospatial

Poste central de commandement de l'emploi basé sur la performance
Services publics en ligne et feedback
Participation du public
Responsabilité et transparence

Gouvernance urbaine « smart »

Logements adéquats, abordables et à la demande
Cohésion communautaire
Identité culturelle
Sécurité personnelle et publique
Services de santé en ligne



Gestion des déchets
Traitement des eaux usées
Gestion de l'eau à base naturelle
Espaces verts
Bâtiments verts
Énergie propre

Système d'accréditation professionnelle
Recrutement transparent et basé sur le mérite
Recherche et développement dans le secteur urbain
Opportunités d'apprentissage à distance et à temps partiel

Opportunités d'investissement attractives
Industries de construction formelles
Incitations à la création d'emplois
Annonces d'emplois centralisées et en ligne

Initiatives de Ville Intelligente



3. Mise en œuvre des études sur les Villes Intelligentes au niveau de la ville



Vientiane Capital
Luang Prabang City
Kayson City
Pakse City



Vientiane Capital
Luang Prabang City

DEVELOPING A SMART AND INTEGRATED URBAN STRATEGY

Luang Prabang, Lao PDR

The Smart and Integrated Urban Strategy will help address the challenge of balancing urban growth objectives with the protection of the local heritage, an essential part of the city.

The strategy will comprise three components, namely urban development, heritage, and tourism. The strategy will be developed in three stages:

- Urban Assessment
- Urban Scenario
- Integrated Strategy



Explication des symboles

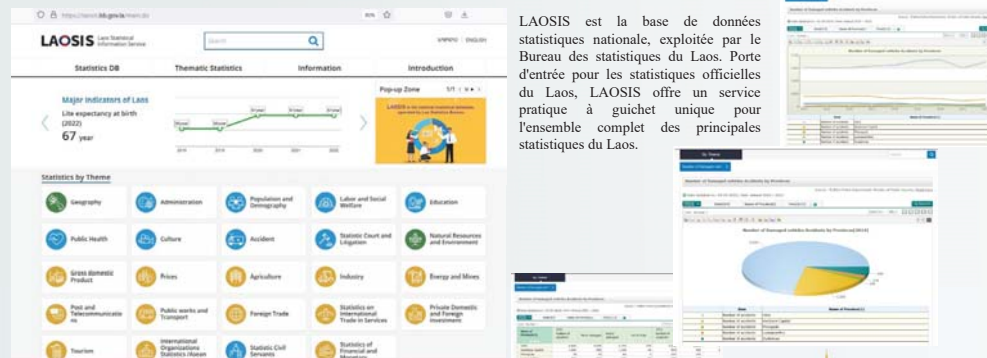
En cours

Terminées

Initiatives de Ville Intelligente



4. Développement de la base de données statistiques nationale (LAOSIS)



source: <https://laosis.lsb.gov.la/info/intro.do>

LAOSIS est la base de données statistiques nationale, exploitée par le Bureau des statistiques du Laos. Porte d'entrée pour les statistiques officielles du Laos, LAOSIS offre un service pratique à guichet unique pour l'ensemble complet des principales statistiques du Laos.

Initiatives de Ville Intelligente

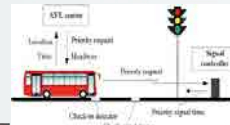


5. Mise en œuvre du Système de Transport Intelligent (ITS) pour le Projet de Transport Urbain Durable de Vientiane (VSUTP), BRT

Gestion du Trafic Prioritaire pour le BRT



- 22 terminaux
- Énergie électrique
- Projet d'expansion des transports
- Frais de stationnement électroniques
- L'impact du projet constituera une nouvelle frontière dans la zone principale de Vientiane, qui sera respectueuse de l'environnement et adaptée aux piétons



Feu Vert Anticipé : Lorsque le bus approche d'une intersection pendant la phase rouge du signal, le système raccourcira la durée de la phase rouge et changera le signal en vert, permettant ainsi au bus de traverser l'intersection plus rapidement.

Extension de la Phase Verte : Si le signal est vert lorsque le bus s'approche de l'intersection, le système prolongera la durée de la phase verte jusqu'à ce que le bus ait complètement traversé l'intersection.

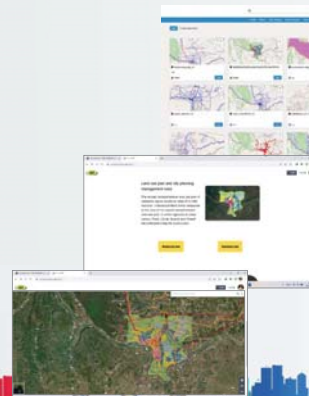
Études de cas/Pratiques



1. Plateforme de données ouvertes basée sur le SIG pour l'information urbaine intégrée de Vientiane – Projet soutenu par la JICA : Projet de Développement des Capacités sur le Contrôle et la Promotion du Développement Urbain (CDUDCP)



source: <https://virgo.npwt.gov.la/#/>



Dans le but de diffuser des informations sur les infrastructures de base, le développement urbain et la législation liée à l'urbanisme à Vientiane, des efforts sont déployés pour recueillir des informations sur les infrastructures de base à l'aide d'un logiciel SIG pouvant être partagé via une plateforme en ligne.

Études de cas/Pratiques

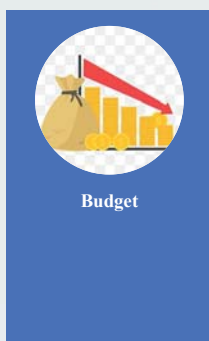


2. Développement d'un plan d'action pour une ville verte pour la ville de Vientiane en utilisant les outils *Advanced Practices for Environmental Excellence in Cities* (APEX) de l'IFC (projet d'assistance technique en cours)

L'objectif principal du projet est de créer un plan d'action pour une ville verte à Vientiane en utilisant les outils APEX de l'IFC. Les initiatives APEX Green Cities de l'IFC visent à soutenir les villes des économies émergentes pour accélérer la mise en œuvre d'actions politiques ambitieuses et transformatrices, ainsi que d'investissements contribuant de manière significative à la transition vers des trajectoires de croissance urbaine à faibles émissions de carbone et efficaces en ressources. Le projet se concentre spécifiquement sur le logiciel APEX, qui, en utilisant des données locales de pairs, estime l'empreinte environnementale d'une ville dans quatre secteurs clés : le bâti et l'énergie, les transports, les déchets et l'eau.



Défis



Budget



Ressources humaines
et législations



Coopération publique
et privée



Recherche et
développement

Conclusion



Nous avons encore un long chemin à parcourir pour créer une smart city complète avec une gestion et une surveillance très efficaces par le gouvernement et le secteur public. Cependant, nous essayons de poser des bases solides en promouvant l'utilisation de la technologie pour résoudre divers problèmes urbains en tant que solutions intelligentes dont nous pourrions apprendre et acquérir de l'expérience. De plus, le terme "smart" ne se résume pas uniquement à la technologie, mais à une planification centrée sur l'humain. Nous devons prendre en compte l'unicité de la culture pour créer une société inclusive. De plus, la conservation de la nature devrait également être prise en compte afin d'utiliser les ressources naturelles de manière durable.

Notre pays est au stade initial des smart cities. L'expérience des pays participant à ce séminaire approfondira notre compréhension et fournira des leçons précieuses pour les défis futurs. En même temps, je suis honoré et ravi d'entendre les suggestions des représentants des pays présents à ce séminaire.

Merci pour votre attention
ຂອບໃຈ



Matériel de présentation_Cambodge

Introduction de Smart Siem Reap (Cambodge)



1. Présentation du pays et de la province
2. Problèmes urbains
3. Initiatives de villes intelligentes
4. Étude de cas
5. Défis

SMART
SIEM REAP

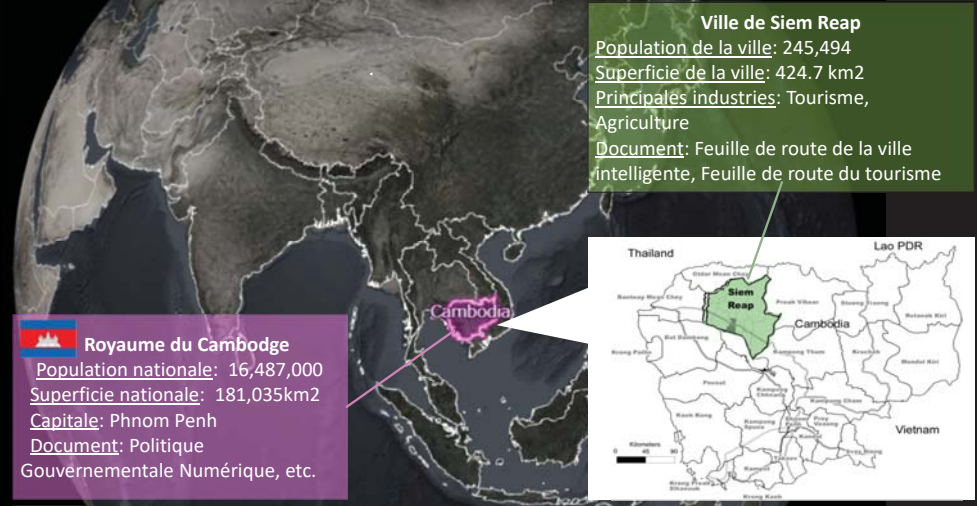




Orateur : M. Yun Linne, Gouverneur adjoint de la province de Siem Reap
Février 2024

1. Présentation du pays et de la province

2



Ville de Siem Reap
Population de la ville: 245,494
Superficie de la ville: 424.7 km2
Principales industries: Tourisme, Agriculture
Document: Feuille de route de la ville intelligente, Feuille de route du tourisme

Royaume du Cambodge
Population nationale: 16,487,000
Superficie nationale: 181,035km2
Capitale: Phnom Penh
Document: Politique Gouvernementale Numérique, etc.

