

Data Collection Survey on Digitalization of Public Services
in African Countries

Final Report
(Main Report)

March 2022

Japan International Cooperation Agency (JICA)

International Development Center of Japan
Koei Research and Consulting
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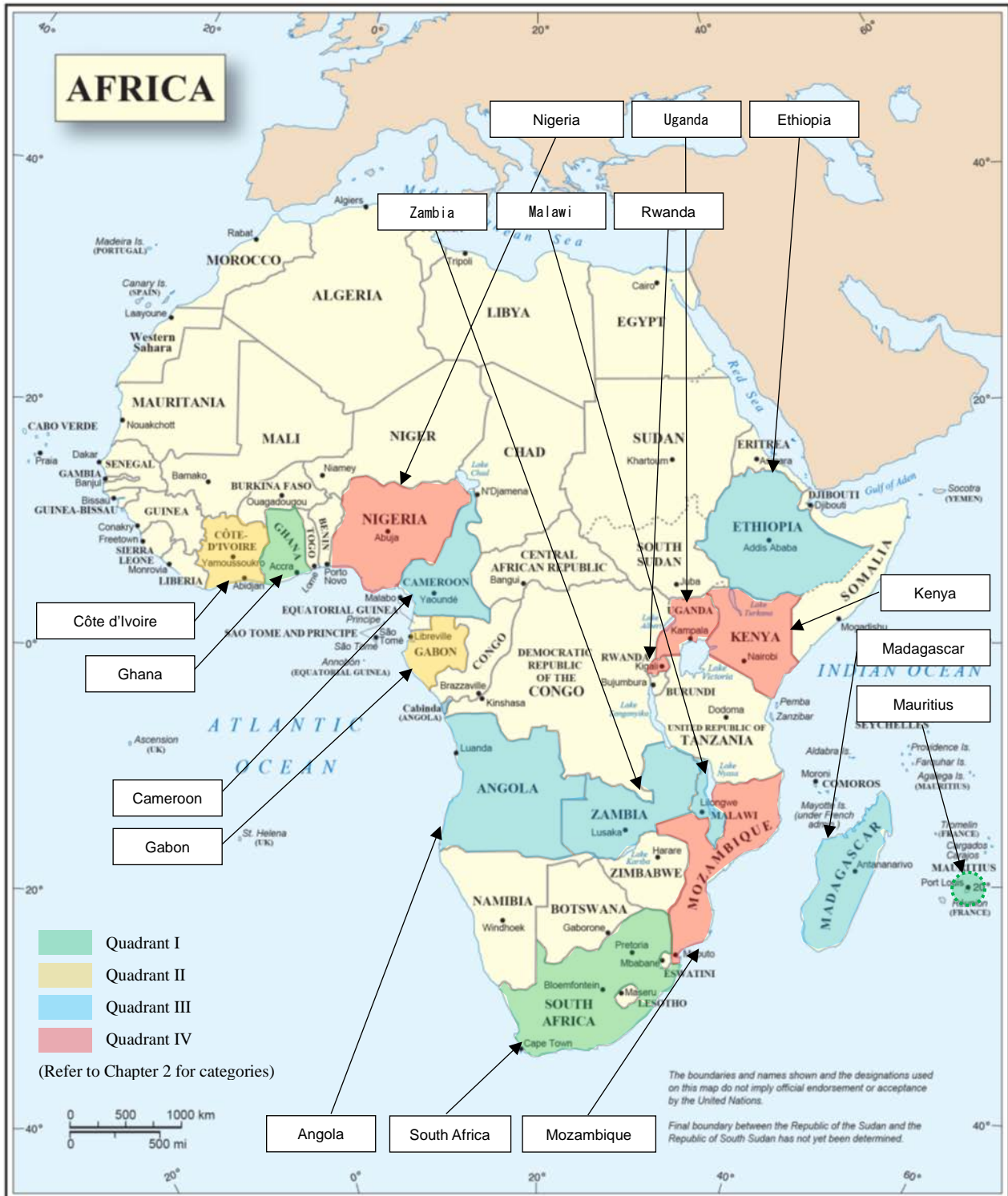
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For currency conversion where necessary, the following exchange rates in February 2022 are applied:

EUR 1 = JPY 128.511000
USD 1 = JPY 115.262000
AOA1 = JPY 0.219900
ETB 1 = JPY 2.322890
GHS 1 = JPY 18.519300
KES 1 = JPY 1.018670
MGA 1 = JPY 0.029150
MWK 1 = JPY 0.144030
MZN 1 = JPY 1.823670
NGN 1 = JPY 0.277620
RWF 1 = JPY 0.115080
ZAR 1 = JPY 7.400860
UGX 1 = JPY 0.033040
XAF 1 = JPY 0.195910
XOF 1 = JPY 0.195910
ZMW 1 = JPY 6.405900

Data Collection Survey on Digitalization of Public Services in African Countries

Location Map of the Target Countries



Map No. 4045 Rev. 8.1 UNITED NATIONS
July 2018

Department of Field Support
Geospatial Information Section (formerly Cartographic Section)

Note: The target countries are colored into four categories described in Chapter 2.

Source: JICA Study Team based on United Nations (<https://www.un.org/Depts/Cartographic/map/profile/africa.pdf>)

Major Socio-Economic Indicators of the Target Countries

Indicators	Kenya	Rwanda	Ethiopia	Uganda	Mozambique
Former suzerain	UK	Belgium	(Independent)	UK	Portugal
Population ('000)	52,573 (2019)	12,626 (2019)	112,078 (2019)	44,270 (2019)	30,366 (2019)
Area ('000 km ²)	580.37	26.34	1,104.30	241.55	786.38
Density (per km ²)	90.59	479.35	101.49	183.27	38.61
GDP (million US)	95,503 (2019)	10,122 (2019)	96,107 (2019)	34,387 (2019)	14,934 (2019)
GNI per capita	1,750 (2019)	2,240 (2019)	850 (2019)	780 (2019)	480 (2019)
GDP Growth Rate	5.37% (2019)	9.41% (2019)	8.28% (2019)	6.51% (2019)	2.22% (2019)
Unemployment	2.64% (2019)	1.03% (2019)	2.08% (2019)	1.84% (2019)	3.24% (2019)
Mobile subscription	96.32% (2018)	78.85% (2018)	37.22% (2017)	57.27% (2018)	41.72% (2018)
Internet users	17.83% (2017)	21.77% (2017)	18.61% (2017)	23.71% (2017)	10.00% (2017)
Account holders	81.57% (2017)	50.02% (2017)	34.83% (2017)	59.20% (2017)	41.67% (2017)
Life expectancy	66.34 (2018)	68.7 (2018)	66.24 (2018)	62.97 (2018)	60.16 (2018)
Death neonatal	19.6 (2018)	15.9 (2018)	28.1 (2018)	19.9 (2018)	27.8 (2018)
Death 5-year-old	41.1 (2018)	56.1 (2018)	55.2 (2018)	46.4 (2018)	73.2 (2018)
Adult HIV	4.7% (2018)	2.5% (2018)	1.0% (2018)	5.7% (2018)	12.6% (2018)
Adult literacy	87.83% (2018)	86.49% (2018)	72.75% (2017)	89.40% (2018)	70.91% (2017)
Primary GER	103.21% (2016)	133.04% (2018)	100.97% (2015)	102.70% (2017)	112.60% (2018)
Primary complete	99.68% (2016)	86.55% (2018)	54.11 (2015)	52.67% (2017)	51.99% (2018)

South Africa	Côte d'Ivoire	Madagascar	Ghana	Nigeria	Cameroon
UK	France	France	UK	UK	France/UK
58,558 (2019)	25,717 (2019)	26,969 (2019)	30,418 (2019)	200,964 (2019)	25,876 (2019)
1,219.09	322.46	587.30	238.54	923.77	475.44
48.03	79.75	45.92	127.52	217.55	54.43
351,431 (2019)	58,792 (2019)	14,084 (2019)	66,984 (2019)	448,120 (2019)	38,760 (2019)
6,040 (2019)	2,290 (2019)	520 (2019)	2,220	2,030 (2019)	1,500 (2019)
0.15% (2019)	6.85% (2019)	4.80% (2019)	6.48% (2019)	2.21% (2019)	4.02% (2019)
28.18% (2019)	3.32% (2019)	1.76% (2019)	4.33% (2019)	8.10% (2019)	3.38% (2019)
159.93% (2018)	134.86% (2018)	40.57% (2017)	137.52% (2018)	88.18% (2018)	73.19% (2018)
56.17% (2017)	46.82% (2018)	9.80% (2017)	39.00% (2017)	42.00% (2017)	23.20% (2017)
69.22% (2017)	41.33% (2017)	17.87% (2017)	57.72% (2017)	39.67% (2017)	34.59% (2017)
63.86 (2018)	57.42 (2018)	66.68 (2018)	63.78 (2018)	54.33 (2018)	58.92 (2018)
10.7 (2018)	33.5 (2018)	20.6 (2018)	23.9 (2018)	36.0 (2018)	26.6 (2018)
33.8 (2018)	81.1 (2015)	53.6 (2018)	47.9 (2018)	119.9 (2018)	76.1 (2018)
20.4% (2018)	2.7% (2017)	0.3% (2018)	1.7% (2018)	1.5% (2018)	3.6% (2018)
95.32% (2017)	58.42% (2018)	81.20% (2018)	92.49% (2018)	75.03% (2018)	85.08% (2018)
100.86% (2016)	99.80% (2018)	142.53% (2018)	114.55% (2018)	84.73% (2016)	103.46% (2018)
87.26% (2016)	71.60% (2017)	65.47% (2018)	93.81% (2018)	NA	64.47% (2018)

Gabon	Angola	Malawi	Mauritius	Zambia	Japan (ref.)
France	Portugal	UK	UK	UK	(Independent)
2,173 (2019)	31,825 (2019)	18,628 (2019)	1,265 (2019)	17,861 (2019)	126,265 (2019)
267.67	1,246.70	118.48	2.04	752.61	377.97
81.18	25.53	157.22	620.10	23.73	334.06
16,658 (2019)	94,635 (2019)	7,667 (2019)	14,180 (2019)	23,064 (2019)	5,081,769 (2019)
7,210 (2019)	3,050 (2019)	380 (2019)	12,740 (2019)	1,450 (2019)	41,690 (2019)
3.39% (2019)	-0.87% (2019)	4.37% (2019)	3.55% (2019)	1.71% (2019)	0.65% (2019)
20.00% (2019)	6.89% (2019)	5.65% (2019)	6.67% (2019)	11.43% (2019)	2.29% (2019)
138.28% (2018)	43.13% (2018)	39.01% (2018)	151.36% (2018)	89.16% (2018)	141.41% (2018)
62.00% (2017)	14.34% (2017)	13.78% (2017)	58.60% (2018)	14.30% (2018)	91.28% (2018)
58.60% (2017)	29.32% (2014)	33.71% (2017)	89.84% (2017)	45.86% (2018)	98.24% (2017)
66.19 (2018)	58.06 (2018)	63.80 (2018)	74.42 (2018)	63.51 (2018)	84.21 (2018)
21.0 (2018)	28.5 (2018)	22.4 (2018)	9.2 (2018)	23.5 (2018)	0.9 (2018)
44.8 (2018)	83.0 (2018)	49.7 (2018)	15.5 (2018)	57.8 (2018)	2.5 (2018)
3.8% (2018)	2.0% (2018)	9.2% (2018)	1.3% (2018)	11.3% (2018)	0.1% (2018)
89.78% (2018)	77.43% (2014)	72.94% (2015)	99.04% (2018)	92.09% (2018)	NA
139.93% (2011)	113.48% (2015)	142.46% (2018)	101.11% (2018)	97.5% (2018)	NA
NA	46.19% (2011)	80.00% (2014)	100.79% (2018)	79.97% (2013)	NA

Source: World Bank (<https://data.worldbank.org/>)

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Abbreviations

(Common)

ACS	African Centre for Statistics, ECA
AFD	Agence française de développement
AfDB	African Development Bank
APAI-CRVS	African Programme for Accelerated Improvement of Civil Registration and Vital Statistics
AU	African Union
BOT	Build-Operate-Transfer
CEDEAO	Communauté économique des états de l'Afrique de l'ouest
COMESA	Common Market for Eastern and Southern Africa
CRVS	Civil Registration and Vital Statistics
CSIRT	Computer Security Incident Response Team
DFID	Department for International Development of the UK
EAC	East African Community
ECA	United Nations Economic Commission for Africa
ECOWAS	Economic Community of West African States
Enabel	Agence belge de développement
EU	European Union
FDI	Foreign Direct Investment
FinTech	Financial Technology
FISP	Farmer Input Support Programme
GDP	Gross Domestic Product
GFF	Global Financing Facility (World Bank Group)
GNI	Gross National Income
GSM	Global System for Mobile Communication
GSMA	GSM Association
ICAO	International Civil Aviation Organization
ICD	International Classification of Diseases
ICT	Information and Communication Technology
ID	Identification (Document)
ID4D	Identification for Development
IDI	ICT Development Index
ILO	International Labour Organization
ISO	International Organization for Standardization
ISP	Internet Service Provider
ITU	International Telecommunication Union
IXP	Internet eXchange Point
JICA	Japan International Cooperation Agency
JETRO	Japan External Trade Organization
KYC	Know Your Customer
MDGs	Millennium Development Goals
MDTF	Multi-Donor Trust Fund
MOSIP	Modular Open-Source Identity Platform
NEPAD	New Partnership for Africa's Development
NFC	Near-Field Communication
ODA	Official Development Assistance
PIN	Personal Identification Number
PPP	Public-Private Partnership
SADC	Southern Africa Development Community
SDGs	Sustainable Development Goals
SIM	Subscriber Identification Module
SME	Small and Medium Enterprises
UHC	Universal Health Coverage
UIN	Unique Identity Number
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund

UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
USO	Universal Service Obligation
WBG	World Bank Group
WHO	World Health Organization
(Kenya)	
CRS	Civil Registration Services
ICTA	ICT Authority
MICT	Ministry of Information and Communications Technology, Innovation, and Youth Affairs
MLSP	Ministry of Labour and Social Protection
MoE	Ministry of Education
MoH	Ministry of Health
NRB	National Registration Bureau
(Rwanda)	
MICTI	Ministry of ICT and Innovations
MINAGRI	Ministry of Agriculture and Animal Resources
MINEDUC	Ministry of Education
NIDA	National Identification Agency
MoH	Ministry of Health
RISA	Rwanda Information Society Authority
RRA	Rwanda Revenue Authority
RSSB	Rwanda Social Security Board
RURA	Rwanda Utility Regulatory Agency
(Ethiopia)	
ESSTI	Ethiopian Space Science and Technology Institute
MINT	Ministry of Innovation and Technology
MLSA	Ministry of Labour and Social Affairs
MoE	Ministry of Education
MoH	Ministry of Health
VERA	Vital Events Registration Agency
(Uganda)	
MES	Ministry of Education and Sports
MGLSD	Ministry of Gender, Labour and Social Development
MICT	Ministry of ICT and National Guidance
MoH	Ministry of Health
NIRA	National Identification and Registration Authority
NITA	National Information Technology Agency
UCC	Uganda Communication Commission
URSB	Uganda Registration Services Bureau
(Mozambique)	
DIC	Direcção de Identificação Civil
INAGE	Instituto Nacional de Governo Electrónico
INTIC	Instituto Nacional de Tecnologias de Informação e Comunicação
MEDH	Ministério da Educação e Desenvolvimento Humano
MITESS	Ministério do Trabalho, Emprego e Segurança Social
MS	Ministério da Saúde
MTC	Ministério dos Transportes e Comunicações
(South Africa)	
DAFF	Department of Agriculture, Forestry and Fisheries
DBE	Department of Basic Education

DCDT	Department of Communications and Digital Technologies
DHA	Department of Home Affairs
DoH	Department of Health
DSD	Department of Social Development
DTPS	Department of Telecommunications and Postal Services
SITA	State Information Technology Agency
(Ghana)	
MCD	Ministry of Communications and Digitalisation
MFA	Ministry of Food and Agriculture
MGCSP	Ministry of Gender, Children and Social Protection
MoH	Ministry of Health
NHIA	National Health Insurance Authority
NIA	National Identification Authority
NITA	National Information Technology Agency
(Nigeria)	
MARD	Ministry of Agriculture and Rural Development
MCDE	Ministry of Communications and Digital Economy
MHADMSD	Ministry of Humanitarian Affairs, Disaster Management and Social Development
MoE	Ministry of Education
MoH	Ministry of Health
NCC	Nigerian Communication Commission
NIMC	National Identity Management Commission
NITDA	National Information Technology Development Agency
(Angola)	
INACOM	Instituto Angolano das Telecomunicações
ME	Ministério da Educação
MS	Ministério da Saúde
MTTICS	Ministério das Telecomunicações, Tecnologias de Informação e Comunicação Social
(Malawi)	
MCRA	Malawi Communications Regulatory Authority
MEST	Ministry of Education, Science and Technology
MHP	Ministry of Health and Population
MITA	Malawi Information Technology Authority
MoI	Ministry of Information
NRB	National Registration Bureau
(Mauritius)	
ICTA	Information and Communication Technologies Authority
METST	Ministry of Education, Tertiary education, Science and Technology
MITCI	Ministry of Information Technology, Communications, and Innovations
MoH	Ministry of Health
MSSNA	Ministry of Social Security and National Solidarity
(Zambia)	
DNPRC	Department of National Registration, Passports and Citizenship
MGE	Ministry of General Education
MoA	Ministry of Agriculture
MoH	Ministry of Health
MTC	Ministry of Transport and Communications
ZICTA	Zambia Information and Communication Technology Authority

1 Introduction

1.1 Background of the Survey

The Novel Coronavirus Disease (COVID-19) may remain influential for a period and force people to live together. Therefore, it is required to deliver the necessary public services to people who need them by avoiding close contacts as much as possible, for example, distance learning and cash transfer.

For example, in Estonia, digitization of the public services contributes to the realization of fair elections, improved tax collection, participation in economic activities by using ID (opening bank account, finding jobs, acquiring housing, etc.), infant care including vaccination, basic education, prevention of corruption, improved security, etc. Digital national ID must be an important infrastructure fundamentally necessary both for the nation and the people to guarantee basic human rights and promote “human security”.

The Identification for Development Initiative (ID4D), established in 2014 with the World Bank as secretariat, aims at coping with this issue. ID4D has been conducting various activities, including collecting information, supporting introduction, and providing advice regarding national ID in developing countries. ID4D regards the national ID as a tool to contribute to many targets of SDGs in addition to SDGs Target 16.9 “By 2030, provide legal identity for all, including birth registration”.

Meanwhile, the progress of digitization for public services in Africa differs country by country. It is necessary to collect related information about the national ID and ICT infrastructure such as the internet, data centers, etc. ICT human resources and legal system, digital government platform, digitization of various public services, etc. On the other hand, the activities of development partners and the private sector in each country may vary. In addition, a secure exchange method of data and information must be taken into consideration.

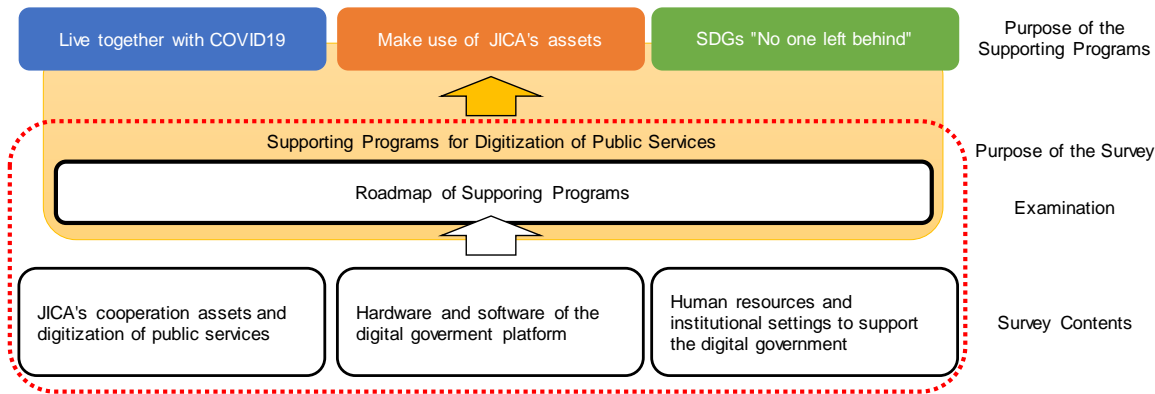
1.2 Purpose of the Survey and Target Areas

The purpose of the Survey is to propose JICA supporting programs with a roadmap for each target country by selecting the most appropriate approach and based on the analysis of the data and information in the following box, which may contribute to the mid to long-term assistance in the digitization of public services.

- | |
|---|
| <ol style="list-style-type: none">1. JICA’s cooperation assets and digitization of public services: health care (mother-and-baby notebook, etc.), education (teacher training, teaching and learning materials, school building, teaching method, etc.)2. Hardware and software of the digital government: preparation for the digital platform, connection of the existing platform with external networks, improvement of broadband internet and ITC infrastructure, etc.3. Human resources and institutional settings to support the digital government: Human resource development in ICT, promotion of digital services, protection of individual information, cybersecurity, pricing policy, etc. |
|---|

The proposed supporting programs must aim at 1) coexistence with COVID-19, 2) efficient use of JICA’s cooperation assets, and 3) achievement of SDGs’ slogan “No one left behind”.

Figure 1.2.1 Purpose of the Survey and the Support Program to be Proposed



Source: JICA Study Team

The Survey will target the following sixteen countries in Africa.

Kenya, Rwanda, Ethiopia, Uganda, Mozambique, South Africa, Côte d’Ivoire, Madagascar, Ghana, Nigeria, Cameroon, Gabon, Angola, Malawi, Mauritius, and Zambia.

1.3 Methodology

JICA Study Team followed the work items in the following table: preparatory work in Japan, fieldwork in each country, and examination in Japan, to formulate the support programs with a roadmap for each country.

Table 1.3.1 Basic Process of the Study

Preparatory Work in Japan	Fieldwork	Examination in Japan
(A) Analysis of the Available Data	(B) Field Survey and Interviews	(C) Proposal for Support Program
<ul style="list-style-type: none"> National Development Plans Current situation and strategy for digitalization of public services Country Assistance Policy of the Government of Japan Priority Area of JICA <p>↓</p> <ul style="list-style-type: none"> Hypotheses for Support Program 	<ul style="list-style-type: none"> Interview with JICA Office to specify the priority areas <p>↓</p> <ul style="list-style-type: none"> Interview with the target organizations Collection of relevant data Site visits, etc. <p>↓</p> <ul style="list-style-type: none"> Discussion with JICA Office to share the proposed roadmap 	<ol style="list-style-type: none"> 1. Technical cooperation for improving the ICT environment 2. Technical cooperation in specific sectors, e.g., health, education 3. Financing in ICT infrastructure 4. Backing up the private sector’s SDGs business 5. Collaboration with other development partners

Source: JICA Study Team

In the preparatory work in Japan, JICA Study Team examined priority areas for the study in line with the national development plans, policy for digitalization of public services in each country, and the Country Assistance Policy of the Government of Japan. Then, JICA Study Team prepared possible support areas for each country, which are expected to realize the coexistence with COVID-19 and the SDGs slogan “No one left behind” by utilizing JICA’s cooperation assets.

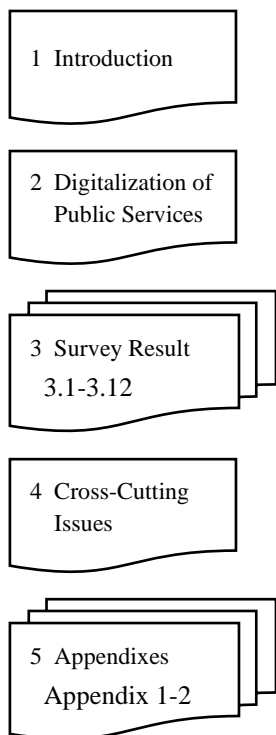
In the fieldwork in each country, the JICA Study Team collected information on “JICA’s cooperation assets and the current situation and strategy digitalization of public services”, “Hardware and software of the digital government”, and “Human resources and institutional settings to support the digital government”. It was made through interviews and site visits as previously mentioned in Section 1.2 “Purpose of the Survey”.

Finally, in Japan, JICA Study Team examined supporting programs with a roadmap that contribute to 1) coexistence with COVID-19, 2) efficient use of JICA's cooperation assets, and 3) achievement of SDGs slogan "No one left behind" based on the result of the analysis. According to the five solution approaches listed in Table 1.3.1 "Basic Process of the Study", JICA Study Team will propose the support programs.

1.4 Composition of the Report

The Draft Final Report is composed of five chapters as indicated below.

Figure 1.4.1 Composition of the Report



Source: JICA Study Team

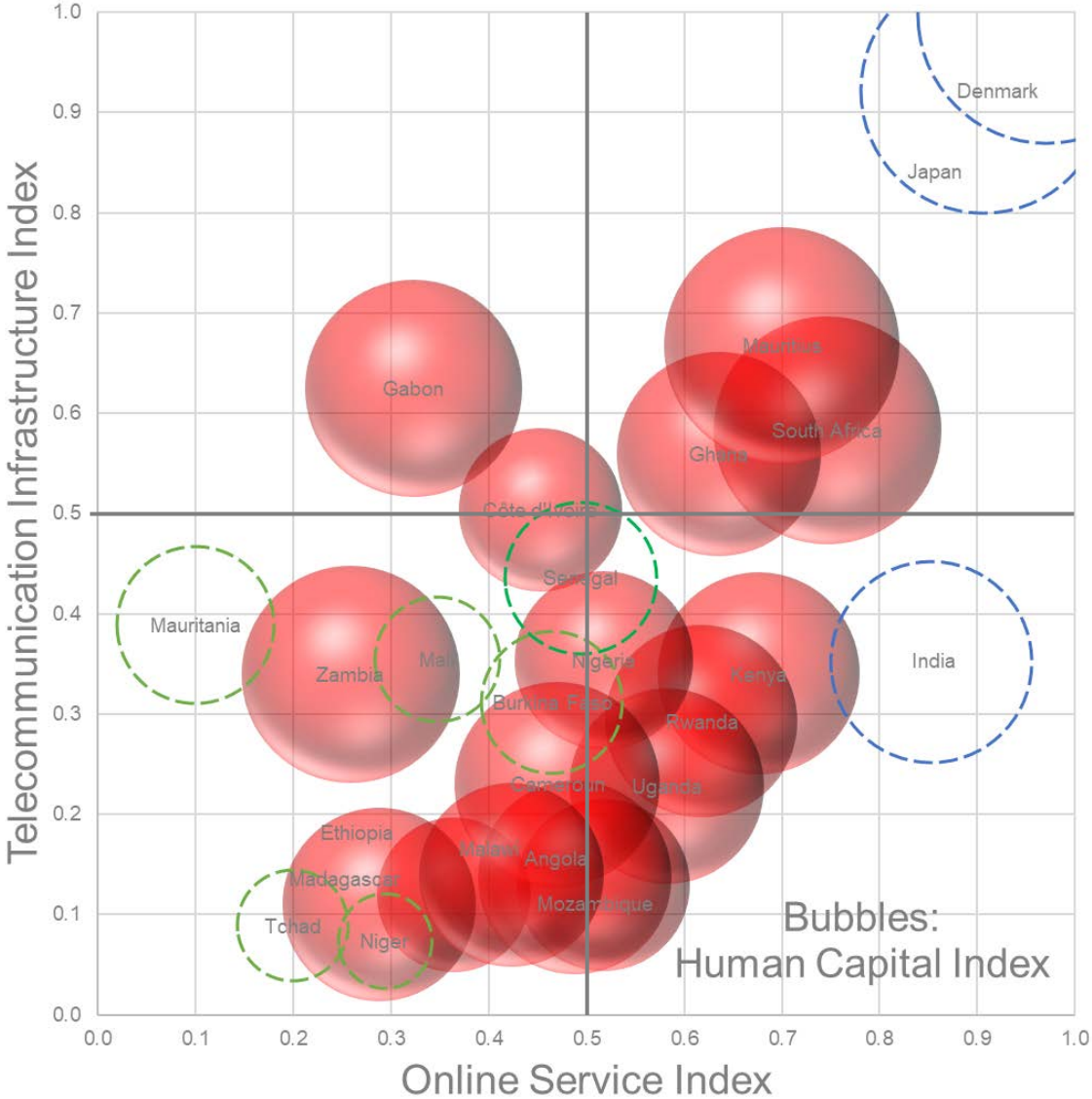
2 Digitalization of Public Services in African Countries

2.1 UN E-Government Survey

The United Nations Department of Economic and Social Affairs (UN DESA) surveys the development status of e-government in each country every two years, and publishes the e-government development index (EGDI), with its calculation basis of Online Service Index (OSI), Telecommunications Infrastructure Index. (TII), and Human Capital Index (HCI).

The figure below shows the results of the 16 target countries, compared with Denmark (ranked at the first in the world), Japan (14th), India ranked (100th), and G5 Sahel countries (Mali, Burkina Faso, Niger, Mauritania, and Chad).

Figure 2.1.1 Positioning of Target Countries in UN E-Government Survey 2020



Source: Prepared by JICA Study Team based on the UN E-Government Survey 2020

From the above figure, the situation of digitization of public services in each country and its position in

comparison with neighboring countries can be understood. The table below summarizes the classification by the Study Team and the preliminary direction of support.

Table 2.1.1 Classification of Target Countries by UN E-Government Survey 2020

Quadrants	Target Countries	Characteristics and Preliminary Direction of Support
I	Mauritius South Africa Ghana	<ul style="list-style-type: none"> OSI, TII, HCI are high, and considered to be the advanced group Considered to be a reference for other target countries, Study Team will learn experience and explore potential as partners.
II	Gabon Côte d'Ivoire	<ul style="list-style-type: none"> TII is relatively high, but OSI is less than half. It is thought that many people own and utilize digital devices, and there is an environment that promotes the digitization of public services. Study Team will consider digitizing public services to meet potential needs.
III	Zambia Cameroon Angola Malawi Madagascar Ethiopia	<ul style="list-style-type: none"> Both OSI and TII have not reached half. It seems that many people are not in an environment where they can own and utilize digital devices. It is necessary to develop communication infrastructure and ICT literacy at the same time, and prioritize the use of digital technology at certain bases rather than widely disseminate online services.
IV	Nigeria Kenya Rwanda Uganda Mozambique	<ul style="list-style-type: none"> Although TII is still low, OLS is relatively high. Despite large disparities within the group, many countries can approach quadrant I by promoting digital devices and improving ICT literacy. Stud Team identifies the obstacles and considers support for entering quadrant I.

Note: The direction of support here is a hypothesis and will be verified based on the analysis of each target country.

Source: Prepared by JICA Study Team based on the UN E-Government Survey 2020

2.2 EC E-Governance Systems Survey

In 2019, the European Commission prepared a research report¹ that serves as guidelines and a roadmap for e-governance development in African countries. The table below summarizes trends of e-government and digital ID in the 16 target countries according to the four categories of quadrants described in the previous Section.

Table 2.2.1 Trends of E-Governance and Digital ID by EC E-Governance Systems Survey

Target Country	Trends in E-Governance	Trends in Digital ID
Quadrant I		
Mauritius	<ul style="list-style-type: none"> In its endeavour to develop Mauritius into a Cyber Island and to create an ICT-literate nation, the Government has clearly identified e-governance as a key initiative which can radically transform the way the Government interacts with citizens and businesses and define the nature of relationships across various Ministries and departments in providing seamless, consistent and value-added public services. The vision of the Government is to provide an effective and efficient delivery of services, on a 24/7 basis, to citizens as well as to the business community. In this respect, the Government has invested in the necessary infrastructure, namely, the Government Online Centre and the Government Web Portal as a gateway to provide Government services online. Mauritius is home to three mobile operators including Emtel, Orange and Mahanagar Telephone Mauritius. This is in addition to the fixed phone operator, Mauritius Telecom. The establishment of a new techno park, a third submarine fibre optic cable as well as enhanced integration of ICT and business, shows that the country is boosting competitiveness in the ICT sector. The country's ICT strength is in line with the government's Smart Mauritius Strategy. The World Economic Forum last year identified Mauritius as the third best country when it comes to telcom and internet connectivity costs in its Global Information Technology Report. For the next years, Mauritius's new e-Government strategy will include initiatives such as Open Government Data to empower citizens and businesses with data building blocks for data analysis and development of mobile apps; as well as a Data Sharing Policy which will make it possible for Government agencies to 	<ul style="list-style-type: none"> The national digital ID card is chip-based smart card. This card is linked to the population database to serve as an ID document, and prove identity and allow secure and reliable e-service transactions. In 2015, the Registrar- General Department (RGD) announced that Mauritius is planning to implement the second phase of its e-Registry Project (MeRP) to provide e-services and facilitate e-submission of documents, e-payment of fees, e-registration, e-search, and e-delivery of registered documents. According to the World Bank, presently, 99 percent of the population in Mauritius has either has a national ID or a voter ID.

¹ Guidelines and Roadmap for full deployment of e-governance systems in Africa, January 2019

	capture data once and share it among themselves. The strategy will also include an Open-Source Software Policy to outline the country's willingness to develop an open-source software industry.	
South Africa	<ul style="list-style-type: none"> • The South African government has established statutory bodies to co-ordinate implementation of e-Government projects. Amongst these are the State Information Technology Agency (SITA) and Government Information Technology Officers Council (GITO Council). • SITA is responsible for the acquisition, installation, implementation, and maintenance of IT in the public sector. The GITO Council, which consists of national and provincial IT officers, is responsible for consolidating and coordinating IT initiatives in government, including e-governance, to facilitate service delivery. • For the South African government, the focus is on G2G (government-to-government), G2BC (Government to Business & Citizen) and G2C (government-to-citizen) activities. • Improved service delivery is facilitated by building e-governance awareness, being a model user in eGovernment centres of excellence, working towards one government information and communication channel (one portal, one call centre, etc.) and above all providing expertise on e-services. • Amongst the ICT initiatives are: Cape Gateway Project, Cape Information Technology Initiative (CITI), Telecentres in rural areas in South Africa, SchoolNet South Africa Project, Mindset Network Organisation and the Khanya Project. Other examples include the e-Natis online vehicle and transport management system, the e-Justice programme to improve judicial processes, the e-Hanis programme to streamline and integrate personal identification data across government departments through the use of unique identifiers, and the National Automated Archival Information Retrieval System (NAAIRS) to facilitate access to public archived records. 	<ul style="list-style-type: none"> • In February 2015, the government of South Africa set up a pilot to roll out the national smart identity card in collaboration with the country's banks. • The smart ID roll-out is expected to be a seven-year long process. Some of the goals of the digitisation project launched in 2016 by the Minister of Home Affairs, Mr Malusi Gigaba, are: • 5.8 million birth records to be digitised per year; • Records will be indexed by ID number for easy retrieval; • Immediate access to a digitised document irrespective of office location; • Electronic records can be viewed / accessed by more than one person simultaneously.
Ghana	<ul style="list-style-type: none"> • Ghana's e-Government Interoperability Framework (e-GIF) is a set of policies, technical standards, and guidelines covering ways to achieve interoperability of public-sector data and information resources, ICT, and electronic business 	<ul style="list-style-type: none"> • Ghana national e-ID cards enable identification of individuals based on biometric information, specifically fingerprints. The card also carries the holder's signature. According to the World Bank report 2017, the National

	processes.	Identification Authority is planning to upgrade the existing identification system to accommodate institutional identity services requirements, and to harmonize all ID systems in Ghana.
Quadrant II		
Gabon	<ul style="list-style-type: none"> Gabon has adopted a plan for the development of government, but it is slow to implement due to many challenges including lack of budget, aggravated by the oil crisis; inadequate broadband communication infrastructure; lack of regulation on the sectors of information society, electronic transactions, cyber criminality; and insufficiently qualified manpower. The country's e-government plan has 3 main components: a "front-office" platform consisting of on-line services for citizens and companies; a "back office" platform consisting of business and administration applications, services and collaborative tools to enhance the government staff productivity; dashboards and decision-support tools for state decision-makers. 	<ul style="list-style-type: none"> Gabon's digital ID was approved in 2011 and introduced in 2013 for local elections. A reliable national biometric registry was built to replace paper-based records with digital records. According to the World Bank, Gabon's government is currently implementing a public key infrastructure to facilitate integration of the national biometric ID programme into future e-government services.
Côte d'Ivoire	<ul style="list-style-type: none"> No initiatives were found. 	<ul style="list-style-type: none"> Two systems exist. The National Identification Office (Office national d'identification, ONI), the public institution that since 2001 has issued identity documents to Ivorians and foreigners in Côte d'Ivoire. Another is the biometric identification system for the almost 4 million people covered by Caisse Nationale d'Assurance Maladie, the national health insurance fund. The latter e-ID card, among other things, also provides a mechanism for authentication.
Quadrant III		
Zambia	<ul style="list-style-type: none"> President Edgar Lungu launched in 2015 the e-government division which he said will contribute to reducing transaction costs and improve productivity. The country's aim is to leverage on e-governance to increase productivity and reduce the cost of doing business by way of having a centralised and standardised government ICTs infrastructure. 	<ul style="list-style-type: none"> Since 2013, the Zambian government have issued a national registration card, (NRC) which today is a low-tech national ID that captures among other features right thumbprint on a card. More than 83 % the eligible population over 16 years of age have national e-ID. The project for launching the upgrading of national e-ID was sponsored by the United National Development Programme.
Cameroon	<ul style="list-style-type: none"> Cameroon has the ambition of becoming a tech hub in Africa, therefore, they created the Digital Cameroon initiative. Expected to be fully implemented by 2020, its goals are developing broadband structure; raising production and offer of digital contents; promoting digital culture; 	<ul style="list-style-type: none"> Cameroon began issuing electronic ID cards in 2013. These electronic IDs were meant to be used for multiple electronic services such as civil identification and health and social services. Biometric ID cards have been introduced in August of 2016.

	improving governance and institutional support among other things.	<ul style="list-style-type: none"> As of early 2017, Cameroon was in the process of reviving its national identification programme.
Angola	<ul style="list-style-type: none"> The Angolan government decided to replace its outdated national identity documents in the mid-2000s with an ID card system that was not only counterfeit-resistant and durable, but would also provide proof of identity to its entire population of 24.3 million citizens - a daunting task given that 62% of the population lives in widely dispersed urban areas and 38% live in hard to access rural areas. 	<ul style="list-style-type: none"> The ID Card program was implemented by 2015.
Malawi	<ul style="list-style-type: none"> The Malawi government has been implementing an e-governance model for the past five years, as a public sector reform initiative to harness ICTs in the provision of government services and enhance efficiency, transparency and accountability to its citizens. The overall aim is to promote the country's socioeconomic development, supporting the aspirations of Vision 2020, with priority being given to ICT activities contributing to poverty reduction. The e-Government element focuses on the modernisation and improved efficiency of public services. Specific strategies have been designed to improve productivity, efficiency, effectiveness and service delivery through institutional and organisational reforms. An e-Legislation project currently exists to set up a responsive ICT Legal framework to facilitate competition, development and participation of Malawi in the Information Society 	<ul style="list-style-type: none"> The United Nations Development Programme (UNDP) is spearheading an effort to launch an electronic identity initiative program known as National Registration and Identification System (NRIS). This initiative will issue chip based smart ID cards and set up a multi-modal biometrics database to register all Malawians 16 years older. According to the World Bank, after completion of the design of the infrastructure to use biometrically secure smart cards, and obtaining of necessary equipment, Malawi will begin mass registration of all eligible Malawians within the country - an estimated 9 million individuals. Malawi hopes to transition to a system of continuous registration in 2018. The mass registration process was planned in June 2017.
Madagascar	<ul style="list-style-type: none"> No initiatives were found. 	<ul style="list-style-type: none"> Since 1961, paper-based ID card has been issued to all the citizens over 18 years of age. There are no data available regarding the issuance and coverage of the paper-based carte nationale d'identité.
Ethiopia	<ul style="list-style-type: none"> The e-Government strategy for Ethiopia has been designed, with a focus on facilitating effective delivery of government services to customers (residents, businesses and visitors). The strategy envisages implementation of 219 e-services comprising of 77 informational and 134 transactional services over a five-year period. The implementation is proposed to be done through twelve priority projects and service delivery would be through four channels (Portal, Call centre, Mobile devices and 	<ul style="list-style-type: none"> Only paper cards exist and they differ in content and appearance across the country and have no security features. The issuing officer verifies the card after confirming the user's identity. These cards are used for many private and public-sector transactions (for food aid).

	<p>Common service centres).</p> <ul style="list-style-type: none"> The plan was approved in 2011 and all 219 e-services were slated to completion by 2015. 	
Quadrant IV		
Nigeria	<ul style="list-style-type: none"> The National eGovernment Strategies (NeGST) project was designed to reduce the bureaucracy that attends to government businesses in the country through the introduction of e-Tax, e-Learning, e-Traffic, e-Procurement, e-Pricing, e-Mail, e-Tourism, e-Payment, e-Revenue, e-Legislation, e-Policing, e-Judiciary, e-Health, e-Agriculture, e-Services, e-Kiosk, e-Buka (e-Cafeteria) etc. Presently the NeGST has online presence at: http://www.negst.com. Similarly, all the Federal ministries are online, and the country has commenced online payment for services in such areas as tax, company registration, online booking, e-Banking etc. 	<ul style="list-style-type: none"> Nigerian national ID is a microprocessor chip-based general multipurpose ID card, with 13 applications including ID verification, authentication, and payment technology to help promote financial inclusion. The chip stores an individual's biometric information of 10 fingerprints and an iris scan. According to the World Bank report of 2017, so far in Nigeria 16 million of the total population of 173.6 million have been registered (i.e., 3.5 percent) and 418,000 national e-ID cards issued. MasterCard is providing the prepaid payment element and it hopes millions of Nigerians without bank accounts will gain access to financial services.
Kenya	<ul style="list-style-type: none"> Kenya is a successful case of e-governance, with a strategy that was planned in 2013 and in 2015 had already led to these e-governance platforms: a new website; an e-citizen platform; an open data platform containing census data and government reports; one-stop shops (Huduma centres) for those who need individualised IT support to engage with government services, such as filing tax returns online. The Kenyan government has sought to engage the public through social media and mobile services, most notably the development of applications that integrate with the nation's company registry, allowing people to search company and business names via mobile. 	<ul style="list-style-type: none"> According to the World Bank, thus far, Kenya has issued 24 million ID cards, but this total may include duplicates as well as the inactive cards of deceased individuals. There are about 1.2 million new registrations each year. National e-ID is central to multiple civic activities. In 2015, MasterCard planned to develop a Smart Card ID with Kenyan banks that will be used to pay for government services and distribute welfare, according to regional media. The programme contained a goal to integrate all services offered through the centres providing a cash payment option for government services.
Rwanda	<ul style="list-style-type: none"> Rwanda Online project to avail all government services online. The country shall have on board 74 services online by end of 2017, avoiding long queues of service seekers by using ICT. The 4G internet coverage will cover 95% of the country by 2017. 	<ul style="list-style-type: none"> Rwanda's national ID system is one the most advanced and well-functioning in Africa. According to the World Bank, in 2017 over 95 % coverage among the eligible population has been achieved. Rwanda's national ID is a secure card with a 2D bar code on the back but without a chip. While there is currently no biometric verification, service providers can access a secure online portal where they can verify identity and biographic data using a person's national ID number. Rwanda is planning soon to introduce an optional multipurpose smart card, among other features enabling biometric verification and machine-readable features. The use of a highly developed system will

		allow identity to unlock programmes of social protection, healthcare and mobile payments.
Uganda	<ul style="list-style-type: none"> An eGovernment Masterplan has been put in place to guide e-governance implementation over the next five years. Uganda is currently implementing ICT-related initiatives in the areas of e-Infrastructure (Research and Education Network Uganda, Broadband Services ERT Programme, National Backbone, Migration from Analogue to Digital Broadcasting Project, e-Network project), eGovernment (Electronic Government Infrastructure, Voter Registration, National Identify Cards project, ICT4Democracy in East Africa project), Technology-enhanced Learning (Connect Ed project, National Curriculum Development Centre, VSAT project, School Net Uganda, Content Development at National Teachers Colleges, Connecting Classrooms project, Improving Learning Outcomes through ICT project, ITELE for ICT project, Helping teachers use ICT for Teaching project), eHealth (Improving health care delivery, Health Child project, Electronic Rural Health Information Project, Malaria Diagnostic Systems project), eCommerce (District Business Information Systems, Reflect ICT Resource Centre, Village Phone Project), ICT for Rural Development and Entrepreneurship (Microsoft Innovation Centre). 	<ul style="list-style-type: none"> The national ID card is a secure card without a chip. According to the World Bank, at this stage in 2017, biographic verification services before offering biometric verification is planned. In addition, consolidation of data into a single social registry that will use unique identifier based on e-ID together with biometric verification will be implemented.
Mozambique	<ul style="list-style-type: none"> The Information and Communication Technology Policy for Mozambique was approved by the Council of Ministers' Resolution No. 28/2000, on 12 December 2000. The Information and Communication Technology Policy Implementation Strategy was approved by the Council of Ministers on 27 June 2002. The eGovernment Interoperability Framework for Mozambique was published by UTICT in October 2010. The Mozambique eGovernment and Communications Infrastructure Project (MEGCIP) is an initiative funded by the World Bank and implemented by the Government of Mozambique during the last six years (2010-2016). The MEGCIP main objectives were: first to support the extension of geographical coverage of data communications networks and reduction of data communication services; second to promote the use of e-governance platforms, applications and services to improve the 	<ul style="list-style-type: none"> National ID: Mozambique's national ID is a laminated card with a magnetic strip that contains among other features also a unique national ID number, biometrics (fingerprints) and signature of the user. In 2017, Mozambique is to adopt a unique identification number system to gather together all the data on citizens. With the new system, the numbers on identity cards, driving licenses, civil registration and passports will be the same, making it easier to obtain citizen's data.

	provision of public services and the participation of the citizen in the governance of the country.	
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Source: Guidelines and Roadmap for full deployment of e-governance systems in Africa, January 2019

From the above table, the target countries classified into quadrants I and IV have e-government and national digital ID in place, while the target countries classified into quadrants II and III have those in trouble or just started.

2.3 Trends of International Initiatives and Development Partners

(1) UN Agencies

UN agencies such as UNDP and UNICEF are promoting Legal Identity Agenda (LIA). It aims at guaranteeing human security by giving legal IDs to all people, but while ID4D of the World Bank focuses people after the age of acquisition of national IDs, UN LIA puts more emphasis on birth registration.

Table 2.3.1 Digitalization Projects by UN Agencies in the Target Countries

Country	Digitalization Projects
Kenya	<ul style="list-style-type: none"> UNDP: UNLIA
Rwanda	NA
Ethiopia	<ul style="list-style-type: none"> UNDP: UNLIA
Uganda	<ul style="list-style-type: none"> UNICEF: Health Education and Training (HEAT)
Mozambique	<ul style="list-style-type: none"> WHO: Developing SISMA (health information system) UNICEF: Mobile app (upSCALE) for community health workers UNDP: UNLIA
South Africa	<ul style="list-style-type: none"> UNICEF: Health Education and Training Project by e-Learning (HEAT)
Côte d'Ivoire	<ul style="list-style-type: none"> UNDP: Lab Accelerator Initiative UNDP: UNLIA
Madagascar	<ul style="list-style-type: none"> UNDP e-Procurement System
Ghana	<ul style="list-style-type: none"> UNFPA: e-Learning for midwives
Nigeria	<ul style="list-style-type: none"> UNICEF: Health Education and Training (HEAT) UNDP: UNLIA
Cameroon	<ul style="list-style-type: none"> UNDP: UNLIA
Gabon	NA
Angola	NA
Malawi	<ul style="list-style-type: none"> UNDP: National Registration and Identification System Project
Mauritius	<ul style="list-style-type: none"> UNDP: Social Registry for Mauritius
Zambia	<ul style="list-style-type: none"> UNDP: UNLIA

Source: UN Agencies

(2) World Bank

The World Bank is implementing or preparing digitalization support projects with different approaches such as the development and utilization of digital national IDs based on the ID4D initiative, the establishment of e-government based on the digital economy initiative, and digitalization in other specific sectors.

Table 2.3.2 Digitalization Projects by World Bank in the Target Countries

Country	Digitalization Projects	Projects in Specific Sector
Kenya	<ul style="list-style-type: none"> Digital Economy Acceleration (On going) Digital Transformation Project (Pipeline) 	<ul style="list-style-type: none"> Information tool for pregnant women on childbirth/examination (Baby monitor) Kenya Social and Economic Inclusion Project 2018-2023 (On going)
Rwanda	<ul style="list-style-type: none"> Digital Acceleration Project (Pipeline) 	<ul style="list-style-type: none"> Human Capital for Inclusive Growth Development Policy Financing (On going)
Ethiopia	<ul style="list-style-type: none"> Ethiopia Digital Foundation Project (Pipeline) 	<ul style="list-style-type: none"> Electronic Single Window (eSW) for Trade (On going) Urban Productive Safety Net and Jobs Project (On going) Strengthen Ethiopia's Adaptive Safety Net Project 2022 (On going)
Uganda	<ul style="list-style-type: none"> Digital Acceleration Program (On going) Regional Communications Infrastructure 	<ul style="list-style-type: none"> Reproductive, Maternal and Child Health Services Improvement Project (On going)

	Program Phase 5 (On going)	<ul style="list-style-type: none"> • Secondary Education Expansion Project (On going) • Third Northern Uganda Social Action Fund Project (NUSAF 3) 2016-2021
Mozambique	<ul style="list-style-type: none"> • Digital Governance and Economy Project-EDGE (pipeline) 	<ul style="list-style-type: none"> • Improvement of Skills Development (On going) • Second Additional Financing for the Social Protection Project and Support to Cyclone and Flood Emergencies 2019-2024 (On going)
South Africa	NA	NA
Côte d'Ivoire	<ul style="list-style-type: none"> • West Africa Unique Identification for Regional Integration and Inclusion (WURI) – Phase 1 (On going) 	<ul style="list-style-type: none"> • E-Agriculture Project (On going) • Social Protection and Economic Inclusion Project 2019-2024
Madagascar	<ul style="list-style-type: none"> • Digital Governance and Identification Management System Project- PRODIGY (On going) 	<ul style="list-style-type: none"> • Social Safety Net Project 2015-2020
Ghana	<ul style="list-style-type: none"> • e-Transform Ghana Project 	<ul style="list-style-type: none"> • Support to midwives • Ghana Productive Safety Net Project (GPSNP-2) (2021-2024) (On going)
Nigeria	<ul style="list-style-type: none"> • Digital Identification for Development Project (On going) (Co-financed by EIB and AFD) 	<ul style="list-style-type: none"> • Edo Basic Education Sector and Skills Transformation Operation (On going) • Adolescent Girls Initiative for Learning and Empowerment (On going) • National Social Safety Net Project, 2016-2022 (On going)
Cameroon	<ul style="list-style-type: none"> • Program for the Acceleration of the Digital Transformation (Pipeline) 	<ul style="list-style-type: none"> • Health System Performance Reinforcement Project (On going) • Secondary Education and Skills Development Project (On going) • Social Safety Nets Project (On going)
Gabon	<ul style="list-style-type: none"> • eGabon Project (On going) • Digital Gabon Project (On going) 	NA
Angola	NA	<ul style="list-style-type: none"> • Decentralization for Improved Service Delivery (On going) • Strengthening the National Social Protection System Project (On going)
Malawi	<ul style="list-style-type: none"> • Digital Malawi Program (On going) 	<ul style="list-style-type: none"> • Financial Inclusion and Entrepreneurship Scaling Project (On going) • Education Sector Improvement Project (On going) • Malawi Social Support for Resilient Livelihoods project (On going)
Mauritius	NA	NA
Zambia	NA	<ul style="list-style-type: none"> • Education Enhancement Project (On going) • Girls' Education and Women's Empowerment and Livelihood Project

Source: World Bank

(3) Other Development Partners

The table below shows the major digitalization support projects by other major development partners.

Table 2.3.3 Major Digitalization Projects by Other Development Partners in the Target Countries

Country	Major Digitalization Projects by Other Development Partners
Kenya	<ul style="list-style-type: none"> • USAID: Development on family planning methods using SMS / apps (m4RH) • GIZ: Make-IT project, Digital Skills for Businesses in East Africa • FAO: e-Agriculture • China: National Data Center, Huawei: Country Connection Project • Korea: Kenya Advanced Institute of Science and Technology (KAIST) in Konza City • Belgium: Last-mile connectivity
Rwanda	<ul style="list-style-type: none"> • KOICA: Digital Ambassador Programme, Rwanda Coding Academy, RRA e-TAX project • GIZ: Digital Solutions for Sustainable Development – DSSD, e-Commerce, Make-IT • AfDB: Kigali Innovation City (KIC), Rwanda Innovation Fund • USAID: Health, Learning, Private sector development, and Governance – ICT components are included • FAO: e-agriculture
Ethiopia	<ul style="list-style-type: none"> • China: Space related support (micro satellite launching, ground station) • France (ESA): Ground station • USA: Technical assistance by NASA • Russia: Technical assistance by Roscosmos
Uganda	<ul style="list-style-type: none"> • USAID: Public awareness for HIV patient by SMS • RCDF Fund: i). Broadband Connectivity and Access Programme, ii). Content Mediation Programme iii) Research Advocacy and Lobbying Programme
Mozambique	<ul style="list-style-type: none"> • China: National Data Center
South Africa	<ul style="list-style-type: none"> • USAID: Information development support in HIV using mobile • EU: National Open Learning System (NOLS)
Côte d’Ivoire	<ul style="list-style-type: none"> • AFD: Open Government Support Program in Francophone Developing Countries (PAGOF) • EU/Huawei: New Digital Strategy
Madagascar	<ul style="list-style-type: none"> • EU: Human resources management • AFD: Appui à la formation professionnelle (FORMAPRO-Madagascar)
Ghana	<ul style="list-style-type: none"> • AFD: Support the acceleration of inclusive and digital businesses in continental Africa (AFIBA) • GIZ, EU: Assistance to disease surveillance system
Nigeria	<ul style="list-style-type: none"> • AFD, EIB: Nigeria Digital Identification for Development Project (Co-financing to World Bank Project) • GIZ, EU: SORMAS (Surveillance Outbreak Response Management and Analysis System) • KOICA: e-GOVERNMENT in Nigeria Benchmarking Invitational Program (i) Support for the development of e-Government Master Plan, ii) Capacity Development, and iii) establishment of e-Government Training Centre (e-GT)) • KOICA: Universal Basic Education for the Implementation of e-Learning and Smart School Project
Cameroon	<ul style="list-style-type: none"> • KOICA: e-Government Master Plan
Gabon	NA
Angola	NA
Malawi	<ul style="list-style-type: none"> • China Exim Bank: Optic fiber network (National backbone), Last-mile connectivity • GIZ: Improving Basic Education in Malawi, Use of ICT for Agriculture in GIZ projects - SNRD Africa • Other partners: Government information system (WEP-Ministry of Agriculture, WHO-Ministry of Health, etc.)
Mauritius	<ul style="list-style-type: none"> • MOU signed with Estonia, India, JPCERT (Japan), etc.
Zambia	<ul style="list-style-type: none"> • China Exim Bank: Smart Zambia Phase I (ICT) Project

Source: Each Development Partner

(4) Smart Africa (<https://smartafrica.org/>)

SMART Africa was established to accelerate the ICT agenda in Africa, which is a basis for the national ID ecosystem at the 22nd Ordinary Session of the Assembly of the African Union in 2014. The number of member countries increased from seven at the beginning to 30, with a total population of more than 700 million today. International organisations such as International Telecommunication Union (ITU), World Bank, African Development Bank (AfDB), United Nations Economic Commission for Africa (ECA), GSM Association (GSMA) are also part of members. The secretariat is placed in Rwanda.

The purpose of SMART Africa is not to develop its ICT individually for each country, but to form a single ICT market in Africa. SMART Africa has developed about 20 successful ICT flagship projects and has been deploying these across the African Continent. Although the digitalised national ID is not a part of these successful flagship projects, SMART Africa is watching the progress of it across the world in cooperation with ID4D by assigning the focal points.

Table 2.3.4 List of Flagship Projects by Smart Africa

Countries	Flagship Projects
1 Angola	High Tech Parks
2 Benin	Innovation and Knowledge Cities
3 Burkina Faso	Capacity Building /Smart Africa Scholarship Fund
4 Chad	Creative Economy
5 Côte d'Ivoire	Cyber Security
6 Djibouti	Data Centers
7 Egypt	Innovation and Entrepreneurship
8 Gabon	ICT Industry Development
9 Ghana	Smart E-payment
10 Guinea	Intra-African Cross-Border Connectivity
11 Kenya	Digital Economy
12 Mali	Entrepreneurship Youth Innovation and Job Creation
13 Niger	Smart Villages
14 Rwanda	Smart Cities and Communities
15 Senegal	Access Broadband & Green Economy
16 South Africa	4th Industrial Revolution: Innovation and Artificial Intelligence
17 South Sudan	African Digital Literacy
18 Togo	Smart Energy and Blue Economy
19 Tunisia	Start-Up and Innovations Ecosystems
20 Uganda	Big Data & Data Measurement for Development

Source: Smart Africa

3 Survey Result by Country

3.1 Kenya

3.1.1 Survey Policy in the Target Country

(1) National Development Plan

“Kenya Vision 2030”, a long-term national development plan in Kenya, has a vision of becoming “a globally competitive and prosperous nation with a high quality of life by 2030”. Under the three pillars of politics, it embraces concrete plans for strategy and realization.

Table 3.1.1 Structure of Kenya Vision 2030

Vision	A globally competitive and prosperous nation with a high quality of life by 2030		
	Macroeconomic stability	Energy	HR development
	Governance reform	STI	Security
	Equity and wealth creation	Land reform	Public service
	Infrastructure		
Strategy	Economic	Social	Political
	a globally competitive and prosperous nation with a high quality of life by 2030	a globally competitive and prosperous nation with a high quality of life by 2030	a globally competitive and prosperous nation with a high quality of life by 2030
	Tourism	Education and training	Rule of law
	Value in agriculture	Health sector	Electoral & political process
Wholesale and retail trade	Water and sanitation	Democracy & public service	
Manufacturing for region	Environment	Transparency-accountability	
BPO	Housing and urbanization	Security, peace-building,	
Financial services	Gender, youth, vulnerable	conflict management	
	Equity-poverty elimination		

Source: Vision 2030

Kenya Vision 2030 is implemented under a five-year medium-term plan. Major programs and projects in the ICT sector in the current Third Medium-Term Plan (2018-2022) include expansion of the national optical fiber backbone, strengthening of e-government and digital public services, strengthening of cybersecurity, development of necessary policies, legislation, regulations and institutional framework, etc.

(2) Country Assistance Policy of the Government of Japan

The Current Assistance Policy of the Government of Japan for Kenya revised in April 2012 is as follows.

Kenya occupies a geographical point as a gateway for shipping and air transportation in the East African region, with a per capita gross national income (GNI) of USD 1,750 (2019, World Bank), the highest in the region, leading the regional economy. There is. In addition, he is enthusiastic about promoting the peace process in Sudan and the Great Lakes region, and is actively contributing to the peace and stability of the region. Such economic development of the country can serve as a growth model within the East African region, and the significance of assistance to the country is great. In addition, the number of Japanese companies entering the country is the second largest among the sub-Saharan and African countries, and it is possible to support infrastructure development, human resource development, etc. while ensuring economic and social stability in the country, including Japanese companies. It is expected that the promotion of private investment will lead to the realization of sustainable economic growth led by the private sector.

Kenya has problems such as an increase in the poor due to urbanization, a serious unemployment problem mainly among young people, and 80% of the country's land is dry and semi-arid, and natural disasters occur frequently. Japan's support for measures to address these issues is significant from the perspective of "poverty reduction" and "sustainable growth," which are the priority issues of the ODA Charter. In addition, this support will also contribute to the achievement of Japan's TICAD commitment.

Kenya implemented a referendum constitutional amendment in 2010, working to limit presidential authority, strengthen judicial independence, and improve administrative capabilities such as decentralization. Supporting the country through assistance to various fields is of great significance in achieving stable political and economic development.

Table 3.1.2 Country Assistance Policy of the Government of Japan for Kenya

ODA Basic Policy	Promoting sustainable economic and social development	
Priority Areas	Economic infrastructure development	transport, energy, urban problems
	Agriculture development	food security, income generation for small scaled farmers
	Environmental protection	water supply and resources, forestry, and disaster control, urban environment
	Human resource development	science-maths at primary-secondary education, teachers' training
	Health	improved access among low-income and rural residents
Remarks	<ul style="list-style-type: none"> Promote assistance encouraging the business and investment of Japanese companies Assistance contributing to the whole regional through East African Community (EAC) 	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Kenya

Kenya offers a wide range of digitized public services through eCitizen and one-stop centers (Huduma centres) in each province. In addition, both eCitizen and Huduma Centres offer cashless payment for public service fees. Furthermore, even under COVID19, Kenya operates a portal site that unifies the registration for various cash transfer programs of different ministries and agencies, aiming for efficient benefits through digitalization. While the system for providing digital public services has been built in this way, the low utilization is a major issue. In addition, despite the active promotion of citizen-centered public services, several issues remain, such as the incomplete linkage between national IDs and mobile money accounts, limited rollout to the poor and vulnerable people, etc.

Among the Country Assistance Policy of the Government of Japan, human resource development necessary for digitalizing the public services and economic infrastructure development contributing to fill the last-mile gaps are expected to ease Kenya's challenges. Besides, Kenya's advanced cashless transaction system applicable for public services payment can be a use-case for other African countries.

Given the above examination, JICA Study Team intended to learn the best practices in Kenya's ICT sector that

can be applied and expanded to other African countries and how they utilized the digitalization of public services in Kenya. JICA Study Team also intended to exchange opinions with relevant agencies and organizations on issues and possible measures in the delivery process of digitalized public services in Kenya.

3.1.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation

1) Vision and Plans

The latest comprehensive strategy to advance digitization in Kenya is the “National ICT Policy,” which was approved by Parliament in 2020 and is now in the process of implementation. Kenya is also implementing the “Digital Economy Masterplan,” which aims to build a digital economy in Kenya. This Digital Economy Masterplan was a summary of various economic goals for creating the digital economy without actual implementation activities. An accompanying strategy with concrete activities is currently being formulated to support the Masterplan implementation and will be unveiled upon completion of deliberation. According to the Ministry of ICT, Innovations, and Youth, the “National ICT Master Plan 2014-2017,” which was previously used as a guide for Kenya’s ICT for development, has completed its mandate and will be renewed to suit the current socio-economic conditions. In terms of infrastructure development, there exist two masterplans which are the “National Broadband Master Plan,” to expand broadband coverage in the country, and the “National ICT Infrastructure Master Plan,” a master plan to develop ICT infrastructure and to expand last mile access.

2) Current Situation and Activities

ICT laws and regulations

ICT policy and legal systems in Kenya are generally well established. However, the ICT Ministry and related agencies, such as ICT Agency and regulatory agency, have indicated a concern of dependency on consultants for policy formulation. Moreover, the implementation of the strategies and policies have not always been smooth due to the capacity constraints of the implementing agencies. This is compounded by the fact that Kenya has a federal system and the 47 local Governments (Counties) have strong authority to implement their own policies. As a result, the policies of the local Governments and those of the central Government are not always aligned which affects the effective implementation of national policies.

The following are list of the major ICT-related laws and regulations in Kenya

Table 3.1.3 ICT related Laws and Regulations in Kenya

Basic ICT Law	Kenya Information and Communication Act 2013 Media Act 2013 *2010 Constitution also has provisions for the use of ICT
National ID	The Registration of Persons Act (Cap 107) The Registration of Persons (National Integrated Identity Management System) Regulations (2020)
Electronic Signature	The Business Laws (Amendment) Act (2020) In addition: Section 83 J~H of the Kenya Information and Communications Act provides provisions for e-signature and e-transaction
Electronic Transactions	-ibid-
Personal Data Protection	Data Protection Act (2019)

	The Data Protection (Civil Registration) Regulations, 2020. Arrangement of Regulations
Cyber Security	Cyber Security and Protection Bill (2016)
Competition Law	Laws of Kenya Competition Act. NO. 12 (2010)
Intellectual Property Protection Law	Intellectual Property Bill (2020)

Source: JICA Study Team

Organization

The Ministry of Information and Communications Technology, Innovation, and Youth Affairs is the main ministry that formulates ICT related policies and coordinates ICT activities within the Government. As an implementation agency, ICT Authority (ICTA) was established in August 2013 under the ICT ministry. The ICTA is responsible for the management and streamlining of all ICT functions of the Kenyan Government. The agency is also responsible for implementing ICT standards in the Government and for expanding ICT literacy, capacities, and innovations in the country. In terms of ICT related regulations, Communication Authority of Kenya (CA) is mandated to provide effective and appropriate regulations in the ICT sector.

Policy implementation in Kenyan Government is carried out by respective sectoral MDAs (Ministries, Departments and Agencies). Each ministry prepares a sector strategy which is aligned to the national strategy and implements the policy based on the strategy. The MDAs in each sector must secure resources (budget, etc.) for implementation. In order to respect the ownership of the ministries and MDAs in each sector, the ICT Ministry will provide technical advice on the preparation of the sector ICT strategy, but will not control the implementation. If these MDAs implement digital initiatives and provide services using digital technology, ICTA will provide necessary technical support to facilitate the processes. This arrangement has also been adapted to the County Governments, where ICTA is providing consultative support to local Governments in their pursuit of digitization activities.

For cyber security, there is National Cyber Command Center, which is under the jurisdiction of the Ministry of Internal Affairs. The ICT Ministry also dispatches expert staff to the Command Center to support its operation. In addition, several CERTs (Computer Emergency Response Team) are operational both by the public and private sectors.

Current status of public service digitization

e-Government initiative to serve Kenyan citizens at the national level is currently being implemented through the e-Citizen portal. The portal currently offers more than 300 services on-line. The e-Citizens Portal was originally planned and being implemented as an umbrella site for many digitized public services. However, Kenya faces significant challenges in accessing the Internet, especially in rural areas and the uptake by the citizenry to utilize e-Citizens portal has not been as smooth as anticipated. In order to mitigate the challenge of expanding access to digitized public services, Huduma Centers, an "one stop shops," are being built and operated in each County to provide citizenry with centralized and easy access to public services. In conjunction with the construction and operation of the Huduma center, a new e-government portal called the Huduma Portal has also been created to augment some of the deficiencies of the e-Citizens portal. The Government is planning

to consolidate and unify the services provided by the current e-Citizens Portal into the new Huduma portal, instead of operating two similar portals for public service deliveries.

3) Challenging area(s)

Following consultations with the counterpart organizations in Kenya, the following are being identified as some of the challenges in the areas of formulation and implementation of ICT strategies and policies:

1. Dependence on consultants for policy formulation
2. Funding constraints
3. Lack of skills of public institutions required for policy implementation
4. Resistance from citizens and bureaucrats for change
5. Digital Divide
6. Lack of digital skills and digital literacy
7. Discrepancies between policies implemented by local and central Governments
8. Implementation without establishing related legislation, regulations, establishment of management bodies, etc. are put off (e.g., Huduma number, establishment of data commissioner, etc.)

Many of these challenges are attributed to the weak capacity of policy making and implementation agencies. As such, there is considerable need to strengthen the capacity of policy making and implementation agencies. In addition, it is also effective to conduct strong public advocacy activities to gain necessary support for the strategies and policies.

4) Activities of Development Partners

Many development partners are providing numerous ICT-related support in Kenya. Some examples of major support include the following:

- World Bank: The World Bank continues to provide ICT-related support to Kenya. In the past, the Bank supported a strong initiative to advance open data in Kenya which resulted in many Government data to be opened to public. Currently, there is a pipeline project being formulated for the USD 350 million Kenya Digital Economy Acceleration Project.
- China: China has supported the construction of a national data center in Kenya's innovation city Konza City. While it is not development partner, Huawei is building the country's backbone network as part of its "Country connection Project," a network that will connect all provinces and districts. Huawei is also building core Government network in Nairobi.
- Korea: Korea has supported construction of Kenya Advanced Institute of Science and Technology (KAIST) in Konza City, Kenya's innovation city which is located 70km south-east of Nairobi. The construction was funded by a loan of USD 95 million from EXIM Bank of Korea. The curriculum development for the new institute will be supported by Korea Advanced Institute of Science and Technology (KAIST), a national science and technology university in Korea.
- Belgium: Support for "Last Mile Connectivity" is being provided.

- Germany: GIZ is implementing “Make-It” project, a regional project to foster up to 50 technology startups through strengthening the startup ecosystem. Other projects include “Digital Skills for Business” Initiative and the E-Commerce support project.
- USAID is currently supporting human capacity development to contribute to the Government's Digital Economy Blueprint 2030. Other projects include ICT business accelerator initiative to create ICT-led businesses in rural areas, and “Health Informatics Governance and Data Analytics Project” to improve healthcare in the rural areas.
- In the health sector, various different donors are providing support for health digitalization. However, many of these projects are implemented by only a few groups in the Ministry of Health which resulted to many of these projects become unsustainable, as the equipment and materials provided are no longer used when the project ends. In addition, the presence of multiple donors makes it very difficult to ensure integration and standardization of health systems in Kenya. Moreover, it has also caused problems of inadvertently sharing sensitive health-related information such as patient examinations/diagnostics records and insurance records, with other countries and/or external organizations.

5) Potential Assistance Needs

In terms of potential support within the area of ICT policies/Legislations, there are considerable needs for improving the policy formulation and enforcement capabilities of the institutions in charge of ICT. In particular, support for the ICT Ministry, which is in charge of policy formulation, would be effective in refraining from the dependency on consultants. It is also useful to change the perception of public services about digitalization of Government.

6) Expected Areas to be Digitalized

One area where digitalization could potentially make a significant difference is in the use of digital technology for Government organizational reform (to support civil servants perform their duties based on data and evidences and reduce bureaucracy). In terms of priority sectors, there exists considerable needs in education, health, security, and legal domains.

7) Potential of using data for innovation in public service improvement

Kenya has already seen an increase in the use of startups and the private sector to mitigate Government challenges and improve public services. CSOs, in particular, have been actively utilizing open data for the past 10 years for such activities as detecting corruption in the Government and monitoring elections. Although the use of open data in the private sector has been lagging behind the CSOs, some private sector such as the financial services are extensively utilizing national IDs for authentication. In these respect, Kenya is becoming an advanced examples of innovative use of data to improve public services.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

The Kenyan Government has created and implemented a framework to stimulate innovation and to provide opportunities through using start-up and innovators to solve Government challenges. For further expansion of such initiatives, however, the Government Procurement Act needs to be amended to enable procurement of

innovative services from startups. In addition, the ministries and agencies also need to change their mindset to favor the use of startups.

(2) ICT Human Resource Development

1) Vision and Plans

National ICT Policy 2019

One of the five policy focus areas is "Skills and Innovation". This area includes the promotion of science and technology innovation, recommendations by the Future Council with private sector representatives, forecasting and counteracting the rise of emerging technologies, and human resource development.

National ICT Policy Guidelines 2020

One of the four key areas is "Skills and Innovation", which aims to develop a world-class ICT workforce. The government will (i) support and enable the development of a robust technology entrepreneurship ecosystem to encourage and adopt innovation in the country, (ii) encourage early stage IPOs in the Growth Enterprise Market Segment of the Capital Market (GEMS) and support the growth of the Permanent Listed Vehicles to build bridges between investors and the businesses that need investment to grow, (iii) support new and innovative local businesses in the country through government ICT public procurement and Kenyan built solutions will be preferred; where there are no local businesses that meet the tender requirements, skills transfer to local firms and personnel will be a mandatory requirement.

Digital Economy Blueprint 2019

Its vision is "a digitally empowered citizenry, living in a digitally enabled society." And its mission is "a nation where every citizen, enterprise and organization has digital access and the capability to participate and thrive in the digital economy." There are two pillars out of the five which are related to human resource development as follows:

- The pillar of "innovation driven entrepreneurship": Its goals and objectives are to (i) increase the number of innovations that progress to market locally, regionally, (ii) increase the contribution of digital products and services to the GDP, (iii) enhance the contribution of innovation driven entrepreneurship to the growth of the digital economy in Kenya, and (iv) develop a vibrant and sustainable support system for innovation through industry and academia research collaboration as well as access to funding.
- The pillar of "digital skills and values": Its goals and objectives are to increase the number of graduates having been trained in Advanced Digital skills and demonstrate required competencies for the digital economy. Such skills include: Artificial intelligence (AI), Machine Learning, Robotics, Big data, Coding in relevant tools e.g., R, Python etc., Cyber security, Internet of Things (IoT), and Mobile app development.

County ICT Roadmap

As of August 2021, all counties have developed ICT roadmaps that analyze the current situation and set out goals with respect to capacity in infrastructure and connectivity, public service delivery, human resource

capacity, and the policy and legal environment. For example, according to the Kericho ICT Roadmap (2015-2020), human resource development capacity is relatively more mature than ICT infrastructure and connectivity and other capacities. An initiative of renewing the Roadmap is yet to be confirmed.

2) Current Situation and Activities

ICT human resource development

In Kenya, in order to teach ICT subject once a week to nurture digital literacy at primary school, the Ministry of Education distributed equipment and materials and conducted two-day teacher training². For secondary schools, computer program education is planned to be introduced, but it has not yet been made into a regular curriculum. All of these are under the jurisdiction of the central government, and the ICT Authority (ICTA) is providing side support.

Seven national universities and many private universities have ICT-related faculties and are fostering ICT human resources. For example, JKUAT³, with which JICA has cooperated for a long time, offers BSc: Computer Science, Computer Technology, Information Technology, Business Computing, MSc: Software Engineering, Telecommunication Engineering, PhD: Telecommunication Engineering, as well as certification courses from CISCO, Microsoft, Oracle, IBM, Huawei, SAP, etc. JKUAT's curriculum is approved by the Commission for University Education and the Inter-University Council of East Africa. It also partners with 20 companies such as IBM, Samsung, Dell, EMC, Microsoft, iHub, nailab, Oracle, Cisco, Intel, Esri, Safaricom (Vodafone) and gained advice to revise the curriculum. JKUAT has been designated as a Centre of Excellence in ICT by the Northern Corridor Integrated Projects (NCIP) implemented in Kenya, Uganda (Makerere University), Rwanda (University of Rwanda) and South Sudan (University of Juba). In addition, there are other university-based projects. As for university level, ICT Authority (ICTA) is implementing the Centre of Excellence project at the University of Nairobi in collaboration with business process outsourcing (BPO) IT companies to train 5,000 people every year to enhance their employability.

On the other hand, most TVET institutions offer a basic ICT education package⁴. Graduates of ICT departments in technical colleges have Diploma of ICT and are employed in the government and private sectors, and some have started their own businesses to provide employment opportunities for other graduates. A curriculum of TVET is primarily developed by the Curriculum Development Assessment and Certification Council (CDACC⁵) under the Ministry of Education in collaboration with the Sector Skills Advisory Council (comprised of industry and faculty) based on Competency-Based Development (CBD) and approved by Technical and Vocational Education and Training Authority (TVETA). The Kenya National Qualifications Authority (KNQA⁶) is responsible for the certification of qualifications degrees at all levels of education. In addition, CDACC has developed several curricula in cooperation with the Mastercard Foundation based on the national level curriculum. There is also a private TVET institution, Moringa School, which is also operating in

² Interview with KICTA Net on 1 April 2021. KICTA Net assists primary schools in remote area for internet connection and additional training for teachers

³ Interview with JKUAT on 25 February 2021.

⁴ Interview with TVETA on 9 March 2021

⁵ <https://www.education.go.ke/index.php/about-us/state-departments/vocational-and-technical-education/cdacc>

⁶ <https://www.knqa.go.ke/>

Rwanda, that helps to improve employability by providing students with practical tasks in a work-like environment.

TVET institutions and universities also provide opportunities to improve skills after employment. For example, at Moringa School, 37% of the students in the data science course are working adults, and the school also undertakes many corporate training programs such as the one for Safaricom. At Adventist University of Africa, a private institution, all of the graduate students in the ICT department are working adults.

In the government, ICTA⁷ is responsible for setting and enforcing ICT human resource development standards, promoting ICT literacy and ICT capacity building, encouraging ICT innovation and enterprise, identifying ICT functional and capacity building needs to improve public service delivery, and research and development for new business. ICTA has also been implementing the following ICT human resource development projects:

- Presidential Digital Talent Programme (Digitalent) launched in 2015: An ICT talent development programme for young people who graduated within two years and it provides internships in the public and private sectors, training and qualification in ICT specialized fields, coaching, mentoring, and support for innovation creation. The program recruits 400 graduates per year, and 1,700 have completed the program and are working for ministries, private companies, NGOs, or have started their own businesses.
- Ajira Programme launched in 2017: A digital skills training and entrepreneurship mentorship programme that aims to create 2 million digital decent jobs for youth by 2022. Its government budget for FY2021/22 is about USD 67 million⁸. The Ajira Digital Portal provides one-off outsourcing opportunities by the public and private sectors for graduates. The Rockefeller Foundation supported the creation of the initial curriculum, and the Mastercard Foundation supported the update of the Portal, among many other partners⁹.
- White Box launched in 2018: A place for innovation and co-creation to improve public sector services for the government, connecting young innovators with a range of co-creation partners¹⁰, investors, mentors and markets. It is currently supported by the UK Tech Hub for incubation.

In the future, ICTA plans to establish the Smart ICT Academy in Konza Smart City so that it will become the center of (i) high-end ICT skills development projects for ICT professionals in the public and private sectors, (ii) digital skills development projects for non-ICT professionals in the public sector, and (iii) digital literacy development projects for users of public services such as the elderly, women, disabled, and youth.

⁷ Interview to ICTA on 12 March 2021.

⁸ <https://www.trade.gov/country-commercial-guides/kenya-information-communications-and-technology-ict>

⁹ For Kenya Labour Management Information System (KLMIS), TVETA collaborates with universities, polytechnic, TVET institutions, Kenya National Qualifications Authority (KNQA), Access to Government Procurement Opportunities (AGPO), And for Kenya Youth Employment Opportunity Programs (KYEOP), TVETA works with Wezo Affirmative Funds (Youth & Women), National Employment Authority. Youth Marketplace (YOMA, a digital CV formulation platform), EU and FCO supports to add value to the programme and CISCO, HP, Huawei ICT Academy, Coursera, Digital Nation Africa supports training

¹⁰ For example, Amref and Kenyatta National Hospital (KNH) are co-creating a blood information management system, DamuSasa

ICT capacity in the public sector

In order to define ICT capacity of civil servants, in 2019, ICTA, collaborating with the Kenya Bureau of Standards, established “the Government ICT Standards: Human Capital and Workforce Development”. The national qualification framework mentioned in the Standards is going to be developed.

The Kenya School of Government (KSG)¹¹, a public corporation under the Ministry of Public Service and Gender, is the main civil service training institute, organizes about 20 ICT training programs per year at its eLearning Development Center with 1,500 participants¹². These include general ICT skills training such as Excel, Word, and e-mail, as well as training on specific government information systems, training to enhance e-learning delivery capacity, data analysis training, and certification and professional skills training provided by private companies for ICT professionals. In addition, civil service training institutes for various sectors and ICTA also provide ICT capacity building for civil servants.

ICT capacity in the private sector

According to the 2019 IPU survey¹³, a large number of ICT skilled human resources are flowing into employment by the private sector, but private companies indicated that for advanced technical skills, theory-oriented education in universities is not enough and companies need to provide additional training. Most Kenyan undergraduates majored in information systems or network systems and that few had studied software development. There are a few companies in Nairobi that develop software, but most of them ask Indian counterparts to develop it and bring it to them¹⁴.

3) Challenging area(s):

The Ministry of ICT believes that the challenge is to strengthen the capacity of each ministry to formulate and enforce ICT policies and to strengthen the technical skills to enable the development of applications using a common platform. In particular, the alignment of digitization policies by counties with those of the central government is an issue. There is also a challenge of the digital divide (including digital payments) in remote/rural areas and among the poor and vulnerable. It includes issues of (i) digital literacy, (ii) network environment (unstable power supply and lack of last-mile connectivity in remote/rural areas), and (iii) high internet units. On the other hand, in terms of skills development, the Ministry believes that a wide range of digital skills (applications, security, networks) as well as policy formulation and enforcement skills that ensure comprehensiveness and consistency are required.

According to ICTA, they are planning to build a Smart ICT Academy in Konza City, which will also serve as a training center for civil servants specializing in ICT, and they are currently seeking investors. In addition, the White Box, a government incubation program for fostering entrepreneurs, will support the creation of innovations and will be used for the digitization of public services, but it is still in its infancy and needs to be

¹¹ Interview with KSG on 17 March 2021

¹² As of 2020, total number of civil servants belong to the central government is 91,873, thus 1,500 trained can be translated to 1.6%, although not all the civil servants are expected to have ICT capacity.

¹³ ICU (2019) Kenya Country Review: ICT Centric Innovation

¹⁴ Interview with Adventist University of Africa on 25 March 2021.

effectively structured.

TVETA mentioned that out of the TVET institutions, Vocational Training Centres have a great need for ICT infrastructure and internet access, and support for human resource development of TVET agencies.

4) Activities of Development Partners:

The TVET sector (regardless of ICT) has been working with the African Development Bank, the World Bank, and the Chinese government to increase the number of TVET institutions, expand ICT infrastructure, improve TVET skills, and provide a capitation fund for all students in public TVET institutions.

In addition to the partners mentioned in the human resource development projects above, the human resource development partners listed on the ICTA website are listed in the table below¹⁵.

Partner	Activity
Carnegie Mellon University	Chipuka Software Development Certification (A certification programme for software developers targeting entry level developers in colleges to build their capacity in software development started in 2014)
Huawei Technologies (Kenya) Co. Ltd.	Huawei Telecom Seeds for the Future (A programme aimed at providing practical on the job skills to 100 top engineering students from all universities with the requisite ICT skills started in 2015)
Microsoft East Africa	Microsoft ICT Skills Training (Provide a platform for ICT skills training for 300,000 teachers, and accreditation as Microsoft Certified Educators started in 2015)
Oracle Technology Systems Ltd	Oracle e-Government Capacity Building Programme (Promotion of ICT literacy and IT practitioner skills, innovation and enterprise development required for e-government service implementation started in 2015).
Systems Applications Products (Africa Region) Proprietary Ltd. (SAP)	SAP Skills for Africa (A collaboration between SAP and universities to provide students the opportunity to train and certify as SAP consultants to increase employability, started in 2015.)

(3) ICT Infrastructure

1) Vision and Plans

In the Kenya Vision 2030, ICT infrastructure is positioned as part of the infrastructure that will serve as the foundation for advancing the three pillars (Economic, Social and Political) of the Kenyan government's policy. In order to realize this Vision 2030, the Ministry of ICT, Innovation & Youth Affairs has announced the National Broadband Strategy 2018-2023. The strategy is categorized into seven areas: (i) infrastructure and connectivity; (ii) services, content, and applications; (iii) capacity building and innovation; (iv) policy, law, and regulation; (v) privacy and security; (vi) broadband equipment; and (vii) investment. For each theme, a gap analysis, identification of opportunities, strategic objectives, and an implementation plan are provided.

¹⁵ <https://icta.go.ke/talent-workforce-building/>

2) Current Status and Activities

International Backbone Network

Table 3.1.4 Eight submarine cables, as shown in the table below, have been landed in Mombasa.

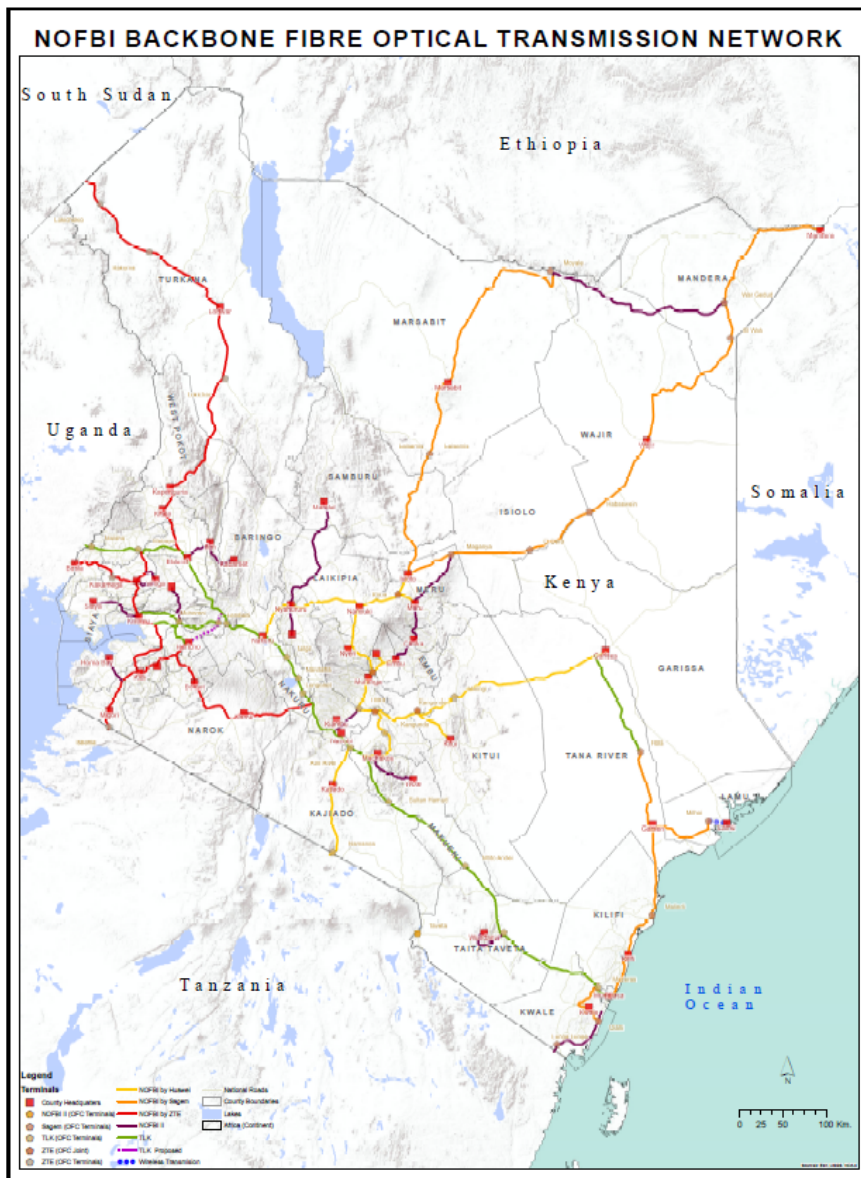
City	Landing station	The Consortium
Monbasa	Africa-1	Saudi Telecom, MTN Group, Telecom Egypt, Telkom South Africa, PCCW Global (Hongkong), Etisalat Contractor: Alcatel Submarine Networks Ltd.
	Djibouti Africa Regional Express (DARE)	Djibouti Telecom, Africa Marine Express, Telesom, Hormuud Telecom Somalia, Golis Telecommunications, Somtel International, Telkom Kenya (Djibouti Telecom has signed a cooperation agreement with China Telecom Group)
	Eastern Africa Submarine System (EASSy)	Bharti Airtel, Botswana Fibre Networks, BT, Comores Telecom, Djibouti Telecom, Etisalat, Mauritius Telecom, MTN Group, Neotel, Orange, Saudi Telecom, Sudan Telecom Company, Tanzania Telecommunications Company Limited, Telkom Kenya, Telkom South Africa, Telma (Telecom Malagasy), Vodacom DRC, WIOCC, Zambia Telecom.
	2Africa	China Mobile International, Facebook, MTN GlobalConnect, Orange, stc, Telecom Egypt, Vodafone and WIOCC
	PEACE Cable	Cable by PEACE CABLE INTERNATIONAL NETWORK CO., LIMITED (Hong Kong) involving Huawei Marine.
	SEACOM/Tata TGN-Eurasia	Investment : 30% IPS (Industrial Promotion Services) , 30% Remgro, 15% Sanlam, 15% Convergence Partners, and 10% Brian Herlihy.
	The East African Marine System (TEAMS)	Government of Kenya(20%), Safaricom Ltd(32%), Telkom Kenya (23%), Kenya Data Networks Ltd (10%), Wananchi Group (6%), Jamii Telecom Ltd (5%), Access Kenya Group (1.8%), BCS Group (1.2%) Contractor: Alcatel Submarine Networks Ltd.
	Lower Indian Ocean Network2	France Telecom-Orange, Mauritius Telecom, Orange Madagascar, Telkom Kenya, Emtel, Societe Reunionnaisse du Radiotelephone, STOI Internet.

Source: JICA Study Team

Domestic Backbone Network

Kenya has a national broadband network, the National Optic Fibre Backbone (NOFBI), and Phase 1, a 4,300 km optical fiber network connecting 58 cities in 35 counties, was completed in 2009 and is in use. The construction of Phase 2 started in 2014, and 1,200 km of civil works and 900 km of optical cables have been laid. NOFBI is also funded by the Kenyan and Chinese governments, with the Ministry of ICT as the supervising agency, the ICT Authority as the implementing agency, Huawei as the builder, and Telkom Kenya as the maintenance and operation.

Figure 3.1.1 Backbone of NOFBI



Source: ICTA

Mobile Network

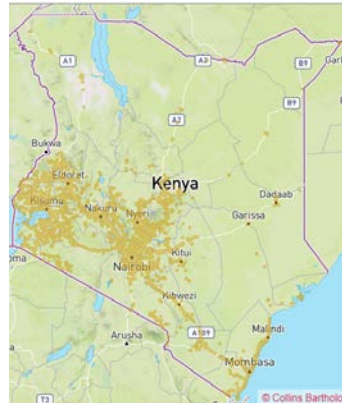
The major mobile operators in Kenya are Safaricom, Airtel Kenya, and Telkom Kenya. Airtel Kenya and Telkom Kenya, which have the second and third largest market shares, have announced a merger in 2018, but as of yet, no merger has taken place.

Figure 3.1.2 Mobile Coverage by each operator

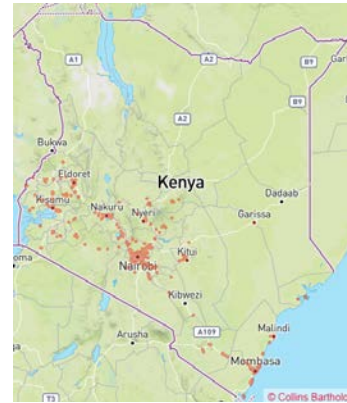
Mobile operator	Outline
Safaricom	Safaricom was established as a division of the Kenya Posts & Telecommunications Corporation, which was converted into a public corporation on May 16, 2002. Safaricom and Vodacom (South Africa) collaborated to launch the M-Pesa service. Capital: Vodacom (34.9%), Vodafone (5%), Government of Kenya (35%), Others (25%)
Airtel Kenya	It is a subsidiary of Airtel Africa and is the second largest player in the Kenyan telecom market. Capital: Bharti Airtel (100%)
Telkom Kenya	It is the third largest telecom operator in terms of market share. Capital: Helios Investment Partners(60%)、 Government of Kenya(40%)



2G Coverage



3G Coverage



4G Coverage



2G Coverage



3G Coverage



4G Coverage



2G Coverage



3G Coverage



4G Coverage

Source: GSMA

Data Center

Seven private data centers (Tier 2-3) have been built in Nairobi and two in Mombasa. Apart from this, a national data center has been built in Konza, and a Tier 3 data center will be built by Huawei as a Phase 2 project.

IXP (Internet Exchange Point)

Two IXPs have been established in Nairobi and Mombasa.

3) Challenging area

Kenya is in the process of developing ICT infrastructure through the construction of National Broadband, data centers, and the mobile telecommunications market. However, the National Broadband Strategy 2018-2023 mentions the need to expand to rural areas, and that there are issues with the quality of broadband, such as speed and reliability. However, the National Broadband Strategy 2018-2023 mentions the need to expand to rural areas and challenges in the quality of broadband speed and reliability.

4) Activities of Development Partners:

In terms of ICT infrastructure in Kenya, China is helping to build the National Broadband, submarine cables, and data centers.

5) Potential Assistance Needs:

It is considered that there is a need to support the construction of the last mile that connects telecommunication networks to rural and regional areas, as described in the issue. Experience in developing ICT infrastructure for remote areas and islands in Japan will also be shared to develop ICT infrastructure for rural and remote areas. Therefore, it is considered that there are ways to support limited target sectors, for example, building ICT infrastructure for rural schools as part of the support for the education sector, and building ICT infrastructure for rural and rural hospitals in the health sector.

(4) National ID

1) Vision and Plans:

Kenya Vision 2030

In the digitization of public services, promotion of digitization of IDs and data linkage are also touted which is led by the Ministry of Interior (Kenya Vision 2030: refer to “<https://vision2030.go.ke/publication/third-medium-term-plan-2018-2022/>”).

National Registration and Identification Bill 2012

Regarding various registrations, the state registration and identification card bill formulated in 2012 is ongoing.

2) Current Situation and Activities

Organization

The National Registration Bureau (NRB) under the Ministry of Interior is in charge of the national ID, and the Civil Registration Services (CRS) under the Ministry of Interior is in charge of resident registration.

Current status and situation of national ID

Kenya's ID system has a long history and was built in 1911 during the Commonwealth of Nations. Initially for

the purpose of drafting troops, it was also diverted to elections, and in 1978, 11 million men and women were registered due to legislation. ID cards were also issued, and in 1995 digitized data was aggregated in a central database. Currently, 956 registration offices (Division> County> Sub-County) can be registered nationwide, and the registration rate is extremely high at 95%.

However, there are some Kenyan nationals who live in remote areas from the registration offices in the village units, lower sub-county, and they have been left out. Rather than leaving this situation as it is, the government is aiming to achieve 100% through the integration of the numbering system and the utilization of Huduma, which is in the process of being developed.

Current status and situation of birth registration and resident registration

Regarding birth registration, there are 155 registration offices throughout Kenya, and although the birth registration rate in 2019 is as high as 76%. Death registration is still low at 39%. It is believed that this is partly due to the lack of awareness of registration.

As an improvement situation, CRS is promoting the "Mother-Child Health Strategy" in collaboration with WHO. A fact-finding survey on the number of deaths has begun, including the Commissioner of County and the heads of local organizations. CRS is also considering "Mobile Registration" in the community as a situation to improve birth registration and death registration. Through these initiatives, the government is aiming for a birth registration rate of 100%. As a medium-term goal, a roadmap was created to bring it to 100% in the five years from 2018 to 2023. The goal is to improve the death registration to about 70%. The situation is that a Technical Working Group is being formed with the participation of development partners such as WHO and CDC.

As of 2018, over 16 million birth records and about 600,000 death records have been digitized.

Plans and initiatives for ID integration

Regarding the integration of Huduma number and national ID, which is being developed in Kenya, NRB is planning to integrate it into a unique ID in the future, including IDs used in other sectors, and utilize it for various services.

The cooperation between Huduma Namba and civil registration data is also underway. Huduma Namba cannot operate without a proper birth certificate. Digitization of registration data throughout Kenya is also underway. The government aims to collect all the data in one place and link it with the data of various related sectors.

Current status and situation of data linkage (interoperability) with other sectors

The idea of integrating existing ID systems, linking them with services in other diverse fields, and accessing other fields to utilize data has been around for some time, and businesses with the technical capabilities were selected through a bidding process to try to implement it. Once an ID is applied for, the goal is to have that ID automatically linked to driver's license and passport applications on the platform, but this has not yet been achieved. Currently, as a preliminary step, the government is aiming to give a unique number at birth, which can be used for schools, hospitals, elections, driver's licenses, pensions, etc. (Currently, medical care, taxation,

and driver's licenses are operated under their own numbering systems).

3) Challenging area(s)

The environment for ID integration and digitalization seems to be getting ready, but the following issues are raised.

As an issue at the registration office, not only outreach to remote residents, but also quick recovery in case of incomplete documents is required from the viewpoint of speeding up the procedure. In particular, the death registration has not been documented, while the Huduma project is currently creating a database and updating it appropriately, and will work on improvement while referring to it (NRB).

Network connection and online connection between registration offices all over the country and the central government are also issues. Currently, of the 956 locations, approximately 120 are online, but only 1/6. At other registration offices, the data is manually mailed to Nairobi. Currently, Nairobi and its suburbs are piloting computerization, and there is an intention to expand this to the whole country as soon as possible (NRB).

In addition, the CRS, which has jurisdiction over birth registration and resident registration, raises the following issues.

- Missing motive. There is a large disparity in equipment between the registration offices in the city center and the registration offices in the rural areas. Most births occur in rural areas, but the lack of motivation to register for birth is seen as a major issue.
- The next major issue is the issue of double registration. There are double registrations in Nairobi with the nearest registration office where you live, but the problem is that there is no mechanism to check.
- Shortage of human resources. The Sub- County registry must cover a very large area, but the challenge is that there are not enough people to handle it. In addition, resources are required for the above-mentioned educational activities for residents. It is recognized that it is necessary to have human resources in order to solve problems at the registry office, such as training for human resources (capacity building) and computerization of processes.
- Insufficient budget. An urgent issue is that the budget for training human resources is insufficient.
- Cooperation with related organizations. For example, cooperation with the National Immigration Bureau is still insufficient.
- Equipment shortage. Insufficient PC required at the registration office.
- Insufficient infrastructure. Electricity and internet connection at local registration offices are not enough to carry out business.

4) Activities of Development Partners

There is a lot of support from development partners regarding birth registration. The main situation are as follows.

Finnish Government: From 2008 to 2012, NOKIA funded a research project to provide smartphones with a birth registration form (B1) programmed into community organizations. (CRVS: 2019)

UNICEF: Comprehensive automation of CRVS business processes, as well as improved legal and policy frameworks

World Bank:

- Digitization strategy planning to expand birth registration in the community
- Development of the ability of registration personnel to monitor the registration process in order to improve data quality
- Collecting causes of death and improving coding
- "Mobile registration office" pilot activities for areas where outreach is difficult
- Planning and providing incentives for improving birth registration

WHO: Strengthening healthcare facilities, including birth and death notifications, especially in rural areas.

CDC (Center for Disease Control and Prevention): Disease prevention and management, and improvement of outbreak reporting

5) Potential Assistance Needs

Although there is little room for support, it is necessary to strengthen birth registration. In particular, birth certification is necessary for vaccination and admission of children, qualifications for graduation exams, acquisition of national ID, etc., and is indispensable for enjoying appropriate social services. Potential needs include deepening awareness of the importance of birth registration, (1) automating end-to-end birth registration, and (2) investing more appropriate human resources to collect "appropriate and reliable data." (3) Invite development partners from outside and receive the necessary support as needed.

6) Expected Areas to be Digitalized

API development to realize data linkage (interoperability)

7) Condition: Infrastructure, Policy, Human Resource, and etc.

In addition to the maintenance of hardware, it is also important to maintain the soft components that make it work.

(5) E-government

1) Vision and Plans

The Public Service Commission's Strategic Plan 2019-2024 aims at "citizen-centric public services" and aims to deliver public services efficiently and effectively. Among the digitalization-related issues in the above strategy are the establishment of a digitalized financial disclosure record management system and the provision of a wide range of public services through a combination of digital payment platforms and digital ID systems.

2) Current Situation and Activities

The government has built an "eCitizen" platform that will allow citizens to use 300 public services with a single login (Single-Sign-On), and in the future, all 5,000 public services will be available. eCitizen has already been integrated with the IPRS (Integrated Population Registration Services) database. eCitizen allows users to make

bank transfers, pay bills using mobile money, debit and credit cards from mobile network operators (MNOs). On eCitizen, users can access a wide range of public services such as corporate registration, medical insurance (NHIS), business license, driver's license renewal, national ID card duplication, student loan application and repayment, National Social Security Fund (NSSF) registration and entitlement, land assessment and registration, Public Procurement Monitoring Board (PPB) registered vendor verification, complaint filing, corruption reporting (Anti-Corruption and Ethics Commission), pension claim, and complaint filing.

In parallel with eCitizen, a physical hub, the Huduma Centers, were established in the county capitals to provide face-to-face as well as online access to public services. The Huduma centers are also positioned as access points for eCitizen, offering multiple channels to meet various needs: (1) more than 60 offices in all provinces, (2) access to the Huduma Mobile Platform from cell phones, (3) Huduma call centers, and (4) payment of public service fees through the Huduma Payment Gateway/Huduma Payment Card using mobile money. The Huduma Payment Gateway allows users to pay for public services through M-Pesa, PayPal, David Card, and Huduma Payment Card. Thus, the government now provides public services through both the e-Government eCitizen and the face-to-face Huduma Center. E-Citizen was planned to be an umbrella site for public services, while the Huduma Center, which is being promoted by the Huduma Secretariat, will serve as a physical one-stop service center and will be integrated into the Huduma portal in the future (according to the Ministry of Information and Communication Technology).

While the top-down concept of e-Citizens is said to be successful and could be a benchmark for other countries, there are reports¹⁶ of low awareness of eCitizen among people at the county level, and there is a need to develop human resources at the county level on the services that can be used by eCitizen. The backbone of the ICT infrastructure has been built with optical fiber to all county government buildings, but the last mile access beyond the fiber is still a huge challenge and hinders citizens' access. It has also been pointed out that many county governments are not aware of the central government's policies. While decentralization has encouraged the need for county governments to implement the central government's digitalization development policies and regulations, many counties have no idea how to implement multiple policies together, resulting in a lot of fragmentation and skill shortages. Some county governments do not even have ICT bureaus to support their citizens, and there is insufficient support for ICT entrepreneurial capacity building. The most used digitized public service at the county level is Huduma Namba. Under decentralization, many government services and agencies are being devolved to the county level, and immigration control can now be done in each region rather than in Nairobi. There is a need for the central government to delegate more authority to the county level and help county governments move forward.

Civil society is also heavily involved in digitalization issues in Kenya. Digital tools are often used in financial inclusion and peacebuilding, and influenced the results of the 2008 and 2017 elections. Boosted by ICT policies and regulations, many companies have established themselves in the Silicon Savannah, and Dell, Microsoft, and others have set up their sub-Saharan Africa headquarters in Kenya.

¹⁶ USAID, "Digital Ecosystem Country Assessment," October 2020.

The Universal Access Fund (UAF), one way to improve last-mile access, is a fund composed of the collected 0.5% of revenue raised by all institutions holding licenses for communication services. UAF is utilized for: (i) to promote communication infrastructure development in rural remote areas; (ii) digital skills development of women and handicapped people; (iii) support capacity building in ICT and innovation; (iv) support expansion of telecommunication services (schools, medical institutions, etc.) and (v) develop local contents in wide areas and improve the access. However, in reality, service providers using UAF to develop rural infrastructure are reluctant to expand their business into rural and marginal areas where investment returns are low even with government subsidies, and last-mile infrastructure development is difficult because the government needs to provide the full investment cost and operating expenses to the service providers which is not sustainable.

3) Challenging area(s)

The utilization rate of eCitizen portal site is 4% and through Huduma center is 44% (USAID report 2020), which is very low especially in rural and remote areas where the last mile problem is serious. The reasons for the low utilization are as follows

- Broadband is underserved outside of urban areas.
- Internet connecting costs remain high due to the MNO oligopoly of Safaricom (64%) and Airtel (27%).
- In the case of the UAF, MNOs, the main funders of the UAF, are reluctant to set up base stations outside of commercially viable areas, and the government subsidies required to promote the UAF's expansion are expensive and unsustainable. In addition, while UAF could be utilized for limited period, it is not easy to secure successors to take over the operation.
- The device is too expensive for many people to afford.
- The number of Huduma Centers is inadequate, with 56 centers in 47 counties across the country.
- Lack of ICT literacy among users and Huduma Center staff.

4) Activities of Development Partners

- World Bank: Digital Economy Acceleration Project with five components: digital connectivity, digital financial services, digital skills, digital platforms, and digital entrepreneurs. Phase 1 is the "Digital Acceleration Project," which involves building infrastructure. The budget for this project is USD 350 million. The project period is five years, from 2021 to 2025. Phase 2 is the Kenya Digital Transformation Project, a project to enhance services. The budget for this project is USD 150 million. The project period is five years, from 2024 to 2028. World bank requires the service delivery to be "citizen-centric". The aim of the project is to promote the use of public services by making them friendly and easy to use.
- The Chinese government supports the construction of a data center in KonzaCity. Huawei is building a national backbone network as part of its "Country Connection Project", which will connect all counties and provinces. Huawei is also building a government core network in Nairobi.
- Konza City: A smart city located 60 km southeast of Nairobi, a project under the Ministry of ICT. The Kenya Advanced Institute of Science and Technology (KAIST) is currently being established by KOICA as a human resource development organization. Israel is partnering in the field of agritech. The Chinese

government and Huawei are cooperating on data centers, data utilization, and scoping of the consortium city. The U.S. is not only supporting the master plan for Phase 1, but is also implementing a collaborative project with Strathmore University. The US Chamber of Commerce is introducing investment institutions.

- Horizontal rollout of Smart Card for public service payment and social welfare delivery by MasterCard, Equity Bank, Commercial Bank of Africa, KCB Group and Diamond Trust Bank.

5) Potential Assistance Needs

Technical support to improve delivery system and utilization

- Support for measures to encourage competition among MNO and improve prices and services
- Support for improvement of UAF operations
- Incentives and subsidy support that contribute to lower device prices
- Support for improving ICT literacy of Huduma Center staff, county staff, etc.
- Technical support for the setting up and operation of the Huduma Centers including PPP.
- Strengthen the management capacity of the last mile operators.

Infrastructure support to improve access

- Maintaining the last mile connection.
- Support for setting up base stations in areas that are not commercially viable.
- Construction of joint antenna.
- Support for the introduction of innovative relay bases for unmanned aircraft, low-orbit satellites, etc.

6) Expected Areas to be Digitalized

The Community Authority of Kenya (the implementing agency of UAF) pointed out the need for digitization of educational content in schools, computers and other devices, and connectivity in the areas of health and agriculture.

7) Potential of using data for innovation in public service improvement

- By utilizing the database of tax payment data, driver's license, resident registration, real estate registration, immigration control, business registration, address (under construction), etc. available through the eCitizen platform, it is expected to improve the reliability and speed of civil procedures through the interoperability of information held by each ministry and contribute to cost reduction through automation. It is also expected to contribute to cost reduction through automation.
- Contributing to cost reduction through automation (e.g., reduction of the national treasury's burden for national health insurance through the use of anonymized medical data)
- Expansion of tailor-made services based on national transaction data.
- Improving transparency through online disclosure and transaction
- Increase in tax collection rate

(6) Education / Edu-tech

1) Vision and Plans:

Kenya Vision 2030 (2007)

The mid-long term development vision towards 2030 was developed in 2007. In 2007, it already highlights distribution of computers to primary schools as one of six flagship project in education sector.

Kenya National ICT Policy (2016)

The policy document for ICT promotion points at needs of improvement of internet connectivity to schools. In the human resources development, needs of promotion of utilization of ICT in all aspects in education sector are emphasized in addition to development of ICT specific human resources.

Education for Sustainable Development Policy for the Education Sector (2017)

The policy document is developed to show direction of education to SDG with assistance from UNESCO. Utilization of ICT in all levels in education is presented for sustainable education development.

Curriculum Guide for ICT Integration in Education (2012)

The document is prepared as training material for primary teachers in harmonized with computer provision project for primary schools. Microsoft and Intel supported the development as well. Training is organized in three different levels, i.e. training for the Ministry staff and school management, fundamental skills, information security and ethics and actual utilization of ICT in teaching and learning process.

2) Current Situation and Activities

Project to distribute computers for primary schools is still ongoing since 2013. Currently tablet PCs are provided in principle. As to secondary schools, equipping PC lab is more common.

In the area of teacher training, CEMASTEIA established with assistance from Japan started to conduct online training because face to face activities are restricted due to prevalence of COVID-19. With experience of implementation in the past of regional training inviting teachers from various African countries, it organized regional training in November 2020 on top of domestic teachers in Kenya, which turned out cost effective as well because traveling and accommodation costs are not really necessary.

3) Challenging area(s)

The Project mentioned above to distribute computers to primary schools could afford to provide tablet PC of only quantity sufficient for one class to use at the same time. In large scale schools, students may have chance to use those once a week or less.

Issue of last mile still remain in many schools in remote areas.

Regional teacher training organized by CEMASTEIA used to be annual regular event in the region with assistance from Japan. However, it has ceased in a few years ago constrained mainly by finance issue.

4) Activities of Development Partners

WB: Kenya GPE COVID 19 Learning Continuity in Basic Education Project

This GPE Project assist continuity of learning during school lockdown and remote teacher training where face

to face training activities are restricted.

WB: Kenya Secondary Education Quality Improvement Project (P160083)

Subcomponent 1.2: Enhancing teacher professional development is to assist school-based teacher support system which adopt remote activities for teacher development but not face to face. The component is not necessarily targeting at utilization of devices with high technology. E.g., use of SNS such as WhatsApp for mutual support among teachers in distance is planned. CEMASTEIA is implementing agency for subjects in science and mathematics.

5) Potential Assistance Needs

The following assistance needs may be prioritized in current situation.

- Infrastructure development to enable internet connectivity to schools as well as procurement of digital devices for learners' use
- Regional teacher training by CEMASTEIA with its experience in past but not only domestic activities

6) Expected Areas to be Digitalized

Digitalization has been initiated and further activities are still required.

- Digitalization of learning material
- Digitalization of teacher training material
- Consistent system of student ID

7) Condition: Infrastructure, Policy, Human Resource, and etc.:

Solution to last mile issue for schools in remote area regarding communication network as well as procurement of digital devices are conditions to further promote digitalization of education.

(7) Health

1) Vision and Plans

Kenya Health Policy 2014-2030 and Fourth Health Sector Strategic Plan 2018-2024

The Government of Kenya developed “Kenya Vision 2030” as a long-term development blueprint for the country, and formulated the “Kenya Health Policy 2014-2030” for the health sector. Universal Health Coverage (UHC) is one of the four “Big Four” agendas to be achieved by 2022. Under the guidance of these development policies, the latest Five-year Kenya Health Sector Strategic Plan (KHSSP) 2018-2024 has been developed. Strategic objectives are listed below.

- To reinforce and improve access to people-centred essential primary health services
- To increase access and improve the quality of health services at all levels
- To institutionalize emergency preparedness and response, early recovery and resilience
- To build and strengthen partnerships and sector coordination
- To strengthen the health systems for effective delivery of health services
- To advocate and mobilize for adequate financing for health at all levels

Digital Health/leveraging on digital revolution is one of the flagship projects under KHSSP to enhance the delivery of health services.

Kenya National eHealth Policy 2016-2030

The National eHealth Policy 2016-2030 provides the policy guiding principles and orientations including effective information sharing for the network of care between healthcare providers, ensuring the interoperability of the systems, securing privacy and confidentiality, creating centres of excellence to promote innovation, and so on. Policy Objectives are the following.

- Enhance interaction between client and health service provider.
- Accelerate the achievement of universal health coverage.
- Enhance the electronic exchange of health data and information.

2) Current Situation and Activities

Policy implementation structure

In Kenya, the Directorate of the Health Sector Coordination and Intergovernmental Relations under the MoH plays a central role in promoting the implementation of the eHealth policy. The Kenya Health Enterprise Architecture (KHEA) has been created, which is a blueprint/framework of areas and models used in the realization of digital health and information systems. The Kenya Health Information Exchange (KHIE) has been proposed for its practical use¹⁷.

Individual systems

- The health management information system (Kenya Health Information System) is deployed nationwide utilizing the DHIS2 platform. The data are regularly collected at the health facilities and shared with the MoH through the County health department. Health personnel and health facility information systems have also been introduced (see below for details).
- The Kenya Health and Research Observatory (KHRO) has been established where various health data are available to the public. Some items are still under development, and further effective utilization is being considered.
- Regarding the introduction of the electronic health record (EHR), while it is reported that some kinds of EHRs have been introduced in most public hospitals of levels 5-6¹⁸, their specifications are inconsistent. WHO and the MoH are developing an integrated EHR platform, and the pilot project at selected Counties is scheduled to start in April 2021.
- For telemedicine, a few projects are reported to be conducted by the own initiatives at the national hospitals or private hospitals. Several commercial telemedicine services are available.
- Numerous mHealth interventions are being implemented. Many provide services related to primary health

¹⁷ Republic of Kenya (2019), Draft business process document for proposed health IT solution for UHC delivery in Kenya

¹⁸ Kenya's health care provision system is divided into six levels: level 6 is tertiary hospital, 5 is secondary hospital, 4 is primary hospital, 3 is health center, 2 is clinic level, and 1 is community health unit.

care such as HIV/AIDS, maternal and child health and malaria using the SMS platform.

3) Challenging area(s)

Overall

According to the KHSSP 2018-2024, Kenya is undergoing an epidemiological transition marked by a decline in morbidity and mortality due to communicable conditions, and an increase in the burden of NCDs. The strengthening of the County government capacity is one of the major challenges as the County government has the primary responsibility of the provision of health services under the devolution in 2013.

Digital Health

- For internet access, fibre optics are available up to the county health department. However, the connectivity in the remote health facilities tends to be limited and there are some areas that even mobile networks are unstable. A stable electricity supply is also a challenge.
- ICT skills and data collection and utilization capabilities among healthcare workers tend to be inadequate.
- Further strengthening is required for the quality of existing information systems such as DHIS2. In addition, interoperability between different information systems is a major challenge as various systems are introduced by disease or programs whose data do not talk to each other.
- It is necessary to accelerate the utilization of personal health data by promoting the integrated EHR.
- While various telemedicine services are provided to the public, relevant laws, regulations, guidelines, and platforms are not yet in place.
- Compliance with the Data Protection Act needs to be enhanced.

4) Information Systems and Platforms

Table 3.1.5 List of major health information systems

System	Data	Owner/operator
KHIS Aggregate (DHIS2)	Aggregated health data for routine monitoring	MoH
KMHFL (Kenya master health facility list)	Public and private health facilities	MoH
KHIS Tracker (DHIS2)	Morbidity and mortality reporting for normal admissions and discharges, and COVID 19 related cases	MoH
IDSR	Communicable disease surveillance	MoH
iHRIS (Integrated human resource information system)	Human resources for health	MoH
LMIS	Medical logistics	MoH
NHIF (National hospital insurance fund)	National health insurance	MoH, NHIF
EHR (various systems)	Personal health data at the health facilities	Health facility
Kenya Health and Research Observatory	Basic health data to be published	MoH

Source: Kenya National eHealth Policy 2016-2030, MoH and development partners

5) Activities of Development Partners

- Japan: The ODA loan “Health Sector Policy Loan for the Attainment of the UHC (Phase 2)” provided in 2020 promotes the digitization of health information systems, such as wifi setup in the MoH and KHRO

development. The SATREPS project¹⁹ also provided support for building a mobile-based outbreak warning system.

- Global Fund: It has been supporting the health information system such as the promotion of the LMIS. It has been announced in the sixth grant in 2019 that it will support the achievement of UHC focusing on digital technology in partnership with PharmAccess.
- WHO: It provides technical support to the MoH for promoting the achievement of UHC by utilizing ICT technology including the development of KHRO and the integrated EHR platform. The pilot project to introduce the integrated EHR at the selected health facilities was planned to start in April 2021.
- World Bank: In addition to technical support for the NHIF, the Transforming Health Systems for Universal Care Project (2016-2022) has been strengthening the M&E systems nationwide, the capacity of health record officers, the civil registration and vital statistics (CRVS) system and so on. A new project on the digital economy also includes support for last mile connectivity to health centres.
- USAID: Health Informatics Governance and Data Analytics Project (2016-2021) supports the development of platforms for effective health information flow from the health centres to the Counties and the MoH.

6) Potential Assistance Needs

- It is necessary to develop ICT infrastructures such as local networks and device availability, particularly in rural areas.
- Promotion of the introduction and utilization of integrated EHR is required.
- It is necessary to create a system that effectively provides standardized telemedicine services by developing a policy framework on the telemedicine
- Strengthening the existing health information systems is required.
- Creating standards for data exchange to promote interoperability is required.

7) Expected Areas to be Digitalized

Personal health data.

8) Potential of Using Data for Innovation in Public Service Improvement

By digitizing personal health data and sharing it among related health facilities and personnel, it is expected to enable continuously follow up with patients and refer them to appropriate health facilities, which leads to the improvement of the quality of and access to health care services.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Adequate ICT infrastructure development at health facilities at all levels
- Ensuring interoperability between systems
- Confirmation of data security and adequate storage

¹⁹ The Project for Development of Rapid Diagnostics and the Establishment of an Alert System for Outbreaks of Yellow Fever and Rift Valley Fever (2012-2017)

- Confirmation of compliance with the Data Protection Act

(8) Social Protection

1) Vision and Plans:

Kenya Vision 2030: Kenya National Development Policy has three pillars, Economic, Social and Political pillars. In the Social Pillar, it states the creation of a social protection fund as a flagship project to support the vulnerable. Kenya National Social Protection Policy (NSPP) was formulated in 2011, and social protection programs have been designed based on this policy. A comprehensive review of the social protection sector was conducted in December 2011. In 2017, the review of the social protection sector was updated and the monitoring evaluation framework (Kenya Social Protection Monitoring and Evaluation Framework 2018-2022, updated in August 2020) was created. In 2020, the Annual Report (Kenya Social Protection Sector Annual Report 2018/19, July 2020) was formulated in line with Kenya Vision 2030, and the Strategy for the Enhancement of the Single Registry (2020) was also published.

Kenya's social protection policy is supervised by the Ministry of Labor and Social Protection (MLSP). Social protection programs are implemented by multiple implementing agencies, depending on the target and content. The National Social Protection Secretariate²⁰ has been established under the MLSP. The implementing agencies of major programs like National Hospital Insurance Fund (NHIF), National Social Safety Fund (NSSF), National Council for Persons with Disabilities, and Donor institutions including ILO, UNICEF, World Bank, are cooperating as partners.

2) Current Situation and Activities:

<Social Protection>

Social protection programs are categorized as follows.

- Social Assistance supports the minimum income protection (social net) of vulnerable groups and is based on non-contributory program. Therefore, it is subject to a means test as needed. The specific program is as follows. Cash Transfer Program to Persons with Severe Disabilities (PWSD-CT), Hunger Safety Net Program (HSNP), Cash Transfer for Orphans and Vulnerable Children (OVC), Older Persons Cash Transfer (OPCT). The number of beneficiaries of these programs is more than 600,000. The executing agency is MLSP.
- Social Security is a contribution-based income security implemented through the NSSF. Formal and informal sector workers and their dependents are eligible. It is a comprehensive social security system with contributions from the government, employers, and workers.
- Health Insurance is a medical and health insurance for all Kenyan citizens and is implemented through NHIF. The NHIF is premised on contributions, but contributions are exempted for the poor. It is one of the important national policies for achieving UHC in Kenya.

²⁰ <http://socialprotection.or.ke/>

<Digitalization>

In Kenya's review of the social protection sector, digitization of the social protection sector is recognized as one of the issues and is being promoted. The Social Protection platform operated by the National Social Protection Secretariate has a webpage of Single Registry. Multi-donor support led by the World Bank continues to build the Single Registry for Social Protection. Through the World Bank's "Kenya Social and Economic Inclusion Project 2018-2023" including Component 1: Strengthening Social Protection Delivery Systems and Component 2: Increasing Access to Social and Economic Inclusion Interventions, effective and efficient social protection programs, including payment mechanisms are promoting. The construction of the supply system and the strengthening of its operation are being continuously implemented.

3) Challenging area(s)

The collection of beneficiary information and household information of the social protection program, which is the basis of the Single Registry, is being promoted in collaboration with NGOs. It takes time and effort to acquire information in rural areas.

The Social Registry currently incorporates three permanent programs (cash benefits for the poor, disabled and the elderly) in the Social Assistance program mentioned above. In the future, it will be necessary to collaborate with social security programs other than Social Assistance through unique identity. Ultimately, E-Government by building an Integrated Population Registry System (IRPS) that connects social security and various public services is aimed to realize.

4) Information Systems and Platforms:

Single Registry for Social Protection which include information of beneficiary and household of social protection program is expected to be materialized in both central-level and local-level. The owner of Single Registry for Social Protection is Government of Kenya and responsible operator is MLSP. Main financial resources and technical donors are World Bank, UNICEF and etc.

Birth registration is being promoted mainly by UICEF and others. Web registration is possible at the central e-Citizen²¹, but there is a need to promote registration in rural areas.

5) Activities of Development Partners

- World Bank: Kenya Social and Economic Inclusion Project 2018-2023 (USD 250 million)

6) Potential Assistance Needs

- Promote the Single Registry for Social Protection and strengthen the information management and monitoring functions of beneficiaries and beneficiary households,
- Strengthen targeting and monitoring functions for the poor and vulnerable by promoting the Single Registry for Social Protection,
- Further promote digital payments utilizing mobile transfer and mobile money in order to build safe and efficient payment methods.

²¹ <https://www.ecitizen.go.ke/ecitizen-services.html>

7) Expected Areas to be Digitalized

- Strengthening the management system of social protect programs through Sigle Registry for Social protection,
- Digitization of all household information,
- Strengthening interoperability with other organizations' MISs,
- Promotion of digital payments utilizing digital transfer and digital money.

8) Potential of Using Data for Innovation in Public Service Improvement

The Government recognizes the Integrated Population Registry System (IRPS) as the key factor of E-Governance and is proceeding with its establishment.

Utilize administrative big data on social protection and households for "evidence-based policy making and monitoring."

9) Infrastructure, institutions, human resources, and other conditions to enable innovation

- Infrastructure development in rural areas where social protection services are provided,
- Capacity building of central and local government officials of MLSP, who will be the main managers and users of data,
- Notification and enlightenment activities to citizens for understanding of benefits from digitalization

3.2 Rwanda

3.2.1 Survey Policy in the Target Country

(1) National Development Plan

In 2021, the Government of Rwanda has formulated a new holistic national development plan VISION 2050 to proceed the original national development plan VISION 2020.

With the goal of bringing prosperity and high quality of life to all nation, the Vision 2050 defines 1) Human Development, 2) Competitiveness and Integration, 3) Agriculture for Wealth Creation, 4) Urbanization and Agglomeration, 5) Accountable and Capable State Institutions are the five pillars of the plan. In addition, 1) Strong and sustainable macroeconomic fundamentals, 2) Positive values supporting Societal Transformation, and 3) Rigorous and effective monitoring and implementation frameworks are defined as key considerations for success.

(2) Country Assistance Policy of the Government of Japan

The Government of Rwanda has set forth Vision 2020 (formulated in 2000), a long-term national development vision, with an aspiration to transform Rwanda into a middle-income country, by achieving its income per capita from 220 USD in 2000 to 1,240 USD by 2020. Aiming at this objective, the Government has actively engaged in the development including economic growth, poverty reduction and job creation, based on the both the first and second Economic Development and Poverty Reduction Strategy (EDPRS and EDPRS-II), and has achieved impressive economic growth in the past 20 years. However, 39.1% of the population is still obliged to live under the poverty line and around 40% of its revenue relies on foreign aids. For securing steady economic growth in the landlocked country Rwanda, it is essential to stimulate not only the domestic economy but also the regional economy within the East African Community (EAC)

The Government of Rwanda has recovered from the civil war and has also achieved the remarkable accomplishment on MDGs. In fact, though Rwanda is regarded as one of the model countries of post-conflict recovery and economic growth, it is still important to support Rwanda from the perspectives of the stabilization of the Great Lakes Region and “Consolidation of Peace”. Also, assistance to Rwanda, which aims to realize poverty reduction through economic growth, is consistent with Japan’s Development Cooperation Charter and assistance policies expressed in the TICAD process.

Table 3.2.1 Country Assistance Policy of the Government of Japan for Rwanda

ODA Basic Policy	Promotion of sustainable growth, poverty reduction and job creation	
Priority Areas	Economic infrastructure development	transportation, trade facilitation and energy
	Agricultural development	promotion of market-oriented and value-added agriculture
	Social service improvement	sustainable safe water supply and sanitation service
	Human resource development for sustainable growth and job creation	science and technology education and training
Remarks	<p>Within the donor coordination framework, Japan leads the water and sanitation sector as well as ICT sector.</p> <p>Under the “Knowledge-based economy”, positive use of ICT is encouraged.</p> <p>Through ABE Initiative, Japanese companies and local Governments have increased their interests to partner with Rwanda in the ICT sector.</p> <p>The establishment of SDGs Center for Africa represents Rwanda’s strong commitment for achieving SDGs.</p>	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Rwanda

While Rwanda is actively working toward becoming an ICT nation, the issue is that the people may not have widely and fairly utilized digitalized public services. In the country assistance policy of the Government of Japan, it is expected that the digitalization of public services will contribute to the improvement of social services, human resource development that supports growth and job creation. It should also be noted that Japan's expected role in donor coordination is to lead the water and sanitation, and ICT sectors.

Given the above examination, JICA Study Team intends to learn the best practices in Rwanda's ICT sector that can be applied and expanded to other African countries and how they utilize the digitalization of public services in Rwanda. JICA Study Team also intends to exchange opinions with relevant agencies and organizations on issues and possible measures in the delivery process of digitalized public services in Rwanda.

3.2.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation

1) Vision and Plan

National ICT Strategy (National ICT Strategy)

Rwanda is one of few countries which recognized and continued to use ICT as one of the pillars for its development from late 1990s. After the civil war and genocide in 1994 which destroyed almost all infrastructures, Rwanda formulated broad vision for its development called Vision 2020 strategy in 1998. The vision aimed to make Rwanda to become a middle-income country by 2020 and use of ICT was recognized as a key to its achievement. Rwanda was also one of the target countries of the UNECA's "National Information Communication Infrastructure" Plan (NICI Plan) in 1999 which supported creation of national ICT strategy. Following the success of its first ICT strategy NICI-I Plan (2000-2005), Rwanda has been formulating and implementing ICT for development strategies every five years since 2000. The first ICT strategy, NICI-I was concentrating on establishing foundational policies and institutions that would serve as the basis for achieving an information economy. The second ICT strategy, NICI-II (2005-2010) developed core infrastructure (fiber-optic backbone networks, national data centers, and infrastructure for administrative and public institutions). In NICI-III, the focus was on private sector development and the effective use of the developed infrastructure where ICT private sector has been strengthened. The final part of the 20 years NICI plan process was synthesized into SRMP (Smart Rwanda Master Plan) which aimed at achieving Rwanda's transformation into an information economy. The year 2020 is the final year of the SRMP and Vision 2020, and the strategy implementation period was completed in July 2021, with the final assessment is underway as of October 2021.

Rwanda has formulated succeeding vision to its Vision 2020 in the form of National Transformation Strategy-1 (NST-1) which also has strong reference to utilizing ICT for its development. In addition, as a successor to the SRMP, ICT Sector Strategic Plan (SSP), a new ICT and development strategy aligned to the NST-I, has been formulated and in the process of implementation.

In addition to these, a number of other sectoral ICT plans and strategies, including e-Government strategies, have been enacted and being implemented. One of the challenges for these strategies is that many of them are about 4-5 years old and there is growing need for them to be updated.

2) Current Situation and Activities

ICT laws and regulations

There are no major deficiencies in the ICT laws and regulations at present. Legislation and regulations are often revised in line with the development and current status (challenges) of ICT and other development. Regulatory sandboxes for ICT services and Fintech are also available to conduct innovative POCs.

As for the latest legislation, the Personal Information Protection Act of 2021 was promulgated on October 15, 2021 and the Act, which is similar to Europe's GDPR, is set to come into effect after a two-year grace period. As with other African countries, prior to passing of the act, there was a regulation in place to protect personally identifiable information through requiring them to be stored in0country. The passage of the comprehensive personal data protection bill will not only allow the citizens could properly manage their personal information properly but is also expected to help establish a data-driven economy in Rwanda.

Table 3.2.2 ICT related Laws and Regulations in Rwanda

Basic ICT Law	ICT Law * ICT Law has been enacted in 13th of May 2017.
National ID	N°14/2008 OF 04/6/2008 governing registration of the population and issuance of the national identity card N° 44/2018 of 13/08/2018 Law amending Law n°14/2008 of 04/6/2008 governing registration of the population and issuance of the national identity card
Electronic Signature	N° 18/201 of 12/05/2010 Law Relating to Electronic Messages, Electronic Signatures and Electronic Transactions
Electronic Transactions	-ibid-
Personal Data Protection	N° 058/2021 of 13/10/2021 Law relating to the protection of personal data and privacy
Cyber Security	Cybersecurity Regulation N° 010/R/CR-CSI/RURA/020 OF 29/05/2020
Competition Law	N° 36/2012 of 21/09/2012 relating to Competition and Consumer Protection
Intellectual Property Protection Law	N° 31/2009 of 26/10/2009 on the protection of intellectual property

Source: Desk Research by JICA Study Team

Organization

The Ministry of ICT and Innovations (MINICT), which oversees ICT and development, is the supervising and policy-making ministry. Rwanda Information Society Authority (RISA) is the implementation agency for the MINICT to implement inter-Governmental and major ICT driven initiatives. National Cyber Security Agency (NCSA) has also been established to safeguard the cyber security. ICT related regulations are conducted by Rwanda Utility Management Agency (RURA), a semi-autonomous regulatory agency. The RURA also grants access to use regulatory sandbox for innovative ICT initiatives. For the Fintech initiative, National Bank of Rwanda (BNR) grants access to the Fintech regulatory sandbox.

Current status of public service digitization

Rwanda embarked on e-Government initiative when it established Rwanda On Line (ROL), a public corporation to provide digitalized public services. The company established an unified e-Government portal called Irembo in partnership with a Singaporean company (The name of the company has now been changed to Irembo as well). The Irembo platform was created with an aim to provide 24hrs 7 days a week access to Government services to its citizens. Although the Government has a goal of digitizing all essential public services, that as of October 2021, 51% of the 1,828 Government services are fully automated (22.7%) or semi-automated (27.8%). 98 of the online services (893 online services) are accessible through the Irembo platform, while the rest (795) are accessible through other platforms such as Government websites, USSD, and other systems. As for the Irembo interface, new more user-friendly interface was created in the form of Irembo 2.0

and it was launched in February 2020. All Rwandans mobile phone users are required to register their phone number to be linked with their national ID (passport number for foreigners). As a result, authentication by Irembo 2.0 has dual authentication system with SMS that further increased transaction security.

Irembo is playing a major role in providing public services under the COVID-19 pandemic when there were strict lock-downs were in place in Rwanda. RISA is also developing an interoperability framework called the Enterprise System Bus (ESB) to connect data and processes of various different ministries and agencies. Development of the ESB was initially being developed by Irembo but as of December 2021, a local company, QT Software took over further development tasks. The ESB is expected to speed up interagency procedures and provide services that meet the needs of citizens through interoperability of data and processes among ministries and agencies.

The digital literacy and digital divide still remain to be big challenges in rural areas. In order to provide e-enabled public services smoothly to the citizenry, an agent system has been introduced (using youth as digital ambassadors and Irembo agents). Irembo is also been used by local Government officials to provide different services to citizens as well.

On the other hand, not all back-end services in Irembo are electronically processed. In many cases, back-end processing is performed with human intervention. The World Bank's new project is aiming at further digitization of the core back-end processes, as well as the enhancement of the Enterprise System Bus. However, the needs to digitize (automate) the back-end processes and increase innovative services are vast and it would be useful to utilize more private companies, including start-ups, to implement these tasks.

3) Issues

- The legal system and regulations for data utilization are generally in place. However, there is a chronic shortage of human resources in the Government. Shortage is mainly in the area of policy and strategy-related areas, and this challenge needs to be mitigated when the Government pushes forward with e-Government initiatives.
- The Government is also making efforts to nurture startups (JICA's ICT Technical Assistance Project is also providing support), but there need to be proactively use the power of startups to expand public sector services and solve Government challenges.
- Many of the services provided by Irembo are not automated and the back-end processes need to be processed manually.
- The priority sector ministries now have Chief Digital Officer (CDO) and a dedicated team under the CDO to drive the digitization of the sector. However, many CDOs are not policy experts may lack the policy related expertise to drive sector digitization policies. There is an urgent need to improve the capacity of these people.

4) Information System / Platform

- Information System/Platform Name: Enterprise System Bus

Main Data : Data managed by ministries and agencies, including personal information

- Owner of the Data/Operator : Ministries/Agencies (Individuals)
- Source of Funding/Donor, etc.: The project has been funded by the Government. However, the system is planned to be strengthened through a new project (Digital Rwanda project) by the World Bank.

5) Activities of Development Partners

In the ICT policy/legal areas, bilateral donor partners including JICA, UN specialized agencies, and the World Bank are providing support which include capacity building.

6) Potential Assistance Needs

The priority development sectors (e.g.; agriculture, education, infrastructure, health, etc.) are embarking on digitization through the team comprised of their Chief Digital Officers (CDOs). However, CDOs lack necessary policy, management, strategy related skills to perform these tasks and there are great needs to furnish these skills. The situation is similar with the MINICT and RISA where both institutions also require strengthening these skill-sets.

7) Expected Areas to be Digitalized:

In Rwanda, almost all sectors are being digitized but there are priority sectors such as health, education, agriculture, public sector, etc. which require more concerted efforts.

8) Potential of using data for innovation in public service improvement

By opening up the data held by ministries, agencies, statistical bureaus, and private companies, more innovative services and products could be introduced to better serve the citizens.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

In order to further strengthen Rwanda's digitalization, it is necessary to actively open up and utilize the data held by the Government and the private sector. This will encourage more innovative products and services will be created by the private sector. In particular, in order to encourage the development, it is necessary to create ecosystem with right incentive mechanisms which include opening up the enterprise system bus in safe manner so that the private sectors, including startups, could use the data to come up with innovative services. It is also necessary to create an environment with right policies (e.g.; regulatory sandbox for data driven innovations) to enable the private sectors to create new services as POCs.

(2) ICT Human Resource Development

1) Vision and Plan

Digital Talent Policy (2016)

The policy is designed to improve the digital literacy of Rwandans at three levels: elite professionals, experts, and basic literacy gainers. It proposes to fill the gap between the demand and supply of skills in the ICT industry, and the establishment of an ICT Sector Skills Council (Digital Skill Council) for ICT Professional Certification. However, at the time of the interview with the Ministry of ICT in March 2021, these institutions have yet to be established, and the Skills Office of the Rwanda Development Board (RDB) is responsible for organizing and coordinating ICT skills. This policy is scheduled to be reviewed and revised in July 2021.

National Skills Development and Employment Promotion Strategy (2019-2024)

This strategy aims to create 5 million jobs by 2050, and 3 million jobs by 2030 by utilizing ICT skills. ICT skills are classified into four categories: Digital Literacy, Content Processing, Hardware Management, and Content Creation and Management.

ICT Sector Strategic Plan (2018-2024)

One of the three overall goals of this strategic plan is to make all citizens digitally literate, and in terms of ICT human resource development, the goal is to develop 12,000 Elite IT Professionals by 2023/24. It also aims to create 100,000 jobs in the ICT industry every year.

ICT Hub Strategy (2019-2024)

It is a strategy for Rwanda to establish itself as an ICT Hub of the continent. The strategic themes are (i) building a critical mass of human resources with a high level of education and IT expertise, (ii) fostering a nationwide innovation culture, and (3) the development of advanced technological capabilities and expertise in specific niche areas.

ICT for Governance Cluster Strategy (2020-2024)

It is a strategy aiming for advancing an effective, efficient, innovative, and inclusive digital Government and has five focus areas. The second focus area is Digital Government Enablers, and one of them is IT capacity development (establishing departments in each ministry to take charge of digital projects). And the fifth focus area is Digital Skills Development, and it includes developing and maintaining evidence-based, decentralized, and cost-effective digital skills, both in Government on the supply side and in citizens, civil society, and businesses on the demand side.

2) Current Situation and Activities

ICT human resource development

As there are not adequate ICT human resources who can engage in practical programming, the Government set up the Rwanda Coding Academy (RCA) in 2019 to train upper secondary-level talent who be ready for immediate employment. RCA has an extracurricular activity include AI, robotics, and IoT education. The

Government intends to expand it to other states in the future²².