2. Problèmes urbains

Siem Reap accueille 4 millions de touristes par an dans une ville de 240 000 habitants.























Problèmes

- Renforcer la promotion en tant que ville touristique
- Améliorer la commodité du tourisme
- Accroître la satisfaction des expériences locales

Source: Khmer Times

2. Problèmes urbains

19 Principaux Problèmes identifiés par l'Enquête sur la Collecte de Données de la Ville Intelligente

Organisations Administratives 	 1. Besoin de structures organisationnelles administratives pour favoriser la collaboration intersectorielle	Tourisme 	 9. Besoins de renforcement de la promotion en tant que ville touristique
	 2. Besoin d'une unité de promotion de la ville intelligente		 10. Besoins d'amélioration de la commodité des comportements touristiques
	 3. Besoin d'une base organisationnelle pour la collaboration avec plusieurs parties prenantes		 11. Besoins d'amélioration de l'attrait des expériences locales dans les attractions touristiques
Systèmes Juridiques Soutien aux Entreprises 	 4. Besoins de clarification et de simplification des procédures juridiques complexes	Mobilité 	 12. Besoins de confort face à la congestion du trafic et au stationnement en voirie
	 5. Besoins de promotion active des entreprises privées dans le domaine de la ville intelligente		 13. Besoins d'une maintenance optimisée des routes
Gestion des Données 	 6. Besoins d'amélioration des infrastructures matérielles et des conditions liées aux TIC	Sécurité 	 14. Besoins en air propre et mobilité respectueuse de l'environnement
	 7. Besoins de partage et d'utilisation de données multi-sectorielles		 15. Besoins en sécurité accrue contre les risques d'accidents de la route et de crimes
	 8. Besoins en système de données ouvertes, sécurité des données et réglementations	Gestion des Déchets 	 16. Besoins en sécurité renforcée contre les catastrophes (incendie, inondation, etc.)
			 17. Besoins de sensibilisation aux actions respectueuses de l'environnement
			 18. Besoins d'application de l'initiative publique
			 19. Besoins en ingénierie des infrastructures

2. Problèmes urbains

Pendant la COVID-19, le gouvernement royal du Cambodge a mené un projet d'amélioration des infrastructures routières pour Siem Reap.



Nouveaux problèmes

- Nécessité de prendre en compte le traitement de nouveaux équipements tels que les caméras de surveillance, y compris la réglementation, le partage d'informations, etc.

Source: MPWT

3. Initiatives de villes intelligentes

Réseau des Villes Intelligentes de l'ASEAN

- En 2018, le document-cadre du Réseau des Villes Intelligentes de l'ASEAN (ASCN) a été adopté lors du Sommet de l'ASEAN.
- Siem Reap a été sélectionnée comme « Smart City » Pilote du Cambodge parmi 26 villes de l'ASEAN



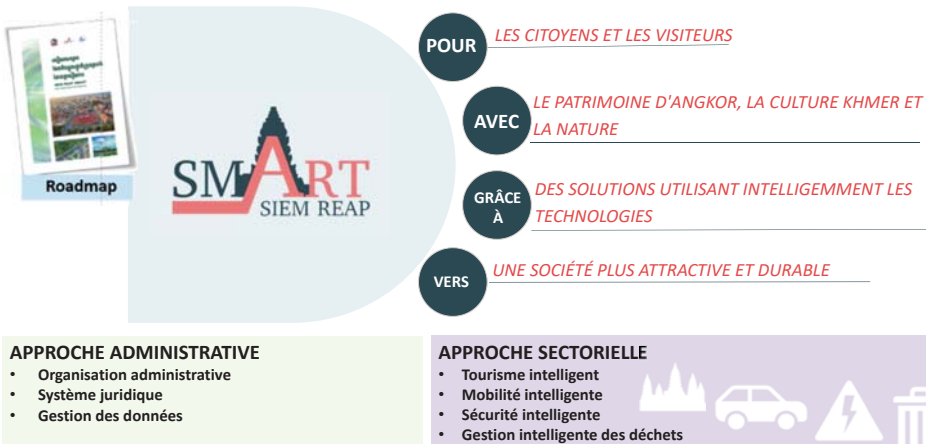
3. Initiatives de villes intelligentes

Histoire du Projet



3. Initiatives de villes intelligentes

Vision et Stratégies



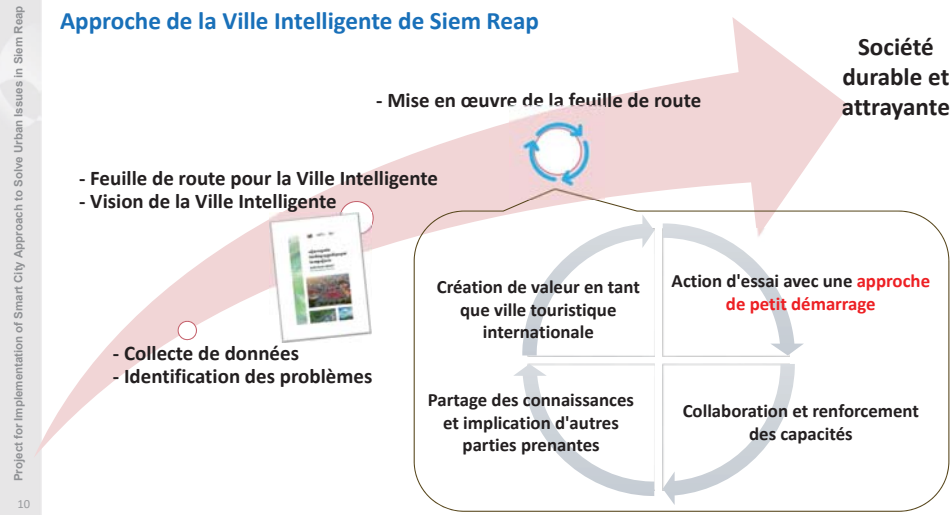
3. Initiatives de villes intelligentes

Projets prioritaires de la Feuille de Route de la Ville Intelligente

Gestion des données	Tourisme "smart"	Mobilité "Smart"	Sécurité "smart"	Gestion "smart" des déchets
D-01 Collecte et analyse intégrées des données D-02 Diffusion des données aux parties prenantes concernées	T-01 Développement de la plateforme de promotion touristique T-02 Système centralisé de réservation et de paiement T-03 Développement de la mobilité partagée T-04 Introduction de MaaS T-05 Développement du paiement sans contact avec les codes QR T-06 Amélioration de l'expérience touristique locale en utilisant la réalité augmentée (AR)	M-01 Introduction du Système de Stationnement Officiel M-02 Surveillance des Conditions Routières M-03 Amélioration de l'Éclairage de Rue M-04 Amélioration du Système de Feux de Signalisation M-05 Amélioration de la Sécurité Routière M-06 Promotion des Véhicules Électriques (VE)	S-01 Introduction du Système de Caméras de Surveillance (CCTV) S-02 Amélioration du Système d'Alerte aux Inondations S-03 Installation du Système d'Alarme Incendie S-04 Amélioration des Relations Publiques S-05 Fire Alarm System Installation	W-01 Système de Gestion des Déchets Solides W-02 Installation de l'IoT pour la Collecte des Ordures W-03 Gestion des Décharges W-04 Amélioration du Système de Qualité de l'Eau W-05 Amélioration du Système des Installations Hydrauliques W-06 Unification de la Charge des Services Publics

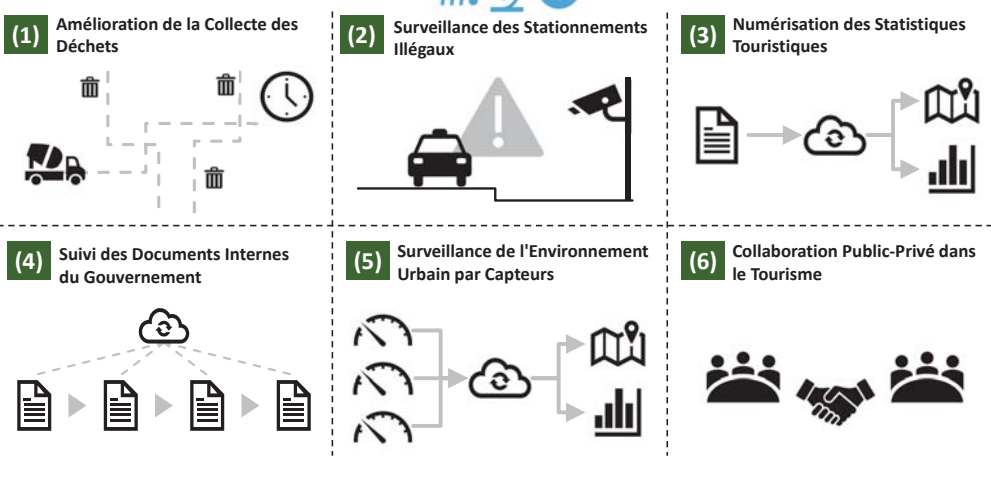
3. Initiatives de villes intelligentes

Approche de la Ville Intelligente de Siem Reap



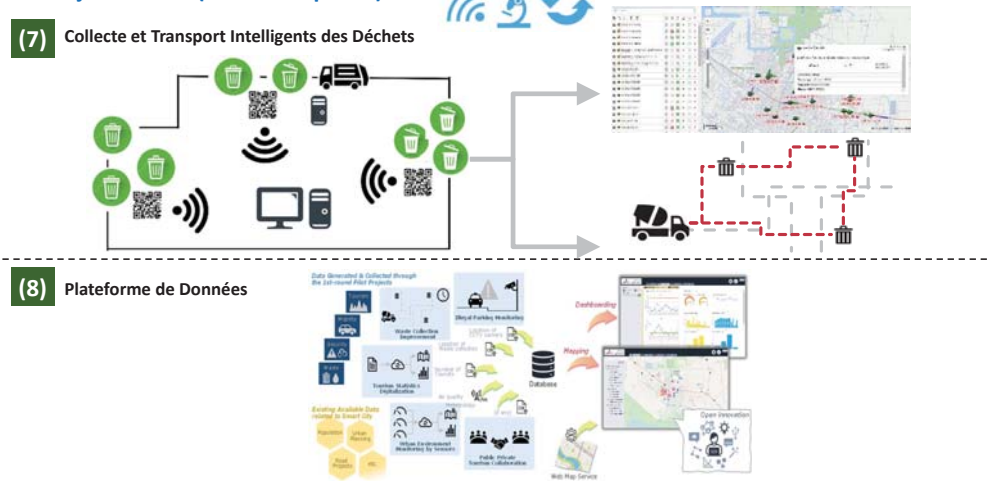
4. Étude de cas

Projets Pilotes (première phase)



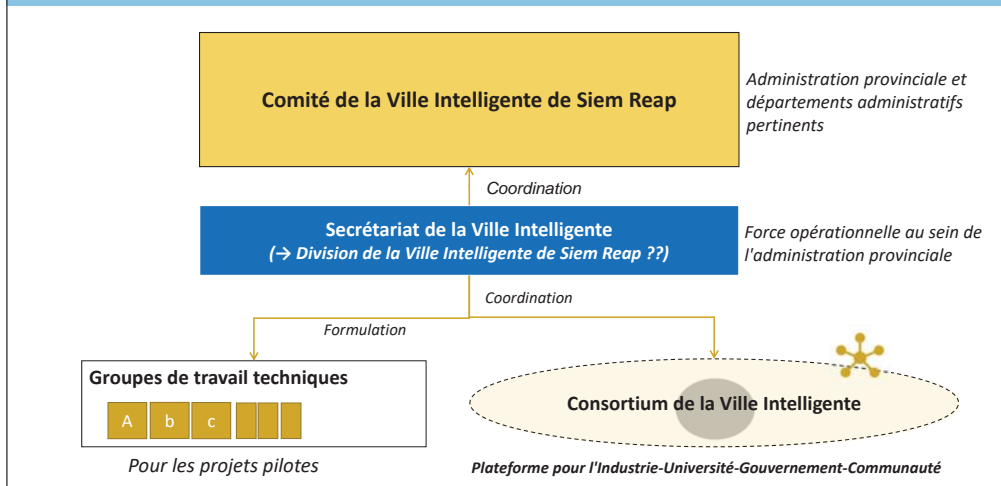
4. Étude de cas

Projets Pilotes (deuxième phase)



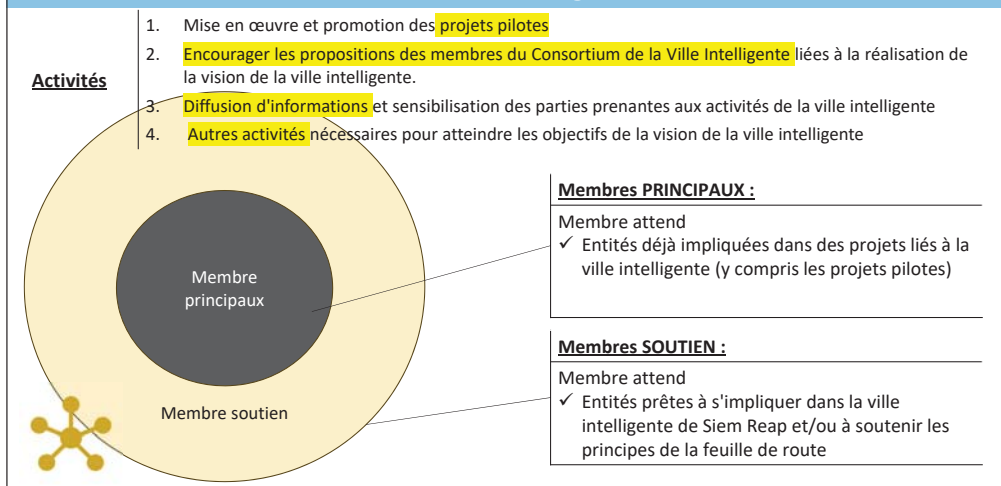
4. Étude de cas

Structure de mise en œuvre de la ville intelligente



4. Étude de cas

Structure de mise en œuvre de la ville intelligente



5. Défis

Défis pour le Développement de la Ville Intelligente	(Contre-mesures)
1. Difficulté à identifier l'organisme de mise en œuvre et à assurer son financement	<ul style="list-style-type: none"> Préparer le "plan d'action" périodique basé sur les plans de la ville intelligente Discuter d'un calendrier plus spécifique et de l'organisme principal de mise en œuvre
2. Problèmes de langage technique (terminologie)	<ul style="list-style-type: none"> Coordonner avec le gouvernement central Établir un consensus parmi les parties prenantes
3. Difficulté à aligner avec d'autres plans/initiatives nationaux/locaux	<ul style="list-style-type: none"> Mettre en place un mécanisme de mise à jour des informations au sein des organisations liées à la ville intelligente
4. Incertitude des actions des parties prenantes privées	<ul style="list-style-type: none"> Créer le plan de mise en œuvre Mener le dialogue avec les secteurs privés
5. Chronophage pour les activités pilotes	<ul style="list-style-type: none"> Formuler un calendrier détaillé avec une marge Commencer petit Permettre l'échec
6. Besoin de budgets périodiques et son incertitude	<ul style="list-style-type: none"> Étudier la taille de budget appropriée à travers des projets pilotes Créer un plan budgétaire
7. Importance d'un plan de renforcement des capacités pour les fonctionnaires	<ul style="list-style-type: none"> Fournir une formation sérieuse sur les compétences technologiques et de gestion
8. Importance des Relations Publiques	<ul style="list-style-type: none"> Organiser des ateliers avec plusieurs parties prenantes

Merci!
សូមអរគុណ



Matériel de présentation_Tanzanie



Transformer les transports
publics dans la ville de
Dar es Salaam, TANZANIE

Présenté lors du:
**Séminaire de Partage de Connaissances sur les
Initiatives de Villes Intelligentes en Asie et en
Afrique.**

Par:
Ir. Fanuel O.S. Kalugendo
Directeur du Développement des Transports
Agence de Transport Rapide de Dar es Salaam (DART)