As for graduates of Tumba Integrated Polytechnic Regional Centre (including ICT faculty), which JICA has supported, it was recognized that the Advanced Diploma granted upon completion of IPRC is disadvantageous for employment, as companies generally tend to seek personnel with an undergraduate degree (Bachelor's degree). In order to provide graduates with the possibility of further education, it was decided that a Bachelor of Technology degree would be granted in the future²³.

The Government has set up Centers of Excellence in ICT-related fields at Carnegie Mellon University (Rwanda is the only country which successfully have it in Africa) and the National University of Rwanda, and is focusing on ICT human resource development. In addition, the African Institute for Mathematical Sciences (AIMS), Adventist University, African Leadership University (ALU), the University of Kigali, and other private institutions are also producing tech talent.

ICT capacity in the public sector

An urgent assessment of the digital skills of all civil servants was conducted with the occurrence of COVID-19, and it was decided that basic digital literacy training to be introduced to bring them all to a level where they can work from home by the end of next year (December 2022)²⁴.

ICT capacity in the private sector

MARA Group, which produces Rwandan-made smartphones, hires IPRC graduates at its factories and trains them to become technicians through internal training and practice²⁵.

RDB's Skill Office, in collaboration with Coursera, is providing ICT training to enable nationals who were laid off due to COVID so that they can work from home²⁶.

Capacity to use digital services

The Government launched the Digital Ambassadors Program in 2016, with the goal of having 500 ambassadors who would provide digital literacy training to 5 million citizens by 2022 and become social entrepreneurs and sole proprietors.

3) Challenging area(s)

Graduates of domestic universities are generally perceived as having insufficient hands-on experience in their field. For example, many of IREMBO's employees were educated outside of Rwanda. The RCA also states that currently its students have more practical programming skills than university graduates.

Although advanced technologies such as AI and IoT are included in the syllabus of the Faculty of IT/ICT of IPRC and University of Rwanda, the content taught in the educational field must be mainly at the basic level because the lecturers are not active engineers who are at the forefront of the field, which affects the technical

²² Interview with RCA on 24 March 2021.

²³ IPRC Tumba Interview, April-13, 2021

²⁴ Interview with Ministry of ICT and Innovation on 26 March 2021.

²⁵ Interview with MARA Group on 29 March 2021.

²⁶ Interview with MINICT on 26 April 2021. JICA ICT Innovation Ecosystem Strengthening Project supports offering "Udemy for Government (online course)" with MINICT and RISA.

level of graduates who become engineers. On the other hand, the skills of engineers required by the industry are to collect the latest technical information that is constantly being upgraded, and to continue to improve their own technology²⁷.

Both the Government and the private sector are considered to have low capacity for system development²⁸. As the importance of data increases in the future, RURA expressed a need to develop human resources such as data scientists and data analysts so that the Government can make decisions based on the data as evidence²⁹.

In general, the public's trust in digital services is an obstacle to the use of digital services³⁰. In addition, some of the end users of public services, such as the elderly, illiterate, and disabled, do not have easy access to digital content and need service content that can be used in their local language because they lack ICT knowledge and some cannot understand contents in English³¹.

4) Activities of Development Partners

World Bank supported “Digital Acceleration Project (DAP)”

It is a pipeline project plans to start in January 2022, co-financed with Asian Infrastructure Investment Bank (AIIB), with a budget of USD 200 million and a project period is under review from the original 5 years. It is designed based on the survey conducted by the African Development Bank and it is expected to cover the development of human resource capacity for data utilization as a component of building a digital identity ecosystem with NIDA³².

GIZ supported “Digital Solutions for Sustainable Development (DSSD)”³³

During the cooperation period of 2017-2020, the project is building capacity of RISA and others, and managing the Digital Transformation Center, which opened in May 2019. The Center is home to five start-ups and has 1,500 community members from Rwanda and abroad who participate in events.

KOICA³⁴

KOICA supported following initiatives:

- ICT Innovation Center: Implemented with RDB as part of the Rwandan Government's efforts to strengthen the ICT sector, ended in 2019. The Center serves as a hub for incubation and development of start-ups mainly in the area of multimedia and gaming. It also provides capacity building programs for the general public, in the area such as mobile apps. It provided studios, computer labs, classrooms, smartphones, PCs, and other necessary equipment for training and provided entrepreneurial support to 20 multimedia start-ups. The next phase of support has been under discussion for two years, but the

²⁷ JICA (2021) “Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda Final Report

²⁸ Interview with KOICA on 30 April 2021.

²⁹ Interview with RURA on 25 March 2021

³⁰ Interview with ICT Chamber on 8 March 2021.

³¹ Interview with RURA on 25 March 2021.

³² Interview with the World Bank on 28 April 2021.

³³ Interview with DSSD conducted under JICA's Data Collection Survey on Technical and Vocational Education and Training in the Republic of Rwanda in 2020.

³⁴ Interview with KOICA on 30 March 2021.

conditions for the establishment of the center's governing body, formal staffing, and certification of qualifications by RDB have not been met.

- **Youth Connekt Initiative:** An initiative to support youth in the African region in collaboration with UNDP. It is an ambitious program that aims to strengthen the capacity of young people in several African countries, not only in the field of ICT, but also in areas related to capacity building and improving the entrepreneurial and business skills of young people.
- **Capacity Development for ICT Education (CADIE Project):** It supports ICT education for secondary school teachers since 2017.
- **Rwanda Coding Academy (RCA):** KOICA is currently discussing the cooperation of a campus and equipment provision and formation of technical cooperation.
- **Digital Ambassador Support Program:** It is under consideration for support to improve digital literacy.
- In addition, support is being provided to IPRC's ICT teacher training program as part of its educational support.

Digital Opportunity Trust (DOT) supported “Digital Ambassador Program”³⁵

It trains youth to be digital ambassadors, bringing the digitization of public services to rural areas and communities, while promoting the employment of youth.

(3) ICT Infrastructure

1) Vision and Plan

The ICT Sector Strategic Plan 2018-2024 builds on the timelines and initiatives outlined in the National Strategy for Transformation (NST1) to provide broadband to all citizens, digitize Government transactions, and improve digital literacy for all by 2024. The plan includes the provision of broadband to all citizens by 2024, the digitization of Government transactions, and the improvement of digital literacy among all people. The Plan aims to make backbone networks a fundamental necessity and broadband a practical reality.

2) Current Situation and Activities

International Backbone Network

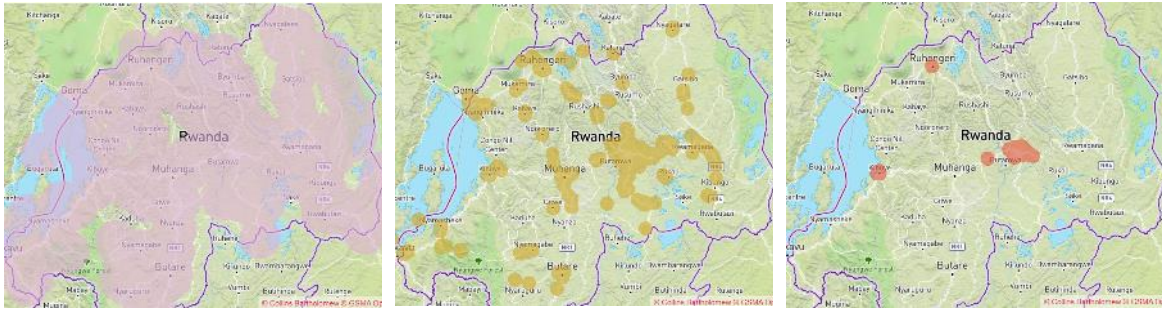
Since Rwanda is a landlocked country, it does not have a landing station, but is connected to two international submarine cable landing stations (Mombasa, Kenya and Dar es Salaam, Tanzania) via an international backbone. The connection from the port of Mombasa is laid through the Northern Corridor Integration Project (NCIP), while the connection from the port of Dar es Salaam is laid through the Africa Central Corridor.

Domestic Backbone Network

In Rwanda, the National Backbone Fiber Optic Network has been installed with a total length of 2,500 km. The National Backbone Fiber Optic Network covers 30 regions, 360 institutions, and 9 border points. The National Backbone Fiber Optic Network is a public-private partnership between the Government of Rwanda, Korea Telecom (KT) and the KT Rwanda Network (KTRN), which is owned and managed by the Rwanda

³⁵ Interview with DOT on 20 May 2021.

Figure 3.2.2 Mobile Coverage by each operator



2G Coverage
 Coverage by MTN Rwanda

3G Coverage

4G Coverage



2G Coverage
 Coverage by Airtel Rwanda

3G Coverage

4G Coverage

Source: GSMA

Data Center

In Rwanda, Telecom House Kigali (one location), a Tier 3 level data center, has been built as a national data center. This national data center is operated by a private company affiliated with Korea. On the other hand, three data centers by Liquid Telecom and two by MTN have been built in Kigali as private data centers.

IXP (Internet Exchange Point)

Around 2004, RITA (Rwanda IT Authority) built the IXP in cooperation with the Swedish International Development Cooperation Agency and the Swedish Institute of Technology. In conjunction with the ccTLD repatriation, the Rwanda Internet Exchange has been set up in Kigali with the support of RURA. The Rwanda's IXP is constructed and managed by RICTA Ltd (Rwanda ICT Association), an affiliated organization of Rwanda ICT Chamber.

3) Challenging area(s)

The National Backbone Fiber Optic Network has been established in Rwanda, but on the other hand, according to ITU data, the Internet usage rate remain at 22%, which is lower than the Africa-wide average of 24%. This low penetration rate is thought to be due to relatively high cost of the Internet, lack of content and services in local languages, weak telecommunications infrastructure in rural areas, and the low number of digitally literate citizens who use the Internet.

4) Activities of Development Partners

As a donor country, China has invested USD 400 billion in Rwanda over the past 12 years. In July 2020, Xi

Jinping, the first Chinese president to visit Rwanda, welcomed the country's participation in the One Belt, One Road Initiative, and reportedly decided to provide a loan of USD 126 million (about ¥13.8 billion) for road construction. He also reached an agreement with the Rwandan Government on the development of a hospital and a new airport. On the other hand, in the telecommunications business, the infrastructure is already in place, so there seems to be no significant room for Chinese capital to enter. However, according to the Japan External Trade Organization (JETRO), the Rwandan Government and China's e-commerce company Alibaba have established the World Wide Web Trade Platform (eWTP) in Rwanda, indicating that China is making inroads in information fields other than infrastructure.

5) Potential Assistance Needs

In response to the issues mentioned above, the Rwandan Government has set the goals of "Broadband for all 2024," "Government Digital Transformation by 2024," and "Digital Literacy for all" in its ICT Sector Strategic Plan 2018-2024. As an ICT infrastructure, it is considered that there is potential support for advancing this policy. On the other hand, Rwanda has a certain level of ICT infrastructure and has been promoted with support from South Korea and Sweden, and China's entry into the information sector, so it is difficult for Japan to enter into the ICT infrastructure domain in Rwanda.

(4) National ID

1) Vision and Plans

Vision 2020, which was formulated in 1998, NICI Plan, Smart Rwanda Master Plan and other ICT utilization are important pillars of national strategy, and they are strongly promoting the introduction, dissemination and utilization of national ID, which is the key to e-Government implementation.

2) Current Situation and Activities

National ID is linked with various sectors such as, Banking sector (Rwanda National Bank), Public sector (tax registration, business registration, land registration, border management, etc.), Social Security, Telco sector (SIM registration KYC), Healthcare sector, Agriculture sector (purchase of fertilizer for farmers, etc.), Ministry of Justice / Rwanda National Police (driver's license), and IREMBO (online public service for citizens) to achieve interoperability. In addition, each ministry and related organization is connected by the prepared standard API (a mechanism to refer to the data after being authenticated by the national ID). The registration rate of national ID is 99%, which is practically registered among all qualified people, and registration is possible at 416 registration centers nationwide.

3) Challenging area(s)

Challenges at the NIDA (central Government) level are the development of a legal framework for the integrated use of IDs (including cross-borders) and the introduction of IDs for minors.

The challenge at the local registration center level is that it takes time to provide services due to poor communication infrastructure, insufficient human resources, and location issues.

4) Information Systems and Platforms

- Information System / Platform Name: N/A

- Main data: National ID (for 11 million people, name, photo, birthday, gender, etc.)
- Owner of the Data/Operator: National Identification Agency (NIDA)
- Source of Funding/Donor, etc.: N/A

5) Activities of Development Partners

Technical assistance is provided by the World Bank.

6) Potential Assistance Needs

It is conceivable to support the development of communication infrastructure and biometric authentication equipment, especially in rural areas.

7) Expected Areas to be Digitalized

The areas considered are the sophistication of the CRVS process, integration with PKI, distributed collection system of biometric information, etc.

8) Potential of using data for innovation in public service improvement

There are already integration of different services with National ID both at the Government and private sectors level. There are strong possibilities of creating innovative services with National ID authentication.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

It is necessary to work on the elimination of the digital divide in rural areas and the development of IDs for minors (especially in the fields of health and social security) in the legal framework for data linkage.

(5) E-Government

1) Vision and plan

Rwanda is an ICT (Information and Communication Technology) nation: it is investing in digital infrastructure to make network services more affordable and improve access to the Internet. The Digital Ambassador Program aims to improve the digital literacy of Rwanda's 5 million people.

2) Current Situation and Activities

The e-Government IREMBO, consisting of IremboGov and IremboPay, is an online (through web and USSD) platform that provides about 100 different digitalized public services and payment methods, and is operated by the private company IREMBO (formerly RwandaOnline) in cooperation with the Government. IREMBO is a government owned private company, and although it is linked to different Government databases through VPNs and other means, it does not own the databases, and its operating costs come from fees paid by people who use the IREMBO platform to receive services.

IremboGov provides services associated with 20 Government agencies, including the Ministry of Education, Ministry of Local Government, Land Management Agency, Ministry of Justice, Immigration and Emigration Agency, and Police (ID cards, birth certificates, marriage certificates, driving violations, police services, immigration, passports, travel documents, land title transfer, health (Universal Insurance Service), etc.). It has 4,000 agents nationwide and provides technical support to related agencies and users.

When applications made in person and those made through third parties such as IREMBO agents, digital ambassadors, and cell phone company agents are combined, applications made through IremboGov account for about 90% of the total number of users, and the Government plans to gradually eliminate face-to-face applications in the future. Especially under COVID-19, the utilization rate of IREMBO has been increasing. IREMBO is not necessarily an end-to-end service; in some cases, ministries and agencies manually handle and issue certified documents after online application.

IremboPay is used by users to pay the Government for digitized public services online (C2G). Users can pay by cash, debit card (Visa, MasterCard), mobile money (MTN, Airtel), or through fintech companies. IremboPay are not used for online payments from the Government to the user (G2P), such as social protection benefits, or between Governments (G2G). Social protection benefits are most often paid by direct deposit (in rural areas, many people have SACCOS accounts).

Public services for consumers have been digitalized to a great extent. Electricity has been fully digitized and consumers pay for their electricity with prepaid meters. The transport sector has also seen a lot of investment by foreign companies and the Government. The digitization of public transport in the capital, Kigali, is a potential investment opportunity, and the Rwanda Utility Regulatory Authority (RURA) is considering an intelligent transport system (platform) for cars, buses, freight transport, logistics, and motorcycles. platform) for cars, buses, freight transport, logistics, and motorcycles.

Communications, public transport, energy, oil, and waste management are serviced in the traditional way, but they are not ready for digitalization, do not require efficiency, and are not responsive to consumers, so the Government is developing licenses and other measures for modernization.

3) Challenging area(s)

- Since the current IremboGov is unstable and not scalable, it is in the process of migrating data from version 1.0 to 2.0 and is considering migrating to 3.0 in the future. In addition, IremboPay is highly dependent on the Pivot interface of Kigali Bank, a private commercial bank, which could be a serious point of failure for IremboPay, and manual reconciliation with partners is not scalable.
- Rwanda is a country with high Internet penetration, with 4G networks reaching 90% of the population, but due to the high cost of data bundles and people's inability to own devices, many people do not have access to the Internet and are unable to access digitalized public services. Ninety percent of the Internet is accessed through cell phones, but only less than 20 percent of the population owns a smartphone, which is another impediment to the development of digitized public services.
- Since there are no regulations on how to handle user information in IremboGov, it is necessary to consult Government and agency regulations to decide whether to delete the data or to store it in a way that the privacy of personal information is protected and maintains its anonymity.
- Lack of devices, high connection fees, inadequate digital literacy, and unstable internet make it difficult for rural people to access digitalized public services.
- Service charges for many of the existing mobile network operators are high.

4) Activities of Development Partners

KOICA: Electronic Billing Machines (EBM) system for RRA (Rwanda Revenue Authority)

It is in the final stages of building a system to manage the electronic receipt system and access all tax-related information, including tax returns and tax payments, called MyRRA. The system is expected to be operational in the first half of 2021.

5) Potential Assistance Needs

Improvement of IREMBO

There is a need for technical and financial support for user research, product design, and piloting/learning for IREMBO 3.0. Joining IREMBO's product advisory board allows investors to feed IREMBO team with their product needs and expectations.

Support for the export of IrremboGOV to other countries

There is a need to export the experience of setting up e-Government unique to respective countries. Funding for user research, product needs, evaluation, product testing and feedback, etc. is considered.

6) Expected Areas to be Digitalized

Introduction of electric drive models

Major automakers in European countries and elsewhere have announced a ban on the use of internal combustion engines, and the Government is concerned about the impact of large-scale dumping of internal combustion engine vehicles on the African continent. A delay in the introduction of electric vehicles could have an enormous impact on developing countries. Huge investments will be required for complete mobility changes and it is required for developed countries to be strategic partners in power grids, infrastructure for charging,

Public Health

Despite the fact that more than 80% of waste is organic, it has not yet been converted and industrialized into fertilizer, gas, etc. Digitalization in the waste management field is expected.

7) Potential of using data for innovation in public service improvement

IREMBO, the operating company of IREMBO, has links to different Government databases, but the data is held by the respective ministries and agencies and not by IREMBO, the operating company. In the future, there is a possibility of coordinating with Government agencies to find use cases and allocate them to IREMBO's operation and maintenance costs.

(6) Education/ Edu-tech

1) Vision and Plan:

Education Sector Strategic Plan 2018/19 to 2023/24

2) Current Situation and Activities

Situation of schools under COVID19 Situation

In Rwanda, sporadic lock-down was introduced from March 21 2020 and this led to the school closure.

University campus is closed and some of the lectures shifted to an online platform. In TCT (Tumba College of Technology), they continued the lectures using their e-learning platform. Some measures are taken to cope with this situation, such as production of educational programs on the Radio and Television. Rwanda is thinking about the creation of a specialized educational channel for Radio and Television.

Introduction of ICT in schools

- OLPC (One Laptop per Child) was introduced in primary schools of Rwanda from October 2008. Rwanda Education Board (REB) is in charge of distribution and management of this program. Due to the limited number of devices introduced, this device XO-Laptop was not used as the developer of the device intended. Originally XO-Laptop was designed to be owned by each student, and the free access to this device should develop an ownership and auto-learning of the student. In reality, one XO-Laptop is used only in classroom settings and several students use the same device. In addition, the choice of OS installed on XO-Laptop changed a few times. Originally XO-Laptop were delivered with Sugar OS, but the teachers were unfamiliar with this OS, so they shifted the OS to Windows. After a while they decided to go back to Sugar OS.
- At the university level, the student can acquire a Laptop made in Rwanda (Positivo, originally developed in Argentina) by installment payment.
- As for the contribution of Japan in this area, SAKURA-sha developed a software to learn mathematics, first on Windows based, and then Sugar OS based.
- Rwanda has geographical disparity for ICT accessibility. To cope with this issue, they made a bus with some internet enabled PCs and promote the use of ICT in the remote areas.
- Although Rwanda is totally covered with an optical fiber network, this network has not arrived in schools nearby. Therefore, high-speed Internet access is only in some privileged schools, and in the majority of schools, teachers use 4G mobile networks on their own modem or their phones.

ICT literacy of teachers

TTC (Teacher Training College) is in charge of teacher training and the teachers acquire ICT skills. To get a post as a teacher, their ICT skill is tested.

National ID and Student ID

Students are provided Student ID which is not related to the National ID.

ICT Skill of MINEDUC Staffs/ Teachers

MINEDUC staff and teachers are well trained in ICT skills.

Existing Information systems

Rwanda has e-Learning platform and MIS in primary and secondary level.

3) Challenging area(s)

- Geographical disparity between capital and regions
- Integration of ICT and ICT Education contents to the curriculum

- Too many projects are running in parallel, and it is difficult to see which project is specifically resulting which outcome.

4) Activities of Development Partners

- World Bank: Rwanda Quality Basic Education for Human Capital Development, ACE (African Center of Excellence), etc.
- JICA: SMASSE (2008-2011), Introduction of Mathematical software in Primary Schools by Sakura-sha, Dispatch of JOCV, **Project for Strengthening the Capacity of Tumba College of Technology (TCT), Training course related to education, and training in science and technology**, Kobe-Kigali Business Initiative (ICT training in University of Rwanda)

5) Potential Assistance Needs:

There are many Japanese cooperation projects related to ICT and Education involved. Tumba College of Technology needs continuous cooperation in terms of ICT, since TCT is a vocational training center the aim of this institution is professional insertion.

6) Expected Areas to be Digitalized

Integration of Student ID and National ID, obtaining diplomas online

(7) Health

1) Vision and Plan:

Fourth Health Sector Strategic Plan 2018-2024

Fourth Health Sector Strategic Plan 2018-2024 states that the overall objective of the health sector is to ensure universal accessibility in geographical and financial terms of equitable and affordable quality health services (preventative, curative, rehabilitative, and promotional services) for all Rwandans. Strategic objectives are listed below.

- Full implementation of the main health programs (improve demand, access and quality)
- Strengthen the health systems building blocks (strengthen policies, resources and management)
- Strengthen all levels of service delivery (organize the services effectively at all levels, referrals)
- Ensure effective governance of the sector (strengthen decentralization, partnership, private sector coordination, aid effectiveness, and financial management)

In terms of the health information system, the priorities are to (a) synchronize all health information systems together and link them with the electronic medical record (EMR) to improve patient management and data use for decision making and (b) promote new health care technologies to improve quality of health services.

National Digital Health Strategic Plan 2018-2023

The vision of the National Digital Health Strategic Plan 2018-2023 is to leverage ICT investments to support an efficient health workforce offering cost effective patient-centered services with secure access to data for

continuity of care and evidence-based decision-making, resulting in improved health and economic status for all Rwandan citizens. The main policy directions are listed below.

- Strengthen integration and interoperability of health information systems
- Improve health service delivery and accessibility through Digital Health
- Improve access to health information and digital services for citizens
- Improve collection, management and use of data at all levels of care
- Strengthen the management of critical resources in the health sector
- Improve ICT infrastructure and software support in the health sector
- Improve the legal user support through PPPs
- Leverage technology to build the capacity of the health workforce, offer decision-support and prepare health workers at all levels to manage and use the full range of digital health technologies
- Promote research and development to adapt innovations and the use of emerging technologies in the health sector

2) Current Situation and Activities

Policy implementation structure

The Ministry of Health (MINISANTE) coordinates Digital Health policy development, coordination, planning, follow-up, evaluation and promotion; while the Rwanda Biomedical Center (RBC) has the overall responsibility for implementation of Digital Health activities. Under the strong leadership of the MINISANTE, Rwanda was a pioneer among African countries in developing an enterprise architecture for health and implementing the first proof of concept for a health information exchange. The standards for interoperability between key systems have been also developed. The implementation of the relevant activities is being conducted in collaboration with the development partners.

Individual systems

According to the interview with the MINISANTE, the current priority projects and their progress are summarized below. The existing health information systems are listed in 4).

Table 3.2.3 Independent Health Information System

	Priority project	Progress
1	Development of standards for interoperability and framework for personal data protection	Complete
2	Strengthening of EMR and HMIS development	Ongoing
3	Development of health information system for community health workers	Ongoing
4	Development of a platform for health information exchange	Started

Source: Interview with MINISANTE

3) Challenging area(s)

Overall

The Fourth Health Sector Strategic Plan (2018-24) states that the epidemiological profile will shift from one dominated by communicable diseases to one where the Non Communicable Diseases (NCDs) will be dominant,

with concomitant demands on the health system for tackling such demands. This shift is already underway.

Digital Health

- Regarding The ICT infrastructure development, improvement of the last mile internet connectivity and expansion of the ICT devices provision, especially in rural health facilities, are among the challenges.
- The establishment of a platform for ensuring interoperability between various information systems is one of the priorities. The pilot project is underway.
- Further promotion of compliance with the personal data protection law regarding health information and the establishment of a secure and centralized data management system is required.
- It is necessary to further promote the effective utilization of the various digitized data.

4) Information System and Platform:

Table 3.2.4 List of major health information systems

System	Data	Owner/operator
R-HMIS (DHIS2)	Aggregated health data for routine monitoring (number of patients by diseases, number of examinations/treatment, number of delivery, number of death etc)	MINISANTE
eIDSR	Communicable disease surveillance	MINISANTE, CDC
TracNet	HIV patient data	MINISANTE
eTB	Tuberculosis patient data	MINISANTE
SISCom	Platform for the community health worker information system	MINISANTE
RapidSMS	mHealth application for CHW to report vital events and selected health indicators concerning pregnant women and children up to 2 years of age.	MINISANTE
IHRIS	Human resources for health	MINISANTE
LIS (Lab information system)	Lab information at the selected referral and district hospitals	MINISANTE
eLMIS	Medical logistics	MINISANTE
CBHI	Community based health information	RSSB ³⁶ , USAID
OpenMRS OpenClinic	Open source platform for the EMR. More than half of the health facilities introduced some kind of the EMR. MINISANTE and WHO have been developing the integrated EMR model.	Health facility

Source: National Digital Health Strategic Plan 2018-2023, the Ministry of Health and development partners

5) Status of the Assistance by Development Partners:

- Global Fund: It supports the establishment of the standards for interoperability between key systems in collaboration with the Mastercard Foundation.
- World Bank: It supports the development of COVID 19 dashboard and the introduction of mobile applications etc through the COVID 19 Emergency Response Project. The Digital Acceleration Project which is under preparation is planning to strengthen health infrastructure and health information systems.
- WHO: It provides the technical support to strengthen the various health information systems including the development of an integrated EMR platform.
- USAID: It supports the strengthening of health information systems including the automation of CBHI system and its integration into DHIS2.

³⁶ Rwanda Social Security Board

(8) Social Protection

1) Vision and Plan

Seven Years Government Programme: National Strategy for Transformation (NST1, 2017-2024)³⁷

The Seven-Year Government Programme (NST1) reaffirms the significant role of social security in eradicating extreme poverty by 2024 and achieving high living standards by 2050. In the second pillar of NST1, "Social Transformation", a comprehensive social security framework is articulated to protect people from external shocks and vulnerabilities, and to promote their transition out of poverty.

National Social Protection Policy (NSPP, 2018)³⁸

The National Social Protection Policy (NSPP) consists of four pillars: a) social security, b) social care services, c) short-term social assistance, and d) livelihood and employment support. It aims not only to ensure the eradication of extreme poverty, but also to promote the development of human capital as a basis for long-term prosperity, break the cycle of intergenerational poverty, and support the realization of equitable and inclusive social transformation and development.

Social Protection Sector Strategic Plan (SP-SSP, 2018/19-2023/24)³⁹

The Social Protection Sector Strategic Plan (SP-SSP) aims to ensure a dignified standard of living for all citizens and to strengthen social security systems through the realization of the four pillars of the National Social Security Policy: a) social security, b) social care services, c) short-term social assistance, and d) livelihood and employment support.

2) Current Situation and Activities

Social Protection

In Rwanda, the legal framework on old age, disability, survivors, and occupational accidents was established before independence in 1962. After the 1994 Rwandan genocide, two social support programs were introduced: the Demobilization and Reintegration of Discharged Soldiers Program in 1997 and the Genocide Survivors Support Fund in 1998. In 2008, the Vision 2020 Umurenge Program (VUP) was introduced as a key program of the Economic Development and Poverty Reduction Strategy (EDPRS). The VUP aimed to prevent households from falling below survival levels and to build a buffer to cope with future shocks. protection The VUP consists of three schemes: public works, direct assistance, and financial assistance. In 2015, cash transfer expenditures amounted to 1.43% of GDP, with an annual per capita expenditure of USD 17.08 per poor person⁴⁰.

Digitalization

- Ubudehe Registry

The Local Oversight and Development Agency (LODA) has been implementing and managing the VUP since

³⁷ https://www.nirda.gov.rw/uploads/tx_dce/National_Strategy_For_Transformation_-NST1-min.pdf

³⁸

https://www.minaloc.gov.rw/fileadmin/user_upload/Minaloc/Publications/Policies/Social_Protection_Policy_Adopted_1_.pdf

³⁹

UNDP. (2019). "The State of Social Assistance in Africa."

around 2012 with the introduction of the Ubudehe Registry, where VUP beneficiaries are identified by Ubudehe categories. LODA has managed and utilized this household information in the Ubudehe Registry to identify beneficiaries and provide cash transfers under VUP. Other ministries and organizations have also made use of the household data in the Ubudehe Registry.

- National Social security Registry (NSPR)

The Ministry of Local Government (MINALOC) and LODA are preparing to introduce the National Social Security Registry (NSPR) to further strengthen the information system infrastructure for social security. In this way, the NSPR will build interoperability not only with social security related databases such as the Ubudehe Registry, the Rwanda Demobilization and Discharge Committee (RDRC) database, the Fund for Assistance to Survivors of Genocide (FARG) database, and the LODA database, but also with the National ID Agency (NIDA) database.

Payment method

The main methods of cash transfer are bank account transfer through Savings and Credit Co-Operative Societies (SACCOs). LODA, in collaboration with telecommunication providers MTN and Airtel, has recently successfully implemented a pilot cash transfer project using mobile money in one province. Based on the results of this project, LODA is planning to expand the mobile money cash transfer nationwide.

3) Challenging area(s)

Targeting

Since 2008, Rwanda's national social protection system has made considerable progress through VUP. However, according to LODA, the VUP has weaknesses in targeting, information management systems, and payment mechanisms: the targeting method using Ubudehe does not accurately identify the poor and targeting errors (exclusion of the poor and inclusion of the non-poor) amount to about 40%. Therefore, The NSPR has established a system to identify poor households by scoring each household using the Household Welfare Score Count and other indicators. This innovative approach aims to reduce the targeting error to about 20%.

Interoperability

Regarding the information management system, LODA's information management system has been expanded through an increase in the number of modalities and has been connected to MINALOC's information management system. In addition, as mentioned above, interoperability with information management systems of other ministries and agencies has been promoted, further increasing convenience. However, according to LODA, although it is connected to the NIDA database, which manages national IDs under the auspices of the World Bank, interoperability between the two is not yet fully functional, and the same issue applies to other databases.

Payment mechanism

Bank account transfers, including SACCOs, are the mainstream payment mechanism, but SACCOs have not yet been digitized, which poses a challenge for smooth payments. The World Bank and AIIB are planning to support the digitization of SACCOs. On the other hand, to promote the digitization of cash transfers, a pilot

project for cash transfers using mobile money is being implemented, but this is a challenge because the population does not even own an inexpensive cell phone (USD 20-25). Mobile money for Government services is C to G, such as payment for e-Government Irembo services, while G to C, such as receipt of cash benefits, is still marginal.

4) Information System and Platform

System/Platform Name

- National Social Protection Registry (NSPR)
- Ubudehe Database

Main data

- Beneficiary and household information

Data ownership/operator

- Ministry of Local Government (MINALOC)
- Local Administrative Entities Development Agency (LODA)

Funding sources/donors

- World Bank, Government funds

5) Activities of Development Partners

- World Bank (2020~2022) Human Capital for Inclusive Growth Development Policy Financing
- World Bank (2018~2021) Strengthening Social Protection System Project
- World Bank & AIIB (2022~2026) Rwanda Digital Acceleration Project (World Bank; USD100 million, AIIB; USD100 million)

6) Potential Assistance Needs

- A Single Registry
- Targeting and monitoring
- Interoperability
- Digital payments

7) Expected Areas to be Digitalized

- Establishment of the Single Registry
- Digitization of all household information
- Enhancement of interoperability with other management information systems
- Promotion of digital payments

8) Potential of using data for innovation in public service improvement

Administrative big data on social protection and households can enhance the Evidence-Based Policy Making (EBPM). It is also possible to propose preventive measures required for each region and the effective allocation

of resources such as cash transfers.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Strengthening of personal information protection laws.
- Develop laws and regulations to promote interoperability.

3.3 Ethiopia

3.3.1 Survey Policy in the Target Country

(1) National Development Plan

The Ethiopian government has developed a 10-year development plan targeting 2021 to 2030. With the vision of becoming an “African Beacon of Prosperity”, 1) Quality economic growth and shared prosperity, 2) Economic productivity and competitiveness, 3) Technological capability and digital economy, 4) Sustainable development financing, 5) Private sector-led economic growth, 6) Resilient green economy, 7) Institutional transformation, 8) Gender and social inclusion, 9) Access to justice and efficient civil service, 10) Regional peace building and economic integration, are defined as 10 pillars, and 1) Multi-sectoral and diversified source of growth and job opportunities, 2) Sustainable and inclusive financial sector development, 3) Harnessing the demographic dividend, 4) Quality and efficient infrastructure development, 5) Sustainable urban development, 6) Peace, justice and inclusive institutions, are defined as six priority areas.

(2) Country Assistance Policy of the Government of Japan

Ethiopia, located in the center of the Horn of Africa, is a large country with a population of approximately 100 million. The African Union (AU) and United Nations Economic Commission for Africa (UNECA) Headquarters are seated in the capital, Addis Ababa, making the city the center of African diplomacy.

Ethiopia has sustained a high economic growth rate of around 10% on average annually in recent years (IMF), and certain results have shown improving agricultural productivity, primary education enrollment rates, and poverty reduction. However, per capita GNI is as low as USD 660 (World Bank, 2016) and there are some other significant issues such as improvement of productivity and quality of agriculture and industries that will be a key factor in the export industry, infrastructure development that is indispensable for economic growth and attracting foreign investment, vulnerability to natural disasters such as drought, and urbanization caused by population increase.

Under such circumstances, the Government of Ethiopia set the national vision of becoming a low middle-income country by 2025 in the “Growth and Transformation Plan II (GTP2)” drawn up in February 2016. The Government of Ethiopia has worked on industrialization centering on the manufacturing industry in addition to agriculture.

Through such assistance to the Ethiopian government's efforts, Japan contributes to high-quality and stable economic growth in Ethiopia and to the investment and advancement of Japanese companies, thereby enhancing bilateral friendship and cooperation, further enhancing Japan's presence in the diplomacy of the African region.

Table 3.3.1 Country Assistance Policy of the Government of Japan for Ethiopia

ODA Basic Policy	Support for high-quality economic growth promotion	
Priority Areas	Agriculture and Rural Development	Enhancing production and productivity, improving income among small-scaled farmers through improved access to the markets
	Industrial Development	Improving productivity, promoting foreign direct investment, Kaizen, human resource development, etc.
	Infrastructure Development	transport and urban infrastructure, capacity building for management, etc.
	Education and Health	comprehensive support in education sector focusing on science and math, science and technology, UHC, health management system, improved health services, etc.
Remarks	<p>Japan formulates projects for developing measures against natural disasters such as droughts and floods, and for renewable energy development. Japan also contributes to solving climate change issues in Ethiopia utilizing the framework of Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries (REDD+) etc.</p> <p>In project formulation, Japan will pay attention to Sustainable Development Goals (SDGs) that include indicators on solid waste management.</p> <p>From the perspective of gender equality, Japan considers elements of supporting capacity development and the promotion of activities for women in project formulation.</p> <p>In addition to collaboration with other development partners, international organizations, NGOs, etc., Japan will also consider cooperation with the Japanese private sector, local governments, universities and research institutions.</p> <p>Japan will also take note of efforts centering on the Ministry of Environment in Japan based on the framework of the 'African Clean Cities Platform'.</p>	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Ethiopia

Ethiopia was ranked 178th out of 193 countries in the United Nations e-government survey (2020). It has been pointed out that there is a delay in communication infrastructure, including the spread of mobile phones and the Internet. On the other hand, Ethiopia has formulated Digital Ethiopia 2025, a national ICT strategy, and is working to improve ICT infrastructure and expand related services. In addition, a pilot is underway to transfer the Kebele Card, which is an ID issued and managed at the administrative village level, to a unified national ID at the national level with the support of the World Bank.

The Country Assistance Policy of the Government of Japan focuses on support for promoting high-quality economic growth, and focuses on four priority areas: agriculture / rural development, industrial promotion, infrastructure development, and education and health. It also states that attention should be paid to adaptation measures to natural disasters such as droughts and floods, climate change issues, SDGs related to waste management, gender, and cooperation with other donors and Japanese private companies and local governments. As for JICA, a 5S expert is dispatched in the health sector, and a technical cooperation project “Project for Capacity Development for Improving Learning Achievement in Mathematics and Science Education” is being carried out in the education sector with dispatchment of a science-mathematics advisor.

Given the above examination, JICA Study Team intends to examine the possible support programs with a roadmap by assessing the current situation and issues to be identified through discussion with relevant agencies and organizations. In particular, JICA Study Team considers the possibility for ICT human resource development to realize high-quality economic growth, including agricultural and rural development, utilization

of digital technology in the health and education sectors, trend of digital economy and telecommunications infrastructure which are priority in the new Ten-Year Development Plan, and collaboration with the World Bank in the national ID development.

3.3.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation:

1) Vision and Plans

“The Digital Ethiopia 2025 - A Strategy for Inclusive Prosperity in Ethiopia is the current strategy for ICT-enabled inclusive development in Ethiopia which was approved in 2020. The strategy aims to promote digital technology and local innovation, particularly in agriculture, manufacturing and tourism, and to expand IT-enabled services in the public and private sectors. It is an ambitious strategy to fast-track the digitalization of Ethiopia, which has been lagging behind other African countries.

The strategy will promote the use of ICTs along the following four paths:

1. Enhancing the value of agriculture
2. Establishing new versions of the global value chain in the manufacturing sector
3. Building IT-enabled services
4. Digitalization as a driver of tourism and competitiveness

Infrastructure development (telecommunication and electricity), national ID system, e-payment, e-Government, e-commerce, and various systems and regulations will be developed simultaneously to enable the above four development pathways.

In addition to the above ICT strategy, ICT is also listed as a pillar for Ethiopia's development in the comprehensive national development strategy, “Ethiopia 2030”, indicating the Ethiopian Government's willingness and high expectation for advancing country digitalization.

2) Current Situation and Activities

ICT laws and regulations

Ethiopia has set a national goal of becoming a middle-income country by 2025, and is promoting the use of digital technology (including local innovation and technology transfer) to achieve this goal. The Government is actively seeking the use of ICT to promote reforms and economic development, and as a result, a number of ICT-related policies, laws, and deregulation measures have been planned, enacted, and implemented.

Table 3.3.2 ICT related Laws and Regulations in Ethiopia

Basic ICT Law	Communication Service Proclamation 1148/2019 (August 12, 2019)
National ID	Ethiopian Nationality Law Proclamation No. 378/2003
Electronic Signature	Electronic Transactions Proclamation No.35/2020
Electronic Transactions	-ibid-
Personal Data Protection	Personal Data Protection provision is in the Constitution, however, it is not expressly stated within the current legal system. The Draft Data Protection Act was drafted in 2008, but no progress has been made since then. Freedom of the Mass Media and Access to Information Proclamation No. 590/2008 contains provision for individual data protection (identifiable individual as personal data:)
Cyber Security	Computer Crime Proclamation No. 958/2016
Competition Law	Trade Competition and Consumers Protection Proclamation No. 813/2013
Intellectual Property Protection Law	Copyright and Neighboring Rights Protection Proclamation no. 410/2004 (the copyright proclamation) Copyright proclamation amendment proclamation no. 872/2014 Implementing regulation - council of ministers regulation no. 305/2014.
Others	Startup Act is being drafted to promote startups in Ethiopia.

Source: JICA Study Team

Organization

The Ministry of Innovation and Technology (MINT) was established by Decree No. 1097 as the supervisory and policy-making authority to comprehensively promote ICT for development. It is responsible for the following major activities

- Formulate development policies and programs related to technology and innovation
- Provide professional and technical assistance to the various regions
- Conduct e-Government promotion activities (operation and management of systems and other information technology resources)
- Develop regulations and setting standards related to information technology at the national level
- Develop deploy, and coordinate all national information systems
- Coordinate and plan implementation of “Digital Ethiopia 2020” or “ICT Ethiopia
- Liaise with other governmental and non-governmental agencies related to technology and innovation
- Conduct activities such as creating national database, national IT infrastructure, national data center, national network, e-services, e-Government and e-office.
- Coordinate all activities related to Digital Ethiopia 2025. Implementation and management of projects to promote national level reforms.
- Promote digitization during COVID-19 so that citizens can access services online in accordance with the COVID-19 directive approved by the Ministry of Upper House of Parliament.
- Provide technical and professional support to other Government agencies.

Under MINT, the Institute of Technology and Innovation (TechIN) has been established by Decree 1097 as the implementing agency for policies and strategies. TechIN is the implementing agency for policies and strategies formulated in relation to technology and innovation.

Other agencies include the Information Network Security Agency (INSA), which is responsible for cybersecurity, and the Communications Authority (CA), which is the regulatory authority for telecommunications entities and postal services.

Current status of public service digitization

As for the digitization of public institutions, it is still in nascent stage. Due to the monopoly of telecommunication company, penetration rate of telecommunication and internet in Ethiopia is low compared to the countries with similar size of the population and economy (mobile penetration rate is 38.5% and internet penetration rate is 20.6% according to 2021 data). As a result, digitization has been slow in both Government and private sectors. However, in 2021, a license for a new telecom company was issued to a joint venture between Sumitomo Corporation of Japan, Orange S.A. and Safaricom. It is expected that the competition will facilitate the internet penetration and increase the digitalization of both the public sectors and the private sectors. On the other hand, infrastructure problems and low Internet penetration in rural areas, censorship, and telecommunications regulations are some of the issues that may slow down Ethiopia to catch up with other countries and the ones which may be difficult to address by policy actions alone.

Space Utilization

Ethiopia Space Science and Technology Institute (ESSTI) is the main organization tasked to expand space utilization for socio-economic development in Ethiopia. The ESSTI are operating Ethiopian satellites and gather geospatial information and satellite images as part of its remote sensing activities. The ESSTI is providing these image and spatial data to universities and other research institutions to jointly conduct researches and formulate effective utilization of these data for socio-economic development. As for the collaboration with Government institutions, the ESSTI provides satellite data to the Ministry of Agriculture, the Ministry of Mining, and the Ministry of Water, Irrigation, and Energy to conduct joint projects on using satellite and spatial data to solve challenges in such areas as agriculture and water resource management. While the ESSTI has yet to forge strong private sector collaborations, however, it supports private company which creates UAVs (drones) as part of its technical assistance.

The ESSTI is currently dispatching a doctoral candidate to Kyushu Institute of Technology to further its satellite technology capabilities and is eager to learn about Japan's spatial information analysis methodology, techniques, and use cases, as well as to increase technological knowledge on satellite technologies.

3) Challenging area(s)

Many policies and legal systems to spearhead Ethiopia's digitization are currently being developed. Although there is a strong need in this area, the World Bank's new project will cover policy and human resource development which would limit JICA's potential support in the area⁴¹. As such, the possibility of JICA supports in the area may be limited to dispatching an expert to support the capacity development through providing OJT type training.

⁴¹ Project Information Document (PID), Ethiopia Digital Foundations Project (P171034) , Pg12, The World Bank, Washington DC, Date Prepared/Updated: 28-Jan-2021 | Report No: PIDA28141

On the other hand, considerable challenges remain in the space and spatial technologies areas. As far as the space technology is concerned, the country needs to further its technological competence in the area of aerospace technology to provide wider and appropriate support to mitigate Ethiopia's socio-economic challenges. In addition to the need for human resource development in the space and spatial technology area, it has been pointed out that there are also financial constraints which is hindering Ethiopia's aspiration of launching more satellites.

4) Information System and Platforms

Plan to establish an interoperability framework for Government is underway.

5) Actives of Development Partners

The World Bank's Ethiopia Digital Foundations Project⁴² (USD 200 million) is expected to start in the second half of 2021. Within its Component 1: Digital economy, enabling legal and regulatory environment: (Cost USD 20.0 M). it is expected that the project will strengthen the capacity of ICT implementation and regulatory ministry/agencies.

China: The ESSTI has been cooperating with China on the launch of Microsats which includes 6U CubeSat.

France and China: France and China are supporting ESSTI to establish a ground satellite base station.

ESSTI also have partnerships with NASA and Russia (Roscosmos).

ESSTI has yet to create direct connection with Japanese space agency, however, ESSTI has mentioned its eagerness to forge partnership with JAXA.

6) Potential Assistance Needs

There seems to be less opportunity for support in the area of ICT Policy/strategy area, as the area is covered extensively by the World Bank's new project. On the other hand, potential to support Ethiopia in the area of space and spatial information utilization seems relatively high for Japan. The area is also where Japan has comparative advantage in its knowledge and technological know-hows.

- Support in the space area could be provided in the following areas:
- Practical use of spatial information and analysis of data from space to solve social issues
- Technical support for microsatellite development and utilization
- Support for data collection and utilization using advanced drones, etc.

7) Expected Areas to be Digitalized

The World Bank's Ethiopia Digital Foundation Project (EDGE) is a five-year project with total cost of USD 203 million (closing date May 2021). The project is designed to lay the foundation for Ethiopia's digital transformation and is comprised of the following three components (excluding the project management component)
Component 1: Digital Economy, enabling legal and regulatory environment (USD 20m + USD 3m from GIF)
Component 2: Digital Government and Connectivity (USD 133m)
Component 3 - Digital Business and Entrepreneurship (USD 40m)
Originally planned at USD 300m, however, reduced to USD 200m due to diversion of funds for COVID emergency response; negotiating with EU and OECD funds for bridging gap is underway. There may be a possibility of co-financing by Japan.

The Digital Ethiopia 2025 aims to promote digital technology and local innovation in agriculture, manufacturing and tourism, and to expand IT-enabled services in the public and private sectors. Demands for digitization in these priority areas are high.

8) Potential of using data for innovation in public service improvement:

When more Government services become digitized through the implementation of Interoperability Framework, there is a strong possibility that innovative services to the citizens could be created through using data managed by ministries, agencies, statistical office, and private companies. Data from satellites and advanced drones could also provide interesting possibilities of creating innovative services and products.

9) Condition: Infrastructure, Policy, Human Resource, and etc.:

In order to promote digitalization in Ethiopia, it is necessary to develop and implement policies to strengthen the innovation ecosystem with strong leadership of the Government. Increasing skilled human resources in public, private, and academic sectors, easing ICT-related regulations, expanding telecommunications and electricity infrastructure, and effectively utilizing the capabilities of the private sector are also key to accelerating digitization in Ethiopia.

(2) ICT Human Resource Development

1) Vision and Plans:

In Digital Ethiopia 2025 released in June 2020, human resource development targets were set for (i) 300,000 digital jobs (100% of all jobs) by 2020, and (ii) 70% of the population to be digitally literate by 2025. Regarding specific human resource development, the then Ministry of Science and Higher Education (MOSHE)⁴³ formulated the Digital Skills Country Action Plan (DSCAP) for Higher Education and TVET 2021-2030 released in December 2020. In order to reduce the unemployment rate, the plan aims to improve the digital literacy and digital skills of students at the higher education and TVET levels, that the market demands. Specifically, two methods are planned as follows:

Create a policy environment and develop a digital skills framework

By 2025, a digital skills framework for educators, ICT professionals and all other professions will be developed, and a national digital skills assessment system will be introduced to assess 25% of ICT professionals and educators, 50% of students in higher education and TVET institutions, and 100% by 2030. The framework was already in place as of August 2021⁴⁴, awaiting approval from senior management. It will be improved through trial and error.

Reform of digital skills programs in higher education and TVET institutions

50% of students enrolled in higher education institutions will be provided with intermediate level digital skills. In addition, highly specialized master's and doctoral programs will be established, with the goal of increasing the number of students in master's programs from the current 1,400 to 2,000 and doctoral programs from the

⁴³ MOSHE was merged to Ministry of Education (MOE) in October 2021. In this survey report, JICA Study Team mentions MOSHE when it happened before the merge, for example, it was MOSHE when DSCAP was launched in December 2020, and when JICA Study Team interviewed in August 2021.

⁴⁴ Interview with MOSHE on 19 August 2021

current 70 to 140 by 2025.

TVET institutions will develop intermediate digital skills education in 568 of the current 1,568 TVET institutions and 175,000 TVET students will complete the Rapid Skilling Program to meet the needs of industry by 2025.

In parallel with the above two, DSCAP sets forth the provision of teaching and learning through the use of Learning management System (LMS) and various digital tools, the enhancement of network infrastructure in educational institutions, and the development of faculty capacity⁴⁵.

2) Current Situation and Activities:

ICT human resource development

In Ethiopia, universities and TVET institutions are under the jurisdiction of Ministry of Education (MOE). There are no specialized ICT schools in TVET institutions, but some of the technical colleges and polytechnics that offer ICT courses are excellent. All public universities have ICT-related faculties and produce about 5,000 ICT human resource every year⁴⁶. It is common for university faculty members to select the best students when they are undergraduates and have them pursue master's and doctoral degrees as teaching staff candidates. In terms of ICT environment in universities, out of 46 public universities, only 10 universities have ICT infrastructure and internet network, while the rest of the universities do not have complete infrastructure⁴⁷. Information and Communication Technology Association of Ethiopia (ICT-ET) is engaged in internship placement, training of teachers for distance education (especially for TVET level), digitization of education contents, and provision of platforms in collaboration with MOSHE to cope with COVID-19⁴⁸.

ICT human resource in the labor market

As mentioned above, 5,000 ICT university graduates are produced every year. The entrants are dominated by male students, although some universities take affirmative action to include more female students. Although universities review their curricula every five years to assess labor market demand, there is a skills gap for university ICT graduates to be work-ready or to become entrepreneurs immediately after graduation⁴⁹. Regarding the supply-demand gap of the domestic ICT workforce, there is a large gap between the human resources created by current university education and the skills needed by the market. Academic institutions and the private sector need to work together to address this issue⁵⁰.

The employment situation after graduation varies from university to university. For example, at the Addis

⁴⁵ At the level of higher education and TVET, MOSHE developed the National ICT Policy for Higher Education and TVET and the Institutional ICT Policy for Higher Education in Ethiopia in December 2020.

⁴⁶ According to MOSHE, public universities with excellent ICT departments are Addis Ababa University, Jimma University (Eastern Africa regional representative for Cisco certification), Addis Ababa University of Science and Technology (small class size, emphasis on graduate school), and Adama University of Science and Technology. Bahardar University and Gondar University excel in software development. In addition, Addis Ababa University of Science and Technology offers a program that selects talented upper secondary school students and gives them short-term training on ICT innovation to make them think about innovation in practice.

⁴⁷ This infrastructure part will be assisted by the Digital Foundation Project supported by the World Bank through EthERNET under MOSHE.

⁴⁸ Interview to ICT-ET on 8 September 2021.

⁴⁹ Interview with MOSHE on 19 August 2021

⁵⁰ Interview with ICT-ET on 8 September 2021.

Ababa University of Science and Technology, the post-graduation employment opportunities were in telecommunication companies, airlines, banks, and private software development companies, and there seemed to be no unemployment situation. On the other hand, according to MOSHE, it is generally difficult to find a job immediately after graduation, and some graduates find jobs that are different from the ones they studied at university⁵¹.

In order to overcome this situation, MOSHE and the Employment Creation Commission jointly implemented a project to improve employability. The contents of the project include training in website development, ICT professional work ethics, digital library creation (practical skills), and internships similar to apprenticeship programs. However, due to lack of budget, the number of participants is only 20-30 per year. In addition to the academic education contents, the university is also trying to provide contents that is close to practical work by offering certification courses provided by international companies such as Huawei, Cisco, and Oracle, and using their course materials. The university also strives to update its faculty members' hands-on experience and expertise by having them bid for government ICT projects⁵². Some universities require students to do internships during their studies, but private companies are not very active in accepting them. Private companies train college graduates after they are hired to make their skills more practical.

ICT capacity in the public sector

Each ministry has its own ICT staff and they belong to the ministry. Each position has its own standard of work requirements set by the government. When the government builds IT systems, for example, public universities may order their internal IT systems from the private sector, or they may develop different systems among public universities and use them mutually. In addition, the Technology and Innovation Institute (Tech-In) under the Ministry of Innovation and Technology (MInT) develops information systems and information infrastructure for public institutions⁵³.

There are different views on the skills of ICT professionals in the civil service, one opinion⁵⁴ is that there is need to be more specialized, such as programming and networking, another opinion⁵⁵ is that their ICT staff are not necessarily less competent, but due to the structure of the government, they are not able to communicate well what they need.

The Civil Service University is a civil service training institute, but it does not have an ICT department that offers diploma or bachelor's degree in ICT. The university offers only short courses in ICT, such as Cisco and Huawei, which are offered to civil servants on campus and for the federal and state governments officials. MInT has also announced that in October 2020, it will work with EDACY (a Swiss online learning platform

⁵¹ It was found that MOSHE and universities interviewed did not conduct tracer survey about graduates. They stated that the relations between universities and private sector is not very strong, and they do not have information about employment of their graduates. It was said that Civil Service Commission conducted its own research on the labor market, but the appointment with them did not materialize.

⁵² Interview with Addis Ababa Science and Technology University on 26 August 2021.

⁵³ Interview with Tech-In on 17 August 2021

⁵⁴ Interview with Civil Service University on 2 August 2021.

⁵⁵ ICT-ET

operator) to provide a digital basics program to Ethiopian civil servants⁵⁶. EDACY has established a Digital Foundation to provide high quality digital skills training (skills, knowledge and mindset) to African government civil servants and is developing a 5-week program in collaboration with the Swiss Institute of Technology (Ecole Polytechnique Fédérale de Lausanne - EPFL). The first batch of the program will target 250 civil servants.

The private sector considers that it is more efficient for governments to procure services from local private firms⁵⁷. In some cases, the government produces systems in-house, but when it procures services from foreign companies at high prices that could be adequately provided by domestic companies, resulting in paying high costs for customization or continuing to pay high royalty and maintenance fees. In this case the government is expected to trust the capabilities of domestic companies and give a contract to them. Domestic companies would be able to provide something that fits Ethiopia's current situation in a sustainable and cheap manner. In order to promote local companies to bid actively, the procurement process, which is currently cumbersome, is expected to be improved.

ICT capacity in the private sector

Private sector employee training (ICT-ET member companies): There is no systematic training or certification for member companies conducted by ICT-ET, but many opportunities for workshops and knowledge sharing among member companies take place. Some member companies provide in-house training, and those that have partnerships with international companies provide opportunities for their employees to obtain certifications such as MS, SAP, and Oracle. However, in many companies, employees take the training voluntarily through online, etc.

Capacity to use digital services

Ethiopia has a low literacy rate of 52%, especially in English, and MInT has established a Technology and Knowledge Expansion Directorate to implement a program to make 70% of the population digitally literate by 2025⁵⁸.

3) Challenging area(s)

Issues raised through interviews are as follows:

- Universities need to make their ICT undergraduate education more relevant to the needs of the job market.
- Tech-In would like to see capacity building support for training promotion as there is currently more systems and infrastructure development than ICT R&D⁵⁹.
- ICT-ET stated that since 80% of the Ethiopian population lives in rural areas, there is a need to strengthen the ICT start-up ecosystem (infrastructure support, market access, mentorship, etc.) in rural cities that are

⁵⁶

<https://www.edacy.com/blogs/The%20Ethiopia%20Government%20and%20EDACY%20SA%20to%20Launch%20Digital%20Skill%20Program%20for%20the%20Public%20servants>

⁵⁷ Interview with Winner Systems Software Solutions on 12 August 2021

⁵⁸ Digital Ethiopia 2025

⁵⁹ Interview with Tech-In on 17 August 2021.

close to the needs of agriculture, tourism, and industry⁶⁰.

4) Activities of Development Partners:

The Digital Foundation Project, supported by the World Bank⁶¹, will provide support for the fundamentals of digitalization, including the ICT legal system, human resource development, and infrastructure environment. The project will support the development of a digital capacity building program for civil servants to enable them to do the remote work under COVID-19, provide USD 100,000 as matching grants to new companies, and support capacity building of MInT for digital business development. In addition, UNDP⁶² is supporting an incubation center for start-ups, and GIZ, together with ICT-ET, is supporting teacher training for online learning in TVET institutions and holding webinars on digital solutions and development of sector issues⁶³.

Furthermore, private companies such as Cisco, Huawei, and Microsoft are also supporting human resource development by providing certification training courses, conducting business contests, offering low-cost applications and online learning support. Huawei, in particular, signed a Memorandum of Understanding (MOU) with the Jobs Creation Commission (JCC) in April 2021 to build an ICT human resource ecosystem in Ethiopia⁶⁴.

(3) ICT Infrastructure

1) Vision and Plans

Regarding to ICT infrastructure, Ethiopia has developed a National Broadband Strategy and Implementation Plan in 2016. An outline of the international network, the domestic backbone, and the last mile to each facility and home is planned, but no detailed routes are planned. There are no detailed plans for routes of broadband, but there are targets to be achieved in each year through the implementation of these plans. The plan is based on Ethiopia's "Growth and Transformation" plan, the global Sustainable Development Goals, the existing environment for high-speed Internet communications, and relevant regional and international recommendations and experiences. Goals for coverage and connectivity for individuals and organizations, as well as goals for usage, affordability, and training, have also been established.

2) Current Situation and Activities

International Backbone Network

Ethiopia is a landlocked country and does not have a landing station, but it is connected to the submarine cable

⁶⁰ Many stakeholders are already working on this area, and JICA is supporting Solve IT Program together with the US Embassy. ICT-ET also expressed interest in partnership with Japanese markets and companies, knowledge of Japanese

⁶¹ The Ethiopia Digital Foundation Project (P171034), approved in April 2021, has a total budget of USD 200 million and the project is expected to be finalized by mid-August. The World Bank also supported Partnerships for Skills in Applied Sciences, Engineering and Technology (PASET) in developing the Digital Skills Country Action Plan (DSCAP) for Higher Education and TVET (2021-2030)

⁶² Interview with MInT on 14 July 2021.

⁶³ Interview with ICT-ET on 8 September 2021 and <https://ictet.org/2020/08/13/ictet-launches-digital-scouts-project-in-collaboration-with-moshe-and-giz>

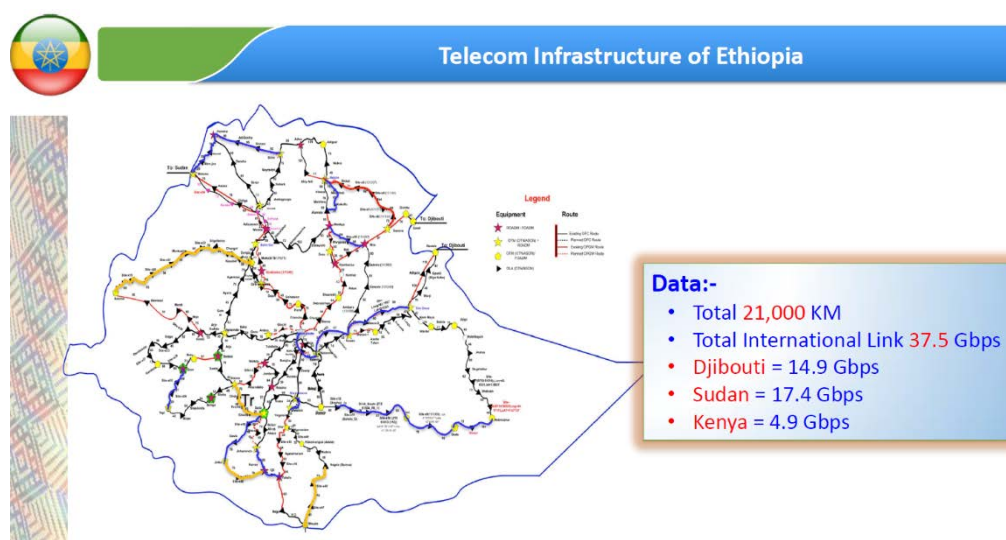
⁶⁴ <https://www.biztechafrika.com/article/jobs-creation-commission-and-huawei-collaborate-cu/16551/> The JCC aims to create 20 million jobs by 2030 In the last fiscal year, the JCC created 3 million jobs for young people, and aims to create more than 14 million jobs in the next four years. According to the same article, Huawei has created 300 jobs in the past 20 years.

landing stations in each country through terrestrial optical cables within Sudan, Djibouti and Kenya. The total capacity of these cables is about 75GB. Starting in 2020, Ethio Telecom is working with Djibouti Telecom to upgrade and increase the capacity of the Djibouti-Ethiopia digital corridor (optical cable). From 2020, Ethio Telecom is working with Djibouti Telecom to upgrade the Djibouti-Ethiopia digital corridor (optical cable) and increase its capacity.

Domestic Backbone Network

Currently, Ethiopia has a backbone (National Optical Fiber Backbone) provided by Ethio Telecom, but it does not cover the entire country and there are areas that need to be expanded. In addition, the communication capacity is not large enough, leading to a decrease in communication speed. In fact, according to data from Ookla, the speed of 16Mbps (Download Speed, July 2021) ranks 151st in the monitoring of communication speed for 180 countries around the world. In terms of communication capacity, MCIT has announced the need for augmentation and aims to replace Woreda-Net (an IP-based system using Optical Fiber and VSAT) with a new National Backbone.

Figure 3.3.1 Backbone Network by Ethio Telecom



Source: MCIT

Mobile Network

In the Ethiopian telecom market, there was only one state-owned company, Ethio Telecom. The privatization of Ethio Telecom is part of the privatization of state-owned companies and economic liberalization promoted by Prime Minister Abiy Ahmed. In May 2021, the Ethiopian Communications Authority approved the entry of a consortium of companies including Sumitomo Corporation (Vodafone (UK), Vodacom (South Africa), Safaricom (Kenya), etc.). In addition, Ethio Telecom is in the process of expanding its 4G area in partnership with Ericsson from 2021, while 2G and 3G have become the mainstream.

Figure 3.3.2 Coverage by Ethio Telecom



Source : GSMA

Data Center

Ethiopia did not have a data center, but in March 2021, Raxio (UK) began construction of a Tier 3 data center at the Addis Ababa ICT Park

IXP (Internet Exchange Point)

Ethiopia does not have an IXP, and the Internet Society (an international non-profit organization) is working to build one, as announced at the Internet Development Conference in Addis Ababa in March 2020.

3) Challenging area(s)

The Ethiopian telecom infrastructure sector is undergoing a period of change with the privatization of the state-owned telecom operators and the opening up of the telecom market. The entry of Japanese companies into this opportunity is expected to increase the market share of Japanese companies in Ethiopia.

As mentioned above, the telecom network, data centers, and IXPs are not fully developed, and there is room for support, but at the same time, it is a time of change, and government policy in the telecom sector is likely to change in the future, making it difficult to provide support.

4) Activities of Development Partners

Around 2016, ZTE delivered Ethio Telecom's optical communication equipment (100Gbps dense wavelength division multiplexing optical transmission system). Also, in 2021, Ethio Telecom announced a partnership with Ericsson of Sweden to expand 4G services to the southwestern region of Ethiopia. Ethiopia is also pushing for liberalization of its telecom market starting in 2019, with a consortium of companies (including Vodafone (UK), Sumisho, Vodacom (South Africa) and Safaricom (Kenya)) entering Ethiopia's telecom business in May 2021.

5) Potential Assistance Needs

Ethiopia's telecom market has a history of being dominated by Ethio Telecom as a state-owned company, so there is no market competition like in other countries, and the ICT infrastructure is not well developed. Therefore, a potential need for assistance would be to support planning for the development of telecommunication networks, data centers, and IXPs. In addition, EtherNet explained that ICT infrastructure in the education sector is also not well developed, especially among 46 universities, only 10 of them have Internet access, which needs support.

As mentioned above, there are several needs for support, but as mentioned in 3) Issues, support for communication networks, data centers, and IXPs is expected to be difficult because the communication market is undergoing dramatic changes. Therefore, as sector-specific support, support for university network construction is considered to be a potential assistance need.

(4) National ID

1) Vision and Plans

- “Digital Ethiopia 2025”
- “10 years Development Plan (2021-2030)” (Planning and Development Committee)
- “Technological capability and digital economy” is included as a priority item in the third section of Chapter 3.3 “Strategic Pillars and Key Priority Areas” of the formulation vision, and in response to this, the government is working to promote ID digitization.

2) Current Situation and Activities

Organization

The Ministry of Peace is in charge of national ID, and INVEA (Immigration, Nationality and Vital Events Authority) is in charge of resident registration.

Current status and situation regarding national ID

In Ethiopia, “Kebele ID” is used nationwide. The registration rate is 95%. Valid for 10 years. However, since paper-based cards are frequently counterfeited (a situation in which one person has multiple Kebele IDs), their reliability is low, and plans are underway to digitize them. In addition to the Ministry of Peace, 10 organizations such as INVEA, MINT (Ministry of Innovation and Technology), and INSA (Information Network Security Agency) are involved in this digitization situation. Ethiopia has a federal government system consisting of 10 regions / states, but each region has an administrative unit of “Zone> Walleda> Kebele”, and IDs are issued in this “Kebele” unit.

As a platform for digitalization, the government has launched a core platform based on MOSIP (Modular Open-Source Identity Platform), and are currently conducting pilot demonstrations by registering about 30,000 citizens. The government has demonstrated to customize MOSIP as a model, but it is still in the proof of concept (PoC) stage. The government is aiming to register more than 2 million people by the end of this year, but it is still only about 2% of the total population of Ethiopia, which is about 110 million people, and the situation is still far away.

Current status and situation regarding birth registration and resident registration

The registration rate for birth registration and other registrations is low, and it has not been digitized. Birth registration is over 18%, marriage and death are 10%, and divorce is 5%. Only 3% of children under the age of 9 have a birth certificate. The government is working to strengthen registration, but the following are assumed as factors. (i) Low awareness of the importance of registration, (ii) Lack of coordination with other related organizations, (iii) Lack of related resources (human resources, equipment, etc.), (iv) Priority at

administration side on registration is not high enough. As a measure to improve the registration rate, INVEA is promoting an enlightenment activity called “C4D (Communication for Development)” in collaboration with UNICEF to raise awareness.

Situation for ID integration between national ID and resident registration

Regarding the integration of both IDs, the direction of integration in the future is already underway, and the national ID includes the birth registration number, and both systems are planned to be integrated eventually. (Supervised by the Ministry of Peace)

Current status and situation of data linkage (interoperability) with other sectors

A plan to build a system based on the above-mentioned MOSIP is underway. According to the Ministry of Peace, which is in charge, the system to be built takes into consideration interoperability with the following two external systems at the time of design. (1) Other sector systems (tax, education), (2) Other Foundational ID systems (basic ID systems such as resident registration). INVEA cites education and health as data-linked sectors. UNICEF (Civil Registration Representative) cites education, medical care, and transportation, and recognizes the “education” field as an important partner sector. In fact, INVEA has begun working with the Addis Ababa Department of Education to ask for “birth registration” at the beginning of the new school year.

3) Challenging area(s)

The Ministry of Peace, which is promoting digitalization for ID integration and data linkage, raised the following two issues.

- Financial support. Funds are required for highly reliable infrastructure, central control systems, registration equipment, etc.
- Currently, PoC is carried out on a small scale, but it cannot be approached to the correct figure unless it is verified on a large scale.

INVEA, which has a registration office, raised the following two issues from another angle.

- The community has “created a strong motivation to register” and has not made progress in coordinating with the interoperable organizations (health, education, banks, etc.).
- Data maintenance issues. Currently, each registry office has begun situation to digitize paper-based analog data, but it faces problems with data quality as well as digitization itself.

4) Information Systems and Platforms

A pilot project for integration of MOSIP middleware and biometrics (10 fingers, iris, face) devices is underway. The biometric authentication software is ABIS (Automated Biometrics Identification Software).

5) Activities of Development Partners

Currently, Kenyan government is working in collaboration with the following development partners.

- UNICEF and the World Bank: Support in areas such as raising awareness of registration (especially

resident registration), training related staff, tool development, printing, etc. (not involved in digitization).

- AFD: Financial support. Supporting capacity building by connecting with companies with technological capabilities in France
- ID4 / Africa: Development of consortium, etc. (I really want technical support, but it is not a technical organization)
- UNECA (United Nations Economic Commission for Africa): Promotion of “APAI-CRVS (Africa Program for Accelerated Improvement of Civil Registration and Demographics)”

6) Potential Assistance Needs

Although situation for system integration and data mutual cooperation have already been planned and advanced, JICA's support is expected as an area.

- Support as a partner to promote digitalization
- Technical support such as scanning paper-based data
- (85% of Ethiopia's Kebele is rural, but all rural areas are paper-based + manual work)

7) Expected Areas to be Digitalized

Technical realization such as “single sign-on”, “digital signature”, “online registration”, “improvement of line connection” (especially in rural areas)

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Numerous plans have been formulated under the initiative of the central government, such as the introduction of “electronic authentication” and “electronic signature”, which are indispensable for promoting digitization, and “biometric authentication” as a security measure in the provision of online administrative services. Although it is about to proceed, digitization of analog data, which is a major premise for this, is urgently needed.

(5) E-Government

1) Vision and Plans

“Digital Ethiopia 2025: A Digital Strategy for Ethiopia's inclusive Prosperity”, which was approved in June 2020, aims to realize the national objectives of job creation, increasing foreign exchange and inclusive prosperity through the transformation of an analog economy into an a fully integrated inclusive digital economy. Based on key industries (agriculture, manufacturing, and services) and priority sectors, it outlines four feasible pathways for digitization: liberating agriculture, global value chains in manufacturing, IT-enabled services, and digitization to enhance the competitiveness of tourism.

The National Bank of Ethiopia, in collaboration with the Ministry of Innovation and Technology (MINT), Information Network Security Agency (INSA), commercial banks and other government agencies (e.g. Ministry of Agriculture) developed the National Digital Payments Strategy for 2021-2024, which was drafted and approved in July 2021. The goal is to promote cashless transactions and financial inclusion.

2) Current Situation and Activities

E-government

"Digital Ethiopia 2025" indicates the goal of achieving its ambitious target of introducing and providing 278 e-government services, from more than 25 institutions, by the end of 2020, up from the current number of around 50 services. The government intends to build e-government in the future. It is also considering doing enterprise architecture of different government agencies and integrating them with digital IDs. The government agency leading the e-government is the Ministry of Innovation and Technology (MINT), which advises the government on the digitization process. The ministry advises the government on the process of digitization and monitors legislation on electronic-transaction and e-government.

Digital payment

Various digital payment instruments are used such as Ethswitch by the Central Bank (National Bank of Ethiopia) and commercial banks, 'Telebirr by Ethio Telecom, which is the first MINT approved telecom company to engage in digital payments, and electronic payment platform companies providing person-to-person payment services (M-Birr, BelCash, Amole, EthioPay, YenePay). The government redirects from traditional bank lead model to telecom company lead model to further promote financial inclusion. In May 2021, Ethio Telecom launched Telebirr, a financial service (mobile money) using mobile phones, with all financial services permitted, including payments, remittances, settlements, savings, and withdrawals. The government is also planning to allow new telecom operators to provide financial services in about a year, and is working on interoperability linkages between Ethio-Telecom, government banks, and commercial banks.

The main areas where digital payment methods are planned to be used are agriculture, tourism, and government payments. Among the public services (water, electricity, etc.), only water bills have started to be paid digitally by government-owned commercial banks, but not yet by private commercial banks.

Digitalization of customs clearance: Ethiopian Electronic Single Window (eSW)

Launched in 2020, the "Ethiopian Electronic Single Window" (eSW) (<https://www.esw.et/esw-trd/>) will connect 16 Cross Border Regulatory Agencies (CBRAs) and allow traders to process all import and export documents in a single electronic application. The eSW is a single entry point for parties involved in trade and transportation to submit standardized information and documents that meet all regulatory requirements for import, export and transportation. Currently, traders are recognized by Taxpayer Identification Number (TIN) as there is no digitized national ID system. The Ministry of Peace has initiated a pilot project for a national ID system and the Ministry of Revenue has also started to collaborate. It is planned to integrate these two systems and share information.

Digitization of address display system

The FDRE Geospatial Information Institute is developing a digital street signage system to address the lack of addressing systems, a key challenge for the development of e-commerce. A prototype is being tested in the city of Addis Ababa, with plans to expand to 70 cities.

3) Challenging area(s)

- Limited Internet use is a major challenge in using digitized public services. Only 19% of the population uses the Internet considerably due to unstable connections and lack of real-time availability, low digital literacy, and high access fees.
- Limited interoperability between services provided by government agencies.
- The strong cash orientation of people in both the public and private sectors and the low demand for digital payments have not motivated the development of digital payment instruments.
- e-SW uses Taxpayer Identification Number (TIN), which is a functional ID, to authenticate the system, but with a functional ID, there is a traceability problem because the ID may be shared or used by another person.

4) Activities of Development Partners

- World Bank, KOICA, Common Market for Eastern and Southern Africa (COMESA):eSW
- World Bank: Supporting the development of the National Digital Payments Strategy for 2021-2024.
- UNDP: Incubation center for innovation and startups, development of a web portal related to innovation and startups.

5) Potential Assistance Needs

- Support for the digitization of map information.
- Support for improving access to networks and intranets in rural areas.
- Support to the Ethiopian Space Science and Technology Institute (ESSTI) in providing data for index-based insurance through the use of satellite data (ESSTI has signed an MOU with the Ministry of Agriculture to provide data for 30 projects over the next 10 years, and is exploring the possibility of providing data for index based insurance, which JICA conducted in cooperation with the Ministry of Agriculture (MoA) and Oromia Bureau of Agriculture and Natural Resources (OBoANR).
- Software development support for eSW, National Data Model Development Project, AI, support for building interoperability with e-payment and national ID

6) Expected Areas to be Digitalized

- Software development support for ESW, National Data Model Development Project, AI, support for building interoperability with e-payment and national ID
- Support for digitization of map information

7) Potential of using data for innovation in public service improvement

- Analyzed data on a quarterly, semi-annual, and annual basis to improve trade in the import/export sector, and produced multiple data and reports for use in policy formulation.
- The integration of digitized housing systems with other digitized public services will lead to the provision of value-added public services.

(6) Education

1) Vision and Plans

- Education Sector Development Plan VI, 2020-2025
- The plan, which was announced in 2021, includes a wide range of plans for ICT use, focusing on the D-TEST initiative described below.

2) Current Situation and Activities

The Ministry of Education launched D-TEST (Digital Technology Education Sector Transformation) as strategic initiative. The initiative is mainly managed by Digital Technology Centre which is mandated to promote digitalization of education in the country. The following six areas are currently addressed.

12th Grade Online Exam

Plans to organize examination to certify completion of secondary education for all regions under the Federation

Online Meeting & Teaching

Plans to develop communication facilities for teachers to interact from distance including CPD

Education Sector Digital ID

Plans to develop ID system adopting the latest block chain technology with collaboration of private sector

Data Analytics

Plans to upgrade the existing EMIS for online data collection

Digital Secondary Schools

Plans to introduce digital textbooks to initiate digital secondary education

National Education Cloud

Plans to develop infrastructure for stakeholders to use information on cloud server

3) Challenging area(s)

While the Ministry presents its comprehensive plans with D-TEST as a core initiative, sources of input are not clear, which may be the largest bottlenecks

4) Information Systems and Platforms

The Ministry recognize current ID system somehow as reasons of various difficulties they face. To address those issues, the Ministry endeavours to bring major private company in the area of block chain into development of ID system.

- Information System/Platform Name: to be identified
- Main Data: teacher and student information
- Owner of the Data/Operator: Ministry of Education
- Source of Funding: Donor, etc.: Government (with technical collaboration with private company)

5) Activities of Development Partners

WB General Education Quality Improvement Programme in Ethiopia (GEQUIP-E)

GEQUIP-E has been implemented with WB implementation assistance and funding from multiple donors. Ownership of the project by the Ministry is high, however, it was not confirmed from hearing session with WB Project Team that the Project mainstreams ICT utilization in education.

6) Potential Assistance Needs

There are various assistance needs where various plans are already in place, e.g. infrastructure development, digital devices procurement, digital textbooks with ICT functions (but not only conversion into PDF version) and effective utilization of ICT in existing teacher development schemes.

7) Expected Areas to be Digitalized

As mentioned above, the Ministry plans to introduce education sector ID system with modern technology. When it is achieved, integration between education sector ID system and National ID would become next area for digitalization in order to assure consistency and connectivity.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Firstly, ICT infrastructure for schools and other educational institutions, then fees for use of communication network may need to be rationalized by free competition with private sector participation.

(7) Health

1) Vision and Plans

The second Health Sector Transformation Plan (HSTP-II)

Ethiopia's Health Sector Plan (HSP) is a 10-year plan covering the period 2015-2024. The first half of the five-year plan was assessed in 2017 and, based on the actual macroeconomic situation, health policy is now being developed in line with the second Health Sector Transformation Plan (HSTP-II), a five-year plan for FY2020 to FY2024.

- HSTP-II identifies five priorities and key interventions are being implemented to address these priorities. the five priorities are;
- Quality and equity of health services: building a high-performance primary health care system across the country to ensure equitable delivery of quality health services
- Digitalization of health information: significant improvements will be made in the way information is collected, analyzed, presented, used and disseminated to influence decision-making.
- Health workforce development: developing health professionals who are motivated, competent and compassionate to provide quality health services, and who are appropriately and equitably staffed.
- Health financing: efficient and transparent budget management, ensuring that budgets are managed accurately and leanly to implement health policies sustainably
- Leadership: strengthen leadership and governance mechanisms at all levels of the health system to promote the achievement of national strategic goals.

Information Revolution Strategic Plan (2018-2025)

The strategy for digital health in Ethiopia is defined in the Information Revolution Strategic Plan (2018-2025), the Ethiopian government's digital information strategy. It has three major objectives: first, to implement policy making based on the accumulation of digitized health data; second, to identify priorities for accelerating and scaling up the digitization of health information systems; and finally, to ensure good governance and strong leadership of health information systems.

In line with this overarching policy, the Ministry of Health has developed the Ethiopian National eHealth Strategic, which outlines the challenges in the area of health services, including the shortage of medical personnel, the ability to respond quickly to emerging infectious diseases and other outbreaks, a seamless nationwide health service delivery system, and the need for doctors to learn new treatments and technologies. The challenges in the field of medical services include a shortage of medical personnel, the ability to respond quickly to outbreaks of emerging infectious diseases, a nationwide seamless medical service delivery system, and the learning of new treatment methods and techniques by doctors. The challenges in the healthcare environment are cited as infrastructure (power, hardware, communications, applications), human resources (IT, informatics, HIT and other professions), leadership and governance, and financing.

2) Current Situation and Activities

In line with the Ethiopian National eHealth Strategic, the Ministry of Health is currently working on seven initiatives: the effective and timely deployment of health information through digitalisation; the provision of telemedicine; the development of an infrastructure for the exchange of health information (interoperability); the management of electronic medical records using a single patient ID; the training of junior doctors in ICT; the establishment of a research and development centre for the use of medical big data; and the use of electronic money in health care (including the payment of health insurance). The following seven initiatives are being undertaken: ICT-based training for young doctors; the establishment of a research and development centre for the use of healthcare big data; and the use of electronic money in healthcare (including payments for medical insurance). He said that they are particularly focusing on training young doctors in the use of ICT.

3) Challenging area(s)

Ministry of Health said that they are considering how to improve the shortage of doctors by training young doctors in the latest medical techniques and treatments, and ensuring the number of doctors who can respond quickly and accurately to emerging infectious diseases. In particular, the Ministry of Health is considering how ICT can help to address the shortage of young doctors who are trained in the latest medical techniques and treatments, and who can respond quickly and accurately to emerging infectious diseases. In addition, they said that it is difficult for policy makers to show strong leadership and management in the field of digital health because of their weakness in digital health planning.

4) Information System and Platforms

Based on remote interviews with the Ministry of Health and other stakeholders, and preliminary in-country research (desk top research), the following is a summary of the current health information system.

- Information System/Platform Name: DHIS2, Electronic Medical Records (EMR), Medical Equipment Management System, Health Information System
- Main Data: Comprehensive data on health information
- Owner of the Data/Operator : Ministry of Health
- Source of Funding/Donor, etc.: USAID, WHO

5) Activities of Development Partners

- USAID: HMIS Scale-up Project (focuses on training human resources to use health information systems)
- UNICEF and African Medical Research Foundation: Health Education and Training (HEAT)

6) Potential Assistance Needs

Throughout the interviews with the Ministry of Health, there was a strong awareness of two issues: the need to use ICT to effectively address the shortage of doctors (especially through the training of young doctors), and the need to develop human resources capable of making policy in the field of digital health. Other issues discussed included improving the telecommunications infrastructure (especially in rural areas) and improving the interoperability of health information systems already in place, but it was felt that improving interoperability would take time and was not a priority.

7) Expected Areas to be Digitalized

- Promotion of telemedicine to solve the shortage of doctors
- Use of electronic money in the collection of insurance premiums under the social health insurance for UHC
- Development of electronic medical records with a single patient ID for the purpose of healthcare big data

8) Potential of using data for innovation in public service improvement

The development of electronic medical records with a single patient ID and greater interoperability between other health information systems could contribute to the development of evidence-based health policies and strategies through the analysis of medical histories, and to the development of tailor-made drugs through the use of healthcare big data.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

The conditions (environment) for promoting the digitalization of the health sector can be summarized as follows;

- Government commitment, the skills and motivation of the health workforce
- Telecommunications infrastructure and interoperability
- Sustainable funding for operations
- Compliance with personal data protection laws

(8) Social Protection

1) Vision and Plans

In Chapter 8 Gender and Social Inclusion of Ethiopia's Ten Years Development Plan (A Pathway to Prosperity 2021-2030), the strengthening of social security is stipulated. In the medium-term plan (Growth and Transformation Plan II: GTP II 2015 / 16-2019 / 20), social security is taken up as cross-cutting tools that support social transformation, such as enhancement of social security, human resource development, support for vulnerable groups, and privatization, centering on employment policy.

The National Social Protection Strategy of Ethiopia: Accelerating social transformation (2016) lists the following five strategic frames from the two backgrounds, development and support for the poor and vulnerable.

i) Coverage and targeting, ii) Comprehensive and evolving support, iii) Graduation, iv) Accountability and communications, v) Mainstreaming of gender, age, disability and HIV.

2) Current Situation and Activities:

<Social Protection>

The 2016 NSPS lists the following five focus areas to promote:

- Productive Safety Nets includes Unconditional social relocation (cash benefits) (considering the introduction of a pension system), conditional social relocation (cash benefits) (considering evidence-based interventions), public works (guaranteeing minimum employment opportunities). Based on the experience of the World Bank Program, cooperation with related ministries like Ministry of Agriculture and Natural Resources, Natural Resources Management Bureau, Road Access Program, Ministry of Urban Development, etc. has begun to be taken in order to develop the program in urban areas.
- Promoting employment opportunities and improving livelihoods is supporting technical assistance, employment services, financial assistance, and improving the quality of technical training in collaboration with TVET for poor households in rural and urban areas.
- Consideration of introduction of social insurance: Mandatory social insurance, weather insurance linked to indexes, life insurance, and Community-Based Health Insurance are being introduced.
- Equal access to basic social services: The main program is multi-sectoral support such as social relocation for human resource development, health insurance, support for persons with disabilities, support for the elderly, school meals, infant protection, etc.
- Providing legal protection and support against abuse, exploitation and violence: It aims preventing abuse and exploitation, protecting from the home environment, legal development and building a network of professional service providers.

<Digitalization>

There is a need to introduce common standards and systems for multiple programs centered on donor support. One of them is the introduction of beneficiary targeting systems, single registries, MISs, and monitoring evaluation systems. The Ministry of Labor and Social Affairs, the competent government agency for social

security, is the lead ministry. The 2016 NSPS provides a timeframe for the digitization of social protection systems. Through the World Bank Strengthen Ethiopia's Adaptive Safety Net Project 2020, digitization, dissemination of MIS systems, and promotion of single registries are being promoted toward the construction of Beneficiary Household Registry.

3) Challenging area(s)

Multiple social security programs centered on donor support are being implemented separately, and there are multiple agencies involved in the implementation of social protection programs within the Ethiopian government. Before proceeding with concrete digitalization, it is necessary to clarify the role of government-related organizations. For this purpose, the World Bank Strengthen Ethiopia's Adaptive Safety Net Project 2020 is taking inventory of related organizations.

4) Information Systems and Platforms:

Beneficiary Household Registry which include information of beneficiary and household of social protection program is expected to be materialized in both central-level and local-level. The owner of Beneficiary Household Registry is Government of Ethiopia and responsible operator is Ministry of Labour and Social Affairs. Main financial resources and technical donors are World Bank and etc.

5) Activities of Development Partners

World Bank: WB, Strengthen Ethiopia's Adaptive Safety Net Project 2020 (USD 105 million)

6) Potential Assistance Needs

- Promote the Beneficiary Household Registry and strengthen the information management and monitoring functions of beneficiaries and beneficiary households,
- Strengthen targeting and monitoring functions for the poor and vulnerable by promoting the Beneficiary Household Registry,
- Improve interoperability in order to meet the new needs of social protection such as one-stop service,
- Further promote digital payments utilizing mobile transfer and mobile money in order to build safe and efficient payment methods.

7) Expected Areas to be Digitalized

- Strengthening the management system of social protect programs through Beneficiary Household Registry,
- Digitization of all household information,
- Strengthening interoperability with other organizations' MISs,
- Promotion of digital payments utilizing digital transfer and digital money.

8) Potential of using data for innovation in public service improvement

Utilize administrative big data on social protection and households for "evidence-based policy making and monitoring."

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Infrastructure development in rural areas where social protection services are provided,
- Capacity building of central and local government officials of Ministry of Labour and Social Affairs, who will be the main managers and users of data,
- Notification and enlightenment activities to citizens for understanding of benefits from digitalization.
- Introducing ID for smooth implementation for Beneficiary Household Registry

3.4 Uganda

3.4.1 Survey Policy in the Target Country

(1) National Development Plan

The current development cooperation policy for Uganda of Japan revised in July 2017 is as follows.

The Ugandan government has formulated the “Uganda Vision 2040” with high goals in three areas including 1) Strengthening fundamentals for harnessing opportunities, 2) Promoting social transformation in various aspects of civil life, including health and education, 3) Improving governance. In the National Development Plan III (2020 / 21-2024 / 25), action plans include the following aspects: 1) Agro-industrialization, 2) Mineral development, 3) Petroleum resources, 4) Tourism development, 5) Natural resources, environment, climate change, land and water, 6) Private sector, 7) Manufacturing, 8) Transportation infrastructure and services, 9) Energy development, 10) Digital transformation, 11) Urbanization and housing, 12) Human capital development, 13) Innovation and technology development, 14) Community mobilization and mindset change, 15) Governance and security, 16) Public sector transformation, and 17) Regional development.

(2) Country Assistance Policy of the Government of Japan

Uganda has a population of nearly 40 million and records stable economic growth of 4-5% per year. Interest in the Japanese business community is increasing considering its location at the corner of the northern corridor connecting Rwanda, Burundi, the eastern Democratic Republic of the Congo, South Sudan and northern Tanzania with Mombasa, the outer port of Kenya. In addition, Uganda participates in the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA) in order to take advantage of its geographical advantage, and is active in regional integration. It is also important from the perspective of encouraging development.

Furthermore, Uganda accepts more than 500,000 refugees⁶⁵ who have fled neighboring countries due to conflicts, etc., and plays an important role in stabilizing the surrounding area. On the other hand, in order to realize a modern prosperous country from the peasant country set forth in Vision 2040, it is necessary to reduce poverty through economic growth on a nationwide scale. Dealing with disparities in other regions has become an issue. In particular, the conflict that lasted until 2006 lags behind the provision of basic infrastructure, social services and human resource development in the northern region.

For these reasons, promoting the realization of “Quality infrastructure development” and “Building a foundation for peace and stability” in line with Japan's efforts at TICAD VI will lead to support for the realization of Uganda's national development plan.

⁶⁵ According to UNHCR web page: <https://data2.unhcr.org/en/country/uga> (as of November 2021) the number of refugees in Uganda is about 1.5 million.

Table 3.4.1 Country Assistance Policy of the Government of Japan for Uganda

ODA Basic Policy	Supporting poverty reduction and the reduction of regional disparity through economic growth	
Priority Areas	Infrastructure Improvement to Achieve Economic Growth	Japan will contribute to the realization of sustainable economic growth in Uganda through infrastructure development while paying attention to project formation that makes use of Japanese technology and knowledge. For example, through support for BTVET (Business, Technical Vocational Education and Training), Japan will support the improvement of the abilities and technical capabilities of human resources who will be the foundation of the industry.
	Income Elevation in Rural Areas	Japan will, through the promotion of rice production including the production of NERICA (New Rice for Africa) and support to market-oriented farm unions, increase agricultural productivity and value addition, and provide assistance for income elevation in rural areas. Especially in rice promotion, "Coalition for African Rice Development (CARD)" Initiative announced at TICAD IV, May 2008, stipulates a goal to double the rice production in Africa from 1400 to 2800 tons within 10 years. As the southeastern part of Uganda is the hub for NERICA rice production in Africa, this region is expected to contribute to achieving this goal.
	Improvement of Living Conditions	To improve the basic livelihood, Japan aims to upgrade and expand the facilities and equipment of regional referral hospitals, build the management capacity and service provision in hospital as well as to reduce child (<5yrs) mortality rates and maternal mortality rates through maternal/child health support.
	Peace Building in Northern Uganda	To improve the basic livelihood, Japan aims to increase rural water supply rate by constructing water supply facilities and strengthening the local capacity of water management.
Remarks	Align with the second national development and Uganda Vision 2040. Positive dialogue with the Government and development partners. Making use of knowledge and technology of the private sector to promote PPP, investment and trade.	

Source: Ministry of Foreign Affairs of Japan, Country Assistance Policy for the Republic of Uganda (July 2017)

(3) Survey Directions for Uganda

Uganda positively proceeds digitalization of public services based on the National ICT Policy 2014 in line with its long-term national development plan, Uganda Vision 2040 and five-year implementation plan, National Development Plan III (2020/21-2024/25). A system is in place to utilize digitized public services, such as assigning a unique national ID number at the time of birth and issuing a national ID card that incorporates biometric information at 16. Besides, the United Nations e-Government Survey (2020) points out that the ICT infrastructure index is low, and it seems necessary to improve access along with the development of telecommunication infrastructure.

The country assistance policy of the Government of Japan is to support poverty reduction and the reduction of regional disparity through economic growth by emphasizing four priority areas: 1) infrastructure development and industrial human resource development, 2) income improvement through rural development, 3) improvement of the living environment such as water supply and health, and 4) social stability of the northern region. It is expected that ICT will be utilized in the development of regional core hospitals, technical cooperation related to the management of medical equipment and materials, and medical services for refugees in the northern region. On the other hand, several relevant studies are being conducted or under preparation. In

particular, “Data Collection Survey on Promotion of ICT and Strengthening of Startup Ecosystem” and “Data Collection Survey on DX Mainstreaming” are overlapping with this survey in terms of the target areas and sectors.

Given the above examination, JICA Study Team intends to examine possible supporting programs with a roadmap based on the interviews with relevant agencies and organizations, and analysis of the current situation and issues in view of ICT human resource development, contribution to social inclusion, and alleviation of disparity in CRSV and social protection including social insurance and welfare programs by utilization of National ID, strengthening of on-stop service in Digital Government, the establishment of a human resource bank that contributes to the creation of employment, etc., all of which contribute to the achievement of economic growth in Uganda. In addition, JICA Study Team will examine the possibility of complementary cooperation or co-financing with the World Bank’s Digital Acceleration Program to expand network connectivity in the selected districts and support social inclusion among refugees and host communities through digital technology.

3.4.2 Current Situation and Issues of Digitalization of Public Service

In this section, as the foundations common to the digitization of public services, there are three fields; (1) ICT policies/systems, (2) ICT human resource development, and (3) ICT infrastructure, followed by public services that are the subject of this survey, there are five fields; (4) National ID, (5)e-governance, (6) Education, (7) Health, and (8) Social Protection, will be describe.

(1) ICT Policy/Legislation:

1) Vision and Plans

As a testimony to Uganda’s resolve to use ICT as a pillar for its development, Uganda’s comprehensive national development strategy, the Third National Development Plan (NDP III) 2020/21 - 2024/25, includes ICT-based digital transformation program as a key component. Uganda has had various ICT strategies and sectoral ICT strategies in the past which were implemented with some concrete results. Currently, a new comprehensive ICT strategy, the Digital Uganda Vision 2040, is being drafted by the Ministry of ICT. This overarching strategy will incorporate Uganda’s National 4th Industrial Revolution Strategy (National 4IR Strategy), which is currently being implemented, and other ICT related policies as part of its strategy. In addition, there are also other ICT related strategies which include the ICT Sector Strategic and Investment Plan 2015/16-2019/20, which aims to promote investment in the ICT sector, and the National E-government Policy Framework 2011 (currently being updated), which aims to promote digitization of public services.

2) Current Situation and Activities

ICT laws and regulations

Various ICT-related Acts and regulations were formulated and are in effect in Uganda. Although there is no basic ICT law, as in other countries, most of the critical regimes necessary for the digitization of public services, such as the National Identity Act, e-commerce Act, and the Personal Information Protection Act, are generally in place. With regard to Uganda’s competition law, Uganda has yet to approve its draft competition law. However, as a country that has ratified COMESA and AfCFTA treaties, Uganda is required to follow the relevant competition-related legal systems. Other legislations affecting ICTs include taxation, such as the taxation of social media use in 2018 and the taxation of data communication in 2021. This has had a significant negative impact on the expansion of ICT use in Uganda.

Table 3.4.2 ICT related Laws and Regulations in Uganda

Basic ICT Law	No specific Basic ICT law exists in Uganda but the National Information Communications Technology Policy for Uganda (2014) has been utilized as foundation for ICT for Development initiative in Uganda. It has been incorporated into Digital Uganda Vision 2040, holistic national ICT strategy. The National Information Communications Technology Policy for Uganda (2014) was established to support the realization of the national vision. It has six major policy objectives which are: 1) to develop intellectual and human resources, 2) to promote innovation in economic and social systems, 3) to integrate and expand ICT infrastructure, 4) to promote the use of ICT services by Government, the private sector, non-governmental organizations, and citizens, and 5) to develop ICT products, applications, and services. non-governmental organizations, and citizens, as well as strengthen research and innovation in ICT products, applications, and services, and 6) improve ICT governance and environment in Uganda.
National ID	Registrations of Persons Act 2015

	Foundational national identity bill for Uganda. It provides provisions for registration of individuals, establishment of a National Identity Register, establishment of a National Registration and Identification Authority, issuance of National Identity Cards and Foreign Identification, etc.
Electronic Signature	Electronic Signatures Act 2011 (Act No. 7 of 2011) Electronic Signatures Regulations 2013 - SI 43 of 2013 Legislation and regulations for electronic certification in Uganda. Key provision includes digital signature issued by a certification authority is considered legally valid.
Electronic Transactions	Electronic Transactions Act 2011 (Act No. 8 of 2011) Electronic Transactions Regulations 2013 - SI 42 of 2013 Legislation and regulations that promote the use of electronic communications and transactions, ensuring security, facilitating business transactions, and providing regulation of electronic communications and transactions in Uganda. The act and regulation also encourage the use of e-government services and established a regulatory regime for electronic transactions.
Personal Data Protection	Data Protection and Privacy Act, 2019 Data Protection and Privacy Regulations 2021 Legislation and regulations governing personal information and data in Uganda. In most cases, it stipulates that individual consent is required before collecting or processing personal data. They also established a controller for data protection.
Cyber Security	Computer Misuse Act 2011 (Act No. 2 of 2011) Act that provides provisions for ensuring the safety and security of electronic transactions and information systems. It also established provisions to prevent unauthorized access to, abuse of, or misuse of information systems, including computers, and to ensure smooth electronic transactions in a reliable and safe electronic environment.
Competition Law	Draft Uganda's Consumer Protection and Competition Bill *The bill was drafted and approved by the cabinet but not yet approved by the parliament. A bill to prevent unfair competition that causes economic damage to businesses through deceptive or unfair business practices.
Intellectual Property Protection Law	The Industrial Property Act 2014 The Geographical Indications Act 2013 Among the intellectual property rights, These acts stipulate the rights related to new technologies such as industrial design, utility model, and technovation.

Source: JICA Study Team

Organization

The Ministry of ICT and National Guidance (MINICT) is the ICT policy making and coordinating body which leads the ICT for development initiatives in Uganda. An implementation agency called National Information Authority (NITA) exists under the ministry which is responsible for implementation of various different ICT related policies and projects. For ICT-related regulations, there is Uganda Communications Commission (ICC), which is the regulatory authority for telecommunications and broadcasting entities.

Current status of public service digitization

In terms of e-Government, the e-citizen portal <https://ecitizen.go.ug/> has been created to provide digitalized public services to citizens which currently provide 107 services. However, the portal does not provide centralized services like the ones in Rwanda or Kenya. The portal is a mere forwarder for the services provided by various different ministries and agencies in their respected sites. In some cases, these links are broken due to the portal not being updated in timely manner. Moreover, as Uganda is a multilingual country, and in order to provide public services to a wider public, the services should be provided in multiple languages but this has not been done so far. The level of public understanding of and confidence in the digitization of public services is also low. The results of the National IT Survey indicated that 90% of the public does not want digitized

services. This may be attributed to such reasons as lack of trust in the provision of electronic services, lack of digital literacy among users, inability to use electronic services due to the digital divide, and lack of government education, etc.

With the support of the World Bank's Uganda Digital Acceleration Project, Uganda is planning to launch a new e-service which integrates 12 services in FY2021. The new service will provide seamless public services with only a single national ID, replacing the need to authenticate with various different IDs with a single login and authentication. The launch of this service is expected to increase the convenience of digitalized public services for citizens in Uganda.

3) Challenging area(s)

As a result of the interviews conducted with the relevant ministries and agencies, as well as the desk researches of Uganda's ICT policies and strategies, it has been determined that the ICT-related policies and strategies in Uganda is generally well established; albeit the fact that some of them need to be updated. Uganda also follow multi-stakeholder process during the policy/strategy formulation process where private companies and civil society actively take part. However, some of the issues identified relate to implementation. It has been noticed that some of the relevant bills and regulations take arduous and lengthy processes before being gazetted officially. Moreover, sometimes implementation of these strategies/policies may be hindered due to weak implementation capacities and lack of resources of the implementation agencies. In this regards, Uganda support in terms of ICT strategy and policy should be concentrated on the strengthening of the capacity of Government officials and institutions to implement ICT strategies and policies and to enable them to better coordinate with different Government ministries and agencies.

There is also the need for "culture change" including "change management" in promoting e-Government, the lack of IT skills among Government officials, the challenges of digital literacy and the digital divide (the price of Internet access and the spread of smart devices), especially in rural areas, and the need to localize contents for ethnic and multilingual groups in the country.

Some of the specific challenges may include the following:

- Weak Capacity of the Ministry and NITA to implement ICT strategies and policies.
- Weak abilities to coordinate with different ministries and agencies.
- Difficulty inducing "culture change" including "change management" in promoting e-Government
- Lack of IT skills among Government officials in promoting e-Government
- Weak Digital literacy and digital divide (price of Internet access and diffusion of smart devices) especially in rural areas
- Weak localization of content for diverse ethnic and multilingual population

In order to advance Ugandan digitalization to support holistic socio-economic transformation, Uganda also needs to get strong endorsement and support from its citizens. As such, focus on creating job using ICT should be one of the top priorities. In this regard, it will be important to strengthen the ecosystem where startups and

private companies can flourish.

4) Activities of Development Partners

CSOs in the area of ICT in Uganda play a major role in the formulation and implementation of ICT policies. Traditional development partners such as the World Bank's Uganda Digital Acceleration Project (USD 200 million), UN agencies, the EU, the US, are also providing support in the area of ICT.

5) Potential Assistance Needs

In the area of ICT policy and strategy, there is great need to strengthen the organization of the Ministry of ICT and NITA to promote ICT, improve the digital and management skills of Government personnel, and advocate citizens and Government officials who have little understanding of digitalization of public services.

6) Expected Areas to be Digitalized

In the area of Ugandan Government digitization, all the front-end services in G2G, G2C, and G2B areas as well as the back-end processes have potential to be digitized. Some of the priority sectors for digitization in Uganda which were indicated by the counterparts include the following:

- Justice, Law and Order (JLO) sector, called Justice Legal Order (JLO)
- Agriculture
- Education
- Insurance (healthcare)
- Tourism and Trade
- Energy and Mineral Resources

7) Potential of Using Data for Innovation in Public Service Improvement

There is a considerable shortage of human resources and skills to fully utilize data in Uganda. As the Government pushes forward with e-Government initiatives, the digital and management skills of Government personnel to utilize data will become considerable challenge. The Government is also focusing on fostering startups and procuring innovations from startups to solve Government challenges and expand public services.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

In order to create employment opportunities using ICT and to digitize Government and public services, it may be effective to create a collaboration platform where Government challenges could be disclosed to innovators and private companies and encourage them to come up with potential solutions. At the same time, as seen in other African countries, it will be effective to further strengthen the innovation ecosystem which would include facility to procure innovations and allow POC to be facilitated. It will also be effective to expand infrastructure and incubation facilities in rural areas to stimulate innovation originating from rural areas.

(2) ICT Human Resource Development⁶⁶

1) Vision and Plans

⁶⁶ During the meeting with JICA Uganda Office on 31 March 2021, it was confirmed that in Uganda they plan to support strengthening the competitiveness of ICT industry and developing ICT engineers so that they would have business with

ICT human resource development is included in the following national policies and plans:

- The National ICT Policy for Uganda 2014, which calls for human resource development to enable the country to target international markets in the ICT industry, and to bridge the urban-rural, gender digital divide and lack of ICT literacy in the public and private sectors. (ii) Uganda's third largest economy
- Uganda's Third National Development Plan (NDPIII, 2021/22-2024/25) identifies digital transformation as a driving force for the Ugandan economy and as one of the six key development opportunities. Specifically, the Digital Transformation Program is designed as one of the 18 development programs, to promote ICT penetration and the use of ICT services for socio-economic development. The plan includes the development of ICT professional human resources and their quality assurance framework, digital literacy training, establishment of ICT core centers in vocational training schools, curriculum review of ICT subjects at all levels of education, and teacher training activities. The number of ICT professional human resources needed in the next five years is projected in 20 skill categories, with the goal of training 23,724 personnel in total. Its outputs are creation of direct employment in ICT job and increase in ICT incubation.

2) Current Situation and Activities

ICT human resource development

The ICT human resource development in reputable universities are as follows⁶⁷.

- Makerere University: One of the largest computing, ICT and information science colleges in Africa, with College of Computing and Information Science. It has 11 faculty members and 300 staff members and houses the Makerere Innovation and Incubation Center and the Makerere University Food Technology Incubation Center. Cisco provides support for teacher training and e-learning contents through Cisco Networking Academy Program⁶⁸.
- Mbarara University of Science and Technology: It has the Faculty of Applied Sciences and Technology and the Institute of Computer Science and focuses on technology research and development.
- Uganda Industrial Research Institute: It supports start-ups and incubation to commercialize results of applied research conducted at the university.
- The National Agricultural Research Organization (NARO): It has released a digital platform, including an application, to facilitate access to research results on agricultural research.

There are also human resource development efforts by the private sector. Huawei⁶⁹, for example, is currently supporting the improvement of ICT skills and the discovery of talents through the Huawei Competition (theory

their counterpart in Japan. It was also confirmed that this survey should not overlap with another data collection survey on ICT industrial promotion and start-up ecosystem strengthening (planned for the period of January 2021 to March 2022). Thus this survey intended to study more on ICT human resource development in public sector.

⁶⁷ JICA (2019) Final Report of the Data Collection Survey on Open Innovation of Disruptive Digital Technology in Africa (as of June 2019). The interview with the TVET directorate of the Ministry of Education and Sport did not materialize.

⁶⁸ <https://cis.mak.ac.ug/cipsd/cisco-academy-support-centre/>

⁶⁹ <https://www.huawei.com/en/searchresult?keywords=uganda>

and practical skills) and Huawei Seeds for the Future (advanced technology training for young people in the ICT industry), which are open to the public, in addition to offering free and paid courses through the university-based Huawei ICT Academy.

In terms of quality control of ICT human resources, the IT Certification Project⁷⁰ is being developed under the National Information Technology Authority (NITA). The project aims at enhancing the competitiveness of Uganda's ICT industry. It developed certification standards to standardize the planning, acquisition, implementation, provision, support, and maintenance of information technology equipment and services, and to ensure uniformity in the quality, relevance, and reliability of information technology use. It provides certification to IT service and product providers, online service providers, IT consultants, and IT training institutions that conform to the prescribed standards. NITA has also signed a Memorandum of Understanding (MoU) with the National Council of Higher Education (NCHE) and the Ministry of Education and Sports to integrate ICT subjects into the national curriculum and ensure compliance with IT education regulations⁷¹.

ICT capacity in the public sector

As of December 2020, the total number of civil servants is 329,633, and the number of ICT officers is 773 (515 male and 258 female), accounts for 0.2% of the total public service. The Ministry of ICT has 174 staff (112% of the establishments), and NITA-U has 65 staff (41% of the establishments), thus a total of 239 staff (including ICT officers, and 0.07% of the total civil servants) is leading the digitalization of the nation⁷².

In 2017, the Government of Uganda introduced Job Descriptions and Person Specifications for ICT Officers and Communication Officers. The Capacity Building Plan for the Uganda Public Service (2020/21-2024/25) includes basic computing training for non-ICT Officers (1,000 annually) and some training courses for ICT officers such as Network Administration and System Administration, Web Design, PC Repair and Maintenance, and IT Services Help Desk training (200 each annually) as a part of the core competency training, and the Ministry of Public Service is responsible for their implementation. For more specialised ICT skills, the NDP III calls for the training of 23,724 personnel in the public and private sectors over five years. The areas of specialization include software quality testing (SQT) automation (3,113 personnel), software development (2,928), systems auditing (2,342), web programming (2,056), IT manager (1,948), enterprise architecture (1,739), as well as areas such as AI and machine learning. The Ministry of ICT is currently preparing an ICT Skills Training Needs Assessment and Training Action Plan, and when it is completed, a detailed training plan for ICT officers are expected to be known.

According to the Civil Service College (CSC), the ICT skills and training systems of government civil servants are as follows⁷³.

- Seventy percent of civil servants meet a minimum level of computer literacy, including the ability to use

⁷⁰ <https://itco.nita.go.ug/> as well as interview with NITA on 1 June 2021.

⁷¹ <https://www.nita.go.ug/service/capacity-development-and-skilling>

⁷² Uganda Ministry of Public Service (2020) Human Resource Statistical Abstract as at December 2020. Civil Servants include those for local government. The information of ICT cadre by ministry and department is not included.

⁷³ Interview with Civil Service College on 16 June 2021.

office and desktop applications such as MS Word, Excel, and PowerPoint. In the COVID-19 disaster, digital skills are no longer optional, but mandatory.

- ICT skills required for civil service jobs are defined as certain level of ICT literacy, specific software programs, and statistical packages. For example, staff working for the Department of Human Resources Management is required to have an ability to work with office packages, and the skills to operate human resource indicators and e-dashboards in the management information system.
- The Local Government Officials Development Institute (LogoDi) is responsible for training local government officials, and CSC is collaborating with LogoDi.
- The ICT training curriculum was developed in collaboration with NITA-U and the Ministry of ICT.
- Even for non-ICT positions such as senior managers and leadership training, there is a provision to introduce customized ICT training for each group, covering introductory knowledge such as e-government and cyber security.
- Since the Ministry of Public Service has introduced an electronic document system to digitize the document management process, all department heads need to be trained on how to use the system.

The Uganda Institute of ICT (UICT)⁷⁴, a governmental institute for ICT human resource development, offers the following courses:

- ICT Diploma and Certificate Programs
- ICT short term training programs according to the needs of each ministry
- ICT professional training courses based on international standards (ICDL, Coursera, CISCO Networking, Microsoft, International Telecommunication Union: ITU, etc.)
- Chief Information Officer training and software engineering training in collaboration with Wits University, South Africa
- ICT training for non-ICT professional staff
- Digital literacy training for formal and informal sectors

In addition to the above, training programs for ICT and non-ICT professional staff on digitization of public services, data science, e-government and e-governance, ICT infrastructure, radio and broadcast media production and programming, multimedia production, etc. are under preparation.

Regarding the digitization of public services, the UICT has been working with the Ministry of ICT in the National ICT Initiatives Support Programme, which intends to build an innovation ecosystem. For the past two years, it has been soliciting "Innovation Challenges" for solutions to government issues and incubating them at Hub. So far, an academic information management system for universities that includes education management, document management, and e-procurement systems has been developed under this program.

3) Current Situation and Activities

⁷⁴ Interview on 19 July 2021.

There are various efforts to improve digital literacy in Uganda. The Uganda Communications Commission (UCC), in partnership with the Uganda Institute of Information and Communication Technology (UICT), is implementing a program to train 50 mentors to teach digital skills in communities and educate 5,000 citizens⁷⁵. In addition, for example, the Finance Trust Bank and Silicon Foundation provide free ICT skills training to 3,400 girls in Kampala every year⁷⁶. Electronic Information for Libraries (EIFL), a Lithuanian non-profit organization, is supporting to improve the digital literacy of women and youth using libraries around the country as base⁷⁷. In addition, the Federation of Small and Medium Enterprises (FSME) of Uganda provides digital literacy skills training for small and medium enterprises in Kampala⁷⁸.

4) Challenging area(s)

The following points were mentioned in the interviews:

- For the government to promote the digitalization of public services, there is a lack of understanding at the top level⁷⁹.
- There is also a lack of capacity among government ICT officials to design and oversee the implementation of digitization, and to build an ecosystem to ensure the successful operation of digitalized public services across the board⁸⁰.
- There is a need to improve the digital skills of government employees⁸¹.

5) Activities of Development Partners

In the area of human resource development, Uganda received support from the following development partners:

- World Bank is planning to start Uganda Digital Acceleration Program in 2021. Its Component 2: Enabling Government Digital Transformation of the Uganda Digital Acceleration Program includes 2.3: Strengthening Cybersecurity and Data Protection (USD 14.9 million)⁸².
- Estonian e-Governance Academy⁸³. As part of the World Bank's support, the Academy is supporting the Ugandan government's enterprise architecture and e-government interoperability development project by providing system integration support and assisting in the development of a national cybersecurity strategy.

In addition, as mentioned above, private companies such as Huawei and Cisco, as well as domestic and international NPOs and organizations are also providing support for human resource development.

⁷⁵ <https://www.uict.ac.ug/digital-literacy-training/>

⁷⁶ <http://digitalinclusionnewslog.itu.int/2018/11/23/digital-literacy-training-to-empower-3400-girls-every-year-in-kampala-uganda/>

⁷⁷ <https://www.eifl.net/country/uganda>

⁷⁸ <https://fsmeuganda.org/digital-literacy-project/>

⁷⁹ Interview with CIPESA on 22 July 2021.

⁸⁰ Interview with PSFU on 6 August 2021.

⁸¹ Interview with NITA on 1 June 2021.

⁸² Cybersecurity capacity and skill building ((i) enhancement of cybersecurity digital skills of core stakeholders and decision makers, basic to tertiary education (university) level, (ii) establishment of cybersecurity training centres in universities for the purpose of public and private sector human resource development, (iii) critical mass of government cybersecurity experts formation (granting of qualifications), (iv) improvement of investigative capabilities of government legal experts), strengthening of child online protection, and development of data protection guidelines and toolkits.

⁸³ <https://ega.ee/?s=uganda> as well as Interview with NITA on 1 June 2021.

6) Potential Assistance Needs

There is a need to educate the management of government to deepen their understanding of public service digitalization, and to support the strengthening of their ability to oversee the entire process and build an ecosystem involving the private sector.

The UICT raised the following points as support needs⁸⁴.

- Support UICT in developing its ICT Innovation Ecosystem to enable our Students to become entrepreneurs to participate in the ICT Innovation Ecosystem,
- Building capacity for teaching and administrative staff to focus on TVET programs to enable graduates to get employed, self-employ or go for further studies,
- To support and collaborate in developing Software Engineers and linking them to Japanese companies to develop software solutions,
- Dispatch of Japanese experts to support in building capacity of lecturers to design and implement the software development and outsourcing program,
- To provide access to Japanese software labs electronically to enable the objective of the software development and outsourcing program,
- To Provision of energy efficient/solar enabled Computer hardware to students, faculty, and staff to enable them deliver/access services from anywhere (on campus/off-campus),
- Provision of curriculum-related scientific and laboratory instruments, multimedia equipment and instructional aids, embedded PCs, overhead projectors, smartboards, Immersive virtual reality systems, digital design and fabrication.

(3) ICT Infrastructure

1) Vision and Plans

The Ugandan government has established "THE NATIONAL BROADBAND POLICY", which is administered by the Uganda Communications Commission (UCC), and has set the following goals and objectives.

- Increase ICT contribution to Government revenue from 8.1 percent in 2012/13 to 10 percent in 2020.
- Increase employment in the ICT sector from 1 million to 3 million people in 2020.
- Improve Uganda's ICT development index by increasing access to ICT infrastructure from 1.96 (2012 Index) to 3.5 (2020 Index); Improving usage of ICT from 0.75 (2012 Index) to 2.5 (2020 Index); and enhance ICT skills development from 3.69 (2012 Index) to 5.5 (2020 Index).
- Increase access to ICT infrastructure to facilitate exploitation of the development priorities.
- Enhance the usage and application of ICT services in business and service delivery.
- Increase job creation through ICT research and development.

⁸⁴ This includes not only human resource development for the digitalization of public services in the public sector, but also the needs for private sector.

- Increase the stock of ICT skilled and industry ready workforce.
- Improve the information security system to be secure, reliable, resilient and capable of responding to cyber security threats.
- Improve the legal and regulatory frameworks to respond to the industry needs.

2) Current Situation and Activities

International Backbone Network

A national fiber optic backbone network connecting Uganda to international submarine cables is being deployed. The submarine cable is connected from one landing port (Mombasa, Kenya). Other neighboring countries are South Sudan, Rwanda, Congo, and Tanzania.

Domestic Backbone Network

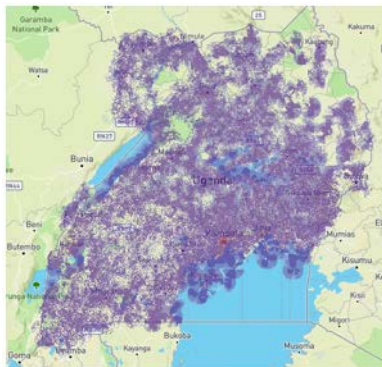
"The National Optic Fibre Backbone Infrastructure (NOFBI) has a total length of 12,000 km nationwide. The implementing agency is the Uganda Communications Commission and the administrator is the Ministry of ICT and National Guidance. Funding comes mainly from loans from major telecom operators.

Mobile Network

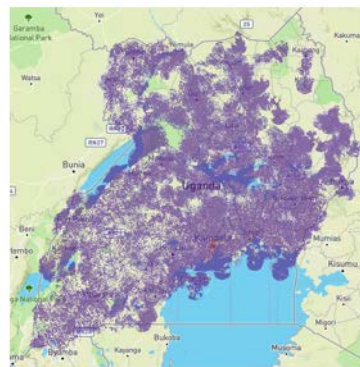
The three major companies are MTN Uganda (51%), Airtel (33%), and Uganda Telecom (9%). The capital structure of each major company is as follows

- MTN Uganda (General (20%), MTN International (80%))
- Airtel Uganda (Bharti Airtel (100%))
- Uganda Telecom (Teleology Holdings GIB Limited (67%), Government of Uganda (33%))

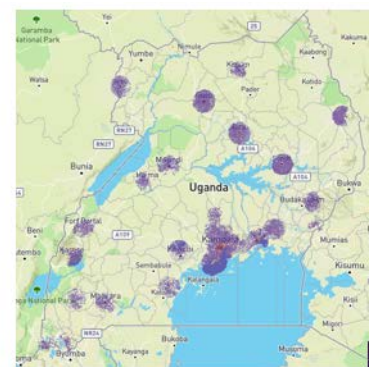
Figure 3.4.1 Mobile Coverage of MTN Uganda



Map A: 2G coverage



Map B: 3G coverage



Map C: 4G coverage

Source: GSM Association

Data Centre

One (1) data center, the Raxio Data Centre, was built in Kampala, the capital of Uganda, with Tier 3 and above capabilities.

IXP (Internet Exchange Point)

The IXP of Uganda named Uganda Internet Exchange (UIX) is located at Kampala, and the operation and maintenance of UIX are carried out by The Uganda Internet eXchange Point.

3) Challenging area(s)

The country of Uganda is one of the most progressive countries in Africa in pushing for policies and standardization in the ICT sector. However, the country faces challenges in developing widespread infrastructure access, especially the last mile to rural areas, due to its large rural population and low income.

The Uganda Electronic Transmission Company Limited (UETCL) signed a USD 2.5 million support with ZTE (ZTE) in August 2016. In addition to upgrading and expanding its fiber optic transmission network, the package includes replacing infrastructure built in 2003 with new dense wavelength division multiplexing (DWDM) equipment. This is intended to increase the capacity of backhaul lines.

However, the bandwidth procured by these capacity expansions is being used at a low level of 30% due to the fact that the lines are not reaching the last mile as mentioned above.

4) Activities of Development Partners

The current source of funding is mainly from loans provided by major telecom operators, and no support from international donors is identified.

In Uganda, the Rural Communications Development Fund (RCDF) is a donor for rural areas.

5) Potential Assistance Needs

Although there is support from other countries, there are areas where communication infrastructure is not yet in place, and it is conceivable that Japan could provide support to these areas.

6) Potential of using data for innovation in public service improvement

There is a possibility of using high-altitude/stratospheric drones to provide last-mile connectivity to rural areas. This technology is expected to provide a stable supply of high-speed wireless communications using drones that can meet the communication needs of rural, unelectrified areas, and is more cost-effective than ground ICT infrastructure that requires a time-consuming and costly construction. Swift Engineering, Inc. of the US has already successfully commercialized, test-flown, and test-communicated high-altitude/stratospheric drones in early 2020, and has begun providing solutions to meet the demand. Although HAPS Mobile, a member of the Softbank Group, is also developing this technology, it has yet to provide a sufficient solution like Swift Engineering, Inc.

(4) National ID

1) Vision and Plans

Uganda Vision 2040

NITA and UCC are jointly formulating the "Fourth Industrial Revolution Strategy" so that it will be part of the "Uganda Digital Vision 2040." The "interoperability framework" was formulated in cooperation with the e-Governance Academy in Estonia.

- URSB (Uganda Registration Service Bureau) is formulating an "Institutional Strategic Investment Plan"

in line with the National Development Plan (ICT for Digital Transformation). Aim to promote digitalization and online.

- "ICT components" are included in the strategic plans of many other sectors. In particular, the COVID 19 disaster accelerated this trend. NITA (National Information Technology Agency) is supporting these situations.

2) Current Situation and Activities

Organization

NIRA (National Identification and Registration Authority) is in charge of both national ID and resident registration. In 2015, the "Registration of Persons Act" was established to establish NIRA. Resident registration, alien registration, birth / death registration and other related services have all been transferred to NIRA (only marriage registration is under the jurisdiction of URSB).

Current status and Situation of national ID

The registration rate as of 2017 is 67% (NIRA intends to raise this to 90%)⁸⁵. The government plans to renew our national ID card toward 2024. A biometric authentication function is added while keeping the national ID number. In addition, the Data Protection Act enacted in 2019 (please refer to "<https://ict.go.ug/wp-content/uploads/2019/03/>") also requires the consent of individuals to control access to specific data. Although it is currently in the form of a transfer to the portal services provided by the other relevant ministries, it is designed to provide access to e-Tax, business registration, transaction license registration, and student loans and so on

Current status and Situation regarding birth registration and resident registration

Birth registration, which is an essential requirement for resident registration, is low (15%), and death registration is also low (2%). In addition, since it is not linked with marriage registration, it is not possible to respond to changes in first and last names. (This registration rate is a number I heard from NIRA himself at the time of the online interview, but according to UNICEF official data⁸⁶, it is said that it has improved to 69% (estimated) by the "UNICEF support program".) Both registration rates are low. Due to the fact that the birth and death components were not included in the national ID registration system from the design stage. There is a history that even if you try to expand the function later, the cost is

Situation for data integration of national ID and resident registration

Under the leadership of NITA and NIRA, the project is underway with a plan to integrate 350 systems including national ID and resident registration, and to interoperate data. The model was "e-estonia" from Estonia. "Alien registration" is an example of a non-priority field. The underlying system is modeled on "X-Road," the data exchange platform for Estonia's "e-estonia." The system has the following features: 1) it uses open-source

⁸⁵ "World Bank ID4D Country Profiles Report"

<https://documents1.worldbank.org/curated/en/298651503551191964/pdf/119065-WP-ID4D-country-profiles-report-final-PUBLIC.pdf>

⁸⁶

https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=UGA.PT_CHLD_Y0T4_REG.F+M.&startPeriod=2006&endPeriod=2021

APIs, so the impact on existing systems and data and the burden of implementation are small; 2) it is highly scalable because it is a system that allows each organization to refer to each other's individually owned information via the Internet; and 3) data and systems are decentralized, so there is no single point of failure. As for the architecture, the main unit provides the core functions necessary for information coordination and consists of three components: a central server, a security server, and a monitoring server. Separately, there is a connection service layer, which provides services to users and the issuance of digital certificates and other services necessary for data coordination, and consists of an information system, adapter server, certification authority, and time certification authority.

In Estonia, 99% of public services are online, and services such as administrative services, elections, education, medical care, and residency can be provided. In addition, the "e-ID," which is equivalent to a "National ID," is linked not only to ID cards, but also to driver's licenses, bank accounts, electronic medical records and prescriptions. It is widely accepted by both providers and users from the perspective of information transparency, privacy protection, and user-oriented service provision. However, Estonia has a population of about 1.3 million people and is not racially diverse, so it differs from Uganda in terms of population size and racial diversity. Although it is not something that can be brought in as it is, it is assumed to be superior in terms of early adoption, considering the fact which existing data and infrastructure can be used, security functions are well developed, and open-source modules are available.

Current status and Situation of data linkage (interoperability) with other sectors

The technology at the time of system introduction has become obsolete, and the government recognizes that, for example, APIs that link data with each other are currently inadequate. Data is linked with about 16 organizations and institutions centered on national IDs, and the government is working on a project to further improve it through an integrated platform. Partners include telecommunications carriers, banks, the Uganda Revenue Authority, and the Financial Institutions Regulatory Agency. Other sectors of cooperation include fields such as "immigration / passport," "statistics," "financial information," "tax," "law," "administrative (public) services," "health," "education," and "welfare benefits."

In addition, the one-stop administrative service "e-Citizens Portal" is still in the conceptual stage, but with the support of the World Bank, it plans to start "e-Service" that integrates 12 services by August 2021. Providing seamless services by authenticating only a single national ID. Until now, IDs for various social services were required for authentication, but plans are to provide "single login" and "single authentication".

Standardization of national ID system and card specifications in the East African Community (EAC)

Not yet done in Uganda. The government recognizes that the development of a legal framework is the first step.

3) Challenging area(s)

The environment for digitalization seems to be getting ready, but the following issues were raised.

- Change of mind-set for people's digital services. There are still many people who want to provide paper-based services. According to the National IT Survey, there is data that 90% of the people do not want to digitize services, so strong "enlightenment activities" are required to change awareness.

- Capacity building for government employees with the aim of improving digital skills.
- NIRA has an operational system with 117 district offices, 156 districts, 3,000 sub-counties, and more than 10,000 parishes (Parish), but it is still difficult to access, so mobile offices (movement) Outreach is required through provisional registration offices) and online. In addition, situation to raise awareness and encourage registration (enlightenment activities and creating strong incentives that make people want to register) are also necessary. (NIRA)
- There is a big problem with data quality (especially past ones). URSB is planning a "data cleansing" project for business registration. ICT infrastructure upgrades and software development are also required. If online application is realized, it will be possible to ensure the accuracy of the data by confirming and verifying the input data at the time of input. (URSB)
- Infrastructure environment improvement (URSB) (especially in local communities)
- Many projects have been started, but project management can be done properly (especially coordination between stakeholders with different interests). (URSB)

4) Activities of Development Partners

- The World Bank has completed the development of the infrastructure environment (mainly hardware for office buildings, network equipment, scanners, PCs, etc.), and is currently discussing additional support. In addition, it is helping to improve the resident registration rate by increasing the birth and death registration rate nationwide. In particular, the government is working on (1) strengthening the functions of NIRA, which is in charge of birth and death registration, (2) supporting the development and dissemination of CRVS communication strategies, and (3) establishing a CRVS monitoring and evaluation system.
- In addition, UNICEF is supporting the development of "Mobile VRS (Vital Registration System)" as part of the "Universal Birth Registration Project in Africa", and is supporting NIRA for the purpose of expanding birth registration.

5) Potential Assistance Needs

Although situation for system integration and mutual data linkage are already underway, areas where JICA is expected to support include "capacity building" and "authentication including biometrics" (NIRA).

6) Condition: Infrastructure, Policy, Human Resource, and etc.

Projects are already underway for major areas such as national ID and resident registration, data mutual cooperation with other sectors (integrated platform construction project for data exchange), and situation to improve the birth registration rate, which is the basis of the project. In the situation, as a latecomer, rather than supporting the entire project, "specific fields" and "missing fields" such as general authentication (hard components) including "biometric authentication" and "capacity development" (soft components) mentioned above. It is thought that support focusing on "is necessary.

(5) E-Governance

1) Vision and Plan

Uganda Vision 2040

Since 2013 the Master Plan has been the strategic foundation for Uganda's economic and social development, setting out investment targets and priorities for the country to become a middle-income country within 30 years. President Museveni has pledged to invest a total of USD 200 billion at the launch of the Vision. ICT is identified as an area of underdevelopment and is one of the infrastructures to be strengthened in the future, along with energy, transportation, water and oil /gas. One of the core projects of the vision is a " A Hi-tech ICT city and associated ICT infrastructure", which aims to enhance the country's global competitiveness by increasing productivity through ICT.

Third National Development Plan (NDPIII) 2020/21 – 2024/25 (2020)

NITA-U Strategic Plan 2018/19-2022/23 (2018)

National Information and Communication Technology Policy for Uganda (2014)

Uganda e-Government Masterplan (2012):

The main goal of this masterplan is to achieve good governance and social and economic development by establishing effective, systematic, and productive e-Government. It examines e-government in Korea and the UK as case studies. For instance, South Korea is ranked 2nd in the United Nations e-government rankings for 2020 (*Uganda is ranked 137th and Japan is ranked 14th), and the progress is being made especially in the standardization of administrative back-office operations including central and local governments, and mutual cooperation between databases. The U.K. ranks 6th in the ranking, and the portal site GOV.UK provides access to the services of 23 government departments and 412 related organizations. Many of the operations are simple, and the site is thoroughly user-friendly. The strategy is divided into four parts - G4C, G2B, G2G and Infrastructure - and the specific goals and strategies for each are set out below.

G2C

(Goal)

To diversify service channels for citizens through ICT and establish citizen-oriented services

(Strategy)

- Online public services
- Diversification of civil services

G2B

(Goal)

To provide integrated industrial information and online services and enhance the enterprise competitiveness through One-stop and transparent G2B services

(Strategy)

- One-stop business service
- Disclosure of administration information and process

G2G

(Goal)

To standardize government administration process, digitalize government administration, and share administrative information to enhance work efficiency

(Strategy)

- Standardization of government administration work
- Computerization of Government administration
- Integration of government information resources

Infrastructure

(Goal)

To strengthen ICT education, expand ICT Infrastructure, formulate related legal framework and organization

(Strategy)

- Establish nation-wide ICT infrastructure
- Development of national standard
- Development of National ICT literacy and HRD
- Improvement of laws and regulations
- Organization of e-Government Committee

National Electronic Government (e-Government) Policy Framework (2011):

The vision of the framework is to ensure online accessibility of all government services and opportunities for community participation in a friendly, transparent and efficient manner for all sections of the society. In addition, the main strategic objective of this framework is to continuously improve the efficiency of, and access to government information and services. Six pillars have been earmarked for the successful implementation of the e-Government program in Uganda. They include;

- Institutional Framework which stipulates the core ministries, departments and agencies, private sector, academia and NGOs specifying roles and responsibilities for each.
- A Legal and Regulatory Framework meant to provide the requisite environment for the e-Government service delivery between government, citizens, business and non-citizens.
- Identified priority e-Government applications and services.
- Common ICT infrastructure and Shared services.
- A deliberate e-Government skills development program for civil servants and other key actors.
- A deliberate communication and advocacy program will need to be developed to popularize the benefits of the e-Government Program across the country.

2) Current Situation and Activities

In Uganda, MINICT developed the “National ICT Policy for Uganda” in 2014, and NITA, under the Ministry, is responsible for implementing and managing each digitization project in line with the policy. e-citizens Portal (<https://ecitizen.go.ug>) NITA intends to set up an e-citizens Portal (<https://ecitizen.go.ug>), a web-based

platform that will bring together all public services and provide a one-stop service. At present, however, the website only provides links to the websites of the ministries, although services are categorized by citizen and business.

NITA also has a strategy to establish a platform that links government, banks, police, judiciary, hospitals, educational institutions and utilities together. In reality, however, the plans and strategies are too far in advance due to the lack of capacity of the institutions and employees involved.

The KCCA is implementing a smart city strategy, which aims to digitize various public services and create a one-stop service. However, implementation has been slow, with the digitization of waste collection services⁸⁷ only starting in 2021. The World Bank report notes that Uganda's digital transformation has only recently begun.

3) Challenging area(s)

According to NITA, the biggest challenge to the digitization of e-government and public services is "culture transformation", including "change management". Particularly in rural areas, where IT literacy is low, there is a strong distrust of digitized services. In fact, according to the National IT Survey, around 90% of the population does not want electronic services. The first step is to educate the public on the misconceptions of digitalization held by the end users. In rural areas, electricity penetration is as low as 10%, making it difficult to access the internet.

As mentioned above, the skills of those responsible for ICT in the ministries and institutions are insufficient to implement the strategic plans, and the number of staff responsible for ICT in all government agencies is low at 1.9% of the total number.

As mentioned earlier, the government of Uganda has several strategies and plans for e-government development, but progress has been slow due to lack of budget and human resources. As noted in the "National Electronic Government Policy Framework", it is recommended to prioritize its digitalization projects and implement those that are most needed.

4) Activities Development Partners

The World Bank, MDA, UNCDF and UNCTAD are among the partners in promoting e-government and the digitization of public services. Uganda's "National Electronic Government Policy Framework" also draws on the transition of e-government development in Kenya and Rwanda (neighboring countries), Mauritius and Singapore (Middle Level Developed Countries), and Japan and Canada (High Level Developed Countries).

5) Potential Assistance Needs

As Uganda is just beginning to establish e-government, the needs for support are diverse. However, most of the interviewees suggested support for human resource development, such as capacity development of government officers and stakeholders in digital skills and training to improve ICT literacy. The first step is to

⁸⁷ In 2017, with the help of GSMA, a pilot project was launched in Kampala City to improve the efficiency of fecal sludge management in pit latrines by matching customers with collection companies closer to them through a GIS tracking system. From 2021, the platform will also be applied to garbage disposal, which has become a problem in recent years.

develop the ICT workforces in order to compensate for the shortage of ICT personnel. The lack of ICT human resources, especially in the public sector, has resulted in plans not being implemented or in significant delays in progress. It is also necessary to improve the level of employees in charge at each public organization in order to manage contracted projects with private companies that have relatively high ICT literacy.

6) Expected Areas to be Digitalized

As mentioned above, the Plan of Action for Electronic Governance identifies agriculture, fisheries, environment, rural development, health, education, industry, commerce and services as priority areas.

7) Potential of Using Data for Innovation in Public Service Improvement

At present, the data has not reached the point of accumulation. For example, in the case of the agriculture, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) would be able to register farmers and obtain personal information and data on crop types, production volume, sales prices, etc., which could then be used to formulate future plans. It will also be possible to transfer subsidies and benefits to farmers without the need for a third party. The use of the system will be expanded by linking it with national ID and health databases.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Uganda has a National Innovation Support Program in place, which aims to develop innovators who can provide solutions to government challenges. However, the reality is that there is a shortage of human resources in the ICT sector and poor digital skills within government.

(6) Education / Edu-tech

1) Vision and Plans

National Development Plan III: 2021/22-2024/25

Digital Transformation is featured as a fulcrum of economic development and one of priority areas. 18 programmes presented in the Plan include Digital Transformation as well as Human Capital Development in comprehensive manner.

National ICT Policy (2014)

The following are presented in “5.2.3 ICT in Education”.

- Review curricula at primary, secondary and tertiary levels in order to pedagogically integrate ICTs in the teaching and learning process;
- Improve the level of investment in educational ICT equipment, software as well as broadband connectivity of primary, secondary and tertiary institutions;
- Impart teachers with the necessary ICT skills in order to enable them use ICTs in the teaching and learning process;
- Establish educational networks for sharing educational resources;
- Promote the growth and implementation of open, distance and e-learning (ODeL) modes of study;
- Create opportunities and provide assistance for the disadvantaged, people with special needs, women and the youth to acquire ICT skills.

2) Current Situation and Activities

Numbers of enrollment in basic education, significantly in primary level, have increased after universal education policies were introduced in early 2000's⁸⁸.

Schools were locked down due to COVID-19 prevalence. With assistance from World Bank, distance mode of learning using printed material or radio programmes, however, development and delivery of learning material via internet are limited⁸⁹.

3) Challenging area(s)

- As the government's expectation to a new project to be commenced this year in comprehensive secondary education development (Uganda Secondary Education Expansion Project: USEEP) seems to be very high, high dependency on foreign donors may hinder effective implementation of education development plans.
- As to online learning, gaps due to communication network is a challenge. Connection fees are borne by learners that causes financial challenge for users.
- Low availability of ICT infrastructures is also a challenge at basic education schools.
- Low motivation of in-service teachers towards trainings could be a potential challenge.

4) Activities of Development Partners

World Bank, Uganda Secondary Education Expansion Project (USEEP)

Upcoming World Bank Project plans to develop teacher development system adopting SESEMAT (Secondary Science and Mathematics Teacher Programme) as a model which has been established by JICA's technical cooperation projects. Intervention to teachers would include more distance mode interaction with trainers or mentors due to COVID-19 prevalence.

World Bank, COVID-19 Education Response Project (CERP)

In response to difficulties due to COVID19, World Bank also extends assistance. Learning resources to be used for learning at home are being developed as a measure against school lock down. However, learning material through internet is limited since many learners might not have access nor could afford to access. Printed material is mainly developed that could be delivered to most of learners as far as physical access is possible. In addition, radio programmes for home learning are also planned that may have relatively good coverage. TV is considered as another media but priority is given to radio since less number of learners would have access to TV. According to World Bank Officers in charge, government staff are managing the programme activities well. Contents development are led by National Curriculum Development Centre. Physical delivery of printed material is managed by Procurement Unit of the Ministry of Education and Sports.

5) Potential Assistance Needs

JICA may have advantage in collaborating in World Bank Project where teacher CPD system is to be developed with utilization of ICT targeting 100 centers, where there could be an assistance need in development of

⁸⁸ Project Appraisal Document, Uganda Secondary Education Expansion Project (USEEP) (P166570)

⁸⁹ Hearing from World Bank Officer in charge of the project

sustainable management mechanism with appropriate staffing.

6) Expected Areas to be Digitalized

Expectation to further improve and digitalize learning material for home learning developed under World Bank assistance in this continued COVID-19 negative that obliges learners to stay home.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

Communication network development and procurement of digital devices for users such as learners to use as well as teachers.