Février 2024



Sommaire



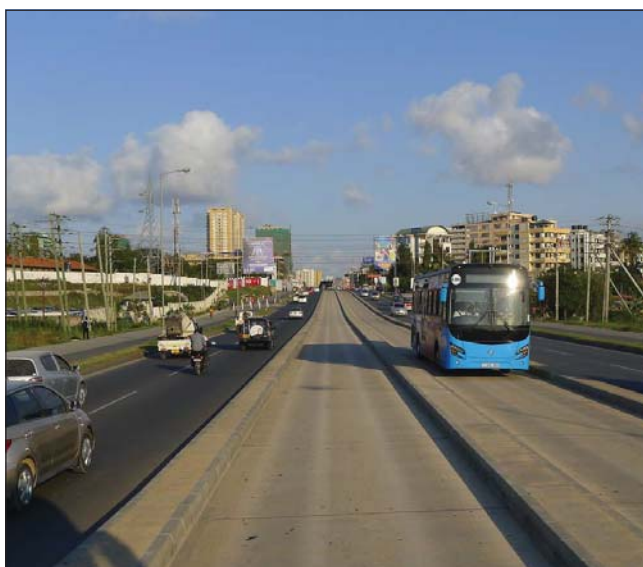
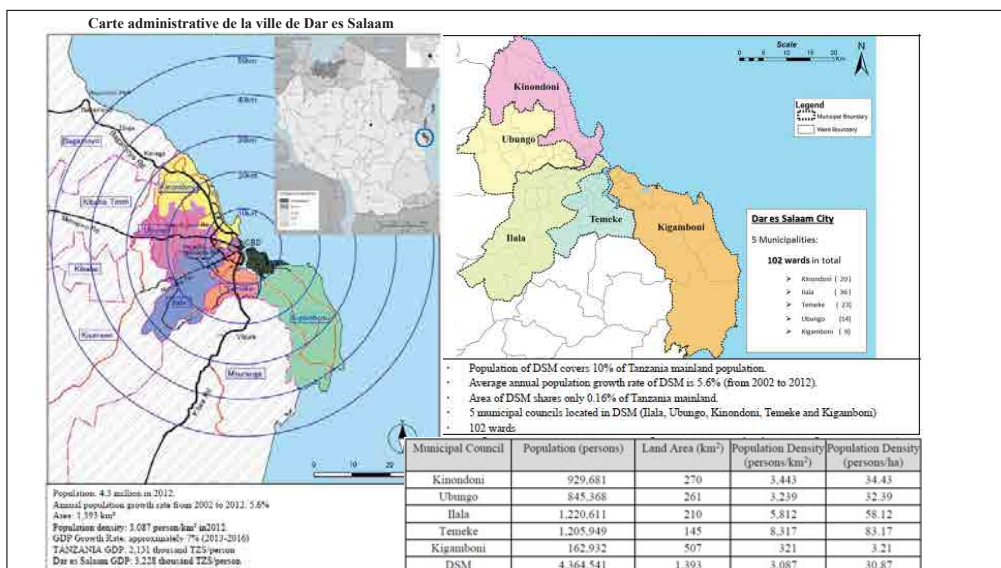
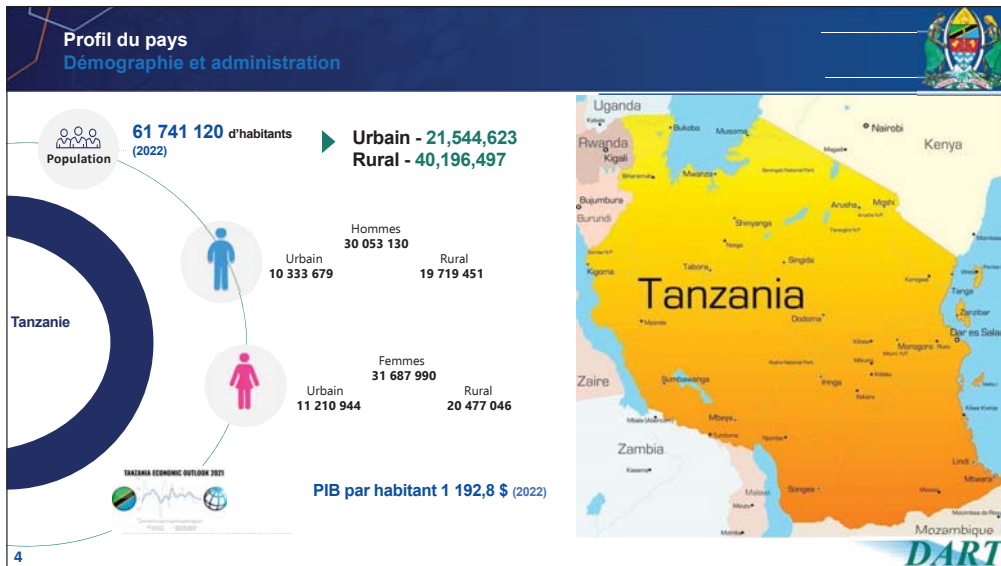
DART
DAR RAPID TRANSIT AGENCY



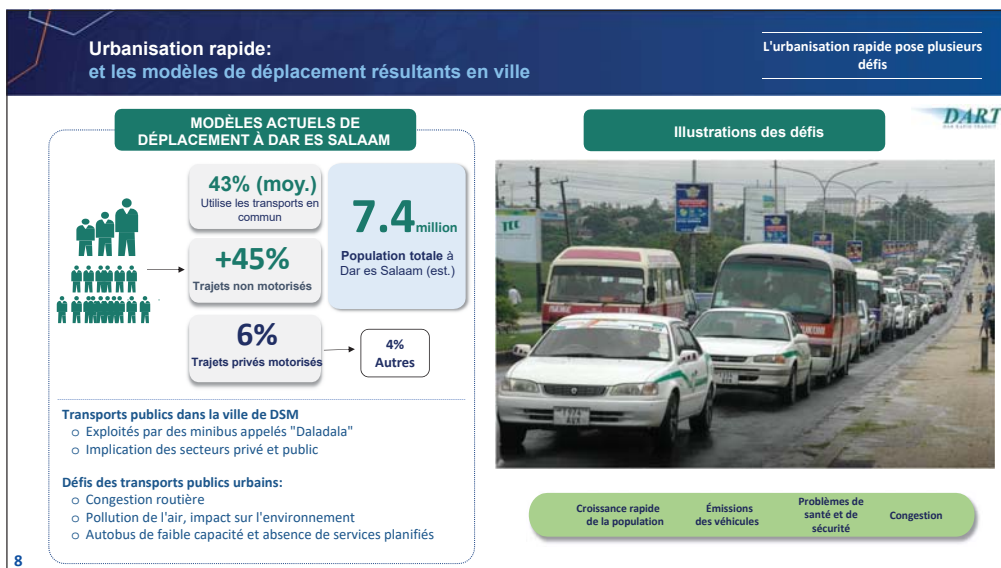
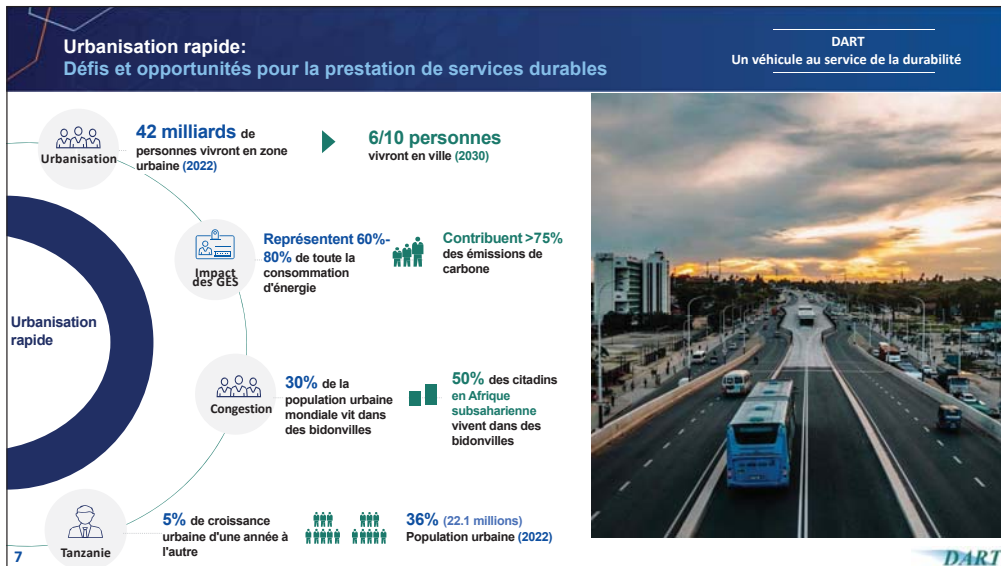
1. Présentation du pays
2. Présentation des enjeux urbains
3. Initiatives de villes intelligentes
4. L'agence DART
5. Études de cas
6. Conclusion



**Présentation du
pays**

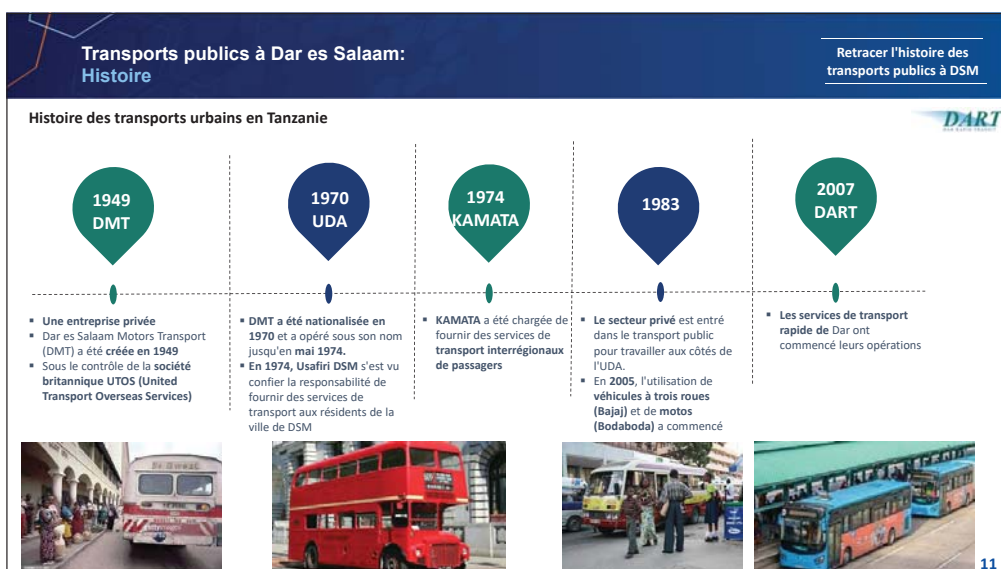


**Présentation des
enjeux urbains**





L'agence DART





Initiatives de villes intelligentes

La ville intelligente ou “Smart City”