(7) Health

1) Vision and Plan

Uganda's National Development Plan II 2015/16-2019/20

Uganda's National Development Plan II 2015/16-2019/20 is the second part of a five-year plan aimed at achieving Uganda's Vision 2040 of a healthy and productive population contributing to socio-economic growth and national development. It sets out plans for each health sector with the overarching goal of accelerating the movement towards achieving UHC, which enables all people to access the basic and quality health services they need without financial burden. There are four main goals;

- Contributing to the production of healthy human capital that generates wealth
- Strengthening economic risk protection to protect households from the financial strain and poverty that comes with access to health services
- Addressing the key determinants of health through enhanced inter-agency collaboration and partnerships
- Strengthening the competitiveness of the health sector in the region to Improving rural health facilities and services.

Uganda National eHealth Policy

Uganda National eHealth Policy, published in November 2018, promotion of eHealth was identified as a priority area in Uganda's National Development Plan II 2015/16-2019/20. To this end, an eHealth Technical Working Group (eHTWG) has been established in the Ministry of Health, chaired by the Director General of Health Services (DGHS, with the Department of Health Information as secretariat).

2) Current Situation and Activities

Under the Uganda National eHealth Policy, the Government of Uganda is promoting comprehensive digital health in health delivery services. For example, it is developing health information systems, improving the ICT literacy and skills of health workforce, and strengthening the telecommunications infrastructure in health facilities.

JICA technical assistance project (Project for Strengthening Health Services through Health Infrastructure Management, Phase 2 (2016-2021)) is supporting Regional Core Hospitals (RRHs = secondary care facilities) to monitor the status of medical equipment using the "NOMAD" system, which is a promising and potential asset. Uganda also needs to improve the number and quality of doctors, and ICT is being considered as a

possible solution, for example telemedicine.

3) Challenging area(s)

Based on the tele-interviews and preliminary domestic surveys (e.g. interviews with JICA headquarters), in addition to the improvement in the number and quality of doctors, there is also a need to improve the ICT literacy of health workforce that inputting data is a burden, and the problem of duplication of patient ID registration. In addition, donor-supported pilots often end with the end of the pilot period and the ending of the budget and the ICT system developed for the pilot, and there are many issues of integration and collaboration (silos).

4) Information Systems and Platforms

On the basis of remote interviews to the field and preliminary in-country research (desk-based desktop research), the current health information system is summarized as follows.

Information System/Platform Name:

- Through the implementation of JICA's 5S-KAIZEN technical assistance, the government has introduced and supported a medical materials management system called NOMAD.
- DHIS2 (Health Management Information System) and Human Resources for Health Information System (HRHIS = Health Human Resources Management System)

Main Data:

- Medical material data and health and health information and hospital personnel information

Owner of the Data/Operator:

- Ministry of Health

Source of Funding/Donor, etc.

- USAID provided financial support for the introduction of the management of medical materials (NOMAD) in hospitals, and JICA assisted operational level for the use of the system, including training on equipment (PC) and input methods through 5S-KAIZEN project.

5) Activities of Development Partners

- World Bank and UNICEF provide financial and technical support in maternal and child health, ex)UNICEF: Community Health Information system (MTRACK)
- USAID is involved in health workforce development

6) Potential Assistance Needs

- Support for the linkage of patient IDs with national IDs as a solution to the problem of duplication of registration as well as assist in improving the accuracy of CRVS as a precondition for this.
- Improving the use of digital devices, including enhancing the ICT literacy of health professionals
- Support for the structure of the telemedicine system with the aim of improving the number and quality of doctors

7) Expected Areas to be Digitalized

From the point of view of the health workforce that "inputting is a burden", support for the creation of a system for efficient management of medical materials and equipment, including the improvement of ICT literacy among medical engineers through the JICA 5S-KAIZEN in NOMAD medical materials management system. Based on the JICA asset, JICA has continued to support the establishment of telemedicine systems, especially training for health workforce in core regional hospitals (RRHs) (localization/start-up company support).

8) Potential of Using Data for Innovation in Public Service Improvement

The development of electronic medical records with a single patient ID and the interoperability of other health information systems will be reflected in evidence-based health policies and strategies based on the analysis of medical history. In addition, the promotion of telemedicine will enable the accumulation of good practices (improvements in the quality and efficiency of diagnosis) through digitalization, which will contribute to the improvement of the quality of health care professionals, thereby improving the quality of medical services, and ultimately increasing the level of trust and satisfaction of the public.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

The conditions (environment) for promoting the digitalization of the health sector can be considered as follows.

- An expansion of the telecommunication infrastructure and ownership of smart phones for telemedicine
- Legislation for the protection of personal data

(8) Social Protection

1) Vision and Plans

After the 20-year civil war, Uganda has built a variety of social protection programs centered on northern assistance, which was greatly affected by the civil war. In Uganda's Third National Development Plan (NDPIII, 2020/21-2024/25), "promotion of human resource development and social welfare" is one of the priority strategies, and toward the achievement of the SDGs the Government is aiming to improve the coverage rate of social protection.

In Uganda there is no universal pension system and universal health insurance system. Most of the social protection programs and employment promotion programs are supported by development partners. Many social protection programs are under the jurisdiction of the Ministry of Gender, Labour and Social Development (MGLSD). In 2015, the National Social Protection Policy 2015 (NSPP) was created to enhance the social protection program. However, government spending on social protection remains at 0.7% of the 2019/20 budget. SAGE (Elderly Support Program) and NUSAF (supported by World Bank), which will be described later, are major direct cash benefit programs, but they accounted for only 0.14% of the 2017/18 government budget. According to the ILO (2019)⁹⁰ the target 1.3 for the SDGs Goal 1 (whose population is covered by at least one social protection program) is less than 5%.

⁹⁰ ILO, World Social Protection Report: Universal social protection to achieve the Sustainable Development Goals 2017-19

2) Current Situation and Activities

<Social Protection>

The main social protection programs are as follows.

The National Social Security Fund: NSSF

This is a program that has been in operation for over 30 years and is mainly aimed at private employees and sole proprietors. Companies with five or more employees are required to join. It is under the supervision of the Ugandan Retirement Regulatory Authority and under the jurisdiction of the Ministry of Finance and MGLSD. There is another similar program for civil servants. Currently, there are around 1.5 million insured persons. The working population of Uganda is about 16 million. Out of this about 1.5 million are working in formal sector⁹¹ and the most of rest who are working in the informal sector are uninsured.

The main services of NSSF are elderly allowance, disability allowance, and survivor allowance. The insured persons are given a social security number and are managed by their number. The integration of National Single Registry (NSR) and national ID is underway and has not yet been fully integrated. Person who has a national ID at the time of NSSF registration can draw out personal information from NIRA. NSSF is becoming more digital among government organizations. In 2016, NSFF transferred analog data to electronic data. Its registration process has been all digitized. Registration is possible through mobile phone with dedicated application⁹². Insurance premiums can also be paid online. NSSF has not yet linked to the NSR which started in 2021. NSR will be described later.

Social protection programs for vulnerable groups

The following are main programs which MGLSD are managing and implementing.

- Social Assistance Grants for Empowerment (SAGE)

SAGE is a cash transfer program for the elderly. It was introduced as a pilot in 2010 with the support of FCDO (then DFID), Irish Aid, and UNICEF⁹³. During the first five years (2010-2015), in principle, it was started for people aged 65 and over in 15 counties, and about 123,000 people benefited. The amount of payment is UGX 25,000 per month. When the target county was gradually expanded in the next dissemination period, the target age was raised to 80 years or older due to budget constraints and the others. In addition, since MGLSD, which manages and implements the program, does not have information on the elderly who are the target of the program, having a national ID of NIRA (National Identification Registration Authority) became a condition for beneficiary of SAGE in order to identify the appropriate target at an entry stage. SAGE links to NSR.

SAGE was planned to be implemented in all counties by 2021, and the number of beneficiaries was expected to be about 1.5 million. If cash benefits are provided to people aged 80 and over in all counties, about 45% of the required amount will depend on donor funds⁹⁴. The COVID-19 pandemic has resulted in a reduction in donor funding, which poses a challenge to financial sustainability. However, since the poverty rate of the

⁹¹ Based on the interview with NSSF

⁹² Ditto

⁹³ Expanding Social Protection (ESP) Programme

⁹⁴ MGLSD, SAGE National Roll out update, January 2021 (Expanding Social Protection Programme),

elderly is high and the number of old-age pension members is limited, the need for SAGE is high, and measures to continue SAGE are being considered.

The Vulnerable Family Grant (VFG), which was started with SAGE, provided cash benefits to vulnerable households. It ended at the end of the trial period. One reason is target person of VFG overlap with them of SAGE⁹⁵.

Many social assistance programs are started with donor support due to technical and political difficulties in system construction, financial factors, and the need for emergency response. Beneficiaries may differ or overlap for each program. Even if the program is the same, if there is a system revision such as a change in qualification requirements like age, it will be necessary to discover and register a new target person. In either case, it is useful to accurately grasp the beneficiary information of each program, and the World Bank has been promoting the digitization of beneficiary information provided by its own programs. These situations have led to the conception and introduction of the single registry.

- The Youth Livelihood Programme (YLP)

The Youth Livelihood Programme (YLP) is an employment promotion program to improve youth unemployment and poverty. Phase 1 was implemented from 2013/14 to 2017/18, and Phase 2 was planned from 2019/2020 with revisions based on the results of the assessment⁹⁶. The target is the unemployed poor, aged 18-30. It also targets vulnerable groups such as the disabled and single-parent families, young people who have dropped out of school and vocational training, young people who have never attended school, and people infected with HIV / AIDS. Forming a group is necessary for applying to YLP, and 30% of the members are required to include females. The selection of target groups is done on a community basis. The program includes (1) Skill Development, (2) Livelihood Support, and (3) Institutional Support. Fund provided for starting a business, named Youth Venture Capital Fund, at require no interest rate and/or low interest rate, and related technical training is provided. Repayment of funds must be made within 3 years.

The maximum loan amount is UGX25 Million. Over the six years of Phase 1, approximately 240,000 people participated in the program and more than 20,000 projects were implemented. Agriculture accounts for about 30% of the loaned projects, followed by trade / sales and services, accounting for about 90% so far. Industry is about 5%⁹⁷. Demand for the program is increasing, but sufficient budgetary measures have not been taken and external funding is being considered. Improving the quality of the lending business that captures the needs of the market is also an issue. The introduction of ICT for program implementation and management has also been recommended⁹⁸. YLP beneficiary information is linked to NSR.

- Orphans and Vulnerable Children (OVC) and Gender Based Violence (GBV)

The Orphans and Vulnerable Children (OVC) MIS has been established as a child protection, monitoring and

⁹⁵ MGLSD, Vulnerable Family Support Grant Phase out Study, 2016

⁹⁶ MGLSD web: <https://mglsd.go.ug/wp-content/uploads/2021/03/Brochure%20-%20End%20of%20YLP%20Phase%20One.pdf> The project activities of 2019/20 were postponed. The implementation status in 2020/21 cannot be confirmed.

⁹⁷ Ditto

⁹⁸ Ditto

reporting system. Several partners, including USAID, are collaborating on nutrition, health and HIV. Some information of OVC MIS has been linked to the National Single Registry and further collaboration is proceeding⁹⁹.

As a female protection, monitoring, and reporting system, a Gender Based Violence (GBV) MIS has been established and is becoming more electronic. Since it is necessary to cooperate with multiple related organizations such as reporting to the police, mediation, and psychosocial support, integration work into NSR is underway¹⁰⁰.

- The World Bank's "Third Northern Uganda Social Action Fund Project (NUSAF 3)"
NUSAF 3 has been extended until June 2021 with additional financing. The contents are (1) Labor Intensive Public Works and Disaster Risk Financing (LIPW), (2) Livelihoods Investment Support (LIS), (3) Strengthening Transparency, Accountability & Anti-Corruption, and (4) Safety Net Mechanisms and Project Management: Monitoring and Evaluation (M & E). The executing agencies of NUSAF are the Prime Minister's Office and MGLSD.

NUSAF beneficiary information is linked to NSR. According to NUSAF documents¹⁰¹, the project has achieved more than the target, and the performance has been reported on the homepage of the Prime Minister's Office in Uganda¹⁰².

The government's youth employment promotion program is implemented by the MGLSD mainly for vulnerable groups and by the Uganda Investment Authority (UIA) for university graduates.

MGLSD Program: The Youth Livelihood Program (YLP)

The subjects are unemployed and poor people aged 18 to 30 (dropouts from school, young people who did not have the opportunity to attend public education, single parents, people with disabilities, HIV / AIDS patients, graduated from junior high school and high school but can't get a job). The contents of support are 1) skill development 20% (acquisition of technology adapted to the labor market: ICT, audio editing, metal processing, mechanics, carpenters, food processing, etc.), 2) life support 70% (investment support to income generation business), 3) Organizational support 10% (support for employment promotion projects, anti-corruption/good governance support). Implementation management is carried out by each local government.

UIA Program: Youth Apprenticeship Program (YAP)

The target is young people who are university graduates and are not working. The contents of support are improvement of employment aptitude through volunteer employment at companies, skill training, business skill training, and entrepreneurship support. It is implemented by the Uganda Investment Agency (UIA) in collaboration with private companies. It doesn't provide financial support unlike MGLSD's YLP.

According to a interview from the UIA, it plans to build an SME platform centered on the SME database. UIA

⁹⁹ Based on the interview with MGLSD

¹⁰⁰ Based on the interview with MGLSD

¹⁰¹ Implementation Status & Results Report (30-Jun-2020)

¹⁰² <https://opm.go.ug/nusaf3-has-transformed-lives-in-northern-uganda/>

is aiming for a business linkage that connects SMEs, markets and financial institutions by aggregating young people, women and SMEs who are aiming for employment and skill improvement. Youth employment support programs have been successful in collaboration with public universities, like Makerere University, Kyambogo University, and Mata University. For technical training, Prim Minister's Office is constructing technical acquisition centers nationwide. The UIA is considering conducting an impact assessment of the program. After mastering the technology, equipment and financial support is required for new business. The SME platform connects these actors. At the conceptual stage, UIA received support from the World Bank and Mastercard Foundation. The UIA is currently looking for partners who support to establish the platform.

<Digitalization>

With the support of the World Bank's Northern Uganda Social Action Fund Project (NUSAF) and UK AID (formerly DFID), the National Single Registry (NSR) for Social Protection was promoted and started operation in February 2021¹⁰³. The operating entity is MGLSD, which is the main implementing entity of the social protection programs. The NSR is linked to the aforementioned SAGE for the elderly and the World Bank's NUSAF program (as of August 2021). Furthermore, in cooperation with the NIRA, authentication through NIRA's ID Database is possible.

The NSR has just been introduced and quarterly committees meeting of relevant agencies including the Prime Minister's Office, and monthly technical committee meeting has been held. NSR is based on beneficiary information for social protection programs. At the start, the beneficiary information of the NUSAF 3 and SAGE, and some information on the protection of children under the supervision of MGLSD was linked to NSR.

The MGLSD website related to NRS has been created¹⁰⁴. It contains the information about the applicants, beneficiaries, potential beneficiaries (some county information), payment information, grievance status, and program exit status of the relevant social protection programs. The following are described as the purpose.

Purpose of Single Registry for Social Protection

- Public access to key social protection data like geographical coverage of schemes, number of beneficiaries, etc.
- On-demand analysis across the social protection sector & comparative analysis between programs, thematic areas, geographical area, etc.
- Data analytics and visualization (e.g., GIS maps, reports, etc.)
- Verifying beneficiary data against the National Identification and Registration Authority (NIRA) database
- Supporting regular reporting against the MGLSD NSPP M&E Framework
- Knowledge management (repository of documents and reports)

By promoting the single registry, Government of Uganda aim to create an Integrated Single Registry that connects other government agencies in the near future, and also aim to build a Social Registry that includes household information other than beneficiaries, such as census information. There is no clear definition for Social Registry and Single Registry, and they are used interchangeably in some countries. In the interview from MGLSD in Uganda, Social Registry is distinguished a tool that enables all citizens to receive public services

¹⁰³ <https://www.youtube.com/watch?v=IqzFruHxIe4>

¹⁰⁴ <http://154.72.196.50/>

including social protection services in conjunction with household information and census information other than the beneficiaries of the certain social protection programs.

3) Challenging area(s)

Social Protection systems and programs of Uganda are in the process of being built, and less than 5% of the population is covered by social protection programs currently. There is no universal insurance in health sector and national pension system dislike Japan, and it is estimated that most people are uninsured except for the 1.5 million people (about 3% of the total population) covered by civil servants social protection programs and NSSF. Raising the coverage of social protection is the biggest challenge.

Under these circumstances, Government of Uganda has promoted to establish the elderly allowance program nationwide, to raise income of the poor through employment program, and to provide basic public services such as health and education for the vulnerable, with the support of donors.

NSR, promoted by the Government of Uganda, becomes a foundation which promotes the digitization of beneficiary information for these representative social protection programs in Uganda. Cash transfer programs targeting the vulnerable are often started as pilot projects supported by donors. As in SAGE, the target beneficiaries may be expanded step by step, and the system may be revised such as changing qualification requirements at the trial stage.

In addition, LIPW of NUSAF is a “cash for work” program that introduce public works for beneficiaries, and the beneficiaries often varies in each time during the project. Similarly, LIS of NUSAE provides subsidies and technical assistance for livelihood improvement activities, and the target beneficiaries are different each time. NUSAF 3 also promoted synergistic effects through collaboration between LIPW and LIS in order to effectively improve and maintain the income of vulnerable groups. NSR is a useful tool for prompt confirmation of applicants and beneficiaries, and accurate confirmation of qualification requirements for system changes and effective operation of programs. Similarly, in service delivery, efficient and effective operation based on the specified personal information becomes possible.

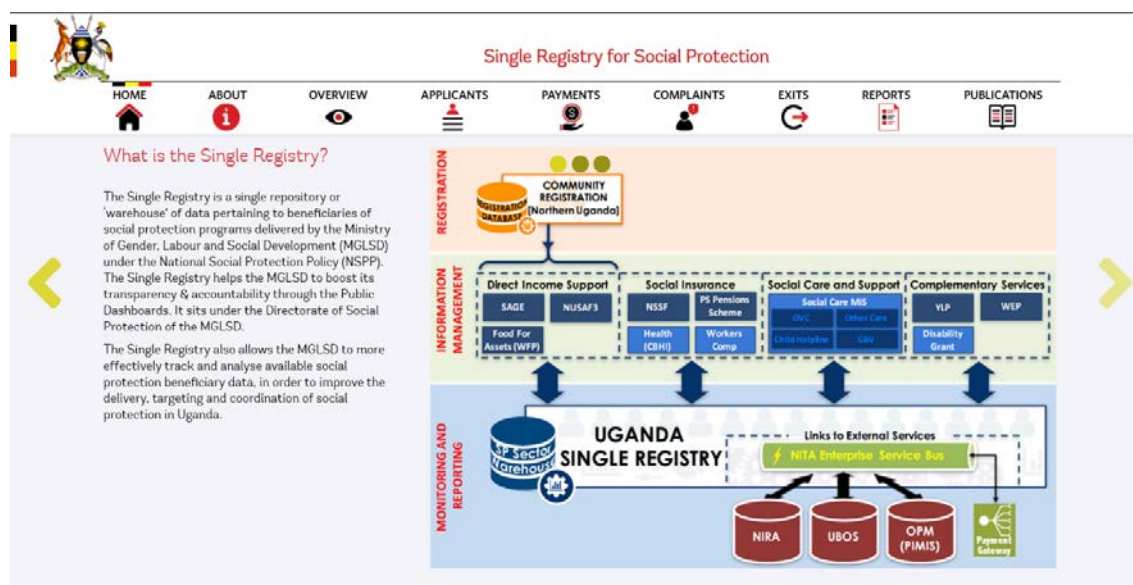
However, at present, MGLSD does not fully utilize the advantages of NSR because multiple programs are running in parallel and not linked to NSR. In addition to these, according to interviews from MGLSD, NSR information is centralized.

The usefulness of NSR has not been fully communicated to the local governments, which are the implement agencies of social protection programs, and the NSR has not been performed effectively. Other issues were expressed that the information and functions of NER would not be utilized in the field due to the fragile infrastructure in local areas and the lack of knowledge of ICT by local government officials.

4) Information Systems and Platforms

National Single Registry (NSR) for Social Protection which include information of beneficiary of social protection programs is expected to be materialized in both central-level and local-level. The owner of NSR for Social Protection is Government of Uganda and responsible operator is MGLSD. Main financial resources and

technical donors are World Bank, UK AID and etc.



Source: MGLSD web page: <http://154.72.196.50/Home/Faqs>

5) Activities of Development Partners

- World Bank: Third Northern Uganda Social Action Fund Project (NUSAF 3) 2016-2021 (USD 130 million)

6) Potential Assistance Needs

- Promote the National Single Registry for Social Protection and strengthen the information management and monitoring functions of beneficiaries,
- Strengthen targeting and monitoring functions for the poor and vulnerable by promoting the National Single Registry for Social Protection,
- Establish a Social Registry and improve interoperability in order to meet the new needs of social protection such as one-stop service,
- Further promote digital payments utilizing mobile transfer and mobile money in order to build safe and efficient payment methods.

7) The potential of using data for innovation in public service improvement

Utilize administrative big data on social protection and households for "evidence-based policy making and monitoring."

8) Expected Areas to be Digitalized

- Strengthening the management system of social protection programs through National Single Registry for Social protection,
- Digitization of all household information,
- Strengthening interoperability with other organizations' MISs,

- Promotion of digital payments utilizing digital transfer and digital money.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Infrastructure development in local areas where social protection programs are provided,
- Capacity building of central and local government officials of MGLSD, who will be the main managers and users of NSR,
- Notification and enlightenment activities to citizens for understanding of benefits from digitalization and NSR.

3.5 Mozambique

3.5.1 Survey Policy in the Target Country

(1) National Development Plan

The Mozambique government has formulated "Agenda 2025" as a national vision and strategy. Detailed strategies are formulated in the following four areas: 1) Human Capital (Basic Living Conditions, National Health Service, Health Network, Administration of Health Units, Training of Health Workers, Massive Expansion of Basic Education, Secondary Education, Community Education and Training, Adult Literacy, TVET, Education for Science and Technology), 2) Social Capital (Social Justice, Land Use and Tenure, Communities and Local Institutions, National Cohesion, Social Inclusion of Youth) , 3) Economic Development (Rural Development, Modernization of Companies, Infrastructure, Role of the State in the Economy, SMEs, Labor Law, Financial Mechanisms for Development, Informal Sector Integration, Human Settlements, Development of Partnership), 4) Governance (Peace, Social and Political Stability, Political Systems, Democracy and Participation, Legality and Security, Access to Information, Decentralization and Deconcentration).

(2) Country Assistance Policy of the Government of Japan

Mozambique has a long coastline of 2,500 km facing the Indian Ocean and occupies a geographical point as a gateway to landlocked countries such as Zimbabwe, Malawi, and Zambia. Since the conclusion of the peace agreement in 1992 after the civil war, national reconstruction and economic and social development have been steadily progressing under stable political conditions. The economic growth rate has recorded around 7% annually in recent years. The country is rich in mineral and energy resources such as coal and gas, is blessed with hydroelectric power generation using the abundant water resources, and has a lot of room for agricultural development, so the potential for economic growth is high. Japan has built a close cooperative relationship with Mozambique in the international arena, and recently, resource-related businesses by Japanese companies have become active, and Japanese companies are very interested in agricultural development, focusing on economic aspects. There is a lot of room for further development of bilateral relations.

On the other hand, Mozambique's per capita GNI is as low as USD 470 (2011 World Bank), and it is positioned as one of the poorest countries in the world. As a result, it is slumping to 184th out of 187 countries (2011 UNDP). The country has a majority of its population engaged in agriculture, but most of it is low-productivity, micro-production activities, and other areas are also underdeveloped.

Japan's support for Mozambique through ODA promotes the resolution of various issues facing the country, and its stability and development will lead to the growth of landlocked countries, and has been active in recent years through the strengthening of Japan-Mozambique relations in general. It is of great significance because it will lead to the improvement and improvement of the investment environment of Japanese companies in the increasingly resource-related business and the agricultural field with high potential.

Table 3.5.1 Country Assistance Policy of the Government of Japan for Mozambique

ODA Basic Policy	Promotion of sustainable economic growth and reduction of poverty by leveraging its potentials	
Priority Areas	Vitalization of regional economy including corridor development	economic corridor, OVOP, tourism, Japanese private companies, etc.
	Human development	health service, access to basic education, access to clean water
	Disaster management and climate change	cyclone, flooding, meteorological observation, forest management, etc.
Remarks	Abundant mineral and energy resources, and high potential for agricultural development PARP formulated in 2011, however its implementation faced difficulties due to the capacity; need to support human resource development in the health and education sectors along with ownership spirit Consecutive effort is needed to eliminate all land mines buried during the civil war	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Mozambique

Mozambique has formulated Agenda 2025, a national development plan based on the four pillars, including human resources, social resources, economic development, and governance. The ICT policy, which aligns with the national development plan, is expected to enhance efficiency, productivity, and profitability, and develop and access new markets in the private sector. It is also likely to improve the efficiency, effectiveness, productivity, and transparency in the public services, which contribute to information disclosure and participatory governance. A national ID number is given at the time of birth registration, and it is possible to obtain a national ID card with biometric information at the age of 18. On the other hand, the UN e-Government Survey 2020 points out that the Telecommunications Infrastructure Index, including the Internet penetration, is extremely low compared to the Online Service Index and Human Capital Index. It is necessary to take measures to improve access to digital services along with the development of communication infrastructure.

The country assistance policy of the Government of Japan towards Mozambique focuses on economic revitalization through corridor development utilizing its foreign ports to landlocked countries such as Malawi, Zambia, and Zimbabwe; human development including support for health services, basic education, securing safe water; and disaster prevention and climate change measures such as cyclones, floods, and floods. It also mentions paying attention to the civil war's aftereffects, such as land mines that remain even after 20 years. The JICA Mozambique Office and the Human Development Department of the JICA Headquarters also consider health and basic education fields to be priority areas.

Given the above, the JICA Study Team will examine possible support programs with a roadmap based on the interviews with relevant organizations and analysis of the current situation and issues mainly in the following areas: to disseminate and reduce disparities in the human development sector such as health service (including digitization of health record) and basic education (technical cooperation and grant aid, etc.); to promote the participatory governance through the dissemination of public services and securing their transparency; to promote economic development through improved access to the markets and enhanced competitiveness in the corridor development.

3.5.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation

1) Vision and Plans

Mozambique is one of the "Early Adaptor" for ICT and development in Africa. It has been implementing ICT for development initiatives since the early 2000s and it was also one of the target countries for the UNECA-led NICI (National Information Communication Infrastructure) Strategy initiative to promote ICT for Development in Africa. Moreover, it was also one of the dozen countries that UNDP supported to develop an ICT strategy (Information Society strategy) in early 2000's. This first ICT implementation strategy was established in 2002 with a multi-stakeholder approach and it has contributed to the achievement of PARPA (Poverty Reduction Strategy PRS) in Mozambique. Following the Information Society Strategy, an e-Government Strategy was enacted in 2006, along with other policies, laws, and regulations to enable creation of an information society.

In 2018, a new Information Society Policy (2018) "Política para a Sociedade de Informação" was created as an evolution of the 2003 Information Society Strategy. The strategy included an accompanying implementation plan which is called "Plano Estratégico para a Sociedade da Informação 2019-2028," The Information Society Strategy Policy. There are several different strategies which supplemented the National Information Society Strategy and plan. The National Broadband Strategy 2017, a strategy for broadband expansion in Mozambique, the Public Administration Reform and Development Strategy (CIRAP 2012~2025), a strategy for public sector reform, the Business Environment Improvement Action Plan (2019-2022), a private sector and business reform plan that anticipates future digitization, and the National Cyber Security Strategy (2019-2022), a cyber-security strategy are some of the ICT related strategies and policies enacted by the Government of Mozambique.

While conducive strategies and policies are in place, there are many challenges which hinders smooth implementation of these strategies and plans.

2) Current Situation and Activities

ICT laws and regulations

Mozambique is a country that has begun initiatives to establish an information society at the turn of 21st century, and has developed policies and regulations based on a comprehensive ICT strategy. As a result, the ICT legal system and related regulations necessary to create an information society are relatively established and in place. One of the success from the policy is that the liberalization of telecommunication companies was carried out at an early stage, and, as a result, the price of Internet access is low compared to other African countries (according to the data of Q1 2020, the price per 1GB is USD 1.81, which is the fourth lowest among African

countries after Egypt, Tunisia, and Ghana)¹⁰⁵. However, this did not translate well to the Internet penetration. According to the 2021 report, mobile penetration (50.4%) and Internet penetration (21.2%) are still very low, and the digital divide continues to be a major challenge, especially in the rural areas¹⁰⁶.

Table 3.5.2 ICT related Laws and Regulations in Mozambique

Basic ICT Law	Law n.º 4/2016 of 3 June 2016 Telecommunications Law (Lei n.º 4/2016, de 3 de Junho Lei das Telecomunicações) *Revision of 2004 Telecommunications Act
National ID	Decree n.º 11/2008 of the Council of Ministers
Electronic Signature	Law n.º 03/2017 of Electronic Transactions Law
Electronic Transactions	-ibid-
Personal Data Protection	Holistic Data Protection law does not exist in Mozambique but provisions within constitution, convention, and following laws cover personal data protection. Law n.º 47344, of 25 November, published in 1966 Civil Code (which has entered into force through Edict no. 22869 on 4th September 1967) Law n.º 34/2014, of 31 December Law on the Right to Information ('the Information Law') Law n.º 35/2014 of 31 December Penal Law ('the Penal Code') Labour Law (Law n.º 23/2007, of 01 August) E-Transaction Law (provision with) AU Convention on Cybercrime
Cyber Security	Law n.º 24/2019 Law n.º 14/2013 on Preventing and combating money laundering and financing of terrorism.
Competition Law	Law n.º 10/2013 on Competition Law
Intellectual Property Protection Law	Decree n.º 47/2015 of December 31, 2015 Industrial Property Code

Source: JICA Study Team

Organization

There are two ministries in Mozambique that are responsible for ICT related activities. One is the “Ministério dos Transportes e Comunicações” - Ministry of Transport and Communications (MTC), which is mainly responsible for telecommunications sector. It has subsidiary institution called “Instituto Nacional das Comunicações de Moçambique (INCM),” which is a regulatory authority for telecommunication companies, TV broadcasting, and responsible for implementing the national broadband strategy. Another key ministry is the “Ministro da Ciência, Tecnologia e Ensino Superior e Técnico Profissional” - Ministry of Science and Technology, Higher and Technical Vocational Education. This ministry is the main ministry responsible for establishing the information society in Mozambique which oversees all ICT initiatives other than those involving telecom sectors. Underneath the ministry, there exist two specialized implementation agencies. “Instituto Nacional de Tecnologias de Informação e Comunicação (INTIC)” is one of the implementing agencies with wide range of mandates that include operation of data centers, cyber security, e-governance, interoperability framework, and management of social media. On the other hand, e-Government initiatives are implemented by “Instituto Nacional de Governo Electrónico (INAGE),” another implementation agency. The

¹⁰⁵ Research ICT Africa Mobile Pricing (RAMP), 1GB Basket, Research ICT Africa, https://researchictafrica.net/ramp_indices_portal/

¹⁰⁶ Simon Kemp, Digital 2021 Mozambique, Hootsuite, 12 February 2021, <https://datareportal.com/reports/digital-2021-mozambique>

e-Government initiative in Mozambique is part of the Government reform processes that have been underway in Mozambique for the past 15 years; INAGE was established in 2017 as an organization to develop, coordinate, and implement e-Government policies in an integrated manner.

As indicated above, Mozambique has overall institutional setup for implementing ICT policies. However, the institutions interviewed during the survey indicated that there remain challenges for the capacity to implement these policies.

Current status of public service digitization

In terms of digitization of public services, the World Bank is playing a central role in supporting the establishment of e-Government system through INAGE. INTIC is supporting the development of technical frameworks and standards for the implementation of the e-Government system. The needs to link the e-Government systems with national IDs is well recognized by the stakeholders, however, many of the current systems are not linked to the national IDs for authentication. With the support of the World Bank, the digitization of national IDs and their linkage to the e-Government system will be implemented. Establishment of Interoperability Framework, which is also critical for creating integrated e-Government was enacted by a law in 2019. However, its operationalization has been delayed and it will be initiated as part of the World Bank project.

According to the interview with the World Bank, it has been indicated that the large scale initiative like the WB project has difficulty providing flexible support. Activities such as POC are important for innovative projects but they have indicated that it may be difficult to implement these within the framework of their project. As JICA support could be flexible, there may be an opportunity for JICA to forge cooperation with the WB project by complementing each other.

3) Challenging area(s)

While the counterparts indicated there aren't major challenges within ICT policy formulation areas, they have mentioned challenges in the area of policy implementation. As such, the following challenges have been identified as hindrances to the digitization of public services:

- Implementation capacity of INAGE to implement e-Government is weak.
- Implementation of innovative activities (POC-like activities) within the big World Bank project are difficult.
- National ID and E-government services are not linked which would hinder provision of integrated services.
- Expansion of electronic services and applications have not progressed.
- Infrastructure is not well developed, especially in rural areas.
- Redundancy of the national data center is not established which would pose security risks for Government and public data.

4) Information Systems and Platforms

- Information System/Platform Name: TBC

- Main Data: TBC
- Owner of the Data/Operator: TBC
- Source of Funding/Donor, etc.: World Bank

5) Activities of Development Partners

The World Bank is providing the largest support in the country with the Digital Governance and Economy Project (EDGE) 5-year USD 150 million project. The main activities of the project are divided into the following four components:

- Component 1: support focusing on two key aspects of digital transformation: institutional capacity and Government connectivity.
- Component 2: support for the development of digital Government services linked to national IDs, while ensuring that all citizens have access to legal identification.
- Component 3: Support the growth of digital private sector by helping SMEs to take advantage of business opportunities created by digitization efforts in the public sector.
- Component 4: Support for effective project implementation (project implementation by Special Project Implementation Unit (SPIU)).

Other donor supported projects include infrastructure support by China (establishment of a national data center) and UNICEF's project with the Ministry of Justice. In the past, Italy supported a project to install WIFI to improve the Internet in rural areas and UNDP supported the development of an ICT strategy.

6) Potential Assistance Needs

Comprehensive support for e-Government implementation is currently underway under the auspice of the World Bank's EDGE project. For the effective implementation of ICT policies and the strengthening of project implementation capacity by the INAGE is essential. In addition to strengthening ICT technology capacity within the agency, it is also necessary to improve soft skills such as project management, leadership, communication, interagency coordination, and appropriate management of financial resources. The World Bank's EDGE project is expected to support strengthening INAGE's policy and project implementation capacity as part of its project component 1, "Building an Enabling Foundation" (USD 30 million). However, there may be a possibility of supporting capacity building of INAGE through on-the-job training by dispatching Japanese experts.

In line with components 2 and 3 of the World Bank's EDGE project, the World Bank is expected to support the private sector, including start-ups, to develop innovative services that utilize public and private data and expand public services. However, a World Bank project representative has remarked that it is difficult to support innovative activities (POC-type activities) within the framework of large-scale World Bank Project. By partnering with the World Bank in this area, it is possible to support POC type initiatives which would expand the digitization of public services by the private sectors. The private sectors, including startups, could be

supported to create innovative public services through utilizing data generated by the e-Government system. Next project of Rwanda will take a similar approach to expand the public services and the same approach could be replicated in Mozambique. This approach could become a promising new way for JICA's support in the Digital Transformation area.

As for the possibility of participation by Japanese companies, services using spatial information are an example of the area where Japanese technological know-hows could be utilized. Partnership between the local private sector and Japanese companies could be supported to conduct POCs in Mozambique to come up with potential business model which could be expanded both within and beyond Mozambique.

Mozambique already sports several POC initiatives spearheaded by Japanese institutions. The Center for Spatial Information Science at the University of Tokyo, for example, calculate and develop large-scale time-series demographic data using anonymized cell phone location log data (CDR). In the same token, POC of road management using human movement data and smartphone acceleration sensors are also underway. These are just a few of the POC conducted using spatial information. Opening and use of these data will not only contribute to the formulation and implementation of appropriate policies using data in various fields such as the transportation sector, water and sanitation, insurance, economic activities, and governance, but will also have the potential to develop new services and products by the private sector.

7) Expected Areas to be Digitalized

Establishment of e-Government and its associated infrastructure enable Mozambique to gather significant amount of data which could be open-up to private sectors to come up with innovative services. By supporting the development of these services by private companies, including start-ups, it will be possible to significantly expand digitalized public services. As for the other use of these data, it may also be possible to be used to develop and implement data-driven, evidence-based policies.

8) Potential of using data for innovation in public service improvement

While there are many needs for digitalization in Mozambique, it is entirely possible to implement various POCs using digital technology in the areas which adhere to Japan's country assistance framework such as human resource development and social development / human development / health improvement programs, economic growth, productivity improvement, and job creation / agricultural development and industrial development, sustainable use of natural resources and environment / water, environment, and (sustainable use of natural resources and environment/water, environment, climate change countermeasures, peace building and governance/security improvement, and disaster prevention. In the area of ICT Policy/Strategy, digital technology (mainly data collection and analysis) can be used for the formulation and implementation of data centric evidence-based policies.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

The survey has not identified any institutional or regulatory hindrances which deter promotion of innovation in Mozambique. However, in order to stimulate innovation, it is necessary to strengthen weak infrastructures, develop human resources with appropriate skills, and improve the capacity of organizations to implement

innovation stimulation policies. As Mozambique embark on digital economy development with private sectors, infrastructure development and data utilization enabled through Government digitization, and human resource development for both public and private sectors, it may be possible to open up to new business opportunities and innovation; especially through supporting the transformation of public services.

(2) ICT Human Resource Development

1) Vision and Plans

The plans and policies related to human resource development in the ICT sector are as follows.

National Development Strategy (2015-2035)

It was prepared with reference to Agenda 2025, the Millennium Development Goals, the Peer Review Mechanism, and the National Poverty Assessment and Report, with an emphasis on human capital development.

Plano Quinquenal do Governo (POG) 2020-2024 (Government Five-Year Plan (2020-2024))

The Plan identifies economic growth, productivity improvement, and job creation as priority areas for the Government. In order to achieve these goals, the plan considers human resource development to be essential, and describes the importance of not only primary and secondary education, but also the development of human resources required by the labor market and vocational training for job seekers and the self-employed.

Strategic Plan for the Information Society 2019-2028 (Strategic Plan for the Information Society 2019-2028)

The Plan was formulated with the aim of making the country a place where all citizens have access to ICT without disparity and can use it for the benefit of individuals and society as a whole. It also states that ICT will be used to drive socio-economic development in seven areas¹⁰⁷, with education and human resource development being the first.

On the other hand, the lack of various equipment, Internet environment, curriculum and training materials, and instructors for ICT education have been cited as challenges. In particular, the shortage of human resources in rural areas has been pointed out.

2) Current Situation and Activities

Government initiatives to develop ICT human resources

Civil servant training institutions and ministries have been conducting training programs to enhance ICT literacy of their staff. However, the content of the training is limited to the basics, such as the operation of PCs and the use of document and table making tools, and even such training is not sufficiently implemented due to the lack of equipment such as PCs. Under such circumstances, there has been no training for civil servants to plan and formulate digital policies, which are necessary for promoting the digitization of public services.

ICT human resource development efforts by others (private sector, academic institutions, etc.)

Some universities have set up separate incubation hubs on campus to provide more practical education, hold hackathons related to software development and digital solutions, and conduct joint projects with private

¹⁰⁷ 7 sectors are “Education and Human Resource Development (Academia and Innovation)”, “Health”, “Agriculture, Fisheries, Environment and Rural Development”, “Industry, Trade and Services”, “e-Government (Good Governance)”, “Access and Connectivity (Telecommunications)”, “Policy and Regulation”.

companies.

In addition, AMPETIC (Association of Mozambican Information Technology Companies), an ICT industry association, is working with the CTA (Confederation of Mozambican Business Associations) on digitization in the private sector, and is also collaborating with universities and schools to organize seminars on IoT and cyber security, as well as computer courses for children. seminars on IoT and cyber security, and computer usage courses for children.

3) Challenging area(s)

There is a shortage of human resources with ICT skills in the country as a whole, and those who have even a little skill tend to go to private companies with higher salaries. Therefore, it is necessary to develop ICT human resources in both the public and private sectors by providing training on ICT technology not only at civil service training institutions but also at universities and other academic institutions to a wide range of citizens.

ICT human resources in the civil service

There are very few government employees with basic engineering and ICT skills, so even if a simple bug arises in a rural area, for example, the government has to send someone all the way from the capital. For this reason, training institutions for government employees provide basic computer skills (Word, Excel, etc.) and specialized training for systems that are already in use within the government (financial systems, etc.), and there is a need to train personnel who understand machine learning, AI, deep tech, robotics, etc., which the Mozambican government wishes to introduce. The government of Mozambique does not provide training in machine learning, AI, deep tech, robotics, or programming using programming languages such as Java. In addition, there is no training for personnel who are able to examine policies related to information protection and cyber security that need to be considered when digitizing public services, analyze the current status of business processes, identify problems, and propose appropriate ICT solutions as solutions. They should be able to analyze the current status of business processes, identify problems, and propose appropriate ICT solutions to solve them.

Under these circumstances, digitization of public services and other services is being promoted as a government policy, and projects are planned. On the other hand, government officials who do not have technical knowledge of ICT are writing the specifications for such projects, so the specifications may not be appropriate. In addition, after the order is placed, the necessary information and proper monitoring cannot be done, and after the delivery, maintenance management cannot be done, and in the end, the system is not built, or even if it is built, it is not used after delivery.

Others

With regard to ICT literacy, it is necessary to start with awareness-raising activities because the literacy of people, especially in rural areas, is low and there is a sense of distrust of "digital". In addition, many people who use smartphones in urban areas only use them for entertainment (SNS and watching videos), and do not use them to search for things they do not understand or to receive various free trainings on the Internet.

4) Information Systems and Platforms

In the first half of 2000, Sweden provided about 400 PCs as part of its technical cooperation to CIUEM (the Information Center located at the University of Eduardo Mondarene), which was conducting ICT literacy training for teachers and other activities. These PCs were distributed to faculties all over the country in accordance with the Mozambican government's policy of setting up computer rooms in public secondary schools throughout the country. since CIUEM is set up within the University of Eduardo Mondarene, its operational base is guaranteed, and with support from Italy, UNDP, and others, it has been able to It has been doing various new things since the dawn of the Internet¹⁰⁸. In addition, although it is not strictly a support, the University of Edoardo Mondarene has collaborated with CISCO Academy and Huawei to hold courses on networking.

5) Activities of Development Partners

There is a shortage of human resources with ICT skills in the country as a whole, and people tend to go to private companies (with higher salaries) even if they only learn basic computer operations at civil service training institutions. Therefore, it is necessary to develop ICT human resources not only in the public sector but also in the private and public sectors by providing training on ICT technology to a wide range of people at universities and other academic institutions.

Thus, what kind of support Japan can provide to Mozambique, which is in need of ICT human resource development in both the public and private sectors, is summarized with reference to ICT human resource development projects that have been implemented in other countries.

Lessons learned and challenges of JICA's ICT human resource development support in Mozambique to date

Project for the Training of Information Technology Professionals (2007-2010): The Mozambique Institute of Information Technology (MICTI), the first ICT higher education institution in the country, was established within the Eduardo Mondarene University as the C/P. The project aimed to enable MICTI to implement an intermediate information technology diploma course that meets the needs of the Mozambican ICT industry. The project was implemented with the aim of enabling MICTI to offer intermediate information technology diploma courses that meet the needs of the Mozambican ICT industry. In spite of the extremely small scale of the project (dispatch of directly managed short-term experts three times a year, some procurement of equipment, and local and Japanese training), a cooperative system was established among industry (CISCO Academy), government (JICA), and academia (the University of Tokyo, which has CISCO Academy-certified instructors), and industry, government, and academia worked together to the implementation of MICTI's ToT training was highly evaluated. At that time, CISCO Academy cooperated with us free of charge, but at present, it is paid (details to be confirmed). (In order to form a new technical cooperation project, it is necessary to find companies (industry) and schools (academia) that are interested in ICT human resources in Mozambique/Africa, and the Mozambican government and JICA (government) should consider a new cooperation system.

¹⁰⁸ For example, CIUEM was the first to bring the Internet and e-mail to Mozambique in 1993. As for the aforementioned project of distributing PCs to schools, CIUEM started the project and handed over the project to the Ministry of Education once the effectiveness and sustainability of the system had been established. In addition, CIUEM has played a role in improving ICT literacy in rural areas by establishing telecentres in rural areas and working with UNESCO to set up multimedia centers in rural areas.

Confirmation of the outline of ICT human resource development projects in other countries

Since around 2007, JICA has been working to introduce and disseminate ITSS (an index developed by Japan's Ministry of Economy, Trade and Industry (METI) that clarifies and systematizes the capabilities required to provide various ICT-related services) mainly in Asia.

ICT Human Resource Development Project Targeting the Japanese Market (Bangladesh, 2017-2021):.

Although a qualification system (ITEE) to objectively check the abilities of ICT human resources was introduced in an earlier project, it has not been widely recognized and utilized in Japan. This project formed a program to develop ICT human resources with the Japanese market in mind as a system to promote and utilize the ITEE. A public-private partnership system was established by successfully matching Bangladeshi students who want to work in Japan after graduation with Japanese companies that are suffering from a shortage of ICT human resources. In Miyazaki Prefecture in particular, the city of Miyazaki is supporting local companies that are facing a shortage of human resources due to the outflow of young people from outside the prefecture, and the University of Miyazaki is actively cooperating in this project to promote local industry and internationalize the university. The project has been highly evaluated for its contribution to both local human resource development and regional development in Japan.

Hanoi University of Technology ITSS Education Capacity Enhancement Project (Vietnam, 2009-2012).

This is a project to train IT engineers with Japanese language skills, with Hanoi University of Technology as the C/P. The project was implemented by the "Higher Education Support Project (IT Sector)," a yen loan program, which procured equipment, accepted foreign students, hired teachers for Japanese language education, and transferred technology. While the Japanese language instruction by the project experts and the activities to accept foreign students through the yen loan program were being implemented, the students were highly motivated and their abilities were highly evaluated, but after the yen loan program ended, the abilities of the students began to decline.

IT Human Resource Development Project (Philippines, 2004-2008)

This project was implemented to enable C/P's University of the Philippines to efficiently provide IT training to university graduates and IT technicians that meets the needs of the Philippine IT industry. At the time of the project implementation, there were a number of Japanese companies operating in the Philippines and they were in need of ICT human resources who could speak Japanese. In this project, the government established a system in which companies contribute scholarships and donations to the university, and excellent students are employed by these Japanese companies after graduation. In fact, the government was able to secure very excellent human resources, and the project was highly evaluated by Japanese companies. Although more and more Japanese companies withdrew from the Philippines due to economic reasons, etc. sometime after the project ended, the University of the Philippines can be highly evaluated in that it continued to provide IT training while shifting to a method of collecting scholarships and donations from companies other than Japan (the current status is unknown).

To summarize the lessons learned from the project so far, it is important to identify the organizations that will

receive the graduating students, develop training programs that can develop the human resources that these organizations are looking for, and consider how to establish a system of cooperation when forming the ICT human resources development project. It is also important to consider how to establish a system of cooperation.

In implementing the project in Mozambique, it is necessary to carefully consider whether Japanese companies can be the recipients of the project as in the case of the projects implemented in Asia mentioned above. However, by ¹⁰⁹implementing the project with Japanese universities and Japanese companies that are already involved in ICT human resource development in Africa, it can be a cooperation to widely develop ICT human resources in Mozambique. In addition, if similar projects can be implemented in Mozambique while making use of the lessons learned from the projects implemented in Asia, it may lead to the development of other African countries in the future.

(3) ICT Infrastructure

1) Vision and Plans

Mozambique has been an early adopter of ICT policy making through the Ministry of Transport and Communications, now in its 23rd year. The government of Mozambique believes that this has gradually resulted in the spread of ICT use and ICT literacy among the government, academia, and civil society.

In terms of telecommunications infrastructure, the country's first submarine cable was connected in 2009, and the domestic backbone has been developed. In the mobile market, market competition has been working properly with the entry of a series of new operators since 2012. As a result, the coverage area of cell phones has expanded, the quality of lines has improved, and prices have been stabilized.

The new Telecommunications Law, which came into effect in 2016, includes an effort to reorganize infrastructure planning with the aim of reducing duplication of investment and using the saved investment to expand coverage in rural areas.

In response, the government adopted a new broadband strategy (Estratégia Nacional de Banda Larga) in 2017, which is currently being implemented. The strategy sets access targets, including a minimum broadband speed of 1 Mbps and 100% wireless broadband penetration in rural areas by 2025. It also lists key activities that should be undertaken to improve access to broadband and secure the necessary investments. However, it does not include targets for reducing the price of broadband or measures such as market intervention by the government, and no figures are yet available on progress.

2) Current Situation and Activities

International Backbone Network

Mozambique is connected from two cable landing ports (Maputo and Nacala), and a national fiber optic backbone network has been deployed. For submarine cables. Other adjacent connections are to South Africa,

¹⁰⁹ There is a global shortage of ICT human resources, and Japan is no exception, and for Japanese companies doing business processing outsourcing (BPO) in the ICT field, having ICT human resources in Africa and Japan means that they can work around the clock without stopping. There is a possibility that they will be interested. There is an example of a Japanese BPO company setting up a local subsidiary in Rwanda and taking on various ICT-related tasks.

Eswatini, Zimbabwe, Zambia, Malawi and Tanzania.

Domestic Backbone Network

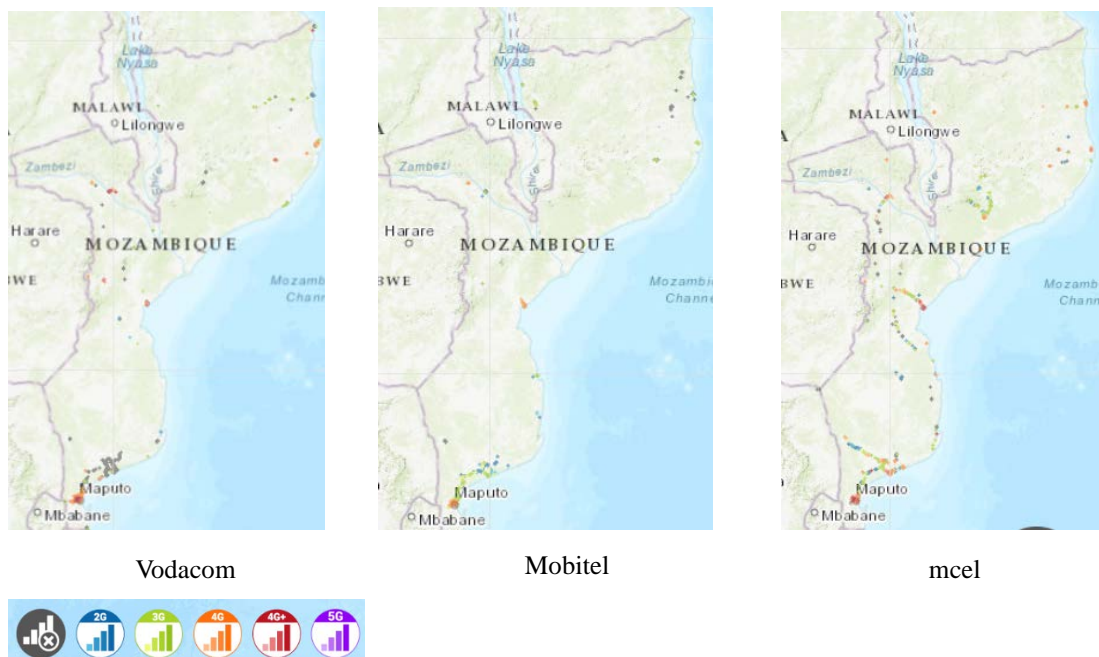
Telecomunicações de Moçambique (TDM), a state-owned company, is providing a total of 3,860 km of Internet access (ADSL and CDMA) nationwide. The implementing agency is the TDM, and the regulatory agency is the National Communications Authority of Mozambique (INCM). The main source of funding is loans from the major telecom operators.

Mobile Network

The three major companies are Vodacom (44%), Movitel (29%), and mCel Mozambique (27% indicate domestic market share.). The capital structure of each major company is as follows

- Vodacom (Vodacom Group (65%))
- Movitel (Viettel (70%), SPI (30%))
- mCel Mozambique (TDM (74%))

Figure-3.5.1 Mobile Coverage by Main carrier



Source: nPerf

Data Centre

Five (5) data center listed below are established and operated in Maputo, the capital of Mozambique, and the safety level of both data centers is Tier-3.

- SeaCom
- Webmasters Lda
- Teledata Mozambique
- Eduardo Mondlane University

- Internet Solutions Moçambique

In addition to the above, a national data center began to be built as part of the eGovernment Strategy approved by Congress in 2006, and was completed around 2015. This data center has built with the supporting of China. The STRATEGIC PLAN FOR THE INFORMATION SOCIETY 2019-2028 states that the availability and efficiency of national data centers will be promoted, and that the national data centers will be used in a meaningful way to promote digitalization. This data center has been operated by INAGE since 2015. Currently, there is only one data center, and redundancy has not yet been achieved by building another data center.

IXP (Internet Exchange Point)

The IXP of Mozambique named Mozambique Internet Exchange (MOZ-IX) is located at Mapto, and the operation and maintenance of MOZ-IX are carried out by Universiade Eduardo Mondlan.

3) Challenging area(s)

In the country, the number of cell phone subscribers accounts for 98% of the total number of phone subscribers, and among them, the majority are prepaid users in the mobile market. In addition, due to the low mobile coverage in rural areas and the high cost of service, the usage of fixed line and fixed broadband lines by the general population is low. As a result, the main issue is that operators have not been able to come up with new services for fixed broadband lines.

4) Information Systems and Platforms

Currently, the main sources of funding for the domestic backbone of the telecommunication infrastructure development are the major telecommunication operators, the World Bank, and EXIMBANK (Vietnam). In addition, government-led initiatives to promote ICT use and ICT literacy are being implemented with the support of the Italian and Finnish governments, the World Bank, UNDP, UNESCO, and other international organizations.

5) Activities of Development Partners

Although there is a wide range of support from the World Bank and other organizations, the support is limited to the backbone network, and there are areas, especially in rural areas, where the telecommunications infrastructure is not well developed. Japan could provide support for the last one-mile problem in these areas.

6) Potential Assistance Needs

As mentioned above, the solution to the last mile problem in rural areas is one of the remaining support measures in Japan. Two innovative technologies to achieve this are the use of sub-gigabit band wireless circuits and the construction of circuits using high-altitude, stratospheric drones.

The sub-gigabit wireless line is a way to reduce the cost of installing lines in the last mile by applying the wireless technology used in electricity and water meters in Japan.

The technology for constructing lines using high-altitude stratospheric drones is a technology that can meet the communication needs of rural areas without electricity, and it is also a technology that provides a stable supply of high-speed wireless communications using drones that are more cost-effective than the time-consuming and costly ground infrastructure.

Swift Engineering, Inc. of the U.S. has already successfully commercialized, test-flown, and test-communicated a high-altitude, stratospheric drone in early 2020, and has begun providing solutions to meet demand. A Japanese company, HAPS Mobile, a member of the Softbank Group, is also developing this technology, but has yet to provide an actual solution.

(4) National ID

1) Vision and Plans

"Agenda 2025: The Nation's Vision and Strategies" formulated in 2003 suggests e-government development to improve the level of public services, but the master plan for national ID, which is one of the essential elements for that, is currently lacking.

2) Current Situation and Activities

The Ministry of Justice is in charge of civil registration (birth, death), and a digitization project is currently underway, supported by UNICEF and the World Bank.

From 2020, the government started interoperability between civil registration (death certificate) and the health sector and expanded to 16 hospitals, but it has stopped because of the COVID-19 pandemic.

According to an interview with the World Bank (Digital Government Project), they assessed the overall ID system, where the registration rate of national IDs has not reached 50% in the first place due to the lack of various resources (equipment, human resources, registration offices, etc.) and low awareness due to lack of public relations activities, and found that departmental silos, i.e. each department carrying out their activities without cooperation, are a severe problem. It was assessed that data linkage was not possible in the situation where various IDs such as health insurance cards, tax IDs, and social security numbers were scattered. Currently, the working group is considering an integrated and reliable ID system in the e-government. Regarding interoperability, they are planning to strengthen CRVS because a base system is needed first. After that, it also supports biometric authentication. At the same time, human resources will be also developed so that the system can be maintained and operated by the local resources alone. However, it was found that the collaboration between the Ministry of Justice (in charge of civil registration) and the Ministry of Home Affairs (in charge of national ID) is a fairly difficult task.

3) Challenging area(s)

First, as a preliminary step to the digitization of services, it is essential to digitize paper-based materials. At present, there is no equipment for that purpose, human resources to operate the equipment, and resources (instructors, teaching materials) to educate the operators. Then, it is necessary to expand and train the registration center management staff, develop ICT infrastructure (in both urban and rural areas), and promote awareness-raising activities for citizens (especially in rural areas).

In terms of policy, it is essential to establish a legal framework for the protection of personal information and privacy, to build consensus on digitization of national ID and resident registration, and to link data between sectors, and, with those in place, to formulate a master plan ("Identity for All"), which is in progress with the support of the World Bank.

4) Information Systems and Platforms

- Information System/Platform Name: eCRVS system (civil registration)
- Main Data: Civil registration information
- Owner of the Data/Operator: The Ministry of Justice Constitutional and Religious Affairs (MJCR) DNRN
- Source of Funding/Donor, etc.: UNICEF, the World Bank

5) Activities of Development Partners

- UNICEF support for improving birth registration
- Improvement of death registration by the World Bank and support for vital statistics
- UNDP voter registration and election management support

6) Potential Assistance Needs

At present, the preconditions for promoting digitalization are not in place, and meaningful support is difficult.

(5) E-government

1) Vision and Plans

Agenda 2025 (2021): A national development plan with four pillars: human resources, social resources and economic development and governance.

Política para a Sociedade de Informação (2018): The main objectives of the policy are to establish guidelines for sustainable development, aiming to make Mozambique an inclusive and competitive society through the development of ICT. With regard to e-government, the following strategies are planned with the goal of improving the efficiency and services of public services by means of ICT.

- Common communication platform and interoperability framework
- Finance and financial management system in Provincial governments
- National Identity and Registration System
- Business registration and facilitation system
- Land and property management system
- Local government horizontal integration system

Plano Estratégico para a Sociedade da Informação 2019-2028 (2019): The vision is to make Mozambique a country in which everyone, without discrimination, has access to and makes use of information and communication technologies for their own benefit and that of society as a whole. It also states that the following seven areas will be the axis of socio-economic development through the use of ICT.

- Education and Human Resource Development
- Health
- Agriculture, environment, and rural development
- Industry, Commerce and Services

- e-Government
- Access and connectivity
- Policy and regulation

2) Current Situation and Activities

Mozambique has implemented several ICT projects with the support of foreign partners, including the ICT policy and implementation strategy and the Mozambique e-Government Strategy. Those related to public services include the e-Government Network (GovNET) and, as part of it, the Government Portal, the National Financial and Administrative System (eSISTAFE), the e-Government Communication Infrastructure Project (MEGCIP), and driver licensing and vehicle registration system by using the biometric authentication.

The Ministries responsible for ICT in the country are the MTC and the MCTES. In particular, the MTC is responsible for telecoms, and its affiliated institution, the Instituto Nacional das Comunicacoes de Mozambique, takes charge of telecoms entities and the national broadband strategy. Meanwhile, the MCTES, through its subsidiary INTIC, is responsible for a wide range of ICT fields, including data centers, cyber security, e-governance, interoperability, and social media.

As for the e-government in particular, the INAGE was established in 2017 by the MCTES to supervise the ICT development plans of the ministries and to coordinate funding. At present, however, the application of e-government is limited, partly due to a lack of infrastructure and ICT human resources.

3) Challenging area(s)

- Lack of ICT human resources.
- Lack of coordination between ministries and agencies. As mentioned above, each ministry and agency are operating individual systems independently, and there is no comprehensive platform to integrate them.
- Extremely low telecommunications infrastructure index, including internet penetration. For instance, in local governments such as provincial / District governments and municipalities in the rural areas, there are no access tools such as Wi-Fi, and government officers often have to send their official emails from their personal mobile phones. The number of computers in government offices is also limited to one shared by the several officers.
- Low mobile phone ownership (20%, 2013) and high communication costs.
- Low IT literacy among the population as a whole and a lack of understanding of the convenience of digitalization.

4) Activities of Development Partners

- World Bank - "Mozambique Digital Governance & Economy": The project is composed of three components: Enabling Foundation, Digital Government and Digital Economy. Digital Government aims to strengthen INAGE in particular.
- Chinese government: support for a data center in Maputo

- UNICEF is providing community level support in the health sector and FAO is providing support in agriculture.

5) Potential Assistance Needs

The World Bank has advised that INAGE is the entry point, but as the organization in charge of promoting digitalization, it is necessary to raise the level and support is needed. INTIC suggested as follows.

- Expanding data centers
- ICT infrastructure especially in rural areas
- Human resource development and organizational strengthening

In addition to the above, INAGE also suggested supporting human resource development and e-government expansion. Since other donors have already started the development of infrastructure and other hardware aspects, the development of ICT human resources, especially in public organizations, seems to be an urgent issue.

6) Expected Areas to be Digitalized

With regard to the aforementioned agriculture, The Ministry of Agriculture and Rural Development (MADER), for instance, is expected to collect personal information, record production and shipments, improve traceability of agricultural products, and grasp market prices by promoting farmer registration. It can also be used for the future planning.

7) Potential of using data for innovation in public service improvement

According to INTIC, the government of Mozambique puts the high priorities on agriculture, energy, tourism, health, medicine, education, trade, and industrial development. In particular, there is an urgent need to establish and use a platform for the industrialization of agriculture as a key industry.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Especially in rural areas, vulnerable ICT infrastructure is the cause of low Internet penetration, it is, however, necessary to start with enlightenment activities to improve the ICT literacy of public officials in local governments and to remove the people's distrust toward digitization.

(6) Education / Edu-tech

1) Vision and Plans

- Education Sector Plan (ESP) 2020-2029

2) Current Situation and Activities

Situation of digitalisation of Educational Contents under COVID-19 Situation

In Mozambique, distance education through Radio/ TV/ Internet is provided even before the expansion period of COVID-19. Time shifting was introduced to schools in Mozambique; 1 day was divided into 3-time frames, and the nighttime shift was completely moved into a distance learning platform.

In universities, introduction of ICT is mandatory on policy level. Top universities such as Universidade

Edouard Mondlane use a blended learning method, mixed face-to-face sessions, and distance learning platform, while other universities have issues in ICT infrastructure.

Situation of teacher training under COVID19

The second phase of the technical cooperation project of JICA has a teacher training component.

Situation of use of media/ digital media for educational purpose

Distance learning system in Mozambique for Secondary schools: Ministry of education or individual teachers can upload educational resources on the server via the Internet, and each student can download these files. The teacher checks individual work of students. In case a student faces an issue, he/she can contact the nearest Support Center (Help Center) via telephone to ask questions to solve the issue. Every state has its own Support Center. In parallel, students can download a resource book from the same website.

For primary and secondary school students, Mozambique provides Radio programs (School Radio) and Television programs (Tele-school).

According to the ICT Department of the Ministry of Education, introduction of ICT devices to schools is clearly mentioned in the National Development Plan, but the plan to provide PCs to every school is stopped due to the economic crisis.

In universities, they introduce LMS platforms like Moodle, at the same time they also use YouTube channels to provide video contents to the students.

Situation of Academic Management System and introduction of Digital IDs

There is a plan by the government that aims to develop an academic management system, MINEDH is working in collaboration with some companies, doing some technical specifications to start developing the system. It will include many functions like student registration, print certificates, and grade management of each student. It was scheduled to start working in 6 months. It will not be linked with the National ID system.

According to Eduardo Mondlane University, Mozambique has a software called SIGA – academic management system at the university level.

3) Challenging area(s)

For the teachers and students in the regions in Mozambique, ICT devices and Internet connection are not affordable, although the unit price of data communication is considered as the cheapest in Africa (Ref: The state of ICT in Mozambique 2018, IRDC).

4) Activities of Development Partners

For Education in general (Not specifically to ICT), partners like UNICEF, GPE, USAID, CIDA provide funds and cooperation projects. As for the ICT specific project, SIDA provides ICT infrastructures to universities.

5) Potential Assistance Needs

There's a need to develop an ICT introduction strategy which suits the **New Curriculum** and the actual situation of schools.

6) The potential of using data for innovation in public service improvement

Digitization of educational contents and its delivery. Digitization of educational statistics.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

See Current situation above.

(7) Health

1) Vision and Plans

Health Sector Strategic Plan/ Plano Estratégico do Sector da Saúde (PESS) 2014-2019

The Health Sector Strategic Plan 2014-2019 has been extended to 2024. It aims to contribute that all Mozambicans particularly the most vulnerable groups can enjoy the best possible health at an affordable cost, thus contributing to the fight against poverty and the promotion of development of the nation. Strategic objectives are listed below.

- Increase access to and use of health services
- Improve the quality of health services
- Reduce the geographical inequities and between population groups for the use of health services
- Improve efficiency in the provision of services and use of resources
- Strengthen health partnerships based on mutual respect
- Increase transparency and accountability in the way that public goods are provided
- Strengthen the health system

Health Information System Strategic Plan /Plano Estratégico do Sistema de Informação para a Saúde 2009-2014

At the time of the survey, the revision of the above Health Information System Strategic Plan (2009-2014) was underway. The main strategic objectives in the preceding strategic plan are listed below.

- Strengthening human resources for health for the activities health information system at all levels.
- Improvement of health information system management.
- Ensuring the information and communication infrastructure and technologies at all levels

In addition, the following are the current priority objectives informed by the MoH during the survey.

- Integration of subsystems introduced by various partners and programs
- Preparation of health information system policy
- Strengthening of human resources
- Introduction and utilization of health management information system (SISMA: Sistema de Informação para Saú de Monitoria e Avaliação) to all health facilities
- Strengthening of hospital management system including the personal health record

2) Current Situation and Activities

Policy implementation structure

In Mozambique, the Directorate of Planning and Cooperation of the MoH is playing a central role in strengthening the health information system. Technical working groups (TWGs) for various programs have been formed within the MoH. Currently, the task force has been set up with the development partners to consider restructuring the cooperation and consultation systems. While it is still in the planning stage, it is being considered to form the TWGs based on the pillars of the health system such as information management for decision making and health finance, not by disease.

Individual systems

- SISMA, a routine health management information system, utilizes DHIS2 software and is being rolled out nationwide.
- The EMR for the tuberculosis program was developed ahead of other programs. MoH is starting a pilot of comprehensive EMR introduction at a selected hospital
- At the community level, multiple information systems have been introduced by various partners. One of the major systems is the UpSCALE app (CommCare platform) that supports the activities of community health workers (CHWs) with UNICEF support. The concept of community health subsystem including standardization of health information systems is under discussion within the government.
- The infectious disease surveillance response (IDSR) system has been launched in 7-8 provinces and is planned to expand to all provinces.
- A Telehealth MZ portal has been built that provides online training courses for primary health care workers and advice from skilled care workers. Currently, there are access points at provincial hospitals, district hospitals, and health centers in areas with good internet connectivity. It can also be accessed from the individual mobile phone. Due to the influence of the COVID 19 epidemic, the need for online training is increasing, and expansion of training modules is planned.

3) Challenging area(s)

Overall

The disease burden in Mozambique is still large for infectious diseases such as HIV/AIDS. HIV/AIDS, neonatal disorders, and tuberculosis are the most common causes of death (2019, IHME). Improving maternal and child health is one of the top priorities.

Digital Health

- Internet access varies from region to region, and it is poor especially in rural areas far from the capital. In addition, there is a shortage of ICT devices such as PCs and tablets.
- While the health data is stored on the MoH server, the space is reported to be insufficient. Strengthening capacity for the secure data storage system is also an issue.
- Overall, it is reported that the quality of data and the use of data for decision making, including at the central level, are inadequate. DHIS2 tends to have a poor reporting rate where the internet connection is

poor. Natural disasters such as floods also affect the reporting rate. Data consistency and quality of disaggregated data also tend to be low.

- Different systems have been constructed and introduced for each disease program, and the interoperability of those systems is one of the major challenges.
- While UpSCALE is being considered as one of the standard apps in the community health subsystem, it has some issues with sustainability such as cost for the expansion. The MoH is considering countermeasures to overcome those challenges.
- The introduction of EMR is a relatively new intervention and the pilot project has just started. Further cooperation and support are required from the partners.
- IDSR is included and reported in DHIS2. However, it is reported that the data are not compiled regularly on a weekly or monthly basis at the central level. Emergency response disease surveillance is not digitized. The World Bank's research report (2021)¹¹⁰ points out the limited indicator-based surveillance and community-based surveillance, poor timeliness and comprehensiveness of data reporting, and inadequate collaboration with laboratories.

4) Information Systems and Platforms

Table 3.5.3 List of major health information systems

System	Data	Owner/operator
SISMA (DHIS2)	Aggregated health data for routine monitoring	MoH
DIHS 2 tracker	COVID19, maternal and child death, IDSR	MoH
Telehealth MZ (selected locations)	eLearning portal to provide online training courses for primary health care workers	MoH
EMR (pilot)	Personal health data	MoH
UpSCALE (CommCare)	Platform for the CHW information system	MoH, UNICEF etc.

Source: MoH and development partners

5) Activities of Development Partners

- Global Fund: It funds for the DHIS2 and Telehealth MZ.
- USAID/CDC: Establishment of the HIV/AIDS and malaria related health systems and introduction of the community-level mHealth apps are supported.
- World Bank: Under the planned project “Digital government and economy project 2021-2026”, it aims to provide information and services to the CHW and front-line healthcare workers through digital portals. In addition, the "Primary health care strengthening program 2017-2023" provides support for the strengthening of birth/death registration and community health information system.
- WHO: Country Cooperation Strategy to Mozambique 2018-2022 includes support for strengthening the health system related to DHIS2 quality improvement. It also provides technical support for the introduction of EMR.
- UNICEF: It supports strengthening child case management and information system for decision making, mainly at the community level. The support includes the digitization of information on CHW activities

¹¹⁰ World Bank (2021), Disease surveillance, emergency preparedness and outbreak response in Eastern and Southern Africa

(malaria, diarrhea, pneumonia control, reproductive health, family planning, etc.) by introducing the CommCare-based UpSCALE app.

6) Potential Assistance Needs

- It is necessary to develop ICT infrastructures such as local networks and device availability, particularly in rural areas.
- Enhancement of DHIS2 utilization at all levels is required.
- The promotion of standardization of the integrated community health information system is required to be supported.
- eIDSR system enhancement including the emergency response disease surveillance needs to be supported.
- Enhancement of comprehensive EMR introduction and utilization needs to be supported.
- Development of digital health policy and standards is required.

7) Expected Areas to be Digitalized

- By digitizing personal health data and sharing it among related health facilities and personnel as well as clients, it is expected to enable continuously follow up with clients and refer them to appropriate health facilities, which leads to the improvement of the quality of and access to health care services.
- By collecting and reporting data on priority infectious diseases in the digital platform, it enables to strengthen surveillance and response capacities by submitting and transmitting data on time. It is expected to contribute to the reduction of morbidity and mortality due to epidemic-prone diseases as well as other public health events.

8) Potential of using data for innovation in public service improvement

- Personal health data at the primary healthcare level
- Infectious disease incidence

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Approval of the community health subsystem concept by the government
- Identification of appropriate apps
- Adequate ICT infrastructure development at health facilities
- Adequate ICT skills
- Confirmation of data security and compliance with the personal data protection law

(8) Social Protection

1) Vision and Plans

According to the National Development Strategy 2015-2035 of Mozambique, social protection policy contributes to poverty reduction in the national plan. In Mozambique, the 16-year civil war finally ended in 1992, and efforts have been made to democratize. From around 2010, technical support for the modernization of social protection programs by multi-donors has been provided, and the introduction of new systems utilizing ICT has been planned. Currently, concrete activities are being implemented under the National Social Protection Policy (2019-2023).

2) Current Situation and Activities

<Social Protection>

The main social security programs are as follows.

Program for the poor (non-contributory)

The Social Security Program for the Poor is supervised by the Ministry of Gender, Children and Social Welfare, and is implemented by the National Social Welfare Institute (INAS). The headquarters of INAS is Maputo, which is operated by 31 implementing organizations nationwide. The main program focuses on non-contributory cash benefits for the elderly, disabled and poor households. It includes support for vulnerable groups such as malnourished, orphans and HIV-infected people, and public works programs and social services. In 2018, approximately 520,000 beneficiaries received supports from this program.

1. Basic Social Allowance Program (PSSB) aims to strengthen consumption levels, autonomy, resilience, and nutrition of children of households (AF) living in poverty and vulnerabilities and provides regular cash benefits indefinitely.
2. Under the Direct Social Support Program (PASD) has a variety of support to deal with shocks and various emergencies that affect individuals or households (AF) in poverty and vulnerabilities situations in the form of a fixed period or long-term social transfer.
3. Assistance Program in Social Units (PAUS) is a series of interventions for permanent or temporary shelters for helpless or endangered people in a family or community environment.
4. Under the Productive Social Welfare Program (PASP) is cash benefits through productive activities to promote the financial independence of beneficiaries. This support plan is reviewed every year and provide different support according to the environment of city and rural area.
5. Social Behavior Services Program (PROSAS) consists of a series of interventions in families and communities to strengthen the ability, to protect from social risks, and to promote social inclusion of the most vulnerable. In particular, it aims to prevent and address the risk of infringement of social rights, including domestic and sexual violence, child marriage, abuse and abandonment, isolation and discrimination against children, women, the elderly and the deficient.

Employee program (contribution type)

Contribution-based social protection programs are available to employees in the private sector (about 75,000)

and the public sector (about 510,000) at their own expense. It includes benefits for old age, illness, childbirth, disability, and death. The number of subscribers is 4.4% of the total number of workers (2018).

Employment promotion program

This program is managed by the Ministry of Labor, Employment and Social Security. In terms of policy, the ILO has been supporting it for many years, and is also supporting the construction of a platform for labor market information systems. In recent years, a platform for young people has been built with support centered on SIDA. The SIDA project has been completed and the Ministry of Labor is looking for the next support donor to establish the platform.

<Digitalization>

The ILO plays a central role in policy and the WB plays a central role in program construction and implementation to support the integration and digitalization of social protection programs. The World Bank reviewed social protection program in Mozambique in 2012. Since then, the digitization of INAS has been promoting and the construction of e-INAS has been in earnest. In addition, the construction of Single Registry of vulnerable households and the planning and implementation of digitization of cash benefits for the vulnerable for the first time in Mozambique has been implementing.

Currently, only programs managed by INAS are linked to the Single Registry of vulnerable households, and they are looking for further cooperation. Regarding cash benefits to vulnerable groups in rural areas, Nippon Plant Fuel Co., Ltd. (Agro-Negócio para o Desenvolvimento de Moçambique de Moçambique de Moçambique de Moçambique, Limitada in Mozambique) made a successful bid for the government's competitive bidding collaborating local mobile phones company. The company constructed its program and this program is implemented.

3) Challenging area(s)

e-INAS seems to have started to operate smoothly with establishing their website (digital platform (<http://www.inas.gov.mz/>)). In reality, there are issues while constructing a payment system for beneficiaries who do not have mobile phones, and they are being implemented while addressing individual issues. Although cooperation with social protection programs other than INAS is planned, it has not led to concrete actions. There are also major technical issues regarding cooperation of related organizations and APIs.

4) Information Systems and Platforms

Single Registry of vulnerable households which include information of beneficiary and household of social protection program is expected to be materialized in both central-level and local-level. The owner of Single Registry of vulnerable households is Government of Mozambique and responsible operator is Ministry of Gender, Children and Social Welfare and INAS. Main financial resources and technical donors are World Bank, etc.

5) Activities of Development Partners

- World Bank: Second Additional Financing for the Social Protection Project and Support to Cyclone and Flood Emergencies 2019-2024 (USD 105 million)

6) Potential Assistance Needs

- Promote the Single Registry of vulnerable households and strengthen the information management and monitoring functions of beneficiaries and beneficiary households,
- Strengthen targeting and monitoring functions for the poor and vulnerable by promoting the Single Registry of vulnerable households,
- Establish a Social Registry and improve interoperability in order to meet the new needs of social protection such as one-stop service,
- Further promote digital payments utilizing mobile transfer and mobile money in order to build safe and efficient payment methods.

7) Expected Areas to be Digitalized

Utilize administrative big data on social protection and households for "evidence-based policy making and monitoring."

8) Potential of using data for innovation in public service improvement

- Strengthening the management system of social protect programs through Single Registry of vulnerable households,
- Digitization of all household information,
- Strengthening interoperability with other organizations' MISs,
- Promotion of digital payments utilizing digital transfer and digital money.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Infrastructure development in rural areas where social protection services are provided,
- Capacity building of central and local government officials of MGLSD, who will be the main managers and users of data, especially regarding API and related technical matter,
- Notification and enlightenment activities to citizens for understanding of benefits from digitalization.

3.6 South Africa

3.6.1 Survey Policy in the Target Country

(1) National Development Plan

The Government of South Africa has formulated National Development Plan 2030 with 13 goals including, 1) Economy and employment, 2) Economic infrastructure, 3) Environmental sustainability and resilience, 4) Inclusive rural economy, 5) South Africa in the region and the world, 6) Transforming human settlements, 7) Improving education, training and innovation, 8) Health care for all, 9) Social protection, 10) Building safer communities, 11) Building a capable and developmental state, 12) Fighting corruption, and 13) National building and social cohesion.

(2) Country Assistance Policy of the Government of Japan

South Africa is a relatively developed country, with the largest GDP in Africa of USD 408.2 billion and per capita GNI of USD 6,960 (World Bank statistics 2011) based on its abundant mineral resources and relatively-developed industries. As the only G20 member in Africa, South Africa has recently been increasing its influence on world issues such as United Nations reform, nuclear disarmament and non-proliferation, and climate change. On the other hand, its domestic income disparity has widened and its unemployment rate has remained at an extremely high level while the average economic growth rate between 2000 and 2010 stagnated at below 4 %.

Under such circumstances, the government aims at promoting economic development, expanding job opportunities and improving social welfare for the poor through huge investments in infrastructure, strengthening human capacity development, enhancing basic social services and supporting the socially vulnerable. Japan's assistance to these areas is not only important for the development and social stability of South Africa but also contributes to the improvement of business environment for Japanese companies operating in the country. Furthermore, strengthening bilateral relations through Official Development Assistance (ODA) will contribute to ensuring supply of natural resources such as rare metals.

In addition, South Africa promotes trade among southern African countries and development of regional infrastructure. It is also making efforts to become a donor country by establishing the South Africa Development Partnership Agency. By partnering with South Africa to provide assistance to third countries, Japan can expect to implement effective assistance.

Table 3.6.1 Country Assistance Policy of the Government of Japan for South Africa

ODA Basic Policy	Acceleration of growth and uplifting the living standard of the poor	
Priority Areas	Support to enhance human capacity and to promote infrastructure development toward acceleration of growth	improvement of basic education and industrial human resources, STI cooperation, infrastructure development by the private sector
	Support for the correction of economic and social gaps	small-scaled farmers, handicap, medical insurance, community development
	Promotion of development in southern Africa	cooperation with SADC, NEPAD, etc.
Remarks	There are about 140 Japanese companies based in SA. ODA is to be used for encouraging their partnerships. SA is a leading country for achieving SDGs in the southern African region.	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for South Africa

South Africa is a leading country in Sub-Saharan African countries. The National e-Government Strategy and Roadmap formulated in 2017 also aims to transform the country into an inclusive digital society. E-Government initiatives are undertaken not only by the Central Government but also by Provincial Governments and municipalities. On the other hand, South Africa is still tackling the digital divide issues, including teaching millions of excluded citizens from digitalized public services and education. In the country assistance policy of the Government of Japan, it is expected that the digitalization of public services will contribute to enhancing human capacity, filling the economic and social gaps. The effective use of Japanese companies based in South Africa for country's development and South Africa's leading position in developing southern African region should also be noted. JICA's priority areas are also in line with the country assistance policy of the Government of Japan.

Given the above examination, JICA Study Team intends to learn the best practices in South Africa's ICT sector that can be applied and expanded to other African countries. JICA Study Team also intends to exchange opinions with relevant agencies and organizations on issues and possible measures to tackle the digital divide in South Africa.

3.6.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation:

1) Vision and Plans

National e-Strategy¹¹¹

In 2017, the DTSPS (now merged with DOC and known as DCDD) defined National e-strategy. According to the National Development Plan Vision 2030, a single integrated digital strategy is needed to promote ICT in the social and economic sectors, and this strategy was established in response to that. It is expected that ICTs will speed up delivery, improve analysis, accumulate knowledge, and enable sharing, learning, and practice. ICT is expected to accelerate delivery, analysis, knowledge accumulation, sharing, learning, and practice. The strategy is divided into three parts: Pillar 1: ICT Sector Interventions, Pillar 2: Sectoral Interventions, and Pillar 3: Digital Industrial Revolution.

Pillar 1: ICT Sector Interventions

ICT sector interventions include broadband expansion, digital broadcasting, strengthening the telecommunications industry, supporting SMMEs, finalizing the e-government strategy, reducing telecommunications costs, spectrum allocation planning, cyber security, and skills enhancement planning and implementation. The need for an effective action plan is stated.

Pillar 2: Sectoral Interventions

The following intervention points have been identified for each public sector.

Value addition to agriculture / agro-processed products, mineral resources, energy/water/transportation sectors, and operational efficiency (marine economy, mining, health, tourism, and basic education).

Pillar 3: Digital Industrial Revolution

The following are listed as action plans to realize the digital industrial revolution.

- Development of digital platforms and APIs (Application Programming Interface) to enable SMMEs to develop new applications.
- Technology transfer to local industries.
- Creation of disruptive technologies to create new markets and industries, such as smart agriculture to connect producers and consumers.

The National e-Government Strategy and Roadmap

In 2017, the DTSPS defined the National e-Government Strategy and Roadmap. The National e-Government

¹¹¹ Telecommunications & Postal Services Department Telecommunications and Postal Services “South Africa’s National e- Strategy”

Strategy and Roadmap aims to digitalize South Africa's public services and lead to an inclusive digital society where all citizens can benefit from and improve the quality of life afforded by digital technologies.

The National e-Government Strategy and Roadmap covers as follows.

Legislative Mandate, Problem Statement, Vision And Mission, Strategic Objectives, Guiding Principles For E-Government Services, Channels Of E-Government Services, National E-Government Strategic Approach, Major Initiatives On E-Government Services, E-Government Role Players And Institutional Arrangements, Monitoring And Evaluation Of E-Government Services, Funding For E-Government Services, High Level Implementation Plan, National E-Government Strategic Initiatives And Roadmap, Risk Analysis And Mitigations.

The following points are listed as requiring special attention.

- Interoperability
- ICT Security
- Economies-of-scale
- Eliminate duplication
- Adopting indigenous languages in ICT

2) Current Situation and Activities

ICT Legislation

As far as ICT legislation is concerned, there are no major deficiencies at the moment, but there are some laws and policies that need to be updated, such as the Electronic Communication Transactions Act (ECA) Act, 2002. It is currently under review. As for the protection of personal information, the proponents of the POPI Act (Personal Information Protection Act) have consulted extensively on cloud and data policies. This is to ensure that when moving to a cloud platform, data that is the property of the South African government does not leave the country. The utilization of public cloud service provided by foreign service providers such as Amazon AWS or Microsoft Azure is prohibited to store government data for security reason. South Africa has sufficient human resources to develop ICT-related laws and does not need any specific assistance from JICA.

Table 3.6.2 ICT related Legal Framework in South Africa

Basic ICT Law	Independent Communications Authority of South Africa Act 2000 SITA Act 88 of 1998 as amended by SITA Amendment Act 38 of 2002
National ID	Birth and Death Registration Act
Electronic Signature	Electronic Communications and Transactions Act
e-Commerce	Electronic Communications and Transactions Act
Personal Data Protection Law	Protection of Personal Information Act
Cyber Security Law	Cybercrimes and Cyber Security Bill National Cybersecurity Framework for South Africa
Competition Law	Competition Act
Intellectual Property Law	Intellectual Property Law

Source: JICA Study Team

Organization

As for organizations, DCDT, which was established in 2018/2019 through the merger of DTSPS and DOC, is responsible for developing the National e-Government Strategy and Roadmap. The DPSA acts as a secretariat for each sector, and once the DPSA has developed norms and standards, each sector is expected to comply with them. SITA is a government agency that procures ICT products or services for the government, provides services to the government, implements the national digital strategy, advocates for policy, provides telecommunications and digital services, and develops application software for the government in all areas.

Current Status of Digitalization of Public Service¹¹²

South Africa is one of the regional leaders in digital public platforms in Africa, second only to Mauritius, according to the United Nations' e-Government Development Index (EGDI) for 2018. Digital public platforms are serving as important enablers of the digital economy, but funding appears to be a challenge. At the sub-national level, progress is being made at the local level, particularly in Gauteng and the Western Cape, and there is a lot of push for government innovation. At the national level, further development has been hampered by a large fragmentation and proliferation of agencies responsible for various platforms and ICT services. Key agencies have overlapping mandates, and responsibilities are unclear, overlapping, and sometimes undefined. State-of-the-art technological capabilities, such as big data analytics, in the public sector are underdeveloped. In South Africa, most of the major back-office systems have been digitized at the national level. However, legacy systems and lack of connectivity are hurdles to implementation. In the public sector, there is no strong impetus to mainstream open application program interfaces (APIs). South Africa has a strong existing national ID system, which is primarily used for face-to-face transactions, but with the redeployment of the Department of Home Affairs (DHA) and the introduction of a new National Identity System (NIS), it has the potential to become the world's leading digital ID system. The coverage of South Africa's National Identity System is over 90%, making South Africa one of the best in the world. However, it is important to design the NIS as a platform (not as a silo) with interoperability in mind; in 2018, as part of the new e-government roadmap, a national e-government central portal was launched to access specific online services, but currently there is no inventory or registry of all online services maintained by the DPSA or DCDT.

3) Challenging area(s)

- South Africa has well-developed ICT laws and strategies, and the capacity to create them domestically, so there are no policy challenges. (From an interview with DCDT)
- The problem, however, is coordination. In South Africa, each province is working on digitalization in a different way, and although there are various systems in place, the lack of interconnectivity between them is a challenge. (From an interview with DPSA)
- On the other hand, the private sector has pointed out that there is a lack of leadership from the government to coordinate these efforts, and there is also a lack of cooperation and coordination between the DPSA, DCDT, SITA, and other stakeholders and the head of the state. (Interview with DHET and others, from World Bank Group, South Africa Digital Economy Diagnostic)

¹¹² World Bank Group "South Africa Digital Economy Diagnostic"

4) Activities of Development Partners

Currently, DPSA and DCDT are not working with development partners on ICT policy/legislation.

5) Potential Assistance Needs

Each sector communicates with DPSA through Government ICT bureaucracy called CIOC(Chief Information Officers Council) and DPSA provides secretariat services(providing ideas for ongoing programs, developing strategies for public service digitization) to CIOC. The DPSA provides secretariat services to the Council of Chief Information Officers (providing ideas for ongoing programs, developing strategies for digitizing public services), but it lacks sufficient budget and skills and needs support. No policy or legal support is needed.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

In order for innovation to occur in South Africa, it is important to modify the disparate digitalization efforts among provinces and departments into an integrated and interconnected structure, so that duplicate efforts are not made in each province and department, and data can be shared. In order to achieve this, it is necessary for the central government to take the lead in creating standards and plans for an interconnected structure, and to encourage all sectors and provinces to do so. However, a survey of the South African private sector indicated that the South African government does not have sufficient leadership, and several organizations said that it is bureaucratic and slow moving. While donors can provide budget and expertise, successful support is difficult to achieve without government leadership, and support in terms of South Africa's ICT policy/legislation is unrealistic.

(2) ICT Human Resource Development

1) Vision and Plans

National Development Vision / Framework

- National Development Plan 2030

National Development Plan 2030 stipulates that ICTs should be widely utilized to provide public services to citizens by 2030. The plan mentions that the “e-literate” of citizens needs to be developed to utilize technological value of ICT.

- National Policy Development Framework 2020

Technological innovation is mentioned as a factor that influences policy decisions, and the importance of developing digital skills is emphasized. It states that urgent consideration of ICT policy and ICT infrastructure development is required to address the digital divide among the population that was identified in the use of digital tools to address the recent spread of COVID-19.

Digitalization

- National e-Government Strategy and Roadmap

National e-Government Strategy and Roadmap was developed in 2017 by the Department of Telecommunication and Postal Services (DTPS). It aims to create an inclusive digital society in which all citizens participate by digitalizing all the public services, and stresses the importance of digital skills

development. It also mentions that improvement of the digital literacy of citizens is required to realize e-government.

- SITA Strategic Plan 2020-2024

SITA Strategic Plan 2020-2024 was developed by the State Information Technology Agency (SITA), which is responsible for government ICT procurement and service delivery. The plan sets out seven goals to achieve digital transformation, including improving the efficiency of government business operations and public service delivery. Goal 5: Build a digital culture points out that it is needed to acquire digital skills in order to achieve digital transformation in public services.

Human Resources Development

- Human Resource Development Strategy for South Africa (HRD-SA) 2010-2030

Human Resource Development Strategy for South Africa (HRD-SA) 2010-2030 was developed in 2009 by the Human resource Development Council. Human resource Development Council is chaired by the Vice President and Ministry of Higher Education and Training functions as its secretariat. The strategy sets out 15 strategies for the development of South Africa's human resources over the 20-year period from 2010 to 2030, and identifies the need to develop a skilled workforce to meet the needs of the ICT sector. The strategy also recommends the development and implementation of an "ICT Skills Development Strategy", the establishment of an "ICT Skills Development Council", and the development of an "ICT Skills Development Strategy".

- National Skills Development Strategy III

National Skills Development Strategy III was developed by the Department of Higher Education and Training (DHET). It calls for the strengthening of the functions of the Sector Education and Training Authority (SETA) to meet the needs of the labour market.

- National Digital and Future Skills Strategy

National Digital and Future Skills Strategy was developed by the Department of Communications and Digital Technologies (DCDT) in September 2020. The strategy sets eight strategy elements and recommends measures to improve digital skills in order to close the gap between supply side and demand sides, enhance economic growth, create jobs, and promote social development and culture.

- MICT SETA Sector Skill Plan

MICT SETA Sector Skill Plan was developed in 2017 by the Media, Information and Communication Technologies Sector Education and Training Authority (MICT SETA). The plan analyses the occupational skills gap and supply and demand of human resource in the media, information and communication sector, and advocates the need to strengthen human resource development for digital transformation.

2) Current Situation and Activities

< Government Initiatives for ICT Human Resources Development >

- MICT SETA, a government agency under the DHET, is responsible for the development and growth of the following five sectors: 1) Advertising; 2) Film and electronic Media; 3) Electronics; 4) Information Technology; and 5) Telecommunications. Though MICT SETA itself does not provide trainings, training

providers are accredited by MICT SETA and provide training opportunities to stakeholders (both public and private sector) in the target sectors.

- DHET is responsible for public universities, vocational schools (TVET), community education and training colleges and the Sector Education and Training Authority (SETA). DHET recognizes the use of ICT and the strengthening of ICT education in these educational and vocational training institutions as an important issue. DHET is currently introducing the South African National Research and Education Network, which links existing universities, to all TVETs.
- The National Open Learning System (NOLS), developed by DHET with the funding support from the European Union, is a national open learning system and provides educational resources, learning materials and teacher materials to teachers and students. DHET also provides training in ICT and blended learning approaches for instructors working in community education and technical vocational training.

< Private Sector Initiatives for ICT Human Resource Development >

- The Information Technology Association of South Africa (ITA), a industry association for the ICT sector, provides training programmes in universities to develop highly qualified ICT professionals, and in vocational training schools (TVET) to train technicians who provide ICT support services. ITA also works with the MICT SETA.
- Huawei is supporting the development of talent in the ICT sector in South Africa through the “Huawei ICT Academy”, a not-for-profit partnership program that authorizes universities and colleges to offer Huawei-accredited courses to their students. The Huawei ICT Academy is designed to provide workers with the standard professional qualifications they need in the ICT industry, and since the program’s launch, more than 60 institutions (40 of them in the TVET sector) in all nine provinces have registered and more than 4,000 students and lecturers have participated in Huawei’s accredited training. In 2008, Huawei opened its fifth training centre in Woodmead, near Johannesburg, following those in Nigeria, Kenya, Egypt and Tunisia, to train ICT professionals.

3) Challenging Area(s)

Issues in the Policy Level

- Various government agencies have prepared their own ICT human resource development strategies and plans, which are not unified in content. In various documents, the shortage of ICT human resources is pointed out and the need to strengthen the development of ICT human resources is stated, but the concrete measures are not always clear.

ICT Skills of Public Servants

- Though strategies and plans to improve the ICT skills of public servants (including those who plan and develop ICT policies) is considered essential to promote the digitalization of public services, there is no such strategies. None of the training courses attended by civil servants are related to digitalization.
- There are large differences in the level of ICT use among local governments. There is a need to improve the ICT skills of public servants, not only in the central government but also in local governments.

ICT Skills Gap in the Labour Market

- There is a significant gap between supply and demand of technical skills of ICT. The supply is not sufficient to meet the demand for ICT personnel in the labour market. The lack of sufficient domestic ICT talent leads to relying on migrant ICT professionals from countries such as China and India.
- Although human resources development in the field of ICT at the basic level is taking place, the development of ICT personnel with highly advanced skills is not sufficient.

ICT Literacy of the Population

- The ICT literacy of the public is not sufficient. The public does not yet have sufficient ICT skills to utilize technology and access services, and there is a need to improve the ICT skills of the public as users.

4) Activities of Development Partners

- The European Union provided funding support to the development the National Open Learning System (NOLS) by DHET.

5) Potential Assistance Needs

- In order to promote the digitalization of public services, there is a need to support the strengthening of the capacity of public servants (central and government) to plan and develop digital policies.

6) Expected Areas to be Digitalized

- Though initiatives are already underway by DHET, and it is hoped that the National Open Learning System (NOLS) will be enhanced to expand and develop distance learning in higher education and vocational training.

7) The potential of using data for innovation in public service improvement

- The centralized management and use of information such as the education and vocational training history of citizens linked to their national IDs is considered.

8) Condition, Infrastructure, Policy, Human Resource, and etc.

- The development of human resources in the field of ICT should be promoted by private sector as well as the government. Governments are required to create a supportive environment for private sector initiatives.

(3) ICT Infrastructure

1) Vision and Plans

South Africa's National Development Plan (NDP) has the following vision for the ICT sector by 2030.

"Support the development of a dynamic and connected information society and a more inclusive, prosperous and vibrant knowledge economy. A seamless information infrastructure that is available and accessible to all, meets the needs of individuals, businesses, and the public sector, and provides access to the creation and consumption of a wide range of integrated services necessary for effective economic and social participation,

at a cost and quality at least equal to that of South Africa's major economic peers and competitors."

In line with the NDP's broader vision, its 2020 vision for broadband is that by 2020, 100 percent of South Africans will have access to broadband services for less than 2.5 percent of the national average monthly income.

2) Current Situation and Activities

International Backbone Network

Table 3.6.3 List of Cable Landing Stations in South Africa

Location	Cable Landing Station	Consortium	Contractor
Mtunzini	2Africa	China Mobile International, Djibouti Telecom, Facebook, MTN Global Connect, Orange, Saudi Telecom Company (STC), Telecom Egypt, Vodafone and WIOCC	Alcatel Submarine Networks (ASN, group of NOKIA)
	Eastern Africa Submarine System (EASSy)	Bharti Airtel, Botswana Fibre Networks, BT, Comores Telecom, Djibouti Telecom, Etisalat, Mauritius Telecom, MTN Group, Neotel, Orange, Saudi Telecom, Sudan Telecom Company, Tanzania Telecommunications Company Limited, Telkom Kenya, Telkom South Africa, Telma (Telecom Malagasy), Vodacom DRC, WIOCC, Zambia Telecom	West Indian Ocean Cable Company (WIOCC)
	SAFE	Angola Telecom, AT&T, BT, Camtel, China Telecom, Chunghwa Telecom, Cote d'Ivoire Telecom, Ghana Telecommunications Company, KPN, KT, Maroc Telecom, Mauritius Telecom, NATCOM (Nigeria), Neotel, OPT, Orange, PCCW, Proximus, SingTel, Sonatel, Sprint, Tata Communications, Telecom Italia Sparkle, Telecom Namibia, Telekom Malaysia, Telkom South Africa, Telstra, Telxius, Verizon, Vodafone	Tyco Submarine Systems (now SubmCom)
	SEACOM/Tata TGN-Eurasia	Ownership structure of SEACOM is as follows: 30% IPS, 30% Remgro, 15% Sanlam, 15% Convergence Partners, and 10% Brian Herlihy	
Umbogintwini	Meltingpot Indianoceanic Submarine System (METISS)	Canal+ Télécom, CEB Fibernet, Emtel, Zeop, SRR (SFR) Telma	ASN
Port Elizabeth	2Africa	China Mobile International, Djibouti Telecom, Facebook, MTN GlobalConnect, Orange, Saudi Telecom Company (STC), Telecom Egypt, Vodafone and WIOCC	Alcatel Submarine Networks (ASN, group of NOKIA)
Cape Town	2Africa	China Mobile International, Djibouti Telecom, Facebook, MTN GlobalConnect, Orange, Saudi Telecom Company (STC), Telecom Egypt, Vodafone and WIOCC	Alcatel Submarine Networks (ASN, group of NOKIA)
Melkbosstrand	Equiano	owned by Google	ASN
	SAFE	Angola Telecom, AT&T, BT, Camtel, China Telecom, Chunghwa Telecom, Cote d'Ivoire Telecom, Ghana Telecommunications Company, KPN, KT, Maroc Telecom, Mauritius Telecom, NATCOM (Nigeria),	Tyco Submarine Systems (now SubmCom)

		Neotel, OPT, Orange, PCCW, Proximus, SingTel, Sonatel, Sprint, Tata Communications, Telecom Italia Sparkle, Telecom Namibia, Telekom Malaysia, Telkom South Africa, Telstra, Telxius, Verizon, Vodafone	
	SAT-3/WASC	36 telecom operators. The largest three investors in SAT-3/WASC were (in order) TCI, a subsidiary of AT&T (U.S.A.); France Telecom (France); and VSNL (India, Singapore). The 11 African shareholders are (in alphabetical order): Angola Telecom, Camtel, Cote d'Ivoire Telecom, Ghana Telecom, Maroc Telecom, Nitel, OPT Benin, OPT Gabon, Sonatel, Telecom Namibia and Telkom SA Ltd. There are also Asian shareholders.	
Duynfontein	Africa Coast Europe (ACE)	invested in the total 700 million dollars project, some of them with the financial support of the World Bank	ASN
Yzerfontein	West African Cable System (WACS)	Telkom (South Africa), Telecom Namibia (Namibia), Angola cables (Angola), OCPT (Democratic Republic of Congo), Congo Telecom (Congo), Camtel (Cameroon, acquired from MTN Cameroon), MTN (Nigeria), Togo Telecom (Togo), MTN (Ghana), MTN (Ivory Coast), PTC (Cape Verde), Vodacom Group (Canary Islands), Tata Communications (Portugal), Tata Communications (UK), Cable and Wireless (London PoP)	In May 2015, Huawei Marine completed an upgrade of WACS (Upgrade I) using 100Gbps technology, increasing the WACS system design capacity to 14.5Tbit/s. In Feb 2019, the WACS Upgrade II was completed with Huawei Marine's solutions to support 32*100Gbps from South Africa to Portugal.

Source: <https://www.submarinecablemap.com/>

Domestic Backbone Network

The government established Broadband Infraco, a state-owned telecom network operator, in 2007, and as of September 2019, cities across the country are connected by a 15,000 km-long fiber. This fiber accepts open access from other operators and allows connectivity to neighboring countries. In addition, the National Broadband Policy South Africa Connect states that the DOC will promote increased investment activities by both the public and private sectors, and establish a wholesale business model to provide both wired and wireless open access networks. In the fixed-line sector, the government is planning to invest in new In the fixed-line sector, in response to the government's stance of promoting the construction of optical fiber infrastructure by new entrants, several new entrants are laying optical fibers and providing open access, mainly in rural cities. Broadband Infraco is currently deploying 15,000 km of fiber and 156 PoPs.

Figure 3.6.1 Situation of the Domestic Backbone Network



Source: Broadband Infracore

Mobile network

In addition to the four incumbent operators - Vodacom, a subsidiary of Vodafone in the UK, MTN, Cell C, and Telkom Mobile - Rain entered the market in June 2018.

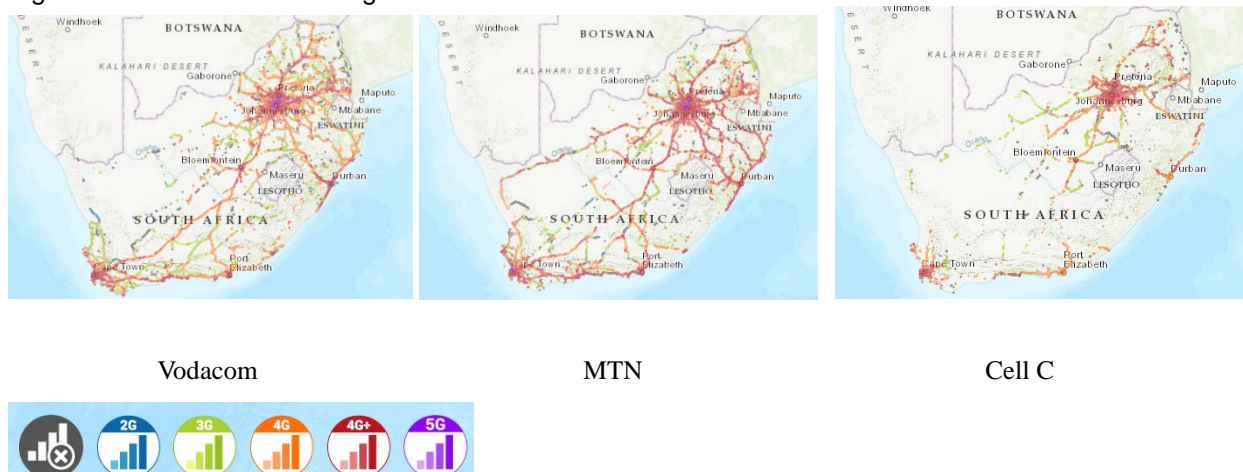
As for MVNOs, they were allowed to enter the market in 2005, and 15 companies, including FNB Connect and Hello Mobile, have implemented their services.

As of March 2019, the number of MVNO subscribers was just under 1.9 million, representing a subscriber share of about 2% of the total mobile communications market.

All four companies have introduced 3G services, which are available almost nationwide; the total number of 3G plan subscriptions stood at about 60 million at the end of March 2019. Vodacom and MTN have introduced a wide range of smartphones, mainly Samsung Galaxy series and iPhones, to stimulate demand for data services; the domestic smartphone penetration rate in 2018 is estimated to be about 35%.

LTE services in the 1800MHz band were launched by Vodacom in October 2012, MTN and Cell C in December 2012, and Telkom Mobile in April 2013, with MTN's population coverage reaching 87% in January 2019. As of March 2019, the total number of LTE service subscribers was about 28 million; Telkom Mobile launched LTE Advanced services in the 1800/2300 MHz band in November 2014, Vodacom in January 2016, and MTN in March 2016, both in the 1800/2100 MHz band, and available in major cities.

Figure 3.6.2 Mobile Coverage of Main carrier



Source: nPerf

Data Centre

The list of Data Centre in South Africa is shown in the table below.

Table 3.6.4 List of Date Centre in South Africa

City	Data Center	Tier Level
Cape town	RSAWEB Internet Services, Vox Datapro, Internet Solutions , Teraco Data Environments (Pty) Ltd, Africa Data Centres	Tier 3
Johannesburg	MTN Business, Business Connexion, New Telco South Africa, Neotel, Teraco Data Environments (Pty) Ltd, Internet Solutions, Business Connexion, Telemedia (PTY) LTD, Vox Datapro, Business Connexion, Africa Data Centres, Vodacom Business, Internet Solutions, Imagine IPS	Tier 3 or above
Port Elizabeth	Internet Solutions	Tier 3
Durban	Internet Solutions, Teraco Data Environments (Pty) Ltd	Tier 3 or above
Midrand	Dynamic Cloud Solutions	Tier 3
Pretoria	ICTGlobe.com	Tier 3

Source: JICA Study Team

The Department of Communications and Digital Technologies is also in the process of building a High-Performance Computing and Data Processing Centre (HPCDPC) and consolidating existing publicly funded data centers.

IXP

The list of IXP (Internet Exchange Point) in South Africa is shown in the table below.

Table 3.6.5 List of IXP in South Africa

City	IXP	Operator
Johannesburg	NAPAfrica IX Johannesburg(NAPAfrica JB1)	NAPAfrica (Teraco)
	Johannesburg Internet Exchange Point(JINX)	INX-ZA
Cape Town	NAPAfrica IX Cape Town (NAPAfrica CT1)	NAPAfrica (Teraco)
	Cape Town Internet Exchange Point (CINX)	INX-ZA
Durban	NAPAfrica IX Durban (NAPAfrica DB1)	NAPAfrica (Teraco)
	Durban Internet Exchange Point (DINX)	INX-ZA

Source: JICA Study Team

3) Challenging area(s)

Each of the communication infrastructures throughout South Africa is in place, and JICA Study Team does not see any major challenges in terms of communication infrastructure except for rural areas.

4) Activities of Development Partners

The telecommunication infrastructure is being developed through investment by existing operators in addition to the National Broadband Policy South Africa Connect by the government, and there is no evidence of support from international donors.

5) Potential Assistance Needs

Infrastructure facilities could be considered in line with each sector's support proposal. Although the communication infrastructure is adequate, if there are concerns about the stability and connectivity of communication in the rural areas targeted by each sector, support to expand the last mile communication infrastructure could be considered.

6) Potential of using data for innovation in public service improvement:

The sub-gigabit band wireless communication used in Japan can be utilized as the last mile communication infrastructure in suburban areas.

(4) National ID

1) Vision and Plans

National Development Plan Vision 2030

The Department of Home Affairs has built a site called "eHome Affaris," an online single-window service that utilizes "smart ID cards." He is promoting digitalization in his own country to promote the Fourth Industrial Revolution in South Africa. "It is important to make it possible to provide one-stop government-related services that are currently being carried out separately by utilizing national IDs," said the Foreign Minister. not present.

2) Current Situation and Activities

Organization

Citizen ID and resident registration are under the jurisdiction of the Department of Home Affairs.

Current status and situation of national ID

- National ID data has been digitized, and the registration rate is extremely high at 99%. In addition, most cities in South Africa have offices that provide national ID services.
- All citizens have an ID number. Previously, the green "National ID Book" was issued, but since 2013, the "Smart ID Card" has been issued and replaced. Currently, both are used together. However, not all citizens have a smart ID card, and the current situation is that it will not be issued unless the place of birth is South Africa.
- There is also a view that "it is easy to build and start a system, but it is difficult to maintain and operate it and keep it alive" (ITTPSA), and there are concerns about the continuity of situation and operational difficulties. It is shown.

Current status and situation of birth registration and resident registration

According to UNICEF statistics, the birth registration rate in South Africa is as high as 88.6%.

Current status and situation of data linkage (interoperability) with other sectors

- Although there was a plan to centrally manage various information by the National Personal Authentication System (NIS) and utilize it for various citizen services, the reality is that the cooperation of various data has not progressed. "When utilizing national IDs in multiple sectors, cooperation between related ministries and agencies is required, but since there are walls between each ministry and agency and they are operated independently, there are issues in promoting digital ID cooperation." There is also a view that "it is ideal to be able to use various services with one ID and one card, but the rules have not been established yet" (CPSI), and for data linkage using national IDs. It is suggested that there are still barriers and steps.
- Currently, the link between the national ID and the graduation certificate in the education field, and the link with the morbidity information and insurance information in the health care field have not been linked yet. Each is managed by its own Unique ID.
- Regarding the digitization of public services, the Department of Communications and Digital Technology was in charge of infrastructure development, and an organization called SITA (State Information Technology Agency) was established to give certain authority to promote digitization, but the state In addition, due to the strong power of local governments, standardization, interoperability, and sharing have not progressed.

3) Challenging area(s)

The following issues are raised at the national and local levels.

As a national issue,

- Insufficient budget
- Cooperation with old systems that have not been digitized yet
- Countermeasures against plagiarism and spoofing of national ID (establishment of security infrastructure)
- Correspondence to unregistered national ID (achieved 100% national ID registration rate)

Challenges at the local level include

- Communication infrastructure development (last mile connection)

4) Activities of Development Partners

Since digitization is being promoted in the home country, and as a result, it appears in the numbers, the need for support in this ID field is not expected.

5) Potential Assistance Needs

As mentioned above, there is not much need for support, but there are still social disparities, and the disparity between central Tokyo and rural areas is large, so eliminating the digital divide, which is a prerequisite for

digitalization, remains an issue. There is also a view from local ministries and agencies that there is a gap between the story on the published data and the actual situation. It is considered that there is a potential need for support in data linkage with.

6) Expected Areas to be Digitalized

API development to realize data linkage (interoperability)

7) Condition: Infrastructure, Policy, Human Resource, and etc.

In addition to the hardware aspect, it is also important to develop the software components that make it work, and to tackle the issues ahead of the development and operation of advanced ID systems.

- Elimination of the digital divide in rural areas (enlightenment activities)
- Development of legal framework for data linkage
- Early childhood development for children under 16 years old (especially in the fields of health care, education, and social security)

(5) E-Government

1) Vision and Plans

- National Development Plan: Vision for 2030
- National e-Strategy, 2020-2024 Strategic Plan
- The National e-Government Strategy and Roadmap

(Water Supply)

A Municipal Guide / Roadmap To Successful ICT Governance (2012)

Although there is no ICT plan or strategy specific to water supply, the South African Local Government Association (SALGA) has developed the above roadmap and also has encouraged local municipalities that take charge of water supply to digitize their operations. The roadmap includes concrete examples of short- and medium-term approaches, with the short-term approach consisting of the following seven points;

- Security Management
- User Access Control
- Program Change Management
- Data Center Management
- Facility and Environment Control
- ICT Service Continuity
- ICT Infrastructure

As for the medium-term approach, the roadmap suggests that an ICT strategic plan to support business should be developed in accordance with the circumstances of each local municipality. In order to prepare for the implementation of the plan, the roadmap outlines the steps to be taken, including the establishment of an ICT

steering committee and the clarification of the scope of responsibility in each ICT-related department.

2) Current Situation and Activities

The “National Development Plan: Vision for 2030”, which forms the basis of the national strategy, states that improving the quality of public services is a critical factor in achieving national transformation. The Plan mentions that ICT is an indispensable tool for this, and that an integrated e-strategy is needed to promote ICT in various sectors. In response, the Ministry of Telecommunications and Postal Service has developed the “National e-Strategy”, which states that the framework for e-Government is to enhance public service delivery through the Digitisation of services.

Furthermore, SITA, the government's ICT procurement and service delivery arm, has drawn up the “2020-2024 Strategic Plan”, which sets out eight goals for the digitization of public services, including improving the efficiency of government business operations and public service delivery. SITA also develops applications for governmental organizations in all sectors.

In this way, the ICT plan for public services is being implemented in a complicated manner by multiple organizations, it is, however, not proceeding smoothly due to regional disparities and communication problems between the central and local governments, as will be described later.

(Water Supply)

In recent years, there has been an increase in the use of ICT in the water supply sector in South Africa to improve operational efficiency. So far ICT in the water sector has mainly been used in the following areas.

- Customer management
- Operation Management
- Financial and control management

What is common in these areas is that ICT is used for information gathering, streamlining of information flow, improvement of work processes, and so on. Regarding the customer management, ICT is used in areas such as public relations, awareness raising and crisis management. Sharing information with customers increases transparency, which in turn increases their trust in water utilities and local municipalities. In terms of the finance and control management, ICT is expected to improve water tariff collection ratio, create a reporting mechanism to manage resources, and improve asset management.

In addition, the implementation of ICT has not always been successful, with some local municipalities facing the challenges described below, an analysis of the successes shows that two main influences are;

- Integration of the system into the existing structure.
- The local municipalities have the budget to maintain the system.

This is currently the case in major metropolitan areas such as Cape Town and Johannesburg, where ICTs in customer management such as smart meters, automated meters and smart grids have been partially

implemented. Local municipalities are also setting up Amanzi, an ICT system that allows customer complaints to be instantly passed on to the relevant departments and administration to deal with incidents. As for the operation management, an increasing number of water utilities are using remote control systems such as SCADA and GIS mapping systems. In terms of financial and control management, some water utilities are aiming to establish a water tariff collection system by means of smart metering systems. In South Africa especially in rural areas, the water tariff collection ratio is low, and the introduction of a mobile money payment system is being considered.

Currently, as shown in the attached documents "South African Water Innovation Prospectus 2017" and "List of the technical innovations in South Africa", many universities and companies are developing products and technologies related to the digitalization of water supply in South Africa. Therefore, there seems to be little room for Japanese companies to participate in the market.

3) Challenging area(s)

South Africa has the highest Gini coefficient in the world at 0.62 (OECD, 2015), and there are disparities in many areas, and ICT is no exception. Even though the ITU's ICT Development Index Score is high for Africa, the ICT infrastructure outside major cities is weak and there are poor population who do not have access to the internet.

There is also a shortage of skilled ICT personnel, and ICT literacy is particularly low among local government officials. This disparity is reflected in public services. For example, an app called Gaurider has been developed specifically for the Gautrain express train between Pretoria and Johannesburg, but the Gautrain only stops near upmarket residential areas, and the high cost of the train means that only a limited number of people ride it. In addition, the electricity situation in South Africa has deteriorated since 2007, and there are frequent load-shadings in various places.

(Water Supply)

According to a survey conducted by the Water Research Commission (WRC), the following 11 issues were identified as barriers to the adoption of ICT.

- Misuse of technology.
- Bureaucracy of procurement.
- Misunderstanding of the benefits of ICT.]
- The use of ICT projects for political purposes.
- Inadequate research and evaluation of ICT projects.
- The lack of long-term evaluation of projects coupled with the projects not sharing the results or findings.
- Resistance to change.
- Financial problems.
- Lack of ICT skills and technical literacy.
- Infrastructure shortage.
- Misunderstanding of project requirements or goals.

4) Activities of Development Partners

As a large-scale support, the World Bank is implementing the “The Eskom Investment Project (USD 3.4 billion)” for the controversial electricity sector. Technical cooperation projects aimed at capacity development can be found in many areas, but the direct project support is rare as in other African countries.

(Water Supply)

Denmark provides technical training for water supply engineers, but no other large-scaled support from overseas was confirmed for water supply ICT-related projects.

5) Potential Assistance Needs

Since the 1990s, local government reform and decentralization has been underway, and the data sharing system between central government (Departments) and local governments (Metropolitan, District and Local Municipalities) and among local governments needs to be improved. This can, however, be done through self-help efforts.

(Water Supply)

In the water supply field as well, there are few opportunities to share information between the Department of Water and Sanitation (DWS) and local governments, and it is imperative to build an information sharing system that connects between them. In addition, the progress of digitization differs depending on the water utility. In general, compared to water supply utilities in urban areas, the utilities located in local areas have many technical uncertainties and there is a lot of room for digitization. On the other hand, water utilities in urban areas, which manages a lot of water users and large -scaled water supply facilities, are facing challenges and issues that are different from those in rural areas, and it is necessary to actively incorporate smart meters, grids, and GIS mapping systems, etc.

6) Expected Areas to be Digitalized

The central government will introduce information sharing systems and tools to ensure that local information is accurate. Local governments will also receive useful information from the central government. However, it is essential that local governments collect accurate information.

(Water Supply)

The current policy of digitalization, concentrating on the areas of customer management, operation management, and financial and control management shall be continued.

(Water Supply)

The biggest problem is that the water utilities, which are the starting point, do not have accurate data. The first step is to collect accurate data by introducing smart meters. The data should be sent to water utilities, the DWS and SALGA for use in the preparation of national water plans.

7) Potential of using data for innovation in public service improvement

In particular, data and information from the District Municipality and Local Municipality will be stored by the

central government and can be used for future planning and indicator development for the whole country.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

There is a shortage of ICT engineers within government organizations, and they are heavy dependent on the private sector for digitization. Even if it is outsourced to the private sectors, government officials will still be responsible for managing it and there is, therefore, an urgent need to train ICT engineers within the government.

(Water Supply)

As indicated in the “3) Challenging area(s)”, there are few ICT engineers in water utilities. It is necessary for each water utility to promote human resource development through new hiring of ICT engineers and ICT training for the government officers. In addition, although South Africa has a high rate of Internet access compared to other African countries, there are more people in rural areas who do not have access to the Internet. This gap needs to be bridged by strengthening the ICT infrastructure in rural areas.

(6) Education

1) Vision and Plans

- NDP Vision 2030
- Schooling 2025 (Basic Education)

2) Current Situation and Activities

Situation of Education under COVID19 Situation

According to UNICEF, 75% to 100% of students are facing the blank school year and introduction of shifts and random fermeture of schools make them have lost about 54% of study time. In addition, 400 to 500 thousands of children dropped out from school and the total number of children who don't attend school increased to 750 thousand.

On the other hand, the Department of Basic Education introduced a blended learning system very quickly, making online resources available (<https://www.thutong.doe.gov.za/>), and introduction of educational programmes via radio and television.

Issues of Education in South Africa

In other African countries, the issues of introducing ICT in education can be summarized in its Availability and Affordability. But in South Africa, the situation is more complex based on social structure, geographical disparity and teachers skill. All the effort the DBE made to face COVID tended to fail because of this complexity, and caused a considerable negative impact.

South Africa's education system does not have major problems as a system. But there's a huge gap between the expected outcome of the system and the reality.

There are a large number of public schools and some private schools, and these private schools usually provide a better education. As for the universities, students can access them if you fulfill a requirement, whether you are from public school or private school.

It seems fair as a system, but the students from public schools face the quality gap of their previous schools as soon as they start studying at the universities.

There's a huge gap in terms of ICT infrastructures. Private schools usually have computer labs, but most of the public schools don't. Many students from public schools touch the computers for the first time when they enter the universities.

Teachers' quality and syllabus contents

There's a huge gap between teachers' ICT literacy between public and private schools.

In addition, teachers in public schools present some issues with their knowledge on pedagogy and educational approach. They just explain what is written in the textbooks.

For Example, there used to be some experiments in science class, but they disappeared now due to the increasing number of students. Other than scientific experiments, subjects like art, music or physical exercise have also disappeared.

As a result, there's a gap between the skills needed in society and the contents of education at schools.

Security issues

General security is severely compromised in South Africa and this situation can be a big risk for the introduction of ICT in schools.

3) Challenging area(s)

- Social disparity, geographical disparity
- Introduction of ICT equipment in schools, introduction of ICT education in the curriculum

4) Activities of Development Partners

- JICA: Programme for industrial human resource development (Experts, Project)
- UNICEF: COVID response

5) Potential Assistance Needs

It is very difficult to plan a project of ICT in Education. There's a severe shortage of ICT equipment in schools, and the root cause is not a simple shortage, it is based on the social structure problem. This issue cannot be addressed only by education projects. In addition, security problem is a big risk for executing a project.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

See Current situation above.

(7) Health

1) Vision and Plans

Strategic Plan 2020/21-2024/25

Strategic Plan 2020/21-2024/25 is designed to realize the objectives of the NDP 2019-2024, the National Development Plan. The main objectives are to reduce deaths from preventable diseases, prevent and control

disease by promoting health, strengthen health systems, provide patient-centred health services, and mitigate social factors that contribute to ill-health (air pollution, poverty, water supply and sewerage infrastructure, etc.).

Strengthening and promoting the National Health Insurance (NHI) is a top priority of the strategy to achieve UHC (the introduction of the National Health Insurance has been delayed due to unforeseen factors caused by the Covid-19 pandemic).

National Digital Health Strategy for South Africa (2019-2024)

The South African government has developed a health plan/digital health strategy, the National Digital Health Strategy for South Africa (2019-2024), which aligns with global health trends under the slogan "One patient, One record". The strategy is in line with global health trends (e.g. achieving UHC). Particular attention has been given to the interaction with other key government systems, such as the National ID for authentication and identification (Ministry of Home Affairs), to complement the National Health Insurance program.

2) Current Situation and Activities

According to the remote interviews with the National Department of Health, they have a total staff of about 1,200, of which about 40 are ICT-related (but not ICT-specific). The annual ICT budget is about 100 million rand, and it is estimated that five times that amount will be needed to implement the strategy.

The telecommunication infrastructure provided by the National Department of Health contributes to improving access to information across health facilities, which is in line with the national government's priority to ensure that hospitals and clinics are connected to the central system (the National Department of Health).

The National Department of Health also works with a number of organizations, including the WHO, to implement specific programmes and projects to address national challenges in line with global trends.

3) Challenging area(s)

Through remote interviews with the National Department of Health (NDoH) and other stakeholders, the biggest challenge is that the NDoH and provincial governments are still stove-piped with many chief executives (CIOs). In addition, while South Africa has accumulated a great deal of expertise in all areas, including digitalization, most of this expertise is not fully utilized in the public sector, either at an academic level or in the private sector. As a result, there is a lack of human resources in government - for example, the NDoH does not have a dedicated digital health department, and the department that manages DHIS2 does not have any digital health experts. Furthermore, they recognize that capacity at provincial level is even lower, although there is good capacity in some provinces such as the Western Cape, KwaZulu-Natal and Gauteng.

Secondly, there are sporadic digital tools in the current health information system, as well as systems developed for HIV / AIDS programmes (e.g. TIER.net), but no platform has been developed to interconnect the entire health service.

Regarding infrastructure and the situation in rural areas, there are two main challenges: the price of internet access and connectivity, and the problem of electricity. As a result, in rural areas there is a mix of digitized information and information that remains paper-based. However, these two are linked by the filing number

used by the digital number, which links the digitized information with the paper-based information while performing manual work.

4) Information Systems and Platforms

Based on remote interviews with the NDoH and other stakeholders, as well as preliminary in-country research (desk-based desktop research), the following is a summary of the current health information system.

Information System/Platform Name

- DHIS (Health Information System)
- HPRS (Health Patient Registry System)
- TIER.net (patient information management tool for HIV / AIDS and TB)

Main Data:

Health and patient information, information on specific diseases

Owner of the Data/Operator:

National Department of Health

Source of Funding/Donor, etc.

WHO is providing technical support for the creation of a one-stop website

5) Activities of Development Partners:

- WHO is supporting the National Health Observatory to build a one-stop website (data platform) to give people access to the health data they need. It is envisaged that this will be fully transferred to NDoH in the future
- World Bank is committed to capacity building of government staff, as part of its technical assistance to achieve universal health coverage

6) Potential Assistance Needs

Aging populations and rising GDPs due to economic development are changing lifestyles and increasing the burden of healthcare costs for NCDs. In addition, there is a high level of expertise in the field of digital health in academia and the private sector. Therefore, there is a potential need for telemedicine, which has a high affinity with NCDs, but it is difficult to implement due to the lack of government legislation and guidelines.

7) Expected Areas to be Digitalized

As part of the Country Development Cooperation Policy (2018), JICA will provide support on policy and human resource development for the promotion of UHC in South Africa, utilizing Japan's knowledge on UHC, and on strengthening health financing capacity to achieve UHC. Also, in view of the assets dispatched by JICA individual experts (2016-2018), support for digitalization in the NHIDWS system (linking national IDs with patient IDs) could be considered as assistance in accelerating the process towards UHC.

8) Potential of using data for innovation in public service improvement

The development of electronic medical records with a single patient ID and greater interoperability between

other health information systems could contribute to the development of evidence-based health policies and strategies through the analysis of medical histories, and to the development of tailor-made drugs through the use of healthcare big data.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

The conditions (environment) for promoting the digitalization of the health sector can be considered as follows.

- Strong leadership and willingness of the Presidency to foster collaboration with the Ministry of Interior, which is responsible for the national ID
- Interoperability of the available systems
- Development of laws and guidelines for privacy protection

(8) Social Protection

1) Vision and Plans

<Constitution of the Republic of South Africa, 1996¹¹³>

South Africa has adopted a rights-based approach to social protection. The South Africa's Bill of Rights (the Chapter II of the Constitution No. 108 of 1996) guarantees everyone's rights to access to health services, including reproductive and medical cares, adequate food and water, and social protection, including adequate social assistance (Article 27)¹¹⁴.

2) Current Situation and Activities:

<Social Protection>

In South Africa, the laws on old age, disability and survivors, sickness and maternity, and work-related injuries were in place before the post-apartheid era of 1994. In other words, all social assistance programs, except child support and the expanded public works program, were in place before 1994. The government fully funds the social assistance program, spending USD 966 per poor person per year, or 3.17% of GDP on social assistance in 2015.

<Digitalization>

Social Pension System (SOCPEN)

The Department of Social Development (DSD) and the South Africa Social Security Agency (SASSA) are responsible for administering these social assistance programs. SASSA operates the Social Pension System (SOCPEN), introduced in the 1980s with government funding. SOCPEN processes applications for cash transfers, such as old-age, disability, veterans, child support, orphanage, and nursing home support, and automatically generates monthly cash transfer files and a list of beneficiaries to be reassessed. Currently, the system processes about eighteen million benefits each month and makes payments to about 11.3 million beneficiaries.

¹¹³ <https://www.gov.za/documents/constitution-republic-south-africa-1996>

¹¹⁴ ILO. (2016). "Extending Social Protection by Anchoring Rights in Law: South Africa."

COVID-19 Relief Grant System (RGS)

SASSA launched the COVID-19 Relief Grant System (RGS) to receive, process and pay applications for the benefit starting April 2020. This could not be managed by SOCPEN, so a new platform promoted by Oracle was built, which allows online applications through WhatsApp, USSD, email, and the SASSA website. Currently, about ten million applications are submitted every month through this relief benefit system, of which about six million are approved and benefits are paid.

Payment Method

The main payment channel for SASSA benefits is the bank account, such as the South African Post Bank accounts. Only 4% currently receive their benefits at traditional cash dispensaries or post office counters. The number of the transactions by mobile money payments is extremely low.

National Integrated Social Information System (NISIS)

The DSD launched the National Integrated Social Information System (NISIS) in 2009. The DSD was supposed to lead the overall coordination, but this did not happen, in part because NISIS had no institutional or legal framework or structure¹¹⁵.

3) Challenging area(s)

Overall

There is no single comprehensive management information system on the population. In response to this, the central government, under the guidance of the Office of the President, is currently considering the establishment of a single registry.

SOCPEN

There are challenges on SOCPEN with old technologies and being not agile. Therefore, it requires a long lead time to confirm that changes made in one part of the system will not adversely affect the entire system.

Screening

Although the application forms are subjected to the Means Test, they rely heavily on information provided by the applicant, and external checks are limited.

Interoperability

SOCPEN does not have a direct link with NISIS. There is limited interface with the population registration system. There is no link interface with PERSAL or government payroll system.

Expansion

An introduction of universal basic income requires the expansion of the coverage to all citizens, not just the elderly, disabled, and children that SOCPEN targets.

Payment Method

The Ministry of Finance introduced regulations for mobile money payments through ensuring authorized phone

¹¹⁵ Barca, V. & Chirchir, R. (2014). "Single Registries and Integrated MISs: De-mystifying Data and Information Management Concepts."

numbers. As a result, the approximately four million beneficiaries must go to the post office counter to receive the COVID-19 Relief Grants.

4) Information Systems and Platforms

<System/Platform Name>

- National Integrated Social Information System (NISIS)
- Social Pension System (SOCPEN)
- COVID-19 Relief Grant System (RGS)

<Main Data>

- Beneficiary information, household information
- Beneficiary information
- Beneficiary information

<Data Ownership/Operator>

- Department of Social Development (DSD)
- South Africa Social Security Agency (SASSA)
- South Africa Social Security Agency (SASSA)

5) Activities of Development Partners

Government Funds

6) Potential Assistance Needs

- A Single Registry
- Targeting and monitoring
- Interoperability
- Digital payments

7) Expected Areas to be Digitalized

- Establishment of the Single Registry
- Digitization of all household information
- Enhancement of interoperability with other management information systems
- Promotion of digital payments

8) Potential of using data for innovation in public service improvement

- Administrative big data on social protection and households can enhance the Evidence-Based Policy Making (EBPM). It is also possible to propose preventive measures required for each region and the effective allocation of resources such as cash transfers.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Strengthening of personal information protection laws.
- Develop laws and regulations to promote interoperability.
- Relaxation of MOF mobile money payment regulations.

3.7 Ghana

3.7.1 Survey Policy in the Target Country

(1) National Development Plan

The Government of Ghana is implementing the Medium-Term National Development Planning Framework (2018-2021) with action plans in five areas: 1) Economic Development (Industrial development, Private sector, Informal economy, Corporate governance, Agriculture and rural development, Fisheries, Tourism and arts), 2) Social Development (Education and training, Health services, Food and nutrition, Population and immigration, Poverty and inequality, Water and sanitation, Child protection and family welfare, The aged, Gender equality, employment of women and girls, Sports and recreation, Youth development, Social protection, Disability development, Employment and decent work), 3) Environment, Infrastructure and Human Settlements (Protected areas, Mineral extraction, Coastal and marine areas, Pollution, Deforestation, desertification and soil erosion, Land administration, Water resources, Climate change, Disaster management, Human settlement, Food control, Transportation, Energy and petroleum, Construction, Infrastructure management, Science, technology and research, ICT), 4) Governance, Corruption and Public Accountability (Democracy, Decentralization, Public accountability, Public sector reform, Corruption and economic crimes, Rule of law and access to justice, Public safety and security, Culture, Civil society, Attitudinal change and patriotism).

(2) Country Assistance Policy of the Government of Japan

Ghana maintains political and social stability by peacefully realizing a peaceful transition of power between the ruling and opposition parties in the presidential election at the end of 2016, and the international community's reputation and expectations are rising as a driving force for democracy in West Africa. In addition, Ghana is actively engaged in economic and social reforms, and the results are extremely important for the economic development of West Africa. Regarding relations with Japan, bilateral relations are friendly, as symbolized by Dr. Hideyo Noguchi, who traveled from Japan to study yellow fever about 90 years ago, and chocolate using Ghanaian cacao beans.

On the economic perspective, commercial production of oil began in 2010, with a per capita GDP of over USD 1,300, making it a low- and middle-income country. In recent years, investment activities from overseas have been active in connection with oil and gas production, but there are still many issues in terms of infrastructure and public services. On the financial aspect, it is recovering from the slump in economic growth over the last few years, but it still has large public debt, which makes it difficult to implement social development projects. In addition, promoting the employment of young people has become a major issue.

In response to these issues, in October 2017, the Government of Ghana announced the “Coordination Program on Economic and Social Development Policy 2017-2024” as a new medium-term economic and development policy. The program on the right is a policy for achieving the goals of economic development and job creation led by the private sector, such as economic revitalization, agricultural and industrial transformation, economic and social infrastructure revitalization, social protection and strengthening of inclusion. , The growth and development of public service institutions are the pillars. It also aims to reduce reliance on foreign aid and

establish independent state management.

Based on these circumstances, it is important for Japan to provide support that contributes to the sustainable and stable economic growth of Ghana through development cooperation centered on ODA.

Table 3.7.1 Country Assistance Policy of the Government of Japan for Ghana

ODA Basic Policy	Promoting sustainable and stable economic growth	
Priority Areas	Infrastructure development	corridor development, urban problems
	Strengthening industrial base including agriculture	Productivity improvement and nutrition improvement for small-scale farmers
	Health	UHC, Maternal and child health, health service improvement
	Human Resource Development	Education Administration, School Management, INSET
Remarks	The government aims to diversify the economy through industrialization led by the private sector and expand public services through PPP, and actively pursues the possibility of collaboration with Japanese companies, including SMEs. Regional integration	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Ghana

Ghana has implemented the “National Public Sector Reform Strategy 2018-2023” since 2018. Digitization is regarded as the key for national development and socio-economic service provision as one of the six pillars of the strategy. Ghana promotes digitalization to improve economic and public sector governance, improve transparency and accountability, increase tax revenue, eliminate corruption, and improve public services access.

In June 2020, the Government launched “Ghana.Gov”, a platform accessible to all government services and enables the users to pay for public goods and services with mobile money or QR code. It is currently in the digital ID registration stage (Ghana Card), where digitalized public services starting from health insurance cards will be linked. Shortly, Ghana Card will be connected to the digital domicile system to improve tax collection from the informal sector, consisting of four-fifth of the population, and the civil registration system, including birth and death registrations. As these measures related to e-government have just started, JICA, private companies, and other development partners need to grasp the whole picture.

Given the above examination, JICA Study Team intends to learn the overall e-government activities undertaken in Ghana to seek possible cooperation by private and public entities. At the same time, JICA Study Team would examine the digitalization in the health and education sectors to seek possible assistance based on the JICA’s cooperation in all forms to date. JICA Study Team also intends to exchange opinions with relevant agencies and organizations on issues and possible measures in the provision and delivery process of digitalized public services in Ghana.

3.7.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation

1) Vision and Plans

The Ghana ICT for Accelerated Development (ICT4AD) Policy¹¹⁶

The Ghana ICT Development Acceleration Policy was enacted in 2003 and aimed to

- Create the necessary environment to promote the deployment, use and application of ICT in the economy and society
- Support the development of ICT industries in terms of knowledge in order to facilitate the production, manufacturing, development, provision and distribution of ICT products and services
- Promoting the modernization of the agricultural sector through the deployment and use of ICT to improve its efficiency and productivity
- Accelerating development and economic growth by supporting the development of a competitive high value-added services sector and developing it into a regional business services and ICT hub.
- Support the improvement of the country's human resource capacity and R&D capabilities.
- Promote the improvement of the education system through the widespread use of ICT.
- Promoting the widespread adoption and use of ICT in society to support the delivery of health and social services.
- Supporting the modernization of civil and public services through the introduction and use of ICT to promote institutional reform, renewal, and improvement of operational efficiency.
- Developing and guiding the implementation of strategies and action plans for e-government, e-governance, e-commerce, and e-business.
- Promoting women's development and eliminating gender inequality in education, employment, and decision-making through the deployment and use of ICTs.

This strategy is very old and Phase 2 is currently being prepared and is expected to be completed by the end of 2021. Under the leadership of the Vice President, NITA is trying to present a roadmap for digitalization, focusing on enterprise architecture and interconnectivity. The priority sector is the health sector. There are many efforts in the health sector, but they are in silos and need to be integrated at the national level. Phase 1 of this strategy was developed by Ghana government itself under the leadership of the Vice President, but Phase 2 is being supported by the World Bank.

e-Transform Ghana Project¹¹⁷

¹¹⁶ The Republic of Ghana "The Ghana ICT for Accelerated Development (Ict4ad) Policy June 2003"

¹¹⁷ Ministry of Communications and Digitalisation, Republic of Ghana, E-Transform Project, accessed on 11 October

The e-Transform Ghana Project is the successor to the previous e-Ghana Project, which was implemented by the World Bank from 2006 to 2014, and was launched by the World Bank in 2014. The project aims to achieve the following

- Component 1: Enabling Environment for Electronic Government;
- Component 2: Common Services and Infrastructure for Electronic Government;
- Component 3: Scale up of e-Services and Applications;
- Component 4: Project Management Support.

The progress of the e-Transform Ghana Project is described in the attached minutes, so please refer to that.