Amélioration des transports en commun grâce au transport rapide par bus (BRT)



Mise en œuvre de bâtiments intelligents grâce au concept de transit-oriented development (TOD)

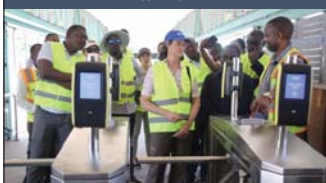


Gerezani Hub Seed project

Verdissement de la ville grâce à la plantation d'arbres le long du BRT



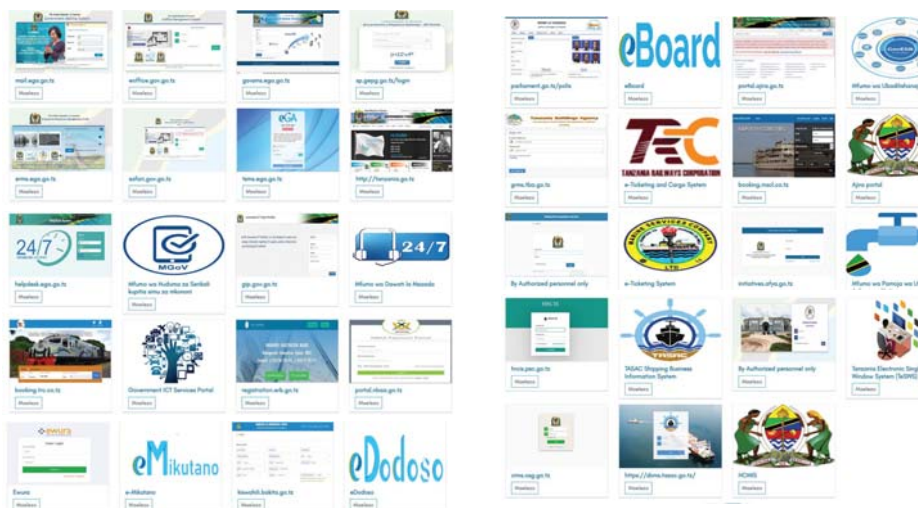
Technologie intelligente dans les transports en commun



Renforcement de la sécurité publique grâce à l'installation de caméras de vidéosurveillance



Les e-services du Gouvernement



Automatisation des services gouvernementaux - Services en ligne via le site web gouvernemental



Études de cas

Optimisation de l'exploitation du BRT à Dar es Salaam



Octroi d'un espace au public et promotion de la mobilité active



Développement de l'infrastructure verte urbaine



Amélioration de la sécurité des usagers de la route



MERCI



Matériel de présentation_Kenya



PRÉSENTATION DU KENYA

Séminaire de Partage de Connaissances sur les Initiatives de Villes Intelligentes en Asie et en Afrique (ABIDJAN, CÔTE D'IVOIRE)

Date : FÉVRIER 2024

Présentateur: Eng. Ali Shariff

DIRECTEUR PRINCIPAL DE L'URBANISME - GOUVERNEMENT DU COMTÉ DE MOMBASA - KENYA

Présentation du Pays

- Superficie d'environ 582 646 km² avec Nairobi comme capitale
- Population du pays d'environ 54 millions d'habitants
- Population urbaine d'environ 15 millions d'habitants et prévue pour représenter la moitié de la population d'ici 2050 (Habitat, 2023) <https://unhabitat.org/kenya>
- Administration décentralisée avec 47 gouvernements de comté
- PIB de 113,42 milliards de dollars américains
- Comprend cinq grandes villes
- Nairobi (696,1 km²) et Mombasa (287 km²) sont les principales villes, contribuant toutes deux à plus de 31 % du PIB du pays



Configuration Urbaine et Problématiques

Les comtés sont mandatés pour entreprendre la gestion urbaine et la planification de leurs zones en vertu de l'annexe 4 de la Constitution du Kenya de 2010, de la Loi sur les gouvernements de comté de 2012, de la Loi sur les zones urbaines et les villes de 2019 (amendée) et de la Loi sur la planification physique et l'utilisation des terres de 2019.

Classification des Zones Urbaines

1. **Centre de Marché**: population d'au moins 2 000 habitants avec des services urbains de base.
2. **Ville**: population d'au moins 10 000 habitants avec des services intermédiaires.
3. **Municipalité**: population d'au moins 50 000 habitants, responsable de la planification et administrée par un conseil, avec des services urbains avancés.
4. **Ville**: population d'au moins 250 000 habitants, responsable de la planification physique et économique, avec des services avancés améliorés et administrée par un conseil, à l'exception des comtés de ville, c'est-à-dire Nairobi et Mombasa.

"Urban Areas and Cities Act, 2019 (Amendment)"

Plans nationaux

- Plan Spatial National
- Plan National de Développement Physique et d'Utilisation des Terres
- Plans Spatiaux de Comté
- Plan de Développement Physique et d'Utilisation des Terres de Comté
- Plan de Développement Physique et d'Utilisation des Terres Local
- Plans de Développement Urbain Intégrés
- Plans d'Utilisation des Terres
- Plans de Construction et de Soutien

Plans Collaboratifs Nationaux et de Comté

- i. **Plans Intercomtés**
- ii. **Plans de Zones Spéciales**

Remarque : Le Secrétaire du Cabinet chargé de l'Aménagement du Territoire a l'autorité nationale de planification administrée par le Directeur Général de l'Aménagement du Territoire.

Le Membre Exécutif du Comité de Comté (CECM) respectif a l'autorité de planification du comté administrée par le Directeur de l'Aménagement du Territoire.

Problématiques Urbaines

Les gouvernements de comté au Kenya sont mandatés pour entreprendre le contrôle du développement avec le soutien politique et budgétaire du gouvernement national.

Défis



Informalité urbaine principalement causée par le manque de sécurité foncière



Inondations urbaines associées à un mauvais drainage et à une planification incohérente de l'utilisation des terres



Modèles fragmentés d'utilisation des terres résultant d'insuffisances dans le contrôle du développement et la planification urbaine

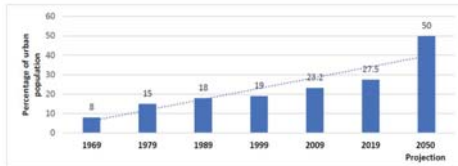


Niveaux faibles d'investissement dans les infrastructures publiques en raison d'une faible capacité financière

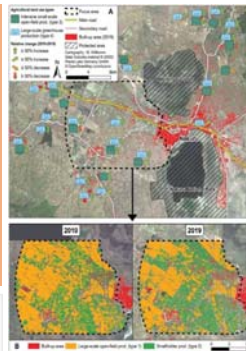


Impacts des Défis

- ❖ Extension urbaine/développement démesuré
- ❖ Manque d'espaces ouverts
- ❖ Pauvreté accrue
- ❖ Perte de terres agricoles
- ❖ Congestion du trafic
- ❖ Émissions
- ❖ Déplacement
- ❖ Fraude foncière/manque de sécurité foncière
- ❖ Prévalence de l'effet d'îlot de chaleur urbain
- ❖ Dégradation urbaine
- ❖ Inégalités et vulnérabilités urbaines
- ❖ Gestion inefficace des déchets



Source: Kenya National Bureau of Statistics Census reports (1969,1979,1989,1999,2009,2019).



1. Maximilian Willkomm, Alexander Follmann & Peter Dannenberg (2021)
2. Source: <https://tomorrowscities.org/tomorrows-nairobi>
3. Urban economic growth in Africa: A case study of Nairobi City County, Kenya

Efforts d'Atténuation



Programme de Logements Abordables

Plan de construction de 500 000 unités de logement abordable en cinq (5) ans



1. Amélioration intégrée des établissements par la régularisation de la propriété et la modernisation des infrastructures
2. Planification de l'inclusion socio-économique
3. Développement de la capacité institutionnelle pour l'amélioration des bidonvilles
4. Gestion de projet et coordination



Site de Shimo la Tewa - Mombasa

Technologie des zones humides construites comme stations d'épuration décentralisées expérimentée à Mombasa dans le but de fournir une méthode abordable pour le traitement des eaux usées



Priorité à l'action climatique

“Smart City” ou Ville intelligente

Une « Smart City » ou ville intelligente utilise les technologies de l'information et de la communication (TIC) pour améliorer sa qualité de vie, sa fonctionnalité et sa durabilité.