2) Current Situation and Activities

ICT Legislation

In terms of ICT legislation, certain areas have been covered, but some laws need to be updated. For example, under the NITA Act enacted in 2008, NITA is supposed to be responsible for mainly infrastructure development. However, it is also necessary to develop applications, etc., and it is necessary to expand the scope of NITA's jurisdiction, respond to standardization, etc., and ensure interoperability for communication between applications. The ICT sector is changing rapidly and the legal framework needs to adapt to it. The ICT legislation will be proposed by NITA, finalized by the Ministry of Communications and Digitalization, and approved by the Parliament.

Table 3.7.2 ICT related Legal Framework in Ghana

Basic ICT Law	National Information Technology Agency Act the National Communications Authority (NCA) Act 769 DTT Broadcasting Policy, 2016 The National Information Technology Act Ghana Investment Funds for Electronic Communications (GIFEC) Act, National Broadband Policy and Implementation Strategy
National ID	Registration of Births and Deaths Act
Electronic Signature	Electronic Transaction Act
e-Commerce	Electronic Communications Act (Act 775) Electronic Communications Amendment Act (Act 786) Electronic Transactions Act (Act 772)
Personal Data Protection Law	The Data Protection Act, 2012 (Act 843)
Cyber Security Law	Ghana National Cyber Security Policy & Strategy Cybersecurity Act 2020
Competition Law	NA
Intellectual Property Law	Trademarks (Amendment) Act, 2014 (Act 876) Copyright Act, 2005 (Act 690) Layout-Designs (Topographies) of Integrated Circuits Act, 2004 (Act 667) Trade Marks Act, 2004 (Act 664) Geographical Indications Act, 2003 (Act 659) Industrial Designs Act, 2003 (Act 660) Patent Act, 2003 (Act 657) (2003)

Source: JICA Study Team

Organization

As an organization, the Ministry of Communications and Digitisation has been established to initiate and develop national policies aimed at achieving cost-effective information and communication infrastructure and services to enhance and promote economic competitiveness. The Ministry of Communications and Digitalization has jurisdiction over (1) ICT policy formulation; (2) coordination, monitoring and evaluation of the efficiency and effectiveness of the performance of the telecommunications sector; (3) formulation of regulations to protect consumers and promote competition in the telecommunications sector; and (4) capacity building in the ICT sector. In addition, NITA was established in 2008 as the agency responsible for implementing Ghana's ICT policy. It aims to achieve sustainable growth in ICT through research and development plans and technology acquisition strategies that will facilitate Ghana becoming a technology-driven, knowledge and value-based economy. NITA is also responsible for initiating e-government in Ghana, a key component of the e-Transform Ghana project.

Current Status of Digitalization of Public Service¹¹⁸

Ghana's growing desire to achieve greater efficiency, transparency, and accountability has led the government to continue to invest in digital platforms for the public sector. A number of digital platforms have been developed, including a national ID, to improve governance and public service delivery.

Nevertheless, there are a number of challenges that affect the government's ability to operate digitally. Trust in government-provided e-services is generally low, with the majority of Ghanaians reportedly unaware that e-government services even exist. NITA, the central driver of Ghana's public sector digital transformation, does not have sufficient organizational capacity or funding to implement the ambitious digital government platform envisioned by the government. As a result, MDAs suffer from a chronic lack of connectivity, and basic services such as e-mail and websites are dysfunctional. They also need to strengthen their data protection expertise to safeguard personal information.

Meanwhile, Ghana ranks third in Africa behind Nigeria and South Africa in terms of private digital platforms (Insight2Impact 2019). Ghana's digital platforms are transforming the delivery of services, especially in the retail, transportation, and accommodation sectors, where the Ghana Card is being developed to be the only identification needed to use any service, and a payment system called Ghana. Gov, a payment system called Ghana.Gov, to link government-related payments and increase interconnectivity.

3) Challenging area(s)

- As mentioned above, on the legal front, the content needs to be updated. For example, in the NITA Act enacted in 2008, NITA is supposed to be mainly responsible for infrastructure development. However, it is also necessary to develop applications, etc., and it is necessary to expand the scope of NITA's jurisdiction, respond to standardization, etc., and ensure interoperability for communication between applications. The field of ICT is changing rapidly, and the legal framework needs to be adapted to it. (From an interview with NITA)

¹¹⁸ The World Bank "Ghana Digital Economy Diagnostic"

- In terms of strategy, although revisions are underway, it is necessary to verify whether the content is consistent with the national direction. (From the interview with NITA)

4) Activities of Development Partners

On the ICT policy/legal front, the World Bank is currently supporting the development of a new digitization strategy and the e-Transform Ghana Project through NITA.

5) Potential Assistance Needs

According to the interview with NITA, they would like to receive support from JICA to advise them on whether the strategy they are developing is in the right direction. In addition, they would like to receive advice on the NITA Act and other ICT-related laws that need to be revised.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

In Ghana, although institutions and human resources are mostly in place, most of the infrastructure is concentrated in urban and commercial areas, and most of the rural areas of the country lack effective coverage. In rural areas in particular, the cost of the Internet remains high and access low. In order to enable innovation, it is important to improve the communication environment.

(2) ICT Human Resource Development

1) Vision and Plans

< National Development Plan / Framework >

Long-Term National Development Plan of Ghana (2018-2057)

Long-Term National Development Plan of Ghana (2018-2057) is a 40-year national development plan with five goals, including the development of ICT infrastructure. There is no clear goal setting for digitalization.

Medium-Term National Development Policy Framework An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All 2018-2021

Medium-Term National Development Policy Framework calls for the active use of ICT to improve public sector operations, increase e-commerce and so on. In terms of human resource development, it is recommended that STEM subjects should be enriched at all levels of education.

< Digitization >

Ghana ICT for Accelerated Development (ICT4AD) Policy

Ghana ICT for Accelerated Development (ICT4AD) Policy was developed by the Ministry of Communication in 2003. It points out the shortage of human resources in the ICT sector and suggests the human resources develop in this field.

< Employment >

National Employment Policy

National Employment Policy states that the use of ICT should be promoted in order to increase labour productivity and create jobs.

< Public Sector, Public Servants>

Human Resource Management Policy Framework and Manual for the Ghana Public Services

Human Resource Management Policy Framework and Manual for the Ghana Public Services points out that ICT is crucially important for the efficient and effective management of public service organizations, and heads of public authorities are required to develop appropriate plans in line with the National ICT Policy and guidelines issued by the National Information Technology Agency (NITA) on the use of ICT in respective public authorities. This includes the development of appropriate systems, processes and rules for create, access, store, transmit and manipulate information in line with the guidelines.

2) Current Situation and Activities

< Government Initiatives to Develop ICT Human Resources>

- Accra Digital Centre (ADC), a mini-technology park under the Ministry of Communications, was established with the support of the World Bank and the Rockefeller Foundation to create digital jobs by promoting digital innovation and entrepreneurship and host technology companies and technology start-ups. ADC provides a platform for business incubation, business acceleration and digital research and development programmes, as well as a range of training programmes to promote innovation and entrepreneurship.
- AITI-KACE (Advanced Information Technology Institute - Kofi Annan Centre of Excellence) was established in 2003 under a bilateral agreement between the Government of Ghana and the Government of India to promote cooperation in the field of ICT. As an ICT training centre, AITI-KACE provides various ICT-related training programmes for graduates of higher education institutions and professionals with work experience in the field of ICT.
- The e-Transform Ghana project, supported by the World Bank and implemented by the Ministry of Communications, aims to improve public service delivery, especially in rural and underserved areas, by creating an enabling environment for e-government. This includes the development of unique electronic identity systems, online transaction and financial services systems, and innovative applications to improve the delivery of public services such as health, education, justice and parliamentary services. In addition, the ICT innovation project being developed at the Accra Digital Centre (ADC) aims to foster technology start-ups to promote digital entrepreneurship and create digital jobs for young people.
- Information Technology Enabled Services (ITES) Secretariat of the Ministry of Communications, as part of the eGhana project, aims to develop the ICT and Business Process Outsourcing (BPO) industries. It provides a range of support services to help private companies in Ghana to gain competitive advantage in these sectors and become internationally competitive, including the provision of training programmes in the ICT sector.

< Initiatives to Strengthen ICT capacity of Public Servants>

- Civil Service Training Centre (CSTC) is a training institution for public servants working for the central government under the Office of the Head of the Civil Service that assesses the training needs of civil

servants, designs and manage training programmes and evaluates them¹¹⁹. The CSTC offers a wide range of training programmes for public servants, including some ICT-related training programmes, but only at the level of basic PC skills such as how to use Microsoft Office applications. JICA is planning to dispatch an advisor to CSTC under the project named “Strengthening the Administrative Human Resource Base”. It is expected that CSTC’s training courses will be more accessible to a wider target through the assistance of the advisor to make training courses available online.

< Private Sector Initiatives to Develop ICT Human Resources¹²⁰>

- Institute of ICT Professionals, Ghana (IIPGH) is an association of ICT professionals from all sectors of government, educational institutions, start-ups, investors, business associations and civil society. IIPGH works on standardisation of ICT development, policy advocacy, training and accreditation of ICT professionals, networking opportunities and training of the general public. The IIPGH also provides skills training in ICT for young people of all ages. In addition, IIPGH runs ICT skills development programmes in collaboration with universities such as the University of Cape Coast. IIPGH also assists universities in restructuring their ICT-related curricula to ensure that they match the needs of the ICT industry.

3) Challenging area(s)

< Issues in the Policy Level>

- Medium-Term National Development Policy Framework (2018-2021) and the ICT Ghana ICT for Accelerated Development (ICT4AD) Policy point out the need for human resource development in the ICT sector, there are no plans or guidelines for ICT human resource development to make this a reality.

< ICT Skills for Public Servants>

- In general, the ICT skills of public servants are not good enough. Although there are significant differences between the situation in central and local government, many administrative services are still carried out manually, which is often a bottleneck for efficient public service delivery.
- Though improvement of the ICT skills of public servants (including the skills for ICT policy formulation and implementation) is considered essential for promoting the digitization of public services, there is no strategies or plans for this purpose. Civil Service Training Centre (CSTC) offers a wide range of training programmes for public servants, including some related to ICT, but only at the level of basic PC skills such as how to use Microsoft Office application. In order to realize the digitization of public services, it is required to improve the digital and ICT capacity of public servants so that they can develop policies

¹¹⁹ Training for local officials is provided by the Office of the Head of the Local Government Service (OHLGS).

¹²⁰ There is not necessarily a clear definition of what constitutes ICT human resources, but the definition of “DX White Paper 2021” (Information-technology Promotion Agency, Japan (IPA)) may be useful. The “DX White Paper 2021” categorizes the digital workforce as “Product Managers”, “Business Designers”, “Tech Leads (engineering managers and architects)”, “Data Scientists”, “Advanced Technology Engineers”, “UI/UX Designers” and “Engineers/Programmers”. Rather than being familiar with advanced ICT technologies, there is a particular need for “Product Managers” and “Business Designers” who are responsible for leading the digitalization process by involving stakeholders, and for planning, developing and promoting policies, and projects.

and measures for the digitization of public services.

< ICT Human Resources Skills Gap in the Labour Market >

- Though there is a high demand for ICT professional in the labour market. the supply has not kept pace with this demand.
- There is a significant gap between the ICT skills that can be acquired in school education and those required in the ICT industry. While there is training in the field of ICT at basic level, there is insufficient training for ICT professionals to learn advanced skills. Continuous skills development is required for ICT professionals.

< ICT Literacy of the Public >

- The basic ICT literacy of the public is not good enough. The public does not yet have sufficient skills to use technology and access services, and there is a need to improve the ICT skills of the public as users/recipient of public services. ICT has been introduced into the compulsory education curriculum, although there are some problems such as lack of teachers' skills and network environment. While it is desirable for a large number of citizens to acquire ICT skills from an early age through compulsory education, it is necessary to provide separate awareness-raising and training opportunities for adults who have already completed compulsory education (especially those who are not familiar with digital devices) so that they can use digitalized public services without any difficulties.

4) Activities of Development Partners

- The World Bank, through its e-Transform Ghana project, is helping to create an enabling environment for e-government. The Accra Digital Centre under the Ministry of Communication, supported by the World Bank and the Rockefeller Foundation, is also developing tech start-ups to promote digital entrepreneurship and create digital jobs for young people.
- GIZ has also implemented a project in Ghana called Make-IT in Africa (2017-2019) to support ICT start-ups in Africa and signed an MOU with Ghana Chamber of Technology in March 2021 to promote digitalization in Ghana.
- Ghanaian-German Centre for Jobs, Migration and Reintegration (GGC)¹²¹, in collaboration with the Ministry of Employment and Labour Relations, organised ICT skills training for students and jobseekers with the aim of increasing employability through ICT skills development and promoting the creation of job opportunities for young people in the digital economy. This included a minimum of 12 hours of practical training in the use of Microsoft Word, Excel, Power Point, social media and general internet use.

¹²¹ <https://www.ghanaweb.com/GhanaHomePage/business/Ghanaian-German-Centre-launches-ICT-Skills-Training-for-students-and-job-seekers-1021951>
<https://www.facebook.com/GhanaianGermanCentre/>

5) Potential Assistance Needs

Since public services are provided by individual sector ministries and agencies, digitization requires that officials in each ministry and agency have an understanding of the overall e-government agenda of the Government of Ghana, as well as an understanding of how to promote digitization of the services under their jurisdiction in relation to other services. Therefore, training opportunities should be provided to enable civil servants in all ministries, not only those in the Ministry of Communications and Digitalization, to have a certain level of knowledge about digitalization. In addition, as local governments are often responsible for the actual provision of public services to citizens, training opportunities will be required not only for central but also for local officials.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

- In order to promote the digitalization of public services, it is essential to change the mindset of public servants and make them acquire digital skills.
- Human resource development in the ICT sector is not only undertaken by the government but also by the private sector. Consideration should be given to ways in which the government and the private sector work in partnership to encourage the private sector to promote human resource development initiatives in the ICT sector.

(3) ICT Infrastructure

1) Vision and Plans

The E-Transform Project (the Project) has been formulated in 2014 as a project of ICT infrastructure development in Ghana. The objectives of Project are to provide public services to much more end-users, especially the nationals living in rural area, by allocating governmental budget efficiently, and to promote business chances and to increase employments related to ICT business. The Project is expected to transform the public services by utilizing ICT technologies such as Wide Area Network (WAN), Internet, Mobile Computing. The Project has been implemented jointly by Government of Ghana (GOG) and World Bank (WB) in association with Ministry of Communications (MOC). The main component of the Project consists of the followings;

- Component 1: Realization of E-Government environment;
- Component 2: Provision of basic E-Government services and implementation of ICT infrastructure;
- Component 3: Enhancement of E-Government services and application program/software; and
- Component 4: Assistance in the project management related to above components 1 to 3.

2) Current Situation and Activities

International Backbone Network

International gateways in Ghana are located at six (6) cable landing stations listed in table below which connect with international submarine cables.

Table 3.7.3 List of Cable Landing Stations in Ghana

Location	Cable Landing Station	Consortium	Contractor
Accra	2Africa	China Mobile International, Djibouti Telecom, Facebook, MTN GlobalConnect, Orange, Saudi Telecom Company (STC), Telecom Egypt, Vodafone and WIOCC	Alcatel Submarine Networks (ASN, group of NOKIA)
	Africa Coast Europe (ACE)	invested in the total 700 million dollars project, some of them with the financial support of the World Bank	ASN
	Glo-1	The Glo-1 cable system is owned and operated by Globacom Limited of Nigeria	ASN
	MainOne	Owned by MainOne Cable Company based in Nigeria	TE SubCom
	SAT-3/WASC	36 telecom operators. The largest three investors in SAT-3/WASC were (in order) TCI, a subsidiary of AT&T (U.S.A.); France Telecom (France); and VSNL (India, Singapore). The 11 African shareholders are (in alphabetical order): Angola Telecom, Camtel, Cote d'Ivoire Telecom, Ghana Telecom, Maroc Telecom, Nitel, OPT Benin, OPT Gabon, Sonatel, Telecom Namibia and Telkom SA Ltd. There are also Asian shareholders.	
	West African Cable System (WACS)	Telkom (South Africa), Telecom Namibia (Namibia), Angola cables (Angola), OCPT (Democratic Republic of Congo), Congo Telecom (Congo), Camtel (Cameroon, acquired from MTN Cameroon), MTN (Nigeria), Togo Telecom (Togo), MTN (Ghana), MTN (Ivory Coast), PTC (Cape Verde), Vodacom Group (Canary Islands), Tata Communications (Portugal), Tata Communications (UK), Cable and Wireless (London PoP)	In May 2015, Huawei Marine completed an upgrade of WACS (Upgrade I) using 100Gbps technology, increasing the WACS system design capacity to 14.5Tbit/s. In Feb 2019, the WACS Upgrade II was completed with Huawei Marine's solutions to support 32*100Gbps from South Africa to Portugal.

Source: JICA Study Team created based on TeleGeograph and survey data from each consortium

Domestic Backbone Network

The national communication backbone has been implemented by the Ministry of Communication with the fund from Chinese Government. The backbone network has been owned, operated and maintained by Vodafone Ghana.

Mobile Network

The 2G GSM and 3G mobile network cover almost all territory of Ghana, and 4G LTE mobile network is deployed at major cities and along main highways. Several mobile network operators (MNOs) such as MTN Ghana, Vodafone Ghana, AirtelTigo provides mobile communication services to the end-users. The ownership of AirtelTigo was transferred to the GOG in April 2021.

Data Centre

Two (2) data center listed below are established and operated in Accra, capital of Ghana. The safety level of both data centers is Tier-3.

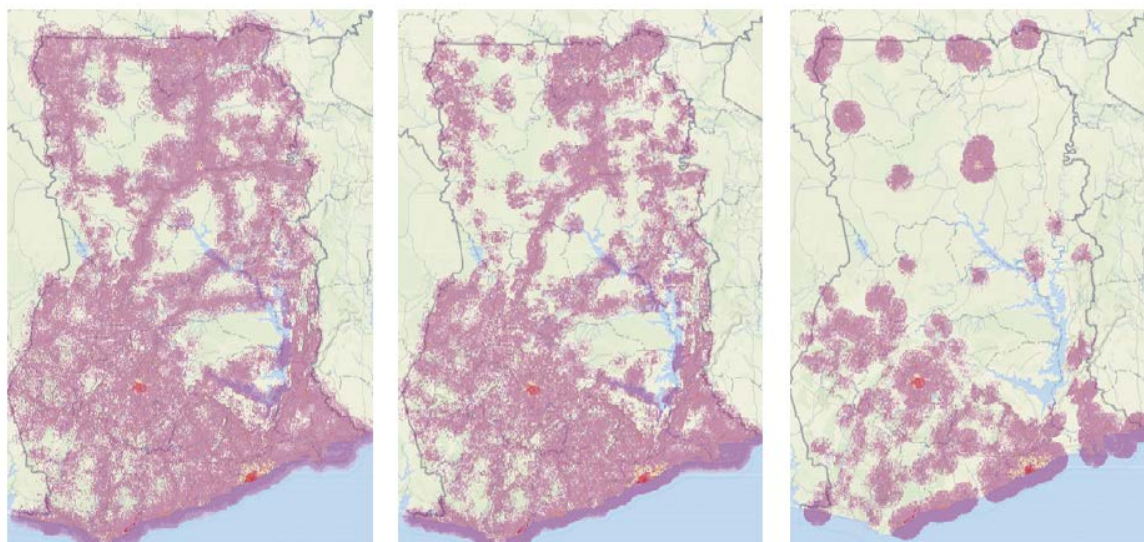
- Rack Africa Data Center

- IS GH Data Center

IXP (Internet Exchange Point)

The IXP of Ghana named Chana Internet Exchange (GIX) is located at Accra, and the operation and maintenance of GIX are carried out by Ghana Internet eXchange Association.

Figure 3.7.1 Mobile Coverage of MTN Ghana



Map A: 2G coverage

Map B: 3G coverage

Map C: 4G coverage

Source: GSM Association

3) Challenging area(s)

As the GOG has implemented ICT infrastructure projects since the year of 2008, ICT indicators defined by ITU is higher than that of average of other 16 African countries targeted in this survey. However, the construction of ICT infrastructure in rural area is still insufficient. Accordingly, the Ghana Investment Fund for Electronic Communications (GIFEC) together with Huawei is conducting the development of ICT infrastructure in rural area by deploying Huawei's network products named RuralStar. Furthermore, the GIFEC is carrying out the network system deployment in rural area by sharing network equipment implemented by private communication carriers to avoid a digital divide between urban area and rural area. In conclusion, ICT infrastructure in Ghana has an issue on rural area network development though, it would be resolved by the assistance from other donors and/or partners.

4) Assistance from other donors/partners

As mentioned earlier, following assistances have been provided by the other donors and/or partners.

- Implementation of E-Transform Project: World Bank
- Domestic Backbone Network Deployment: the Chinese Government
- Rural Area Network System Deployment: GIFEC and Huawei

5) Potential Assistance Needs

Although several assistances have been provided from other donors and/or partners, there are still areas where ICT infrastructure is not yet in place, and the Government of Japan (GOJ) could provide support to these areas.

In addition, ICT infrastructure facilities could also be developed in line with other sectors' assistance plan.

6) Potential of using data for innovation in public service improvement

There is a possibility of using high-altitude/stratospheric drones to provide last-mile connectivity to rural areas. This technology is expected to provide a stable supply of high-speed wireless communications using drones that can meet the communication needs of rural, unelectrified areas, and is more cost-effective than ground ICT infrastructure that requires a time-consuming and costly construction. Swift Engineering, Inc. of the US has already successfully commercialized, test-flown, and test-communicated high-altitude/stratospheric drones in early 2020, and has begun providing solutions to meet the demand. Although HAPS Mobile, a member of the Softbank Group, is also developing this technology, it has yet to provide a sufficient solution like Swift Engineering, Inc.

(4) National ID

1) Vision and Plans

The national development plans such as Long-Term National Development Plan of Ghana (2018-2057), Ghana Shared Growth and Development Agenda (GSGDA) I, II, III, and the national ICT development plans such as The Ghana ICT for Accelerated Development (ICT4AD) Policy touch upon the e-government and the national ID, which is one of the core elements of the e-government, as follows. GSGDA II (2014-2017) lists specific indicators and their quantitative targets and aims to improve the national ID registration rate and information linkage between national ID and civil registration. On the other hand, ICT4AD does not have a specific description of national ID, but as one of the directions of e-government, interoperability between sectors is indicated as the key to improving the efficiency of the public services.

2) Current Situation and Activities

In 2006, the National Identification Authority (NIA) was established and the national ID program for all Ghanaian residents (including non-Ghanaian citizens) over the age of 15 was launched. An eligible person is obliged to obtain a national ID card (Ghana Card) containing national ID and biometric information. The card is valid for 10 years. NIA is considering linking various IDs such as tax payment numbers, social security numbers, and passport numbers with national IDs, but the concrete progress is not particularly well. The national ID registration rate is gradually increasing, but it is still low at a mere 2%.

Regarding the protection of personal information, the Data Protection Act was enacted in 2012, and an independent data protection committee has jurisdiction over privacy and personal information protection regulations.

In terms of interoperability, the Ghana Card is linked to health insurance cards in the health sector, and holders no longer need to present their health insurance cards at medical facilities. The operation has also begun in rural areas. In the future, it will be possible to manage individual medical care history with a single ID of Ghana

Card. On the other hand, the fact is that the benefits have not spread because the penetration rate of Ghana Card itself is still low. What is currently being done is to integrate NHIS (National Health Insurance Scheme) data into the Ghana Card so that patients can be treated with the Ghana Card no matter where they use the medical facility. Within NHIA, a specialized department has been set up. There is a memorandum of understanding (MoU) between NIA, which has jurisdiction over the Ghana Card, and NHIA (The National Health Insurance Authority) but details are unknown.

In addition, it is possible to pay taxes efficiently using Ghana Card on the startup support platform, and NEIP (National Entrepreneurship and Innovation Plan) recommends that startup companies use Ghana Card.

3) Challenging area(s)

- The registration rate of Ghana Card is still low, and there are few situations where people can realize the benefits even if they collaborate with other sectors such as the health field.
- Also, the function of the platform (Ghana.Gov) is insufficient.
- The network environment of the communication infrastructure is fragile, and there is a problem with the connection. As a remedy, there is a discussion between NIA and a private institution (Identity Management Systems Ltd, IMS) working together to use the 241 Community ICT Centers as an ID registry to solve the last mile issue, and whether a center could be used as a registry was evaluated. Around 2018, a study was also conducted on how to use the GIFEC satellite halls in areas where connections are poor.

4) Information Systems and Platforms

- Information System/Platform Name: Ghana.Gov
- Main data: National ID (name, gender, date of birth, height, fingerprint, etc.)
- Owner of the Data/Operator: National Identification Authority (NIA)
- Source of Funding/Donor, etc.: NA

5) Potential Assistance Needs

It seems that there is a potential need for support for the development of ICT infrastructure, the deployment of biometric authentication equipment, and the improvement of data linkage and interoperability.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

It is essential to promote the elimination of the digital divide in rural areas, the establishment of processes related to data linkage, and the development of IDs for minors (especially in the fields of health and social security).

(5) E-Government

1) Vision and Plans

The government has been implementing the National Public Sector Reform Strategy 2018-2023 since 2018, and the six pillars of the strategy are (a) focus on citizens and the private sector, (b) competent and disciplined

labor, (d) strengthening the public sector regulatory framework, (d) modernizing and improving the work environment, (e) strengthening the structure of local government, and (f) digitizing public sector services and systems.

The objective of digitizing public services is to improve the governance of the economy and the public sector, improve transparency and accountability, improve domestic revenue mobilization, curb corruption, and improve access to public services. It aims to promote "e-ID registration" and "e-address registration," to clarify where people live and work, and to increase tax collection from the informal sector, which accounts for 4/5 of the economy.

2) Current Situation and Activities

Ghana Interbank Payment & Settlement Systems Platform (GhIPSS), established in 2007 as a wholly owned subsidiary of the Bank of Ghana, implements and manages interoperable payment system infrastructures for banks and non-bank financial institutions in Ghana. The platform will include all banks, mobile operators, and Fintechs engaged in back-end payment systems. The government has built a digital services and payments platform, Ghana.Gov (<https://www.ghana.gov.gh/>), based on GhIPSS, on which C2G, G2C (World Bank's LEAP, national service program, etc.), G2B, B2G, and G2G are available to a certain extent. In the future, they intend to tie all digitized public services to Ghana.Gov and evolve Ghana.Gov into a One Stop Service Center as well as a payment center. Currently, 80 percent of the population uses public essential services such as water and electricity, but only 20 percent of the population has access to digital technology such as smart meters as of 2017.

The government allocates about 30% of procurement for start-ups and youth, women, and people with disabilities to foster start-ups. The software for digitized public services in various ministries and agencies is mainly created by private local companies (e.g. Digital Addressing System, etc.).

The government is using the Universal Service Fund; namely, Ghana Investment Fund for Electronic Communications (GIFEC) to develop the last mile infrastructure in rural and remote areas through Public Private Partnership (PPP) in order to use digitized public services (Rural Telephony project).

GIFEC is an agency under the ministry of communications, which was given legal backing to the organization by the Electronic Communications Act, 2008 (Act 775) and as part of their mandate, implements the universal Service Fund for the government.

The aim is to develop at least 3G infrastructure in rural and remote areas, so that no matter which telecom company exists, digitized services are accessible in rural areas. Since telecom companies are reluctant to enter rural and remote areas where the economic returns are low, the government will invest in setting up minimum infrastructure and invite telecom companies to come in so that people can make calls and get data. The cost of telecommunication in rural and remote areas will be subsidized by the government and will be set lower than in urban areas to make the cost of telephony and data acquisition lower. As the above mentioned, Rural Telephony Project which was financed by the Chinese government, has developed infrastructure in rural areas through public and private partnerships and connected many communities to internet and set up UMTS 900

rural star technology in 400 places.

3) Challenging area(s)

- The government plans to link all digitized public services to Ghana.Gov in the future, but the digitization rate of public services is still limited.
- Rural people face difficulties in accessing digitized public services.
- The readiness to make digitized payments for public service usage on Ghana.Gov, but government-to-consumer (G2C) payments through online is not well utilized.
- GhanaGov account has not yet be integrated with GhanaCard, which is being integrated with taxpayer ID number, health insurance card number, social security number, and passport.

4) Activities of Development Partners

GIFEC: Equipment support by Norwegian government and ITU. Korean government support through smart community project. Working with UNESCO, GIZ, and the private sector.

Huawei's participation in GIFEC's PPP project for last-mile infrastructure development in remote rural areas using RuralStar (a technology to create a technically compact backhaul base station with low installation and O&M costs for remote areas in developing countries).

Financial and technical support by GIZ to develop start-up companies.

5) Potential Assistance Needs

- Integration of digitized public services provided by various ministries into GhanaGov. so that people can use GhanaGov as a one stop center.
- Expanding Internet access via satellite in rural areas where broadband service is not yet available.
- Support for the promotion of digitalization of community facilities (schools, health facilities, etc.) in collaboration with GIFEC's Smart Community Project.
- The Ghana Open Data Initiative (GODI), an effort to host ministry datasets in open data format, has been inactive but is being revitalized under the World Bank's E-Transform project. There is also a move to establish a permanent GODI secretariat within the National Information Technology Agency (NITA), and a request was made for financial and technical support for the GODI (dispatch of experts to the GODI secretariat to be established).

6) Expected Areas to be Digitalized

Digitization of community hospitals, schools, agricultural sector and other areas. The government has provided ICT training to general public and civil servants in order to solve digital divide problem in a whole country. Trainings were provided to 188 managers of community ICT centers, 1,720 civil servants at MMDA at community ICT centers. More than 5000 artisans were trained. Furthermore, coding utilizing JAVA script, Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) were taught to children and youth at schools.

7) Potential of Using Data for Innovation in Public Service Improvement

- Data-driven policy formulation and decision-making
- Improving the efficiency of hospital operations, and improving production and marketing for farmers.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

- A quota system of government procurement from start-ups.
- Improve the environment to make it easier for private mobile network operators (MNOs) to invest in rural infrastructure (e.g., the government negotiates with community leaders when acquiring land, and the government provides Internet access in areas where the return on investment is low and it is difficult for MNOs to invest).

(7) Health

1) Vision and Plans

National Health Strategy

Ghana's National Health Strategy has been revised for 2020. This strategy has been developed in the context of the National Development Planning Commission's (NDPC) medium-term national policy framework. At the same time, the strategy is informed by the UN Sustainable Development Goals (SDGs), the African Union (AU) Vision 2063: "The Africa We Want", ECOWAS Vision 2020, the African Health Strategy (2016-2030) and the African Health Transformation Agenda (2015-2020).

The five policies set out in the strategy are aimed at achieving the following through the promotion of intra- and inter-agency collaboration.

- Strengthen the health service delivery system and increase its resilience to emerging infectious diseases
- Promote healthy lifestyles
- Improve the physical environment (e.g. communication infrastructure and health facilities)
- Improve the socio-economic status of the population
- Strengthen financing to ensure sustainability in the implementation of health sector policies

Ghana E-Health Strategy

Ghana has had a digital health strategy, the GHANA E-HEALTH STRATEGY, in place since 2010. The strategy is a five-year plan that needed to be reviewed in 2015-2016, but the review process started in 2018 and is still under revision.

The new strategy has been prepared in collaboration with WHO and focuses on the seven pillars of WHO's strategy (infrastructure development, guidelines development, compliance strengthening, human resources development, development of services and applications, etc.).

Another three major priorities of the new strategy are the national roll-out of electronic health records, including patient information records, medicines management systems and telemedicine. On the other hand,

the overall priority for the health sector is to improve health services and strengthen the NHIA in order to achieve UHC.

2) Current Situation and Activities

In the digitalization of the health sector, the Ministry of Health carried out a pilot study between 2017 and 2018 in 20 healthcare facilities in teaching hospitals (tertiary care facilities) and states hospitals (secondary care facilities). The aim was to examine the portability of different data, including health service delivery and continuity of care, as well as real-time solutions. As a result, a solution was developed that can be customized to suit different levels of hospitals and deployed across the board. The GHS has introduced electronic medical records in all teaching hospitals in the country except Collet-Bu, Ho, Okomfo Anokye and Tamale.

The GHS has developed its own health information exchange platform called Centre for Health Information Management (CHIM)¹²², which is a dashboard for DHIMS2, maternal and child health, HIV/TB (tuberculosis) E-Tracker and COVID-19 information. The CHIMs are required to be reported by each health facility once a month and are updated with the latest information.

The NHIA has developed e-Claim in collaboration with STL, a private company, and is now able to develop and update the application itself.

3) Challenging area(s)

Through remote interviews with the Ministry of Health, the GHS and the NHIA, it was noted that there were problems with different hospitals and development partners bringing in different types of systems, causing problems with system silos. Another priority for the health sector as a whole is to strengthen the digitization of NHIA in order to achieve UHC. Other issues raised included the weak ICT literacy of health workers and the weak connectivity of the telecommunications infrastructure.

4) Information Systems and Platforms

Based on the remote interviews with the Ministry of Health, GHS and NHIA, the current health information system is summarized as follows.

Information System/Platform Name:

- Ministry of Health/GHS-CHIM (dashboard), DHIS2 (health information system), E-Tracker for maternal and child health, HIV/TB, HAMS (personal database per hospital), SORMAS (surveillance system), Medicines Management Systems etc.
- NIHA-e-Claim

Main Data:

- Health, patient and health insurance information

Owner of the Data/Operator:

- Ministry of Health / GHS and NIHA

Source of Funding/Donor, etc.

¹²² CHIM: <https://chimgh.org/>

- Discussions between the Government of Ghana and donors have been held to determine the proportion of the budget and the main body of the system development.

5) Activities of Development Partners

Global Fund, USAID: Medicines Management Systems

- USAID, KOFIH, DFID: Financial support for NHIA
- Millennium Village funding: Pilot telemedicine/diagnostics activities for COVID-19
- WHO: Support to the Ministry of Health to develop a digital strategy
- GIZ and EU: Assist for SORMAS (Surveillance Outbreak Response Management and Analysis System)

6) Potential Assistance Needs

Based on remote interviews in the field and in-country research (interviews with the Human Development Department at JICA headquarters and desk-top research), JICA Study Team considered that there were needs for support in the following three areas;

- Improving the efficiency of NHIA through digitization to achieve UHC (including data utilization with other ministries and agencies using Ghana Card)
- Promotion of telemedicine/diagnosis (participation of Japanese companies and Japanese knowledge)
- Development of user-friendly applications using mobile phones in the field of maternal and child health

7) Expected Areas to be Digitalized

- Digitalization of NIHA to improve operational efficiency
- Telemedicine/diagnosis (including improvement of ICT literacy of health personnel, especially health workforce in rural area, and development of clinical laboratory information systems)
- Digitalization of the maternal and child health sector, one of the JICA assets

8) Potential of Using Data for Innovation in Public Service Improvement

The development of electronic medical records with a single patient ID and greater interoperability between other health information systems could contribute to the development of evidence-based health policies and strategies through the analysis of medical histories, and to the development of tailor-made drugs using healthcare big data.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

The conditions (environment) for promoting the digitalization of the health sector are as follows.

- Strong leadership by the President
- Collaboration with other related ministries such as NITA and NIA
- ICT literacy of the health workforce

(8) Social Protection

1) Vision and Plans

In Part 2 of Ghana's Medium Term Development Plan 2018-2021 (MTDP) importance of Social Protection is clarified as important tool for poverty reduction and equitable life. The Ghana National Social Protection Policy (2015) prioritizes the following four areas:

- Everyone has access to basic medical care,
- Guaranteed minimum income to access the basic needs of the child's life,
- Guarantee a minimum income for the working generation,
- Guarantee a minimum income for the elderly.

2) Current Situation

<Social Protection>

There are five main social protection programs. It is expected that all flagship programs are integrated and provide for comprehensive support although currently they are implemented individually.

- Livelihood Employment Against Poverty (LEAP) and
- Labor Intensive Public Works (LIPW)

The above two programs have been implemented as components of the World Bank's Ghana Productive Safety Net Project (GPSNP 2010-2019). LEAP is a cash benefit program for the poor and poor households and is managed by the Ministry of Gender, Children and Social Protection (MoGCSP). LIPW is a cash-for-work-based program that supports short-term employment for the poor. It is managed by the Ministry of Local Government, Decentralization and Rural Development (MLGRD). Currently, GPSNP-2 (2021-2024) is being implemented.

- National Health Insurance (NHI) is a medical insurance program managed by the Ministry of Health and aims to promote UHC.
- The Ghana School Feeding Program (GSFP) is a school lunch project started in 2005 under the initiative of the Comprehensive Africa Agricultural Development Program (CAADP) and is managed by MoGCSP.
- The Education Capitation Grant is a program introduced for the purpose of improving access to basic education and improving the quality of education. It has been taken over by the World Bank's Ghana Accountability for Learning Outcomes Projects (GALOP, 2020-2026), which is currently underway.

In addition to the above, there is a pension system for employees (SSNIT: Social Security and National Insurance Trust). The number of subscribers is about 1.6 million (2020), and social security numbers with biometrics have been introduced to the subscribers.

<Digitalization>

The Ghana National Household Registry (GNHR) is being developed and introduced for the effective operation

of social protection systems and the effective identification of beneficiaries. The main supporters are WB and DFID. Of the above five flagship programs, three are being integrated: LEAP, LIPW, and GSFP. Among them, LEAP and LIPW have introduced electronic systems such as e-payment and e-attendance with biometric authentication. LEAP is linked to Ghana Gov, which is being promoted separately by the Ghanaian government. Information on the NHIS: National Health Insurance Scheme is also linked to GNHR.

Birth registration has been supported by UNICEF, and mobile phone registration has been promoted in rural areas, which has shown significant improvements over the last few years.

3) Challenging area(s)

Promotion of the Ghana National Household Registry (GNHR) and Single Window Citizen Engagement Service (SWCES) requires capacity building of the primary data managers, the Ministry of Gender, Children and Social Protection and related local government administrators. Furthermore, cooperation with related government agencies is indispensable.

Since there are non-electrified villages in rural areas, it is necessary to build a system according to the local situation as well as infrastructure development.

4) Information Systems and Platforms

Ghana National Household Registry (GNHR) which include information of beneficiary and household of social protection program and Single Window Citizen Engagement Service (SWCES) which include all citizens' information in the future, is expected to be materialized in both central-level and local-level. The owner of Ghana National Household Registry (GNHR) is Government of Ghana and responsible operator is MoGCSP. Main financial resources and technical donors are World Bank, UK FCDO, EU, UNICEF, UNHCR, USAID and etc.

5) Activities of Development Partners

World Bank: Ghana Productive Safety Net Project (GPSNP-2) (2021-2024) (USD 100 million)

6) Potential Assistance Needs

Promote the Ghana National Household Registry (GNHR), Single Window Citizen Engagement Service (SWCES) and strengthen the information management and monitoring functions of beneficiaries and beneficiary households, and improve interoperability in order to meet the new needs of social protection such as one-stop service,

7) Expected Areas to be Digitalized

- Strengthening the management system of social protect programs through Ghana National Household Registry (GNHR),
- Digitization of all household information,
- Strengthening interoperability with other organizations' MISs,

8) Potential of Using Data for Innovation in Public Service Improvement

Utilize administrative big data on social protection and households for "evidence-based policy making and monitoring."

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Infrastructure development in rural areas where social protection services are provided,
- Capacity building of central and local government officials of MoGCSP, who will be the main managers and users of data and the related officials of other government organizations,
- Notification and enlightenment activities to citizens for understanding of benefits from digitalization.

3.8 Nigeria

3.8.1 National Development Plan and Digitalization of Public Services

(1) National Development Plan

The Nigerian government has formulated a medium- to long-term development strategy “Nigeria Vision 20: 2020” with action plans in three areas: 1) Guaranteeing the well-being and productivity of the People (Eradicate extreme hunger and poverty, Enhance access to quality and affordable healthcare, Provide sustainable access to portable water and basic sanitation, Provide accessible and affordable housing, Build human capacity for sustainable livelihoods and national development, Promote gender equality and empower women, Improve access to micro-credit, Foster a culture of entertainment and recreation for enhanced productivity), 2) Optimize the key source of economic growth (Stimulate primary production to enhance the competitiveness, Significantly increase production of processed and manufactured goods for export, Stimulate domestic and foreign trade in value-adding products and services, Strengthen linkages between key sectors), 3) Fostering sustainable social and economic development (Efficient, accountable, transparent and participatory governance, Competitive, private sector-led business environment characterized by sustained macroeconomic stability, Enhance national security and improve the administration of justice, Promote unity in diversity, national pride and the conservation of the cultural heritage, Develop sufficient and efficient infrastructure to support sustained economic growth, Preserve the environment for sustainable socio-economic development, Promote the sustainable development of Nigeria’s geo-political regions into economic growth poles.

(2) Country Assistance Policy of the Government of Japan

Nigeria is one of the most powerful countries in Africa, with the largest economy and population. It has a presence in the African Union (AU) and the Economic Community of West African States (ECOWAS), and a high potential for becoming a major base for Japanese firms’ economic activities in Sub-Saharan Africa. Development cooperation with Nigeria will not only contribute to regional development and reinforcing the diplomatic relations between Japan and Africa, but it will also contribute to improving the investment environment for foreign companies, including Japan, when they consider expanding their business to Nigeria. In addition, liquefied natural gas is a major export item to Japan, and maintaining a stable relationship with Nigeria is also important from a viewpoint of stabilizing energy security in our country.

The Nigerian Government aims to become one of the world's top 20 economies by 2020, as stated in the development strategy "Vision 20:2020", and it is active in addressing a range of issues such as diversifying away from the monoculture economy through industrial diversification, infrastructure development serving as the foundation of economic activities, employment creation focusing on youths, social development including improvement of public health, and humanitarian and reconstruction assistance in the North East region. In response to these challenges, Japan’s development cooperation will contribute to stable economic and social development while fully utilizing Japan’s technology and experience.

Table 3.8.1 Country Assistance Policy of the Government of Japan for Nigeria

ODA Basic Policy	<p>Promotion of high-quality and inclusive economic and social development as well as stabilization of society</p> <p>To realize economic and social development and social stabilization, Japan works together with the Nigerian government based on "Vision 20:2020", its medium to long term development strategy. Moreover, Japan implements ODA projects in line with the three priority areas of African development indicated in the Nairobi Declaration, which was the outcome of TICAD VI ((1) Promoting structural economic transformation through economic diversification and industrialization, (2) Promoting resilient health systems for quality of life, (3) Promoting social stability for shared prosperity).</p>	
Priority Areas	<p>Building a foundation for high-quality economic growth</p>	<p>To support: improvement of core infrastructure (especially in the power sector) for the foundation of economic activities; improvement of urban infrastructure (especially transportation, urban water supply and sanitation) as the base of economic activity; and diversification of the economy and promotion of industrial development (particularly agriculture, fisheries and food industry, and private sector).</p>
	<p>Improvement of inclusive and robust health and medical systems</p>	<p>To support: strengthening primary health services; achieving Universal Health Coverage; improving food and nutrition security; and strengthening the capacity for the response and control of infectious disease outbreaks by gaining capacities of laboratories and the Nigeria Centre for Disease Control.</p>
	<p>Promotion of peace and stability including reconstruction assistance in the North (East) Region</p>	<p>To support: humanitarian assistance for internally displaced persons and refugees; reconstruction assistance for social stabilization in sectors such as education, vocational training, job creation, health and nutrition, and agriculture; and counterterrorism measures (etc.) through capacity development of border control and judicial sector (etc.).</p>
Remarks	<p>The security situation remains unstable, mainly in the North East region. For implementing assistance in Nigeria, the security situation should be considered. Close attention needs to be paid to the safety measures of stakeholders and necessary safety measures must be taken. Nigeria is the largest economy in Africa. While classified as "Lower Middle-Income Countries and Territories" on the DAC List of ODA Recipients, it still remains a developing country with the largest poverty population in Africa; thus, inclusive development assistance must be considered.</p> <p>Given the federal regime of Nigeria's governance system, interregional balance should be considered when implementing projects. On the other hand, with regard to the selection of project areas, attention should be paid to the state administrative capacity, governance, and security situation.</p> <p>From the viewpoint of supporting those Japanese companies that focus on the potentiality of Nigeria as a base for economic activities, emphasis should be placed on improvement of investment environment and cooperation between the public and private sectors in each project.</p>	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Nigeria

Nigeria has formulated a national development plan, Nigeria Vision 20: 2020, based on the three pillars of national welfare and productivity, economic growth, and social development. The ICT policy Nigeria ICT Roadmap, 2017-2020, includes governance, e-government, e-commerce, ICT industry, infrastructure, backbone construction, connectivity and coverage expansion, ICT universities, and innovation hub construction. On the other hand, issues such as the spread of ICT skills, insufficient legislation for personal information protection, and national ID programs' proliferation have been identified. The issues have been improved and strengthened through the Digital National ID Project supported by the World Bank.

The country assistance policy of the Japanese government focuses on promoting high-quality inclusive economic and social development and social stability. Its priority areas include basic infrastructure and urban infrastructure, economic diversification and industrial promotion, and inclusive health and medical systems, reconstruction assistance in the northern (eastern) region and its social stabilization through humanitarian assistance for IDPs and refugees, education, and vocational training, job creation, etc. It also mentions supporting the activities of Japanese companies as the largest market in Africa. The JICA Nigeria Office and the Human Development Department of the Headquarters expect to collect information on the possibility of using digital technology in health and education.

Given the above examination, JICA Study Team intends to examine possible supporting programs with a roadmap based on the interviews with relevant agencies and organizations (including World Bank country office) and analyze the current situation and issues in view of inclusive economic and social development and social stabilization. In particular, emphasis will be placed on utilizing digital technology in health, basic education, vocational training, employment matching, industrial promotion and diversification, future perspective of digital ID utilization in various purposes, and the contribution of Japanese companies to Nigeria's society. Specifically, JICA Study Team will first collect and analyze overall information focusing on ICT environment, legislation, and human resource development. Then, based on the discuss with the JICA office, JICA Study Team will develop support programs with a roadmap for the selected priority sectors and areas.

3.8.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation:

1) Vision and Plans

Nigeria ICT roadmap (2017-2020)¹²³

This roadmap has been established with the aim of creating employment opportunities through ICT, creating ICT exhibition centers, and generating ICT innovation. This roadmap consists of the following components.

- Building ICT industry and infrastructure
- Strengthening of laws and regulations
- Capacity building
- Addressing common issues such as information security and innovation

National Digital Economy Policy and Strategy (2020-2030)¹²⁴

As a successor to the Nigerian ICT Roadmap 2017-2020, the National Digital Economy Policy and Strategy 2020-2030 has been formulated. In order to accelerate the Nigerian national digital economy, the policy focuses on the following eight pillars.

- Developmental Regulation (Promoting ICT)
- Digital Literacy & Skills
- Solid Infrastructure (Mainly on telecommunication)
- Service Infrastructure (Providing Digital Platform)
- Digital Services Development & Promotion (Promoting innovative or small and medium enterprise)
- Soft Infrastructure (Strengthening public confidence in the use of digital technologies and participation in the digital economy such as by corresponding cyber security)
- Digital Society & Emerging Technologies (focus on tying the development of the digital economy to indices of well-being in the lives of the ordinary citizens; mentoring startups on emerging technologies and deploying their solutions)
- Indigenous Content Development & Adoption (Leveraging digital talent within Nigeria)

SRAP 2021-2024¹²⁵

In line with the National Digital Economy Policy and Strategy 2020-2030, NITDA has formulated SRAP 2021-2024 as a roadmap and action plan for NITDA. In addition, the NITDA SRAP 2021 – 2024 is driven by three-

¹²³ Federal Ministry of Communications “Nigeria ICT roadmap (2017-2020)”

¹²⁴ Federal Ministry of Communications and Digital Economy “National Digital Economy Policy and Strategy (2020-2030)”

¹²⁵ NITDA “STRATEGIC Roadmap and Action Plan (SRAP 2021 - 2024)”

pronged objectives, which are:

- to articulate a new strategy for NITDA in consonance with the current aspirations of Government, the realities of today and the demands of the future;
- to contribute its quota towards the implementation of National Digital Economy Policy and Strategy (2020-2030) especially within the framework of its mandate; and
- to implement programs that would facilitate the digital transformation of Nigeria.

The seven strategic pillars identified by the Agency as the fulcrum for the roadmap are:

- **Developmental Regulation:** Development of a regulatory framework that unlocks opportunities in the digital economy across all sectors.
- **Digital Literacy and Skills:** Development and adoption of digital literacy standards for Nigeria.
- **Digital Transformation:** Transformation of government services by leveraging digital technologies.
- **Digital Innovation & Entrepreneurship:** Creation of an ecosystem for Innovation Driven Enterprises and MSMEs to thrive.
- **Cybersecurity:** To strengthen the cyberspace and reduce vulnerabilities exploitable by threat actors.
- **Emerging Technologies:** Facilitation of the adoption and adaptation of emerging technologies in Nigeria.
- **Promotion of Indigenous Content:** The creation of an enabling framework for the adoption of home-grown innovation for a digital economy.

2) Current Situation and Activities

ICT laws and regulations

According to our interview with the Ministry of Communications and Digital Economy, Nigeria's ICT-related legal framework continues to improve and there are no major challenges. However, according to a web-based survey, there are some delays in the development of ICT-related laws, such as the lack of a law on electronic commerce¹²⁶¹²⁷.

Table 3.8.2 ICT related Laws and Regulations in Nigeria

Basic ICT Law	NITDA Act Nigerian Communications Act
National ID	the National Identity Management Commission (NIMC) Act
Electronic Signature	Nigerian Evidence Act (Section 93)
e-Commerce	N/A
Personal Data Protection Law	Nigeria Data Protection Regulation
Cyber Security Law	Cybercrime Act 2015
Competition Law	The Federal Competition and Consumer Protection Act
Intellectual Property Law	Intellectual Property Law

Source: Summarized by the JICA Study Team

¹²⁶ Developing Legal Framework for Electronic Commerce in Nigeria: Some Lessons from U.K and Singapore, accessed on 7 October 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3182325

¹²⁷ E-Commerce In Nigeria: Legal Framework, Challenges and Prospect, accessed on 7 October 2021, <https://dailytrust.com/e-commerce-in-nigeria-legal-framework-challenges-and-prospect>

Organization

The ICT-related organizations in Nigeria are as follows.

Federal Ministry of Communications and Digital Economy

The Federal Ministry of Communications and Digital Economy is responsible for overall ICT policy in Nigeria and formulates government policies on the postal, telecommunications and ICT sector. The following semi-governmental agencies are implementing the formulated policies.

NITDA

NITDA regulates, monitors, evaluates and reviews progress on an ongoing basis under the supervision and coordination of the Federal Ministry of Communications and Digital Economy to ensure that the ICT policies formulated by the Ministry are efficiently implemented to promote the development and growth of ICT in Nigeria.

NCC

The NCC implements regulations and procedures to enable private operators in the telecommunications industry to participate in telecommunications. It attracts investment into the country, allows operating companies to compete fairly, and protects consumers.

Galaxy Backbone

Galaxy Backbone hosts the website. Galaxy Backbone manages the government's data center, hosts the data for all government shared services, and provides government-specific cloud services.

NIGCOMSAT

NIGCOMSAT uses satellites to provide broadband and other services.

NiPOST

NiPOST is in charge of the postal service.

NIMC

NIMC issues identification cards for its citizens.

Current status of public service digitization

While Nigeria has made some progress in achieving the goals of the e-Government Master Plan and ICT Roadmap, institutional arrangements, the development of privacy and data protection laws, monitoring the quality of digital services, and many other challenges remain. The Nigerian government has recently launched the Central Portal for Government Services (www.services.gov.ng). It aims to provide a single point of access to government information and services, enhance accountability, and improve the delivery and quality of public services¹²⁸. However, it is not fully functional and is currently undergoing improvements, with error messages appearing when you actually try to access it. There is a government site that serves as a single point of contact for trade, called TRADE.GOV.NG, and it is used by the Central Bank of Nigeria, Customs, Standards

¹²⁸ World Bank Group “Nigeria Digital Economy Diagnostic Report”

Organization of Nigeria (SON) and all other government agencies related to trade services.

The digitization of public services is the responsibility of the Federal Government's Head of Civil Service as of 2021, and will be expanded to all MDAs in the future. Sectors that are being digitized include electronic signature and authentication, finance and IDIS, JIDMIS, procurement, taxation, customs, health, and education. Compliance and government revenue alignment are also being digitized. However, not all agencies have been digitized at the same level.

NITDA has developed an interoperability framework, which is currently under implementation, and is working to increase interoperability among government systems. However, it is informed that it is not working well.

3) Challenging area(s)

- At the federal level, ICT strategies have been established and various efforts are being made, but efforts at the local level are not sufficiently advanced.

4) Potential Assistance Needs

- Support for developing ICT strategies at the local level and support for implementing ICT strategies

5) Condition: Infrastructure, Policy, Human Resource, and etc.

In order to support the formulation and implementation of ICT strategies at the local level, leadership on the part of the federal government and cooperation between the federal and local governments are necessary to enhance interconnectivity.

(2) ICT Human Resource Development

1) Vision and Plans

Nigeria Vision 20: 2020

Nigeria Vision 20: 2020 is a national vision that aims to place Nigeria among the 20 leading countries in the world by the year 2020. Concerning the ICT sector, it aims to promote and enhance local production and content development, and states that this should be achieved primarily by the private sector through the promotion of innovation and entrepreneurship. In terms of human resource development, the plan states making school curricula more relevant to meet the needs of the labor market, with an emphasis on ICT skills development.

National Digital Economy Policy and Strategy (2020-2030)

National Digital Economy Policy and Strategy (2020-2030) was developed by the Federal Ministry for Communications and the Digital Economy. It has eight pillars, of which Pillar #2 is “Digital Literacy and Skills”. The policy objectives of this pillar are 1) to integrate digital literacy/skills into the national education curriculum at all levels, 2) to support training and capacity building among public sector employees, 3) to create a pool of digitally skilled personnel, 4) to bridge the gap between the academia and industry, and 5) to lower the access barrier to digital tools for the citizens.

Nigeria E-Government Master Plan

E-Government Master Plan, developed by the Federal Ministry of Communications with the support of KOICA,

refers to ICT human resource development. It suggests the inclusion of ICT education in the national curriculum, the development of human resources with ICT skills, and ICT capacity building and training for public sector employees.

The Nigeria e-Government Interoperability Framework (Ne-GIF)

Nigeria e-Government Interoperability Framework (Ne-GIF), developed by NITDA in 2019, states that interoperability among ministries and agencies is necessary to realize e-government. There are three types of interoperability, namely organizational interoperability, semantic interoperability, and technical interoperability. It points out it is necessary to build up skills and expertise through capacity building to achieve organizational interoperability.

National Information and Communication Technology (ICT) Policy

National Information and Communication Technology (ICT) Policy, developed in 2012 by the Federal Ministry of Communications and Technology, states that the ICT skills level of ICT professionals and the general public of Nigeria are still very low. The policy mentions that considering enormous potential of ICT for Nigeria's socio-economic development, strengthening the ICT workforce should be a top priority. It also recommends measures to achieve this, including the inclusion of ICT subjects in the education curriculum, human resource development of ICT professionals, and the improvement of ICT skills of public servants through training program.

NITDA Strategic Roadmap and Action Plan (SRAP) for 2021-2024

SRAP shows sets out specific action plans in line with the National Digital Economy Policy and Strategy (2020-2030) including a range of initiatives on digital literacy and skills.

2) Current Situation and Activities

ICT Human Resource Development in the public sector

- The Administrative Staff College of Nigeria (ASCON) provides training to the staff of all three tiers of the government (federal, states and provinces). ASCON also provides ICT-related training programs, the aim of which is to ensure that all public servants are computer literate and able to carry out their duties effectively, so that public services can reach every corner of Nigeria.
- e-Government Training Centre (e-GTC) located at the Public Service Institute of Nigeria (PSIN) provides a range of e-government training programs for public servants.

ICT Human Resource Development in the private sector

The Nigerian Computer Society (NCS), an association of the Nigerian ICT industry, provides ICT training to ICT practitioners, and also advises the government, and other relevant organizations on national and international policy matters affecting the ICT industry. NCS has established partnerships with similar associations overseas, such as the British Computer Society (BCS).

3) Challenging area(s)

ICT capacity in the public sector

- As states and provinces are independent from the federal government, the extent to which they have digitalized public services varies among them. The digital skills of employees of states and provinces are generally very low, although this varies.
- The Nigerian government has formulated policy documents such as the National Digital Economy Policy and Strategy (2020-2030) and the Nigeria E-Government Master Plan. However, civil servants on the ground are not necessarily familiar with this trend and are not willing to take the initiative in promoting digitalization of public services. There is a huge gap between the ideals envisaged in the policy documents and the reality of civil servants on the ground.
- ASCON provides trainings to the staff of all three levels of government - federal, states and provinces - but supply is not keeping pace with the increasing demand. The facilities and equipment of ASCON to provide for ICT training is not sufficient.
- The digital and ICT skills that civil servants need to acquire in order to promote the digitalization of public services are not sufficiently identified. Furthermore, there is no human resource development mechanism in place to provide the necessary training to civil servants on a systematic and continuous basis.

ICT capacity in the private sector

- The demand for IT professionals is very high. There is a gap between the skills needed and the actual skill levels of IT professionals.

4) Activities of Development Partners

- KOICA will provide support to the Ministry of Communications and Digital Economy to deepen the e-Government Master Plan by establishing a digital infrastructure for e-Government and providing consulting services. Through this support, capacity building of the members of the Digital Transformation Technical Working Group (DTTG) will be carried out.
- KOICA supported the establishment of the e-Government Training Centre (e-GTC), which is located at the Public Service Institute of Nigeria (PSIN) in Abuja.

5) Potential Assistance Needs

- The Nigerian government is committed to the implementation of e-government with clear objectives. Though e-Government Training Centre (e-GTC) is providing training programs on e-government to civil servants, it is unlikely that the e-GTC alone will be able to cover training for all public servants including employees of states/provinces. Therefore, it seems that there is a need for the support to enable the provision of training in digitalization, including e-government, to a larger number of public servants.
- While it is not necessary for civil servants themselves to have advanced ICT skills, they need to understand the characteristics of digital technologies and take the initiative to use them to improve public services by formulating the necessary policies and social systems. There is a need for support for initiatives that promote an understanding of the Nigeria's e-government agenda for all civil servants, regardless of their job role.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

- While the Nigerian government has a clear goal and commitment to realize e-government, it is essential to change the mindset of public servants (employees of all the tiers of government: Federal, states and provinces) and make them acquire digital skills to achieve this goal.

(3) ICT Infrastructure

1) Vision and Plans

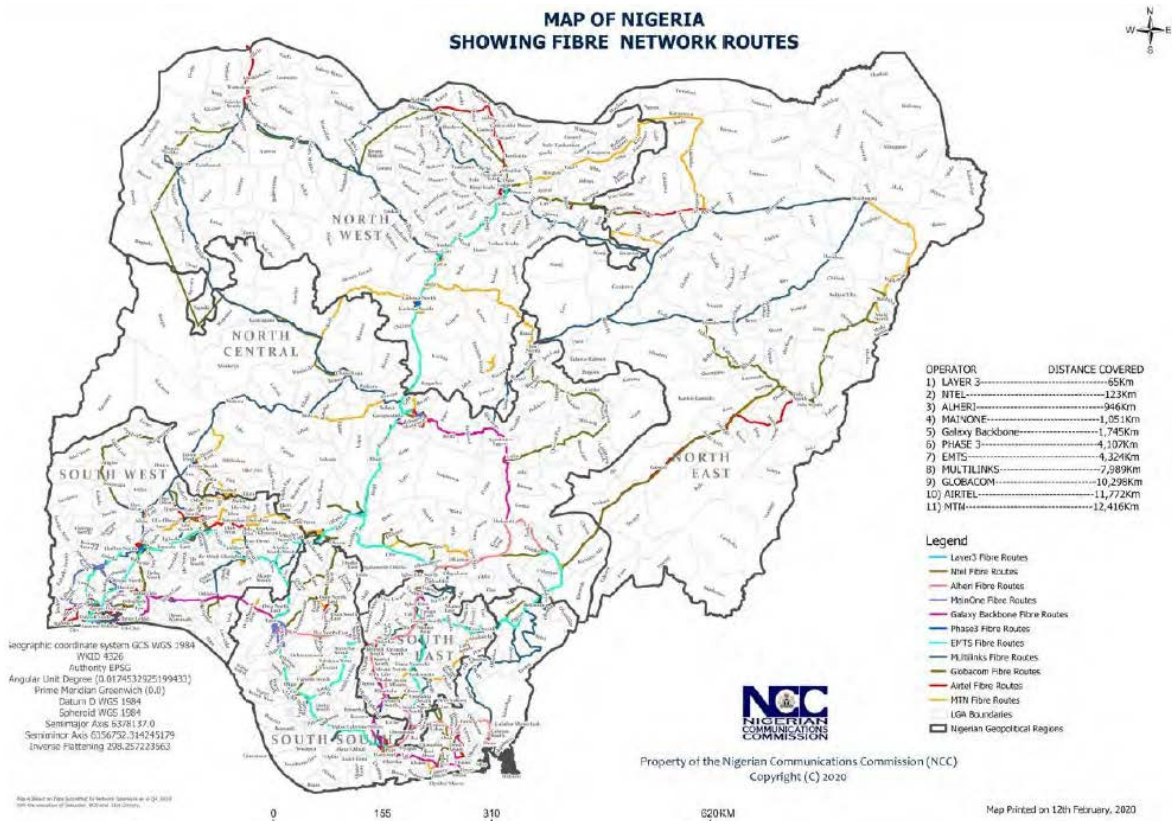
The Nigerian National Broadband Plan (2020-2025) was formulated as a vision/plan of ICT infrastructure development in Nigeria by Nigeria's Minister for Communication and Digital Economy in March 2020. The plan is to indicate actions to deploy broadband network covering entire regions of Nigeria and consists of eight major development points/fields that are (i) Developmental Regulation, (ii) Digital Literacy and Skills, (iii) Solid Infrastructure, (iv) Service Infrastructure, (v) Digital Services Development & Promotion, (vi) Soft Infrastructure, (vii) Digital Society & Emerging Technologies, and (viii) Indigenous Content Promotion & Adoption. The target/goal of plan is to provide 10Mbps broadband services in the year of 2023 and 25Mbps broadband services in 2025 even in rural area by enhancing last mile connections.

2) Current Status of ICT Infrastructure

International Backbone Network

International gateways in Nigeria are located at three cable landing stations, that is Lagos, Bonny, Kwa Ibo, which are connected with nine international submarine cables.

Figure 3.8.1 Route Map of Optic Fiber Network in Nigeria (4th Quarter of 2019)



Source: Nigerian National Broadband Plan (2020-2025)

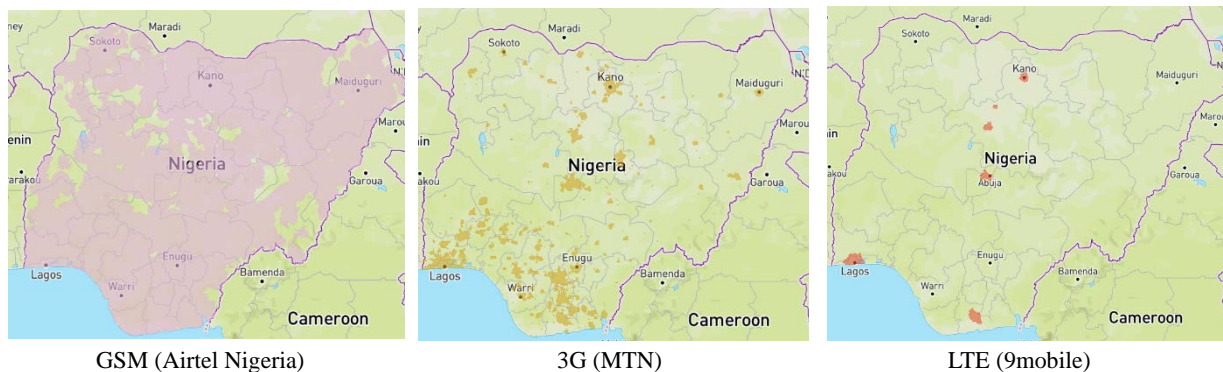
Domestic Backbone Network

The national communication backbone has been implemented by various network operators. The total length of optic fiber network is around 54,000 km as shown in Figure 3.8.1.

Mobile Network

Four Mobile Network Operators (MNOs), that is MTN, Globacom, Airtel Nigeria, and 9mobile (Etisalat Nigeria), provide GSM mobile services, and two MNOs (Visafone and Multi-Links) supply CDMA mobile services. 2G GSM mobile services are provided in almost all areas of Nigeria by those MNOs though, 3G and 4G LTE services are available at main cities only.

Figure 3.8.2 Mobile Coverage of MNOs in Nigeria



Source: GSM Association

Data Centre

Three data centers listed below are established and operated in Nigeria.

- Rack Centre (Tier III)
- LOS1 Lagos Data Centre
- IS Nigeria Data Centre

IXP (Internet Exchange Point)

The IXPs of Nigeria are established at three (3) cities as shown in table below, and those IXPs are operated and maintained by Internet eXchange Point of Nigeria Ltd.

Table 3.8.3 IXPs in Nigeria

Location	IXP	Operator
Abuja	Abuja IX (IXPN)	Internet eXchange Point of Nigeria Ltd.
Lagos	Internet eXchange Point of Nigeria (IXPN)	Internet eXchange Point of Nigeria Ltd.
Port Harcourt	Port Harcourt IX (IXPN)	Internet eXchange Point of Nigeria Ltd.

Source: The African IXP Association

3) Challenging area(s)

Although the backbone network connecting with major cities have been deployed, network system covering rural area is still insufficient in Nigeria. A shortage of human resources related ICT infrastructure planning, design, construction and O&M is another issue.

The penetration of mobile services is significantly increasing recently, however that in rural area is still low. Also, the penetration of fixed broadband services is quite low due to poor deployment planning, difficulties in license acquisition, prominence of wireless broadband services, etc.

4) Activities of Development Partners

The optic fiber network in Nigeria has been implemented mainly by the fund source of Chinese Government.

5) Potential Assistance Needs

Although several assistances have been provided from other donors and/or patterners, there are still areas where ICT infrastructure is not yet in place, and the Government of Japan (GOJ) could provide support to these areas by implementing public Wi-Fi and/or broadband wireless network such as LTE.

In addition, ICT infrastructure facilities could also be developed in line with other sectors' assistance plan.

6) Potential of using data for innovation in public service improvement

There is a possibility of using high-altitude/stratospheric drones to provide last-mile connectivity to rural areas. This technology is expected to provide a stable supply of high-speed wireless communications using drones that can meet the communication needs of rural, unelectrified areas, and is more cost-effective than ground ICT infrastructure that requires a time-consuming and costly construction as ground ICT infrastructure such as Public Wi-Fi and LTE require the provision of Access Points (APs), base stations and terrestrial access networks to connect the APs and base stations to the backbone network). Swift Engineering, Inc. of the US has

already successfully commercialized, test-flown, and test-communicated high-altitude/stratospheric drones in early 2020, and has begun providing solutions to meet the demand. Although HAPS Mobile, a member of the Softbank Group, is also developing this technology, it has yet.

(4) National ID

1) Vision and Plans

Nigeria Vision 20: 2020

In "Nigeria Vision 20: 2020" formulated in 2009, it is pointed out that socio-economic infrastructure including ICT has not reached the level required for realizing sustainable growth, and the direction is shown to proceed with modernization of infrastructure by incorporating the vitality of the private sector effectively and efficiently.

2) Current Situation and Activities

All citizens (including adults and children) are obliged to obtain a national ID, and a national ID card with biometrics (fingerprint, iris) will be issued. Since there is a possibility that the biometric information may change significantly during the growth period for those under 16 years old, the biometric information on the card is updated every two years. In addition to authentication, national ID cards are used for payment functions for financial inclusion, but as of 2017, there are more than 13 ID programs, and the registration rate of national IDs is extremely low at 6%. In order to drastically improve this situation, NIMC (National Identity Management Commission), which was established in 2007, has a five-year plan from last year (2020) to 2024 with the support of the World Bank and is currently carrying out a large-scale project to integrate various IDs (including CVRS) into national IDs and digitize them. The outline is as follows.