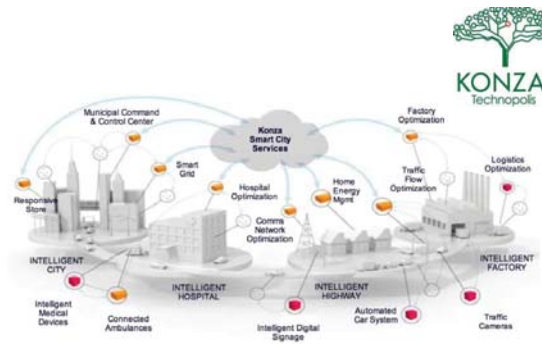
Exemples de solutions urbaines basées sur les TIC

Énergie/services publics/eau	Santé	Transport
<ul style="list-style-type: none">- Système de « comptage intelligent »- Mesure en temps réel des économies d'énergie - 10 à 15 %- Systèmes de « distribution intelligente »- Transmission/distribution en réseau intelligente- Surveillance en temps réel de l'état du réseau	<ul style="list-style-type: none">- Systèmes à distance pour les diagnostics et le traitement- Améliorer l'expérience du patient et la pénétration des soins directs- Améliorer les réponses en cas d'urgence	<ul style="list-style-type: none">- Systèmes de transport intelligents- Flux de circulation dirigé en fonction d'informations en temps réel- Systèmes automatiques pour réduire la congestion- Gestion dynamique de la demande- Systèmes tels que le covoiturage, la planification de transport multimodal, etc.
Éducation	Logement	Sécurité publique
<ul style="list-style-type: none">- Systèmes de diffusion interactive de contenu bidirectionnel pour les étudiants et les enseignants- Systèmes de surveillance- Accès à distance- Accès à du contenu de qualité	<ul style="list-style-type: none">- Solutions immobilières intelligentes qui gèrent l'efficacité énergétique des bâtiments, la sécurité, l'approvisionnement en services publics, etc.- Réduisent le coût total de possession sur le cycle de vie du bâtiment- Fournissent des propriétés écologiquement durables	<ul style="list-style-type: none">- Systèmes intelligents- Surveillance à l'échelle de la ville, suivi des capteurs, alertes, contrôles- Systèmes de gestion dynamique des ressources- Réponse rapide en cas d'urgence

Initiatives de Villes Intelligentes au Kenya - Projet phare de Konza Smart City

Fiche d'information sur l'initiative

- ❖ Projet phare de la Vision du Kenya 2030
- ❖ Initiative gouvernementale
- ❖ Couvre plus de 400 acres
- ❖ À 60 km au sud-est de Nairobi
- ❖ Alimenté par les TIC
- ❖ 800 millions de dollars américains engagés
- ❖ Propose des centres de données, des zones industrielles, des espaces commerciaux, des écoles, des hôpitaux, des hôtels, des centres de conventions et de divertissements



Objectifs et Résultats Attendus de la Ville Intelligente

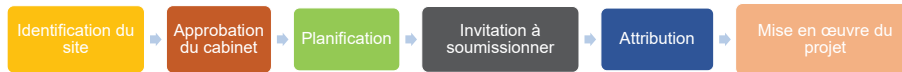
Objectifs

1. Centré sur les personnes
2. Équité
3. Sécurité
4. Durabilité

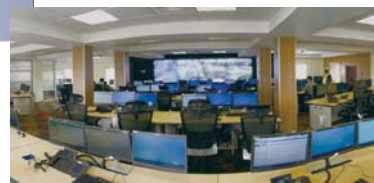
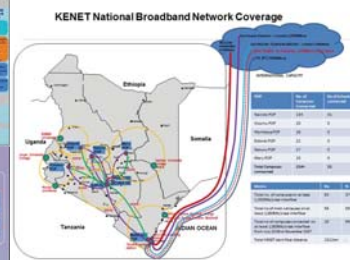
Résultats Attendus

1. Amélioration de la qualité de vie
2. Mobilité améliorée
3. Renforcement des économies
4. Gouvernance inclusive
5. Protection de l'environnement et mesures de sauvegarde

Stratégie de Mise en Oeuvre de la Ville Intelligente au Kenya



Technologies Utilisées



Développement de Konza Smart City

- Conçu et approuvé en 2008 en tant que projet de la Vision 2030
- Prévu pour l'externalisation des processus métier (BPO) et les services activés par la technologie de l'information (ITE)
- Mise en service en 2009
- Plan directeur de la phase 1 élaboré en 2012
- Pose de la première pierre en 2013
- Infrastructure et directives relatives aux parcelles à partir de 2014
- Travaux routiers et terrassements commencés en 2015
- Alimentation électrique et connexion Internet en 2016
- Engagement pour le centre de données en 2017
- Travaux majeurs d'infrastructure commencent en 2018
- Premier bâtiment complexe achevé en 2019



Améliorations apportées par Konza Smart City

- ❖ Héberge le centre de données national et le centre de récupération après sinistre
- ❖ Un catalyseur pour faire progresser l'économie numérique du Kenya, par exemple, l'Open University of Kenya, qui est basée sur le web, est domiciliée à Konza.
- ❖ Site pour la Zone Économique Spéciale

Potentiel des villes intelligentes au Kenya

- i. Intégration des services de ville intelligente dans les villes existantes
- ii. Avancée dans la durabilité urbaine dans les villes kényanes
- iii. Déploiement étendu de l'infrastructure des TIC à travers le pays
- iv. Amélioration de la prestation de services urbains

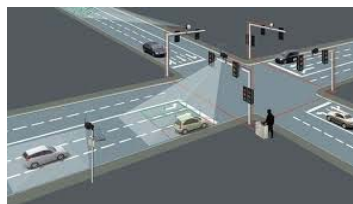
Défis

1. Contraintes financières et soutien gouvernemental limité
2. Lacunes en matière de politiques et de législation
3. Capacité technique limitée pour mettre en œuvre la planification de la ville intelligente
4. Progrès lent dans la transition vers une économie numérique

Initiatives de Villes Intelligentes à Mombasa

A. LE SYSTÈME DE TRANSPORT INTELLIGENT DE MOMBASA

- Ce projet vise à atténuer la congestion routière à Mombasa.
- Le projet est financé par la JICA dans le cadre du programme d'aide aux subventions.
- Il comprendra l'installation de caméras de surveillance, d'un centre de données et d'une salle de contrôle du trafic.
- Environ 22 intersections seront améliorées et des feux de signalisation seront installés.
- Le projet devrait débuter en 2025 et être achevé d'ici 2027, sous réserve de la signature de l'accord de subvention entre le gouvernement du Kenya et le gouvernement du Japon.



B. LE PROJET DE VILLE INTELLIGENTE DE MOMBASA

Ce projet sera réalisé par le gouvernement du comté de Mombasa pour traiter les problèmes suivants:

- Construction illégale,
- Insécurité,
- Amélioration des recettes.

Les caméras de surveillance seront installées dans des zones d'usage public telles que les plages, les parcs d'attractions, à proximité du canal de Likoni, les marchés et sur les routes fréquentées.





Republic of Rwanda
Ministère de l'infrastructure

VILLES INTELLIGENTES

Par Eric HAKIZIMANA
Spécialiste du cadre de développement spatial
Approche sectorielle de l'urbanisation - USWAp

RWANDA

économie de la connaissance compétitive et riche en informations de la connaissance

Densité / 2022



- Total Pop : 13,246,394
- Population urbaine : 27,9
- Densité : 503 par/Km2

Projection / 2052

- Total Pop : 23.4M
- Population urbaine : 16.8M 72%





TIC / 2022

- 78% des ménages ont les téléphones mobiles.
- Prestation de services par le biais des TIC : 74.59%
- 22% des ménages privés avoir des membres ayant accès à l'internet.



2/20/2024 2

QUESTIONS URBAINES



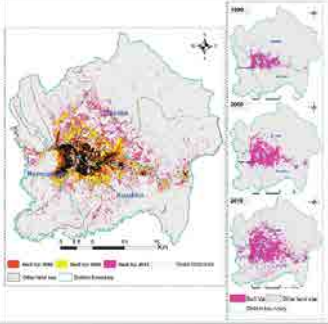
Dégradation des sols

Augmentation du nombre de voitures particulières - Congestion du trafic - Mode moto

Établissements informels

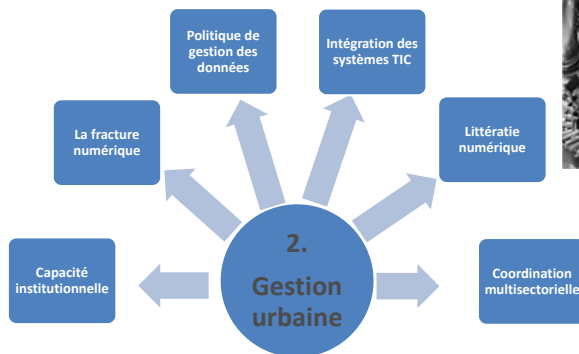
Coût élevé de la fourniture d'infrastructures

1. Croissance démographique couplée à l'expansion urbaine



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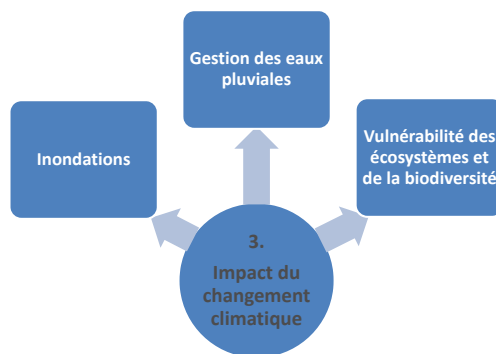
QUESTIONS URBAINES



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QUESTIONS URBAINES



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DÉBALLER LE "CONCEPT DE VILLE INTELLIGENTE"

"Une ville intelligente dans le contexte rwandais :
Il s'agit d'un programme qui tire parti de la puissance de la technologie ;
Technologie, données et innovation améliorer la qualité de vie des habitants et coordonner et intégrer les secteurs de la gestion urbaine".



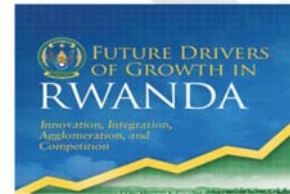
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LA VISION



Vision : Accélérer la transformation socio-économique durable et inclusive en tirant parti de la technologie et de l'innovation

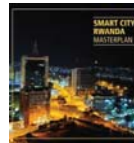


Les TIC en tant que moteur transversal du développement

L'innovation, moteur essentiel d'une croissance élevée

2/20/2024

7



En garantissant une gestion et une planification inclusives basées sur les données, des infrastructures et des services communautaires efficaces, et une innovation localisée et partagée, les villes rwandaises peuvent être des moteurs de développement économique et durable.

Plan Directeur des Villes Intelligentes du Rwanda

PILLARS		BUILDING BLOCKS		ACTION INITIATIVES	
1	Smart governance and planning	A	Data-led urban planning and management	1	GIS-based urban management platform
				2	Cross-ministry finance and project management platform
				3	Multi-stakeholder urban planning platform
2	Smart and efficient services and utilities	B	Smart policies and regulations	4	Dynamic data-led master planning
				5	Enabling environment for urban technology testing
				6	Data strategies including open data, privacy and cybersecurity
3	Localized innovation for social and economic development	C	Public engagement and open data	7	Free internet zones in strategic and residential areas
				8	Digital citizen engagement tools
				9	Private sector engagement tools and accessible to all
		D	Shared local infrastructure	10	Digitally monitor and manage utility infrastructure
				11	Explore smart micro grids based on the consumer model
				12	Introduce regulatory frameworks for virtual power plants and other demand-based management systems
		E	Efficient, demand-based services	13	Promote smart data-led 'door-to-door' mobility solutions
				14	Collaborative multi-ministry open data platform for e-services
				15	Digital access points for rural villages
		F	Sustainable and resilient resource management	16	Use sensor networks to collect environmental data
				17	Smart and resilient buildings and neighbourhood pilot projects
				18	Designate some public buildings as smart and green buildings and educational labs
		G	Education, innovation and digital literacy	19	Innovation in education, from primary school to higher education
				20	ICT training in education, for local authorities and the general public
				21	Provide a national fund for startups and innovation accelerator
		H	Localized and challenge-based financial opportunities	22	Establish innovation hubs in ministries and local authorities
				23	Promote local digital business platforms
				24	Create collaborative community co-working spaces and digital excellence centers
		I	Digital transformation of financial services	25	Introduce collaborative urban innovation labs with academia, community and industry
				26	Introduce a one-stop e-payment platform for all life-time services
				27	Enable electronic due-diligence and business loan systems for SMEs

10 ÉTAPES POUR CONSTRUIRE DES VILLES INTELLIGENTES AU RWANDA





- 
- www.irembo.gov.rw

Cible :

- Introduire au moins 200 services publics supplémentaires sur le portail public en ligne Irembo d'ici la fin de l'année fiscale en cours (2023/2024).

PRIORITÉS EN COURS



Smart C5 - 2,5 millions d'euros



Surveillance "smart" de l'eau - 300 000 €



Plateforme de réseau IoT - 300 000 €



Cartographie numérique des transports en commun - 300 000 €



Portail "Mbaza" - 500 000 €



Système de gestion des catastrophes et d'intervention d'urgence - 1 million d'euros

PARTAGEZ AVEC NOUS VOTRE EXPÉRIENCE...

L'énergie

Eau et assainissement

Logement

Transport



- ☐ Amélioration de la fiabilité du réseau électrique national grâce à la détection, au diagnostic et à la réparation proactifs des défaillances.
- ☐ Réduire les pertes d'eau (eau non facturée) de 40 % à 5 % en vue de l'accès universel à l'eau potable d'ici 2030, grâce à une gestion de la pression axée sur la demande et à une détection proactive des fuites et des éclatements de tuyaux dans le réseau de distribution.
- ☐ Promouvoir l'urbanisation durable par la détection et l'alerte précoces des établissements informels.
- ☐ Optimisation de la circulation dans la ville de Kigali afin de réduire le temps d'attente de 30 à 15 minutes grâce à un routage intelligent du trafic.

MERCI !

**Appendix 7 Declaration on the Knowledge Sharing Seminar on
Smart City Initiatives in Asia and Africa**

The Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa
Abidjan, Cote d'Ivoire, 28 February-1 March 2024

Final Declaration

1. The Background and Objectives

Cities today face a diverse and complex set of challenges, despite the recognized benefits of population agglomeration. The issues presented by the triple planetary crisis of climate change, biodiversity loss and pollution are mutually reinforcing and intrinsically linked. Meanwhile, demographic change and socio-economic disparities, both within cities and between cities, pose a challenge for inclusivity. However, we also recognize that cities play an important role, individually and as part of an effective network, in providing innovative, integrated and advanced solutions for these challenges that can enable a just and green transition on the journey to net-zero patterns of production and consumption. We highlight that, in order for cities to play their part in this transition, there is a need to properly allocate financial, human and intellectual resources and to benefit from investment from both the public and private sectors.

Japan International Cooperation Agency (JICA) has been assisting developing countries to develop a Master Plan and/or Urban Management. Currently, the integration of Smart City Approach for Urban Planning and Management is one of the solutions to address major issues/challenges facing cities in the world. JICA recognizes that the project counterparts in Sub-Saharan Africa and Asia have much experience and knowledge for solving urban issues, and at the same time, face a lot of challenges in promoting smart city initiatives. Therefore, considering the diverse practices and examples of smart cities, there is value in sharing knowledge and experience of initiatives from each country to enhance the mutual understanding. In this respect, JICA has decided to hold a seminar to deepen mutual understandings of cases of smart cities and facilitate discussions among counterparts to solve the urban issues of each country.

The aims of the seminar are 1) exchange the knowledge and the issues that each country is facing regarding smart city initiatives to deepen the understanding of what they should aim for, and identify the necessary organizational and government support, and 2) exchange the urban issues prevalent in each country to foster a more profound discourse on the effectiveness of smart cities as a mean of solving urban issues in each country.

2. Discussions

We shared with own experience, issues and challenges of Smart Cities Activities.

Many Countries / Cities have conducted to formulate Smart City Initiatives which cover various sectors such as Urban Planning / Development, Mobility / Transportation, Environment, Safe / Security and Governance.

Through the presentation and discussions, there were many common and important key issues. Specially, it was categorized as following three themes;

1) Urban Master Planning

There are following keywords of priority or challenges for Urban Master Planning and Smart City Approach;

- Smart Planning (Assessment, Planning, Implementation, Monitoring and Reporting using Smart Technology)
- Information and Data Management
- Digitalization of City Plans
- Digitalization of Land Information
- Governance Framework
- Implementation Mechanism
- Considering of Customary Issues

2) Implementation of Urban Master Plan and Smart City

There are following issues for implementation of Urban Master Plan and Smart City Approach;

- Master Plan and Detailed Plan
- Management Committee
- Data / Information Management
- Capacity Development (human resource, institution / organization, and budget / finance)
- Continuous and Sustainable Activities (not end)
- Collaboration and Cooperation among Various Stakeholders such as Public, Private and International Organizations, etc.
- Platform / Networking
- E-Government, Access of Administrative Service

3) Smart Mobility / Transportation

There are following ideas for sharing based on each experience

- Smart City Initiatives and Priority
- Platform for sharing the information data and collaboration
- Leading Agencies for Smart City
- Collaboration/coordination of National Government and Local Government
- Budget and Funding (Government, Private and International Partner), PPP
- Ideas are important to get the fund
- Different mode of transportation, Sustainable transportation (environment)

Promoting smart cities as an effective and efficient approach to urban planning and development is considered effective, but smart cities deal with a wide range of fields, and it is necessary to discuss which fields are particularly adaptable and effective, based on the issues and characteristics of each city. It should also be noted that smart cities are not the only solution.

Although it is believed that smart city linkages can be effective in urban development master plans, it is necessary to consider how to link urban development master plan approaches that focus on medium- and long-term future prospects with smart city technologies that are evolving rapidly on a day-to-day basis.

In order to promote urban development and smart cities, cooperation from international organizations and other key players will continue to be needed. Institutional and technical capacity building,

organizational strengthening, partnership with academia and private sector will continue to be required. The promotion of public-private partnerships in urban development is important.

Urban mobility and transportation issues are a common challenge for each country and each city as they arise from rapid urbanization. On the other hand, transportation modes are diversifying according to the level of urban development and city status, and transportation planning should be considered from a comprehensive perspective.

3. Conclusion and Way forward

We found many valuable lessons in this seminar through the presentations and discussions. As the conclusion, the following points are worth noting among others.

- 1) The presentations indicated a high level of interest in smart cities, particularly in the following topics: Transportation / mobility, Planning, Governance / Financing, Social / Education / Health, Safety / Security and Information.
- 2) Smart cities are effective in solving urban issues, but they require a comprehensive and cross-cutting approach. In order to promote those approaches, master plans and mechanisms for coordination and cooperation among various stakeholders are important. At same time, the capacity development needs to be promoted.
- 3) A major challenge for the future is how to integrate and coordinate traditional master planning methods with innovative smart city methods.
- 4) It should be noted that smart cities are not the only solution, not an end in themselves. it is necessary to consider sustainable approach including resilience, inclusiveness, take into account people's needs, climate change, as well as land use planning and urban development in an integrated manner.

Finally, we confirmed the importance of the “Knowledge Sharing Seminar on Smart City Initiatives in Asia and Africa”, to share and learn experiences from each other, and the continue to sustain and develop the network of participating countries and agencies. We commit to enhance exchange of information, the sharing of best practices and the discussion of policy options regarding, but not limited to, the topics of green and resilient cities, inclusive cities and digitalization in cities.

Abidjan, 1 March 2024

Séminaire de partage des connaissances sur les initiatives en matière de villes intelligentes en Asie et en Afrique

Abidjan, Côte d'Ivoire, 28 février-1er mars 2024

Déclaration finale

1. Contexte et objectifs

Les villes sont aujourd'hui confrontées à un ensemble de défis divers et complexes, malgré les avantages reconnus aux citoyens. Les problèmes posés par la triple crise planétaire du changement climatique, de la perte de biodiversité et de la pollution se renforcent mutuellement et sont intrinsèquement liés. Par ailleurs, l'évolution démographique et les disparités socio-économiques, tant à l'intérieur des villes qu'entre les villes, constituent un défi pour **le renforcement et l'inclusivité des outils de planification urbaine**. Cependant, nous reconnaissons également que les villes jouent un rôle important, individuellement et dans le cadre d'un réseau efficace, en fournissant des solutions innovantes, intégrées et avancées pour relever ces défis, qui peuvent permettre une transition juste et verte sur le chemin des modes de production et de consommation nette zéro. Nous soulignons que, pour que les villes jouent leur rôle dans cette transition, il est nécessaire d'allouer correctement les ressources financières, humaines et intellectuelles et de bénéficier des investissements des secteurs public et privé.

L'Agence japonaise de coopération internationale (JICA) aide les pays en développement à élaborer un plan directeur et/ou de gestion urbaine. Actuellement, l'intégration de l'approche Ville Intelligente dans la planification et la gestion urbaine est l'une des solutions pour répondre aux principaux problèmes/défis auxquels sont confrontées les villes dans le monde. La JICA reconnaît que les partenaires du projet en Afrique subsaharienne et en Asie ont beaucoup d'expériences et de connaissances pour résoudre les problèmes urbains, bien qu'ils font face à de nombreux défis dans la promotion des initiatives de la ville intelligente. Par conséquent, compte tenu de la diversité des pratiques et des exemples de villes intelligentes, il est utile de partager les connaissances et l'expérience des initiatives de chaque pays afin d'améliorer la compréhension mutuelle. À cet égard, la JICA a décidé d'organiser un séminaire pour approfondir la compréhension mutuelle des cas de villes intelligentes et faciliter les discussions entre homologues afin résoudre les problèmes urbains de chaque pays.

Les objectifs du séminaire sont les suivants : 1) échanger sur les connaissances et les problèmes auxquels chaque pays est confronté en ce qui concerne les initiatives de villes intelligentes afin d'approfondir la compréhension des objectifs à atteindre et d'identifier le soutien organisationnel et gouvernemental nécessaire, et 2) échanger les problèmes urbains prévalant dans chaque pays afin de favoriser un discours plus approfondi sur l'efficacité des villes intelligentes en tant que moyen de résoudre les problèmes urbains dans chaque pays.

2. Discussions

Nous avons partagé notre propre expérience, les questions et les défis liés aux activités des villes intelligentes.

De nombreux pays et villes ont formulé des initiatives de villes intelligentes qui couvrent divers secteurs tels que la Planification Urbaine et le développement urbain, la mobilité et les transports urbains, l'environnement, la sécurité et la gouvernance.

La présentation et les discussions ont permis de dégager de nombreux défis clés communs et importants. Ils ont été classés selon les trois thèmes suivants ;

1) Planification urbaine

Les mots clés suivants sont des priorités ou des défis pour la planification urbaine et l'approche de la ville intelligente ;

- Planification intelligente (évaluation, documents d'urbanisme, mise en œuvre, suivi et établissement de rapports à l'aide de technologies intelligentes)
- Gestion de l'information et des données
- Numérisation, digitalisation des plans de ville
- Numérisation, digitalisation des informations foncières
- Cadre de gouvernance
- Mécanisme de mise en œuvre
- Prise en compte de l'identité culturelle

2) Mise en œuvre du plan directeur d'urbanisme et du concept de la Ville Intelligente

La mise en œuvre du plan directeur d'urbanisme et de l'approche "ville intelligente" pose les problèmes suivants ;

- Plan d'urbanisme directeur et plan d'urbanisme de détail
- Comité de gestion
- Gestion des données et de l'information
- Développement des capacités (ressources humaines, institutions/organisations, budget/finances)
- Activités continues et durables (pas de fin)
- Collaboration et coopération entre les différentes parties prenantes, telles que les organisations publiques, privées et internationales, etc.
- Plate-forme / Mise en réseau
- Administration en ligne, accès aux services administratifs

3) Mobilité urbaine / Transports urbains

Voici quelques idées de partage basées sur chaque expérience

- Initiatives et priorités en matière de ville intelligente
- Plateforme de partage des données d'information et de collaboration
- Agences leaders pour la ville intelligente
- Collaboration/coordination entre le gouvernement national et les autorités locales
- Budget et financement (gouvernement, partenaires privés et internationaux), PPP
- Les idées sont importantes pour obtenir le fonds
- Différents modes de transport, Transport durable (environnement)

La promotion des villes intelligentes en tant qu'approche efficace de la planification et du développement urbains est considérée comme efficace, mais les villes intelligentes traitent d'un large éventail de domaines, et il est nécessaire de discuter des domaines qui sont particulièrement

adaptables et efficaces, sur la base des problèmes et des caractéristiques de chaque ville. Il convient également de noter que les villes intelligentes ne sont pas la seule solution.

Bien que l'on pense que les liens entre les villes intelligentes et les plans directeurs de développement urbain puissent être évidents, il est nécessaire de réfléchir à la manière de lier les approches des plans directeurs de développement urbain qui se concentrent sur les perspectives d'avenir à moyen et long terme avec les technologies des villes intelligentes qui évoluent rapidement au jour le jour.

Afin de promouvoir le développement urbain durable et les villes intelligentes, la coopération entre les organisations internationales et les autres acteurs clés restera nécessaire. Le renforcement des capacités institutionnelles et techniques, le partenariat avec le monde universitaire et le secteur privé continueront d'être nécessaires. La promotion des partenariats public-privé dans le domaine du développement urbain est également indéniable.

La mobilité urbaine et les problèmes de transport constituent d'une part, un défi commun pour chaque pays et chaque ville, car ils résultent d'une urbanisation rapide. D'autre part, les modes de transport se diversifient en fonction du niveau de développement urbain et du statut de la ville, et la planification des transports doit être envisagée dans une perspective globale.

3. Conclusion et perspectives d'avenir

Les présentations et les discussions de ce séminaire nous ont permis de tirer de nombreux enseignements précieux. En guise de conclusion, les points suivants méritent d'être soulignés parmi tant d'autres.

- 1) Les présentations ont montré un grand intérêt pour les villes intelligentes, en particulier pour les sujets suivants : Transport / mobilité, Planification, Gouvernance / Financement, Infrastructures et équipements socio-collectifs (Éducation / Santé, Sûreté / Sécurité et Communication, etc.).
- 2) Les villes intelligentes sont efficaces pour résoudre les problèmes urbains, mais elles nécessitent une approche globale et transversale. Pour promouvoir ces approches, il est important de disposer de plans directeurs et de mécanismes de coordination et de coopération entre les différentes parties prenantes. Dans le même temps, le renforcement des capacités doit être encouragé.
- 3) Un défi majeur pour l'avenir est de savoir comment intégrer et coordonner les méthodes traditionnelles de planification générale avec les méthodes innovantes de la ville intelligente.
- 4) Il convient de noter que les villes intelligentes ne sont pas la seule solution, ni une fin en soi. Il est nécessaire d'envisager une approche durable comprenant la résilience, l'inclusivité, la prise en compte des besoins de la population, le changement climatique, ainsi que l'aménagement du territoire et le développement urbain de manière intégrée.

Enfin, nous avons confirmé l'importance du "Séminaire de partage des connaissances sur les initiatives en matière de villes intelligentes en Asie et en Afrique", afin de partager et d'apprendre des expériences des uns et des autres, et de continuer à soutenir et à développer le réseau des pays et des agences participants. Nous nous engageons à renforcer l'échange d'informations, le partage des meilleures pratiques et la discussion des options politiques concernant, sans s'y limiter, les thèmes des villes vertes et résilientes, des villes inclusives et innovantes.

Abidjan, 1er mars 2024