- Total project cost: USD 430 million
- Period: February 2020-June 2024
- Component 1: Legal framework development
- Component 2: ID management system implementation
- Component 3: Data Linkage - Candidates: Finance (eKYC), Tax Payment (TIN), Health, Social Security, Education, etc.
- Component 4: Project management
- Risks: Overall, the risk is perceived to be very high, especially political risk, technical risk, legal risk, organizational capacity risk, and inter-stakeholder coordination risk.

The project involves all data-gathering agencies, including NIMC, the National IT Development Agency (NITDA), the Federal Tax Service, the Immigration Department, police, and correction centers. There is a Federal Steering Committee chaired by the Secretary of the Federal Government, which is a joint committee with a secretariat at NIMC. NIMC is also in charge of procurement for this project. NITDA is participating to promote interoperability. In addition, there is a technical committee and a legal committee.

- Data protection regulations were enacted in 2019.
- (Note) As per the instruction of the JICA field office and the Japanese embassy in Nigeria, NIMC was not

approached, and the World Bank did not respond within the deadline. The above is a summary of the documentary surveys and hearings with the pertinent institutions (NITDA and Federal Tax Service (FIRS)).

3) Challenging area(s)

There is an urgent need to integrate the various ID programs in disarray. (Currently, a World Bank-led project for integration is underway)

4) Information Systems and Platforms

- Information System/Platform Name:
- Main data:
- Information stored on the card: National ID Number (NIN), face photo, fingerprint, iris, digital signature
- Information stored in the database: name, address, parents' name, relatives, place of birth, physical characteristics, address of self and parents' hometown, address of relatives
- Owner of the Data/Operator: NIMC
- Datacenter: The main data center is located at the NIMC headquarters in Abuja, and the secondary server is located at the DR site on the outskirts of Abuja.
- Source of Funding/Donor, etc.: The World Bank

5) Activities of Development Partners

The World Bank ID integration and digitization project is underway.

(5) E-Government

1) Vision and Plans

"The National Digital Economy Policy and Strategy 2020-2030 defines e-government and cybersecurity as its main pillars. The Federal Ministry of Communications and Digital Economy, together with the Korea International Cooperation Agency (KOICA), has formulated the National e-Government Master Plan to oversee the implementation of e-government in the country. Based on the Master Plan, the federal government will conduct high-level discussions with state government officials who wish to establish e-government, carry out e-Government assessment and gap analysis on the State Government policies, institutional framework & structure, other success factors, IT infrastructure and other IT resources), develop the State e-Government Master Plan through a phased approach that includes report of analysis, strategy formulation, definition and identification of strategic initiatives, implementation plan and program management and official present the State e-Government Master Plan to the State Government and relevant stakeholders. "The Nigeria 1e-Government Interoperability Framework (Ne-GIF) (2019.8) sets as one of its goals the efficient delivery of public services by multiple government agencies at an acceptable cost to citizens. The Ne-GIF (2019.8) is a framework for developing interoperability among multiple government agencies that provide public services using ICT.

2) Current Situation and Activities

"SERVICES.GOV.NG" (www.services.gov.ng), which was launched as an entry point for federal government information and service delivery, enhanced accountability, and improved public service delivery and quality, is an ongoing project and is not fully functional. There are various services that need to be integrated into "SERVICES.GOV.NG" to provide digitalized public services under the jurisdiction of the federal state, such as national ID, passport, driver's license, digital signature and authentication, digital finance, digital procurement, digital taxation, digital customs clearance, digital health, digital education, digital immigration, and digital voting. The World Bank, through its ongoing Digital Identification for Development Project, is supporting the integration of all e-government services to the national identity.

State governments wishing to develop their own e-government service portals are consulting with the National Information Technology Development Agency (NITDA) to formulate ICT policies that meet their needs and build e-government platforms. As of 2020, the Head of Civil Service of the federal government is engaged in digitization, but this will be expanded to all ministries and agencies in the future.

One example of a public service that proceeds with digitalization is tax collection and payment (Federal Inland Revenue Service, FIRS). As the federal government's tax administration system, FIRS has developed in-house "Tax Pro Max" to replace the previous "Tax Administration System (ITAS)". TAX Pro Max registers all taxpayers and integrates all payment platforms in the country. All ministries have been integrated, tax forms are in place, and revenue is being raised. In the year from June 2020 to June 2021, tax revenue increased by about 25%, from NGN 526billion to NGN 650 billion. There is no interoperability between the federal government's tax management system (Tax Pro Max) and the state governments' tax management systems. Not all states have automated their tax management systems, and not all states are required to integrate their state government systems with the federal system. In fact, fewer states have automated their tax administration systems than those that have not. The federal government collects corporate income tax (limited liability companies. Public limited companies) and value-added tax, and allocates the value-added tax between the federal and state governments according to a formula determined between the federal and state governments. The state government collects personal income tax and enterprises income tax. All federal taxes can be paid online.

3) Challenging area(s)

From government's points of view, the following challenges exist to provide digitalized public services:

- "There are various services that need to be integrated into "SERVICES.GOV.NG", while some ministries are reluctant to upload non-sensitive data. There is a need to increase trust in "SERVICES.GOV.NG" and to develop interoperability among ministry sites.
- The e-government program at the federal level in Nigeria is managed through a Public-Private Partnership (PPP) scheme, with a tripartite agreement between the federal government (NITDA), strategic technology partners such as the entrepreneurs who innovate and start up business, higher institutions which enhances talent, corporate organization who absorb the human capital and private investors, resulting in duplication

of responsibilities and time-consuming effective coordination.

From users' point of view, e-government public services are still not easily accessed and utilized. The followings should be tackled with in order to solve the low utilization problem: a) People's low awareness about government portals and the services available on the sites; b) most Nigerians do not trust online services, especially financial transactions through digital finance due to cybersecurity and weak data protection laws; c) theft and destruction of equipment, low ICT literacy and resistance to change; d) frequency range and last mile to home are problematic for regular and sustainable use of services; e) lack of human resources in the ministries responsible for ICT including lack of maintenance staff for digitized service delivery in rural areas; and f) inadequate fiber, mobile Internet coverage, roads, and energy infrastructure. Due to physical distance from urban areas, etc., people do not have daily access to internet and mobile phones in rural areas.

4) Activities of Development Partners

Korea International Cooperation Agency (KOICA)

Phase 1: Support for the development of a national e-government master plan from 2013 to 2019. KOICA has spent USD 500 million towards the realization of e-Government for Nigeria. Through the project, transparency and effectiveness of government services provision were expected, thousands of the government officials had been trained in Korea while some attained programs in Nigeria, and an e-Government training center was established in Public Service Institute Training Centre.

Phase 2: Deepening of the National e-Government Master Plan: establishment of a digital infrastructure for e-government and provision of consulting services; capacity building support for the National Information Technology Development Agency, Galaxy Backbone (a wholly government-owned communications technology service provider). Total amount: USD 13 million (signed in September 2021). (Cooperation period: 5 years; CP agency: Ministry of Communications and Digital Economy)

5) Potential Assistance Needs

- High priority areas for the government include: e-signature and authentication, e-finance and IDIS, JIDMIS, e-procurement, e-taxation, e-customs, e-health, and e-education.
- In order to digitize public services, it is necessary to digitize paper-based documents in the government in line with improvement of workflow.
- JICA Nigeria Open Innovation Challenge (2019.5) Study on the possibility of using STI (Science and Technology Innovation) of start-up companies to improve existing public services, a project related to TICAD7.

6) Expected Areas to be Digitalized

To strengthen Tax Pro Max, which currently has no cooperating donors, it is expected to help the FIRS (Federal Income Tax Service) to digitize its documents.

7) Potential of Using Data for Innovation in Public Service Improvement

- Improving the quality, speed, etc. of public services through e-government SERVICES.GOV
- Industrial promotion through TRADE.GOV, an e-government on trade
- Improving administrative efficiency through digitization of ministries and agencies
- Improving tax collection and payment and increasing tax revenue through the Federal Tax Administration TAX Pro Max

(6) Education

1) Vision and Plans

Education for Change, A Ministerial Strategic Plan (2018-2022)

It points out that the existing policies do not meet society today. It recommends that existing policy needs to be reviewed, revised, and then distributed to stakeholders by printing over 100 million copies.

National Policy on Information and Communication Technologies (ICT) in Education

In accordance with the above plan, 10 outcomes in utilization of ICT in education were described, with the promotion of the teaching and learning process at the top of the list. It also raises human resources development, infrastructure development, research and development, sensitization, governance, finance, and monitoring and evaluation as seven priority areas with policy statement and strategies.

National Implementation Guidelines for ICT in Education

In order to implement the above new policy, guidelines following the policy was also developed in parallel and distributed.

2) Current Situation and Activities

As described above, policy with concrete guidelines were released in May 2019. The progress may be more active in the area of online learning because of unexpected prevalence of COVID-19 now. Infrastructure development may take a certain time. Accordingly, those learners having access to internet may benefit more from the implementation of the policy as of now.

3) Challenging area(s)

The new policy seems to start its implementation specially in urban areas, however, it may be widening gaps of digital divide.

Three states in Northeast that JICA puts priority are found out that communication network is very poor at this moment. For the study team failed to conduct online meeting due to bad network connectivity. According to written information collected, it seems that basic infrastructure such as desks and chairs for students as well as facility such as science laboratory have higher priorities than ICT related needs.

4) Activities of Development Partners

In the three priority northeast states by JICA Nigeria Office, Yobe State reported that there are UNICEF, Better Education Service Delivery for All by WB, Universal Basic Education Commission by UBEC as development partners assistances. Other states have not reported details.

5) Potential Assistance Needs

Three priority states in northeast seem to have priorities in basic infrastructure such as desks and chairs for students as well as facilities such as science laboratory but not digitization of education.

6) Expected Areas to be Digitalized

As stated above, where priorities lie in basic school infrastructure, there is no expected areas to be digitalized in three northeast states.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

In the three priority states in northeast, basic infrastructures for schools have priorities to digitalization of education.

(7) Health

1) Vision and Plans

National Strategic Health Development Plan II (2018-2022)

The National Strategic Health Development Plan II (2018-2022) builds on the assessment and lessons learned from the first National Strategic Health Development Plan (2010-2016) and ensures that it is also consistent with Vision 20:2020 of the Economic Recovery and Growth Plan (ERGP), the country's medium-term economic development plan. It also takes care to ensure consistency with the Vision 20:2020 of ERGP.

The Second National Strategic Health Development Plan (2018-2022) prioritizes the achievement of UHC as an overarching goal and is structured around five strategic pillars;

- Strengthening leadership and governance and improving the environment for community participation and collaboration with health partnerships
- Increasing the uptake of a comprehensive package of health care covering maternal and child health and nutrition, communicable and non-communicable diseases, mental health, aged care and NTDs
- Strengthening health systems (focusing on human resources, health information systems, medicines, vaccines and other medical technologies, disease surveillance and research)
- Strengthening rapid response to health emergencies and risks such as emerging infectious diseases, Covid-19
- Strengthening sustainable financing

National Health ICT Strategic Framework 2015-2020

The National Health ICT Strategic Framework 2015-2020 exists, but no post-2020 strategy or plan has been published. The strategy for the period up to 2020 is to promote the active use of ICT technologies to ensure that people have access to the healthcare services they need and to contribute to achieving Universal Health Coverage (UHC).

2) Current Situation and Activities

National Health ICT Strategic Framework 2015-2020 sets out performance indicators for the contribution to UHC and the use of ICT technologies. For example, UHC includes utilization of health services and health

insurance coverage, while ICT technology includes the extent to which birth registration and health information systems are linked and the extent to which e-learning is used to train health workforce.

Short-term objectives include the establishment of a sustainable financing mechanism for the use of ICT in the health sector, the development of guidelines for the digital health sector, and the identification of priorities in the digital health.

3) Challenging area(s)

Through a remote meeting with the Ministry of Health, it was learned that there is a system for monthly reporting from the states to the coalition government using DHIS2, but that interoperability is a challenge. In addition, the Ministry of Health, with support from WHO, UNICEF and USAID (both technical and financial), is trying to train medical personnel to use ICT, but even after training, the trained personnel themselves are leaving the government and the quality of human resources is not improving. Other issues he mentioned were the lack of infrastructure and devices such as electricity and tablets.

4) Information Systems and Platforms

Based on remote interviews with the Ministry of Health and other stakeholders, and preliminary in-country research (desk top research), the following is a summary of the current health information system.

Information System/Platform Name

- DHIS2

Main Data

- Health and health information in each health facility

Owner of the Data/Operator :

- Ministry of Health

Source of Funding/Donor, etc.

- The budget of the government is running it

5) Activities of Development Partners

- WHO, UNICEF and USAID are supporting capacity building, including ICT literacy, as part of health workforce development
- GIZ and the EU are assisting in the digitization of the Surveillance Outbreak Response Management and Analysis System (SORMAS) disease surveillance system

6) Potential Assistance Needs

Ninja Cup held in 2020, Nigeria received a large number of applications from the health sector, and four of the eight companies selected (telemedicine, emergency medicine, pharmacy networks, etc.) were in the health sector. Therefore, digitalization in the form of collaboration with start-ups (public-private partnerships) is a good possibility.

7) Expected Areas to be Digitalized

- Promotion of telemedicine (improvement of the quality of health services to achieve UHC, ex) Improving the efficiency of electronic medical records by harmonizing among the health facilities, and to cope with infectious diseases such as Covid-19)

8) Potential of Using Data for Innovation in Public Service Improvement

The promotion of telemedicine will enable the accumulation of good practices (improvement in the quality of diagnosis and diagnostic efficiency) through digitalization, which will contribute to the improvement of the quality of health care professionals, thereby improving the overall quality of health care services and ultimately increasing public confidence and satisfaction.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

The conditions (environment) for promoting the digitalization of the health sector can be summarized as follows.

- Government commitment, skills and motivation of the health workforce
- Improving Interoperability
- Matching and commitment from Japanese companies
- Compliance with the Personal Information Protection Act

(8) Social Protection

1) Vision and Plans

Nigeria Mid-term National Development Plan 2021-2025 describes promotion of poverty reduction and Social Protection in Chapter 6 Social Development. Social Protection is expected to identify potential beneficiaries of social security programs and ensure accountability and transparency through innovative solutions.

Nigeria has a high poverty rate, and it is estimated that the population in extreme poverty will increase from 42.8% in 2016 to 45% by 2030¹²⁹. The poverty rate varies by region, especially in the northern and rural areas. In the National Social Protection Policy 2016 (NSP) prepared in 2016, poverty reduction is listed as the first policy goal, and the provision of a social protection program for that purpose is listed as a policy goal. The eight priority areas are as follows. (i) Education and health services, (ii) Social welfare and child protection, (iii) Housing security, (iv) Income compensation / employment, (v) Social insurance scheme, (xi) Social welfare, (xii) Traditional family / community support, (xiii) Rules / regulations.

2) Current Situation and Activities

<Social Protection>

Program for the poor (non-contributory program)

The National Social Safety Net Coordinating Office (NASSCO) was established in 2016 with the support of the World Bank (National Social Safety Net Project, 2016) with the aim of strengthening safety nets and social security programs. Currently, social security programs are consolidated into NASSCO and a National Social

¹²⁹ WB, Advancing Social Protection in a Dynamic Nigeria (ASA P165426), 2019.

Registry has been established for efficient implementation of effective programs. The main National Safety Nets Project (NASSP) programs are as follows.

- YESSO: Youth Employment and Social Support Operations is providing life skills training, grants and retraining to promote employment of vulnerable youth.
- CSDP: Community and Social Development Project is a program to distribute subsidies to promote the development of vulnerable communities.
- CTP: Cash Transfer Program has started in 2016, when NCTO (National Cash Transfer Office) was established as implementation body for this program, for aiming to provide cash transfer for vulnerable person and household.
- CDP: Child Development Grant Program is a pilot project supported by Save the Children (Zamfara and Jigawa States) funded by DFID. It includes unconditional cash benefits for pregnant women and women with infants under the age of two aiming to suppress stunting.

National Health Insurance Scheme (NHIS) (<https://www.nhis.gov.ng/>)

It was established by the NHIS Act of 2004. It aims to achieve UHC by covering three sectors: the formal sector, the informal sector, and the vulnerable group (pregnant women, infants under 5 years old, prisoners, retirees, and the elderly).

The main program for the formal sector is the contributory “The Formal Sector Social Health Insurance Program”, which targets civil servants, military and police and security services, and private companies with more than 10 employees. An online registration and payment system has been established. It is managed by the Ministry of Health.

There are two main services targeting the informal sector: i) “Tertiary Institutions Social Health Insurance Program (TISHIP)”, a system for spending health management of students at higher education institutions from pool funds through student donations. The target higher education institutions are (1) universities, (2) educational colleges, technical colleges, agricultural colleges, unit price colleges, nursing schools, midwifery schools, health technology schools, and (3) other specialized educational institutions. The other one is ii) “Community-based Social Health Insurance Program”. This program is for groups such as households / individuals or occupational groups. Under the ethics of mutual aid, pool funds are formed, and members participate in their management. At least 50% of group members are required to be willing to join the program (or a group with at least 1000 members). There is a defined procedure for registrant registration, and a membership card or the like that supports member identification is required.

The last one is “Vulnerable Group Social Health Insurance Programs” which are aimed at individuals who are unable to carry out sufficient economic activity due to their physical condition, including aging. By target group, they are classified into (i) disabled people, (ii) prisoners, (iii) infants under 5 years old, (iv) pregnant women, and (v) elderly people.

National Pension Program (<https://www.pencom.gov.ng/>)

It is intended for civil servants and private companies with 14 or more employees. There are more than 20,000 registered companies (2020). It covers old-age pensions, disability pensions, and survivor pensions. The executing agency is the National Pension Commission, which is supervised by the Ministry of Finance, Budget & National Planning.

Nigeria Social Insurance Trust Fund (<https://www.nsitfweb.com.ng/html/AboutUs.cfm#>)

It is a provident fund scheme for private companies, established in 1961. It aims to compensate for economic losses from retirement, employment suspension, invalidation or death to provide poverty reduction measures under ILO Convention No. 102. It is known as a compulsory savings scheme, with contribution from both labor and management. Their share is 6% of the basic salary equally. (Currently, civil servants are enrolled in the National Pension Program mentioned above). The Ministry of Labor and Employment is in charge.

<Digitalization>

Through the World Bank National Social Safety Net Project, 2016, social protection programs are being consolidated into NASSCO, which was established in 2016, and continuous support is being provided to build a National Social Registry to effectively and efficiently implementation of social protection programs. The National Social Registry was built in 2019 and beneficiary identification, registration, cash benefits and the introduction of Digital Wallets have been already implemented. The National Social Registry is referable with the National ID issued by the NIMC (National Identity Management Commission).

3) Challenging area(s)

It has not revealed how the National Social Registry, built in 2019, actually works. With decentralization, it seems that the construction of a system to support cash benefit programs in local areas is progressing (<https://ncto.gov.ng/about-us/>). However, according to the 2019 World Bank Report, fragmentation of social protection programs makes it even more difficult for relevant agencies to work together. Fiscal spending on social protection remains low compared to other countries with similar income levels. Furthermore, the ability to disseminate information is weak, and the program has not been made known to potential beneficiaries and related organizations. It is thought that the social protection program itself will be improved and gradually integrated into the National Social Registry.

4) Information Systems and Platforms

National Single Registry which includes information of beneficially and household of social protection program is expected to be materialized in both central-level and local-level. The owner of National Single Registry is Government of Nigeria and responsible operator is Ministry of Humanitarian Affairs, Disaster Management and Social Development. Main financial resources and technical donors are World Bank and etc.

5) Activities of Development Partners

As mentioned above, World Bank supports NASSCO to establish National Social Registry aiming for efficiently implementation of effective SP programs through National Social Safety Net Project, 2016-2022 (USD 180 million).

6) Potential Assistance Needs

- Promote the National Single Registry and strengthen the information management and monitoring functions of beneficiaries and beneficiary households,
- Strengthen targeting and monitoring functions for the poor and vulnerable by promoting the National Single Registry,
- Establish a Beneficiary Household Registry and improve interoperability in order to meet the new needs of social protection such as one-stop service,
- Further promote digital payments utilizing mobile transfer and mobile money in order to build safe and efficient payment methods.

7) Expected Areas to be Digitalized

- Strengthening the management system of social protect programs through National Single Registry,
- Digitization of all household information,
- Strengthening interoperability with other organizations' MISs,
- Promotion of digital payments utilizing digital transfer and digital money.

8) Potential of Using Data for Innovation in Public Service Improvement:

Utilize administrative big data on social protection and households for "evidence-based policy making and monitoring."

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Infrastructure development in rural areas where social protection services are provided,
- capacity building of central and local government officials of MGLSD, who will be the main managers and users of data,
- Notification and enlightenment activities to citizens for understanding of benefits from digitalization,
- Introducing ID for smooth implementation for Beneficiary Household Registry

3.9 Angola

3.9.1 National Development Plan and Digitalization of Public Services

(1) National Development Plan

The Government of Angola has formulated the “Angola National Development Plan (2018-2022)” with the action plans in six areas including, 1) Human Development and Welfare (Education and higher education, Human resource development, Health, Social protection, Housing, Culture, Sports), 2) Sustainable and Diversified and Inclusive Economic Development (Public finances, Business environment, competitiveness and productivity, Promotion of production, import replacement and export diversification, Environmental sustainability, Employment and working conditions), 3) Infrastructure for Development (Transportation and logistics, Energy and electricity, Water and sanitation, Communications), 4) Peace, Democracy, Rule of Law, Governance, Reform and Decentralization (Democracy and civil society, Governance, state reform and modernization of public administration, Decentralization), 5) Harmonious Development of the Territory (Territorial development, Spatial planning and urbanism), 6) International and Regional Contexts (National defense, National and citizen security, Strengthening of the Angola’s role).

(2) Country Assistance Policy of the Government of Japan

Angola has abundant energy and mineral resources such as oil and diamonds, and has great potential in agriculture and fisheries, and is of great interest to Japanese companies. Japan's ODA to Angola not only supports the country's development efforts, but also provides lateral support for the business expansion of Japanese companies and contributes comprehensively to the country's economic development.

In addition, Angola has maintained a stable domestic political situation since the end of the civil war that lasted about 30 years in 2002, and in the international arena, CPLP (2 years from 2010) and SADC (1 year from 2011). Angola has been increasing its presence as a regional power by serving as a chair country and a non-permanent member of the UN Security Council (two years from 2015).

On the other hand, the country's economy is still dependent on oil, and the economic situation has deteriorated due to the slump in oil prices since the latter half of 2014. Although the government has set industrial diversification as an urgent priority by fostering non-oil sectors such as agriculture, manufacturing, and service industries, it is making efforts, but there is a decisive shortage of human resources and funds that contribute to industrial development. In addition, the demining work necessary for the development of the basic social infrastructure that collapsed due to the effects of the civil war, regional development, and the stability of the lives of local residents is still insufficient even ten years after the civil war. The Human Development Index (2015) is still low at 149th out of 188th, and there is an urgent need to improve social services.

For this reason, Japan will respond to overcoming development issues facing the country through economic infrastructure development for industrial diversification, human resource development through technical cooperation, support from the perspective of human security, etc., and at the same time, it will be a national enterprise. By providing lateral support for facilitating business development, Japan will bring about job creation and technology transfer in the country, and provide support that contributes to income improvement

and industrial development. Promoting sustainable growth and poverty reduction in the country through such efforts is significant because it is in line with Japan's Development Cooperation Charter and TICAD process.

Table 3.9.1 Country Assistance Policy of the Government of Japan for Angola

ODA Basic Policy	Sustainable economic development and human security	
Priority Areas	Economic development for industrial diversification	Industrialization not depending on oil, efficiency, socio-economic infrastructure
	Diversified human resource development	Vocational training on mining, agriculture, manufacturing, etc.
	Support for securing human security	Land mines, medical service and sanitation, natural disaster, etc.
Remarks	Taking advantage of opportunities for collaboration with Japanese private companies as a promising resource-rich country, with a view to developing industrial human resources who will be ready to work Strategic cooperation with other development partners.	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Angola

Angola formulated the National Development Plan APDN 2018-2022, which included six pillars: human development and welfare, inclusive economic development, infrastructure for development, peace-democracy-rule of law-governance, harmonious land development, and interregional-international cooperation. The priority areas in the ICT White Paper 2018-2022 include expanding communication infrastructure and networks, laying submarine cables, transitioning to digital TV broadcasting (the second country adopted Japanese system after Botswana in Africa), cybersecurity, and interoperability improvement between governments, digital health, digitization of industry and establishment of certification bodies, promotion of e-commerce, etc. On the other hand, the digitization of national IDs has not progressed so much, and the registration rate remains low. The UN e-Government Survey 2020 also points out that the Telecommunications Infrastructure Index is extremely low compared to the Online Service Index and Human Capital Index.

The country assistance policy of the government of Japan focuses on sustainable economic development and human security. Its priority areas included economic development support aimed at diversifying industries, diverse human resource development, and support related to people's safety. As for the JICA's support, the health sector is emphasized as one of the priorities, and a maternal and child health handbook project is being implemented, although digitization is not considered. The World Bank requested possible cooperation with JICA in the on-going maternal and child health project. There is no record of technical cooperation so far.

Given the above examination, the JICA Study Team intends to examine possible supporting programs with a roadmap based on the interviews with relevant agencies and organizations and analyze the current situation and issues. In particular, emphasis will be placed on the possible application of digitalization for economic development and business environment improvement by diversifying industries to support Japanese companies' activities and improved public service delivery such as health and sanitation through collaboration with other partners such as the World Bank.

3.9.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation:

1) Vision and Plans

Plano Nacional da Sociedade da Informação 2013-2017 (National Information Society Plan 2013-2017)

National Information Society Plan 2013-2017 is a revision and update of the Angolan government's Action Plan for the Information Society, developed in 2005. Since 2005, access to information and communication technologies (ICTs) has increased significantly in Angola. This is mainly due to economic growth, favorable political and social conditions, and lower telecommunications prices. However, there are still issues in terms of infrastructure, qualified human resources, content and services for citizens and businesses, which limit access, ICT value creation and national development. Angola's focus in the ICT sector is implementation, which requires a real transformation in citizens, economy and society. This plan aims to fill the current issues, strengthen the impact of ICT on economic and social development, and promote an inclusive country where citizens are connected to the world, have access to educational opportunities and appropriate medical care, and have the opportunity to develop ideas and personal and professional skills. National Information Society Plan 2013-2017 consists of three cross-cutting pillars and four sectoral pillars.

- Infrastructure and Connectivity
- Digital Citizenship
- Promotion of e-Government
- Agriculture, Rural Development, Environment and Fisheries
- Health
- Education
- Industry, Commerce and Services

Livro Branco das Tecnologias de Informação e Comunicação 2018-2022 (Estratégia Nacional para as TIC em Angola 19-22)¹³⁰

The chapter on Estratégia Nacional para as TIC em Angola 19-22 (the Angola National ICT Strategy 2018-2022) in the Livro Branco das Tecnologias de Informação e Comunicação 2018 – 2022 (the White Paper on Information and Communication Technologies 2018-2022) states that the ICT sector is a key sector of the economy and that the following points are important.

- A key factor in the country's social development and economic prosperity
- A driving force in the fight against poverty and social exclusion

¹³⁰ República de Angola “Livro Branco das Tecnologias de Informação e Comunicação 2018 – 2022 Estratégia para a Transformação Digital”

- A catalyst for the modernization and progress of the Angolan people, and a basis for the creation of an information and knowledge society.

The following enhancements have been described as high priority areas to strengthen the ICT sector.

- Infrastructure, networks and digital inclusion
- Adoption of modern technologies in public services

In addition to digitalization in health, education, agriculture, environment, fisheries, industry, commerce, construction, and utilities, the report also mentions elementary ICT solutions such as promoting the use of e-mail and upgrading video conferencing systems.

- Regulations
- Technological innovation

2) Current Situation and Activities

ICT laws and regulations

ICT Legislation

Although the Study Team was not able to meet with Ministério das Telecomunicações, Tecnologias de Informação to discuss the issues and other details, our web-based research indicates that Angola has a complete set of ICT-related laws.

Table 3.9.2 ICT related Legal Framework in Angola

Basic ICT Law	Decreto Presidencial n.º 166/20
National ID	Despacho n.º 1631/13
Electronic Signature	Decreto Presidencial Nº 202/11
e-Commerce	Decreto Presidencial Nº 202/11
Personal Data Protection Law	Lei Nº 22/11, Lei da Protecção de Dados
Cyber Security Law	Lei Nº Lei de Protecção das Redes e Sistemas Informáticos(LPRSI)
Competition Law	Lei Nº 5/18
Intellectual Property Law	Lei Nº 3/92

Source: JICA Study Team based on the interviews to ICT regulation authorities

Organization

The ICT-related organizations in Angola are as follows.

- Ministério das Telecomunicações, Tecnologias de Informação
Ministério das Telecomunicações, Tecnologias de Informação is responsible for formulating, implementing, executing and managing policies in the field of telecommunications and information. It establishes and supports at all times the general policies, norms and standards of institutional communication implemented by the various ministries and agencies, as well as those directed towards technology, postal services, meteorology and geophysics, social communication, advertising and national and international connections.
- Instituto Angolano das Comunicações (INACOM)

INACOM oversees telecommunications businesses through regulation, supervision and inspection of the telecommunications sector, including electronic communications and postal services, to ensure quality of service in a healthy competitive environment.

Current Status of Digitalization of Public Service

Angola is in the process of digitizing its school student information management system, national ID, smart meter management and payment, and online payment systems. According to a software developer called NellCorp, health, education, banking, telecommunications, transportation, housing, and agriculture are the priority sectors for digitization. Although there are some excellent software developers in Angola, digitization has been slow due to the lack of understanding and planning capacity of government officials for digitization, as well as the lack of budget. Usually, many countries require government data to be kept in the country for security reasons, but in Angola, there is no law requiring data to be stored in the country, and the systems are often placed in multiple clouds such as AWS and Google Cloud. Due to cost and security issues, Angola's data centers are not very reliable.

3) Challenging area(s)

- The lack of funding has been a challenge. One example is that once a project started digitalization of a public service, the government is no longer able to pay the software company that placed the order, and the software company tried to develop the software on its own, but the progress was not sufficient.
- High cost of Internet and mobile data.
- The government's capacity to promote digitalization is low, especially among senior officials.
- Corruption is widespread in Angola, and digitization is likely to be resisted by those with vested interests because it increases traceability.
- There is a lack of communication/collaboration between the government and the technical community such as private software development companies.

4) Potential Assistance Needs

The Study Team were not able to meet with Ministério das Telecomunicações, Tecnologias de Informação, which is in charge of the ICT policy, and thus were not able to directly interview them about their support needs. However, considering the fact that the government is not positive about digitalization to increase traceability, and that the lack of interest of the Angolan government in meeting with the Study Team to discuss the proposal to support Angola's ICT policy, the Study Team hypothesizes that it will be difficult to support the country in the area of ICT policy.

5) Condition: Infrastructure, Policy, Human Resource, and etc.

It is important that the government is positive about digitization, that the telecommunication environment and power supply are stable, that the private ICT companies are capable enough to implement digitization, that the government officials have the skills to use ICT, that the ICT strategy is not only in place but also that the system to implement it is in place, and that the financing for digitization is available.

(2) ICT Human Resource Development

1) Vision and Plans

National Development Vision / Framework

Angola Plano de Desenvolvimento Nacional (2018-2022)) recommends the development and implementation of a “National Strategy for Human Resources Development” in order to provide comprehensive, equitable and quality education and lifelong learning for all citizens. It suggests the enhancement of technical and vocational training (TVET), the establishment of a national qualification system and the expansion of vocational training to all regions.

Digitalization

Strategy for Digital Transformation (2018-2022)

Strategy for Digital Transformation (2018-2022) states that digital inclusion must be achieved by making the general public equipped with digital skills. It also recommends more active use of ICT in the provision of public services.

2) Current Situation and Activities

Government Initiatives for ICT Human Resource Development

Escola Nacional de Administração e Políticas Públicas (ENAPP) offers a range of training programmes for public servants, including in the area of ICT. ENAPP has a headquarters in Luanda and six regional centres across the country.

Private Sector Initiatives to train ICT Technicians

- Huawei has invested USD 60 million to build a Technological Training Centre in 2021. The Technical Training Centre is expected to be operational in December 2022 and will develop the skills of over 1,500 engineers in the telecommunications and information technology sectors.
- Huawei has signed a Memorandum of Understanding (MoU) with the Ministry of Foreign Affairs in the field of human resources development in ICT. Huawei will provide 500 hours of ICT training to 50 public servants to equip them with the latest technology in the industry, as well as 3,000 hours of Huawei-certified training to ICT-related employees of private companies.
- Huawei Technologies and the Ministry of Higher Education have signed a cooperation agreement for the development of ICT skills and the improvement of the technological infrastructure in Angolan higher education institutions. This cooperation aims at improving the teaching and learning process in the higher education system. It plans to improve the equipment of ICT training institutions and repair the existing infrastructure.

Private Sector Initiatives to Improve ICT Skills of the Public

- Profuturo is a programme launched by Catholic Schools with the aim of providing a digital classroom for 260,000 primary school children in Angola by 2020. In the first phase, 10 schools will be supported with digital skills training and technology infrastructure, and a further 16 schools will be supported in the second phase. Through this project, as well as providing access to tools and knowledge for digital training,

a multi-featured management platform will be provided to improve the technology capacity of schools.

- The National Computer and Information Systems Company, sponsored by the Ministry of Education, has been implementing the “Meu Kamba” project since 2014 to distribute and install computers and interactive whiteboards in primary school classrooms in public schools across the country. As of 2018, 161 schools and 91 primary classrooms had access to computers through this project, which has been extended its activities to 60,000 students by the end of 2018.

3) Challenging area(s)

Issues in the Policy Level

- The direction of ICT human resource development is not clear due to the absence of policies and guidelines to promote ICT human resource development.

ICT skills for civil servants

- Civil servants lack the capacity for policy-making and institutional design necessary for the digitization of public services.
- There is no structural and continuous training for public servants, including in areas related to digital and ICT.

4) Activities of Development Partners

The Government of Angola and the Government of Finland have signed a cooperation agreement in the fields of telecommunications, information technology and meteorology. This agreement will facilitate training and technological development in these fields.

5) Potential Assistance Needs

There is a potential need for the support with regard to the development of policies and guidelines to promote ICT human resource development. In particular, there is a need to improve the digital skills of public servants who are expected to lead the digitalization of public services, and to develop a structural and continuous training programme for public servants.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

It is essential to change the mindset of public servants and make them acquire digital skills in order to promote the digitalization of public services.

(3) ICT Infrastructure

1) Vision and Plans

In terms of ICT infrastructure, Angola has been developing ICT infrastructure in accordance with its long-term development plan, *Estratégia de Desenvolvimento a Longo Prazo Para Angola 2025 (Vision 2025)*, which was formulated in 2004 to provide citizens, businesses, and government with access to telecommunication and Internet services. In addition, the government is promoting reconstruction and economic development from the civil war.

Vision 2025 is undergoing periodic evaluation of progress and revision of the plan. The revisions include the problem of the economic disparity between the Atlantic coast, where infrastructure development is well advanced, and the inland areas, where development is lagging; the need to diversify the economy, which is mainly based on oil exports; and the need to improve administrative, educational, industrial, and medical services through the development of communication infrastructure.

Angola Cable is responsible for the maintenance and management of the broadband network, the Angola Domestic Network System (ADONES). Nzadi Cable System provides fiber optic links between the submarine oil platforms along the Angolan coast and the coastal cities, while Angola IXP provides Internet access and Movitel and Unitel provide cell phone services. The ICT infrastructure is being developed in cooperation with the Angolan government, foreign companies and international organizations.

2) Current Situation and Activities

International Backbone Network

In Angola, three types of submarine cables (SACS 40 TB, WACS 14.5 TB, SAT3/WACS 340 GB) have been laid from two landing ports (Sangano and Cacuaço).

Table 3.9.3 Submarine cables in Angola

City	Landing station	The Consortium	Contractor
Sangano	South Atlantic Cable System (SACS)	Angola Telecom, Unitel, MSTelcom, Movitel and Startel	Angola Cables, In September 2018 Angola Cables announced that the SACS cable was on-line and ready to begin commercial operation. The capacity is 40 Tbit/s between Brazil and Angola.
	West African Cable System (WACS)	Broadband Infracore, Telkom South Africa, Vodacom DRC, MTN, Tata Communications, Togo Telecom, Telecom Namibia, Office Congolais de Poste et Télécommunication, Congo Telecom, Altice Portugal, Angola Cables, Cape Verde Telecom, Vodafone Espana, Vodafone, Neotel, PCCW, Camtel, Vodafone Ghana	In May 2015, Huawei Marine completed an upgrade of WACS (Upgrade I) using 100Gbps technology, increasing the WACS system design capacity to 14.5Tbit/s. In Feb 2019, the WACS Upgrade II was completed with Huawei Marine's solutions to support 32*100Gbps from South Africa to Portugal.
Cacuaço	SAT-3/WASC	36 telecom operators. The largest three investors in SAT-3/WASC were (in order) TCI, a subsidiary of AT&T (U.S.A.); France Telecom (France); and VSNL (India, Singapore). The 11 African shareholders are (in alphabetical order): Angola Telecom, Camtel, Cote d'Ivoire Telecom, Ghana Telecom, Maroc Telecom, Nitel, OPT Benin, OPT Gabon, Sonatel, Telecom Namibia and Telkom SA Ltd. There are also Asian shareholders.	

Source: <https://www.submarinecablemap.com/>

Domestic Backbone Network

ADONES has about 1,800 km of fiber optic connections between eight cities on the Atlantic coast, with a capacity of 80 GB, and is the basis for providing telecommunications services to 70 percent of the country's population.

The telecommunication network is managed by Angola Cables, which also operates the Internet access business in Angola (Figure 3.9.1). However, the construction of the fiber-optic network outside the eight coastal cities

and inland has been delayed, creating a gap between the Atlantic coast and the inland areas.

Figure 3.9.1 Cities of connection by ADONES



Source: Submarine Telecoms Forum

Mobile Network

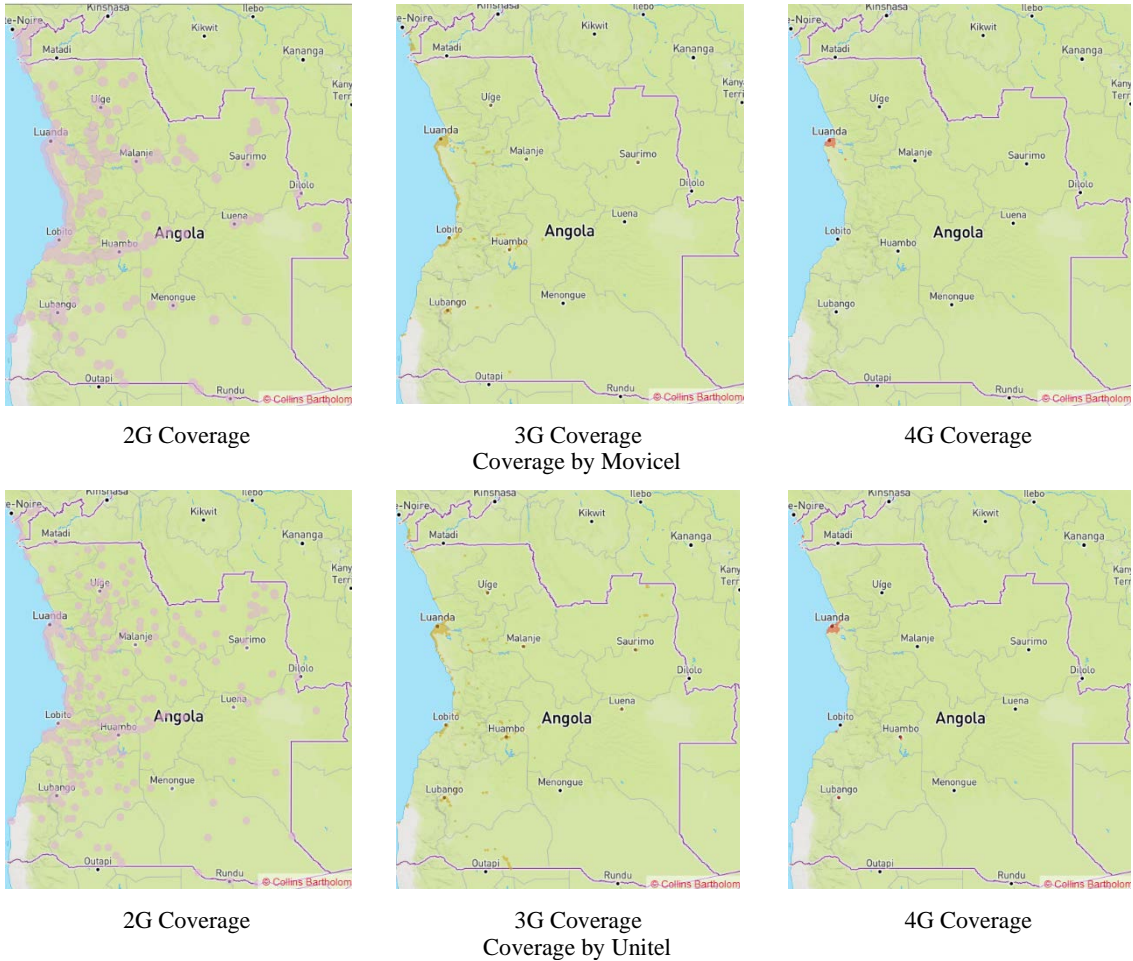
The following two major mobile operators are listed below.

- Movicol: Former national carrier, Capital (Angola Telecom and ENCTA: 20%、 others: 80%)
- Unitel; Angolan private joint venture, Capital (Africatel 、 Sonangol、 Geni and Vidatel: 25% each)

The mobile operators are mainly domestically funded, but with technology support from Europe and China. 46.6% mobile penetration in 2019, but the main areas served are along the Atlantic coast, with relatively fast internet connections only in Luanda, and 2G or 3G connections elsewhere. In 2019, mobile phone penetration will be 46.6%, but the main areas served will be along the Atlantic coast, with relatively fast internet connections only in the capital city of Luanda, and 2G or 3G connections in the rest of the country.

Regarding the mobile penetration rate, the average for Africa as a whole is 74.4% according to the ITU, while Angola shows a lower figure. In addition, the cell phone penetration rate in urban areas is 83%, while in rural areas it is 31%, creating a big difference.

Figure 3.9.2 Mobile Coverage by each operator



Source: GSMA

Data Center

The following five data centers have been established in Angola.

Table 3.9.4 Data Centers in Angola

Datacenter	Outline
Angonap	It is in Luanda and is operated by Angola Cables. The data center is also connected to international submarine cables at the Tier 3 level.
ASA MStelcom Data Centre	It is in Luanda and is operated by ASA MStelcom, which is a subsidiary of Angola's national oil company, Sonangol Group, and is Tier 3 level.
CFIN ATALANTICO Data Center	It is in Luanda and is operated by Banco Millennium Atlantico.
ITA Luanda	It is in Luanda and is operated by Internet Technologies Angola (ITA), which built a data center with a capacity of 1,500 servers in 2017 and is building a data center with a capacity of 7,000 servers in 2019.
MULTIPLA Data Center	It is in Luanda and is operated by IP WORLD - Sociedade de servicos e telecomunicacoes Limitada.

Source: JICA Study Team

IXP (Internet Exchange Point)

ANGONIX's IXP (Angola IXP) is managed by Angola Cable.

3) Challenging area (s)

Public digitization and infrastructure development is underway, but the use of ICTs is sluggish due to the lack of high-speed connections using cell phone networks and the lack of public infrastructure in the interior. In addition, when the Angolan government assessed Vison 2025 in 2018, it identified the following issues: improving the economic growth and living conditions of the population, minimizing territorial asymmetries in infrastructure, using e-government and developing ICT infrastructure.

4) Activities of Development Partners

In terms of ICT software, an MOU on telecommunications, information technology and meteorology was signed between the Government of Finland and the Government of Angola in November 2020; in terms of ICT infrastructure, the World Bank, European countries and domestic capital are being used. In terms of ICT infrastructure development, the World Bank, European countries, and domestic capital have been used. China has provided technical assistance between IT-related companies (Huawei, ZTE) and Angolan companies, but no large-scale assistance has been provided by the Chinese government.

5) Potential Assistance Needs

An information gap has emerged between urban and rural areas. This disparity can be attributed to the lack of ICT infrastructure in rural areas, the high cost of Internet and mobile communication (Monthly fee of Fixed Broadband (Fixed broadband sub-basket) is 29.92 USD, Monthly fee of Mobile broadband (Mobile-broadband sub-basket, postpaid computer-based, 1 GB) is 21.39 USD), and ICT literacy. In order to address this information gap, the potential support needs are considered to be the development of broadband networks in rural and inland areas, in order to extend broadband networks to rural and inland areas, and to contribute to lowering the cost of Internet by increasing the number of users through the development of rice miles.

(4) National ID

1) Vision and Plans

- Angola Plano de Desenvolvimento Nacional (2018-2022),
- Livro Branco das Tecnologias de Informação e Comunicação 2018 – 2022

2) Current Situation and Activities

Since 1999, the Ministry of Justice and Human Rights has issued a national ID, which has been digitalized since 2009. At the age of 10, an Angolan citizen is obliged to register his/her/their national ID. The national ID card has biometric authentication and stores the iris in addition to the fingerprints, hence it can be said that it is relatively advanced. Communication conditions are often poor, so secure satellite communications may be used when issuing cards. The national ID registration rate was 28% as of 2017, but now it has increased to approximately 60% (July 2021) owing to various efforts such as the expansion of registration centers, deployment of mobile kits, and execution of registration campaigns. However, it is said that the current COVID-19 pandemic slowed down the pace of progress. The Personal Information Protection Law was enacted in 2011, but there are no regulations yet regarding the specific enforcement mechanism.

The Ministry of Justice and Human Rights is continuously training their ICT human resources in charge of the national ID systems for the required skills of network management and programming, and able to maintain and operate the system almost exclusively by Angolan people without receiving external support. They are also working to simplify the registration process.

Regarding interoperability, the data is already linked with the pension system and the tax filing ID, and the link with the election voter ID is planned to be realized in 2022. However, it is not linked to civil registration (currently paper-based). The birth registration rate was 56% in 2017.

3) Challenging area(s)

- The instability of infrastructure (telecommunications, electricity) is a major issue.
- Although the national ID card is technically relatively advanced, the registration rate is still low at approximately 60%, and although various measures are currently being taken, it is necessary to take measures to further expand uses and benefits, and promote interoperability (especially civil registration) and public relations activities to improve the registration rate.
- A mechanism and a structure that substantially guarantee the protection of personal information have not been established yet.

4) Information Systems and Platforms

- Information System/Platform Name: National ID system
- Main Data: National ID, name, date of birth, issue date and place, birth certificate, photo, marriage history, signature, address, fingerprint, iris
- Owner of the Data/Operator: Ministry of Justice and Human Rights
- Source of Funding/Donor, etc.:

5) Activities of Development Partners

UNICEF has a track record of supporting birth registration campaigns in 2001.

(5) E-Government

1) Vision and Plans

National Development Plan 2018 - 2022 (2018)

The latest Five-Year Plan, which forms the basis of all development programs in Angola. Regarding ICT, the investment in communication infrastructure and information technology has not been as effective as expected during the previous five-year planning period, and it is necessary to formulate a new strategy. ICT continues to be a high priority for development along with the energy industry, with one of its priority actions being to promote the use of ICT in the public procurement process. Other specific goals related to ICT are as follows.

- Goal 1.1: By 2022, the number of fixed lines installed will increase by 7.3%
- Goal 2.1: Mobile phone penetration increased from 54.46% in 2017 to 59.33% in 2022
- Goal 3.1: National digital phone penetration rate will increase from 20.65% in 2017 to 31.18% in 2022

- Goal 3.2: Digital network coverage in rural areas increased from 34% in 2017 to 98.7% in 2022.
- Goal 3.3: Increase the number of users of media libraries with ICT access by 397% by 2022.

In addition, it also aims to promote efforts to create a local software industry.

Strategic Plan of the National Space Program Management Office 2019 - 2022 (2019)

The Plan aims to further the institution's mission, vision and values, in alignment with the National Space Strategy 2016-2025, Plan (PDN) 2018-2022 and the ICT White Paper 2019-2022. Primarily, the Plan presents a strategic diagnosis for the revision and approval of the legislative acts that govern the space activities in the country, the construction, launch and operation of the ANGOSAT-2 satellite, future satellites and studies for the implementation of the space agency. The plan also calls for strengthening ICT connections through satellites.

Livro Branco das Tecnologias de Informação e Comunicação 2018-2022 (Estratégia Nacional para as TIC em Angola 19-22)

The White Paper describes a path of ICT development that is fundamental to Angola's information society, and that responds to the diversifying economy and the promotion of digital transformation. In particular, the areas where ICT is planned to be introduced include health, education, agriculture, environment, fisheries, industry, commerce, energy and water, construction and public works, and rural development. As for the e-government, it aims to improve the efficiency of business processes, enhance the quality of public services, and reduce the operating costs of public organizations. It calls for the enhancement of interoperability among government agencies and the establishment of a platform that will facilitate electronic communication and information exchange among public organizations, private companies, and the general public. In order to achieve this, training to improve the ICT literacy of government officials is planned.

Plano Nacional da Sociedade da Informação 2013-2017

A revised version of the e-Government Strategy (Plano de Acção para a Governação Electrónica) developed in 2005. The following four points have been identified as key to the development of e-government.

- Expanding services to the general public.
- Improving the efficiency and effectiveness of government agencies
- Improving the capacity of government officials and agencies
- Ensure the interoperability and security of digital technologies in government agencies.

Specific programs planned included citizen portals, government portals, one-stop services for businesses, human resource sharing services, and citizen and business kiosks.

2) Current Situation and Activities

In Angola, MINTTICS takes charge of the digitisation of public services and is promoting the digitisation of each service in accordance with the "Livro Branco das Tecnologias de Informação e Comunicação 2018 – 2022" and "Plan of Action for Electronic Governance".

In terms of promoting e-government, the priority areas are health, education, agriculture, environment, fisheries,

industry, commerce, energy and water, construction and public works, and rural development, with a focus on a combined package of e-governance, access and connectivity across these.

In 2019, MINTTICS partnered with the Ministry of Economy and Planning to launch an online one-stop service for enterprises to register online. It also plans to build a Portal for Electronic Portal Services (SEPE) to facilitate the digitization of public services for citizens and businesses. At this stage, the SEPE offers a limited number of public services, but it is linked to a wide range of government resources.

3) Challenging area(s)

Angola has a population of about 31 million (2019), of which 13.2 million (about 43% in 2018) own a mobile phone and 4.5 million (about 15% in 2017) have access to the internet. Especially in rural areas, the ratio of internet access is even lower due to the lack of infrastructure.

Angola is three times the size of Japan, and although 10,000 km of fiber optic cables have already been laid, this is not enough to connect all 18 provinces. In order to solve this problem, MINTTICS is working on a plan to build a satellite infrastructure to cover the whole country quickly.

In addition, in each interview, the lack of ICT literacy and awareness of digitalization among the government officers of the various public organizations was pointed out.

4) Activities of Development Partners

- World Bank, WHO, UNICEF and USAID - Health
- African Development Bank and UNICEF – Water Supply and Sanitation

5) Potential Assistance Needs

A number of interviewees (particularly from the private sector) pointed to a lack of capacity in digital skills among government officers in public sectors. In fact, the interviewees in the MINSAs, MED and MINEAs were all aware of the lack of ICT capacity and ICT literacy within their ministries and would like to receive support for training and other forms of capacity building.

6) Expected Areas to be Digitalized

As mentioned above, the “Livro Branco das Tecnologias de Informação e Comunicação 2018 – 2022” 2 identifies health, education, agriculture, environment, fisheries, industry, commerce, energy and water, construction and public works, and rural development as priority areas. Of these, the key industries of energy and agriculture are expected to increase productivity through digitalization.

7) Potential of using data for innovation in public service improvement

- Planning by means of data on crops and fish catches
- Elaboration of observations and predictions using AI based on data obtained by remote sensing such as satellites
- Monitoring the status of malaria, tuberculosis, HIV and other diseases using health information systems
- Managing student information, grades and class autonomy

- Strengthening business by analyzing purchasing data, etc.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Government officers themselves in the public sectors tend to recognize ICT as a mere input tool and do not understand the importance and value of digitization. The ICT literacy of the general public is also low, but the capacity building of the government officers is needed first.

(6) Education

1) Vision and Plans

- National Action Plan for Education (Revised Every Year)

2) Current Situation and Activities

a) Situation of schools under COVID19 Situation

Primary/ Secondary/ High schools were closed from March 2020 for 3 months. Now they took necessary measures to prevent the infection such as;

- Reduce the number of students in a classroom
- Provide disinfectant alcohol/ gel, thermometers, nitrile gloves etc.
- Accelerate vaccination of teachers

As for the use of radio and television, Angola is providing educational programs.

Introduction of ICT in schools

As MDE says no schools are connected to the internet, the introduction of ICT in schools (Primary/ Secondary/ High School) is not very popular in Angola. MDE started working on it, through the following projects;

- Distribution of Tablets: For use in remote areas. Teachers can download digitized educational resources where a mobile network is available, and they can use it in remote schools. This “Virtual School Project” will be launched in 2021.
- School management system in Secondary schools: This system will manage Student information, grades and situation of attendance. Data will be stored both on the device and on the server of the Ministry. And the data will be synchronized where the network is available.

Currently no school is connected to the Internet in Angola.

ICT literacy of teachers

The National Institute for the Training of Education Staff (INFQ) is in charge of teacher training, including ICT related skills.

National ID and Student ID

Every student has a Student ID, but this ID is not related to the National ID. Actually, Angola’s National ID is related only to Tax ID, the linkage with other IDs will be realised in the future, Angola has no donors working

in this field, Institute of Telecommunication is the organization in charge.

The student must provide his National ID information for the first registration to schools. In Angola, people got the birth certificate number and this number is used as the Civil Registration Number.

ICT skill of Ministry of Education Staff

They need training about how to use ICT in their work. More precisely, MDE needs more skilled staff in the field of i) Information Network, ii) Software Development, iii) Data storage, iv) System administration, v) Artificial Intelligence (Machine learning), vi) Database management.

The government of Angola planned twice a training program destined for public servants in these technological fields, but there was no implementation due to the budget shortage.

Other existent Information systems

As for the school buildings, they are registered on the database of the Ministry of Finance. MDE does not have a database of teachers and staff of the ministry.

3) Challenging area(s)

- Network availability and affordability
- IT literacy of teachers

4) Activities of Development Partners

- World Bank: Learning for All, Girls Empowerment
- JICA: SMASSE (2009-2012), Vocational Training Center
- UNICEF: School canteen, COVID19 Response

5) Potential Assistance Needs

Education and ICT are not the priority areas for the Japanese Cooperation Plan. Considering the weak ICT infrastructures in remote areas, there will be a big challenge to introduce ICT in Education. Since Inputs by JICA in the Educational field is limited, it will be better to establish human resource development/ connection via scholarship scheme or KCCP scheme to plan long term development.

6) Expected Areas to be Digitalized

Delivery of educational contents in regions.

(7) Health

1) Vision and Plans

National Health Development Plan/Plano Nacional de Desenvolvimento Sanitário (PNDS)2012-2025

National Health Policy 2010 aims to ensure “a healthy life for all” by 2025, and the National Health Development Plan 2012-2025 was developed as its instrument of execution. The strategic objectives of the Plan are listed below.

- Improve the provision of quality health care, in terms of promotion, prevention, treatment and

rehabilitation, strengthening the articulation between primary care and hospital care

- Operationalize health care delivery at the community level and each health pyramid level
- Improve the organization, management and functioning of the health system through necessary resource allocation and adoption of rules and procedures to increase efficiency and quality
- Participate in the transformation of the social determinants of health and promote national partnerships and international organizations in favour of reduction of MCH mortality and combating major endemic diseases

Health Information Strategic Plan/Plano Estrategico de Informatização da Saude 2010-2015/

At the time of the survey, the revision of the above Health Information Strategic Plan was not planned. According to the MoH, the main strategic objectives in the preceding plan are listed below.

- Construction of a unified platform for health information systems (DHIS2)
- Integration of subsystems such as malaria, HIV/AIDS, health personnel, logistics, etc.
- Supply of necessary health personnel and materials and equipment
- Expansion and stabilization of internet access

In addition, the MoH informed that the capacity strengthening of planning and implementation of monitoring and evaluation is also the priority objective. It is reported that the roadmap for the implementation of DHIS2 platform in the integrated health management system (2018-2020) is regarded as a major government strategy.

2) Current Situation and Activities

Policy implementation structure

In Angola, the Department of Studies, Planning and Statistics/Gabinete de Estudos, Planeamento e Estatística (GEPE) and the Department of Information Technology/Gabinete de Tecnologia e Informação (GTI) play a central role to strengthen the health information system.

Individual systems

- DHIS2, a routine health data monitoring system, is being integrated and strengthened based on the above roadmap. The roadmap also plans to integrate the Logistics Management System (eLMIS) with DHIS2. Internet usage fees for access to DHIS2 are provided free of charge by a major provider¹³¹.
- For the EMR, pilots are being implemented at regional hospitals in Luanda province by the MoH and the Ministry of ICT. At the community level, the MoH has been collaborating with UNICEF on a pilot project called the SIS Community since 2019, where community health workers (CHWs) or health center workers collect and manage malaria and nutrition-related data with the KoboCollect app. It is also possible to connect with DHIS2. It was informed that discussions are underway to develop a policy or strategy on the community health information systems.

¹³¹ UNITEL

3) Challenging area(s)

Overall

The disease burden in Angola is still large for infectious diseases such as HIV/AIDS. Neonatal disorders, HIV/AIDS, and diarrhoea are the most common causes of death (2019, IHME). Improving maternal and child health is one of the top priorities.

Digital Health

- In particular, the status of ICT infrastructure development in rural areas is fragile, and in addition, many primary health facilities are reported to have inadequate basic infrastructures such as water and electricity.
- In general, it is reported that the ICT skills of health care providers and administrative officers tend to be inadequate, and many of them cannot use some advanced functions on the basic tools. Information management is mainly done on paper, and accuracy is an issue.
- One of the major challenges is the existence of multiple subsystems. The MoH plans to standardize systems and software. While there is an integration plan for DHIS2 and eLMIS, multiple health information systems are introduced on the individual disease at the primary and community level. MoH is aiming to create a standardization mechanism through the above-mentioned SIS community project.
- Regarding the reporting rate and data accuracy of DHIS2, while malaria, HIV/AIDS, and immunization related domains are high, there are challenges in other fields and areas not supported by development partners. Particularly data utilization tends to be insufficient. The MoH mentioned that improving data collection on sexual education and reproductive health is one of the priorities.
- Although maternal and child health has a high policy priority, there are few partners who support the digitalization of that area. It is reported that information gathering to grasp the actual situation on the ground is limited.
- Regarding data storage and management, development partners host data in the cloud servers and overseas servers as there is no secure data storage system within the country. There is a need to develop and/or strengthen the legal framework and secure the data management system.

4) Information Systems and Platforms

Table 3.9.5 List of major health information systems

System	Data	Owner/operator
DHIS2	Aggregated health data for routine monitoring	MoH
OpenLMIS	Medical logistics	MoH
KoboCollect (pilot)	Community health data	MoH, UNICEF etc

Source: MoH and development partners

5) Activities of Development Partners

- Global Fund: It supports HIV/AIDS treatment programs, prevention of mother-to-child transmission, and malaria control. It also supports promoting DHIS2 and providing ICT devices.
- WHO: It provides technical support to the MoH on data quality improvement and capacity development at the provincial and municipal levels to enhance DHIS2 utilization.

- UNICEF: A SIS community project for building a community health information system is underway for malaria and nutrition.
- World Bank: Strengthening health information systems such as DHIS2 is supported through the Health System Performance Strengthening Project for Angola (2018-2023).
- USAID: A large-scale HIV/AIDS and malaria project is being conducted in the health sector. It is leading the process of developing and implementing the DHIS2 roadmap, and is also supporting the development of malaria and HIV patient follow-up apps.
- PSI: It mainly supports malaria-related programs. Regarding the strengthening of the health information system, along with strengthening the capacity of the MoH, it is supporting the promotion and quality improvement of DHIS2, digital supervision, eLearning platform development, etc. for eight provinces.

6) Potential Assistance Needs

- It is necessary to develop ICT infrastructures such as local networks and devices availability.
- Support for the standardization of community based personal health data information systems is required considering the community health information system policy and/or strategy if developed.
- Support for promoting the introduction of EMR systems is required
- In particular, promotion of operation and utilization of DHIS2 for programs other than malaria, HIV/AIDS and vaccination is required.
- It is required to build a central data center and strengthen data management capacity to strengthen a secure data management system.

7) Expected Areas to be Digitalized

Personal health data at the primary healthcare level

8) Potential of using data for innovation in public service improvement

By digitizing personal health data and sharing it among related health facilities and personnel as well as clients, it is expected to enable continuously follow up with clients and refer them to appropriate health facilities, which leads to the improvement of the quality of and access to health care services.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Confirmation of standard application based on the result of SIS community project
- Adequate ICT infrastructure development at health facilities
- Development of the adequate legal framework
- Confirmation of data security and compliance with the personal data protection law

(8) Social Protection

1) Vision and Plans

National Development Plan (PDN, 2018-22)¹³²

The National Development Plan (PDN) aims to extend social security coverage to at least 40 per cent of the economically active population by 2022. This is to 1) promote the social and productive reintegration of the most vulnerable and excluded groups; 2) promote the reduction of social, economic, cultural, and regional asymmetries and contribute to equitable and sustainable development; 3) re-adapt institutional structures to support government social action; and 4) support efforts to provide social services to people with disabilities and their families¹³³.

Social Security Law

In Angola, there is a legal and institutional framework for social security (Law 7/04/2004). In addition, a National Social Security Policy has been drafted and is awaiting approval by the Presidency; a decree for a unified social registry has been announced for 2019.

2) Current Situation and Activities

Social Protection>

It is only in the last decade, since the enactment of the Social Security Law of 2004, that social security in Angola has made progress. The law provides for three approaches to social security: a "basic" component funded by taxes to ensure human dignity and a minimum standard of living for vulnerable groups; a "mandatory" component targeting economic activities in the formal sector; and a voluntary "complementary" component targeting those who can contribute more to enhance benefits. In 2015, a social assistance program called the Cartão Kikua Credit Card Remittance Program was introduced. This program aimed to reduce poverty while improving the nutritional status of participants and strengthening the role of women in addressing food insecurity.¹³⁴

Digitalization

Information System and Management of Social Action / O Sistema de informação e Gestão da Acção Social (SIGAS)

The Information System and Management of Social Action (SIGAS) is an instrument for identifying the most vulnerable households in Angola and their socio-economic characteristics, which can be used for various policies and programs. Through SIGAS, it is possible to know the key characteristics and needs of the poorest and most vulnerable groups and the possibility of getting out of poverty. The system is a strategic tool for social security promotion and networking, as well as a fundamental mechanism for the integration of initiatives from different sectors¹³⁵.

Unified Social Registry (Cadastro Social Unico, CSU)

¹³² <https://www.cabri-sbo.org/en/documents/national-development-plan-pnd-2018-2022>

¹³³ ILO. "Angola: Social Protection: Building social protection floors and comprehensive social security systems."

¹³⁴ UNDP. (2019). "The State of Social Assistance in Africa."

¹³⁵ UNICEF. (2018). "Nota Resumo do APROSOC."

The Unified Social Registry (Cadastro Social Unico, CSU) is planning to register up to two million households (40-45% of the population) and will be a valuable tool for social security policy planning and coordination.¹³⁶

3) Challenging area(s)

Improving data collection, updating and proxemics testing

The quality of data collection and the length of the data update period are two of the challenges. There is a need to collect comprehensive data on households and shorten the data update period. In addition, effective allocation of limited resources should be achieved by reducing targeting errors through the improvement of the quality of proxy means tests.

Monitoring and evaluation framework

A monitoring and evaluation framework has not yet been established. It is necessary to establish a monitoring and evaluation framework as soon as possible to realize future impact evaluation and evidence-based policy planning and formulation.

4) Information Systems and Platforms

- Information System/Platform Name

Information System and Management of Social Action (Information System and Management of Social Action / O Sistema de informação e Gestão da Acção Social: SIGAS)

Unified Social Registry (Cadastro Social Unico, CSU)

- Main Data: Beneficiary and household information
- Owner of the Data/Operator: Ministry of Social Action, Family and Promotion of Women (MASFAMU)
- Source of Funding/Donor, etc.: World Bank, EU, UNICEF, government funds

5) Activities of Development Partners

- UNDP TA for SRM
- UNDP Marshall Plan Social Contract Drafting Support
- World Bank (2019~2023) Strengthening the National Social Protection System Project (Cash Transfer), USD320 million
- UNICEF (2020) Municipalization of Social Action (MAS)

6) Potential Assistance Needs

- A Single Registry
- Targeting and monitoring
- Interoperability
- Digital payments

¹³⁶ World Bank. (2019). "Angola Social Safety Net Project Information Document."

7) Expected Areas to be Digitalized

- Establishment of the Single Registry
- Digitization of all household information
- Enhancement of interoperability with other management information systems
- Promotion of digital payments

8) Potential of using data for innovation in public service improvement

- Administrative big data on social protection and households can enhance the Evidence-Based Policy Making (EBPM). It is also possible to propose preventive measures required for each region and the effective allocation of resources such as cash transfers.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Strengthening of personal information protection laws.
- Develop laws and regulations to promote interoperability.

3.10 Malawi

3.10.1 Survey Policy in the Target Country

(1) National Development Plan

In the long-term plan “Malawi 2063”, the Malawi government has set 1) Agricultural productivity and commercialization, 2) Industrial promotion, and 3) Urbanization as three pillars. In the five-year plan “the Malawi Growth and Development Strategy: MGDS III (2017-2022)”, action plans are formulated in the following priority six areas: 1) Agriculture, water development and climate change, 2) Education and skills development, 3) Energy, industry and tourism development, 4) Transport and ICT infrastructure, 5) Health and population, 6) Other development areas.

(2) Country Assistance Policy of the Government of Japan

Malawi is a country in Southern Africa that maintains peace and stability. It has a population of approximately 18 million spread over a relatively small size of land. Malawi is categorized as a least developed country with a GNI per capita of 320 USD.

Malawi's economy is predominantly agrarian. For example, almost 80% of the population is engaged in agriculture as smallholder farmers and primary commodities such as tobacco, sugar and nuts account for approximately 80% of its total export. However, the base of Malawi's economy remains fragile. Due to insufficient development of irrigation, Malawi depends on rain fed farming and is constantly affected by weather related shocks. In recent years, in particular, Malawi has been facing water and food shortage caused by frequent droughts and floods, as climate change intensifies its impacts. Under these circumstances, diversification of agriculture to focus on products that are profitable and respond to market demand is in dire need.

Access to electricity also remains a challenge in Malawi. Depending on firewood as source of energy has led to the loss of forest coverage at an alarming rate. This in turn is resulting in soil erosion and eventually high siltation at the dams of hydro power stations, creating a vicious circle of further deteriorating power generation capacity. Malawi is urged to address power shortage while protecting the environment.

A rapid population growth has resulted in nearly 50% of the population (approx. 8.5 million people) of Malawi being under 18 years of age. Therefore, human resource development is critically important for the youth to equip themselves with abilities to achieve self-reliant development. Capacity development of the core government officials is also of great importance to steer sustainable development of the country.

From a regional perspective, Malawi is located in a strategic position as it lies along the Nacala Corridor that connects Zambia, Malawi and Mozambique. Development of the corridor will enhance regional connectivity, reduce high transportation costs, and promote the growth and stable resource supply in the entire Southern African Region.

The Government of Malawi aims at achieving sustainable growth based on the MGDS III with the goal of “Building a Productive, Competitive and Resilient Nation”. Japan's support to Malawi's efforts towards

sustainable development is of great significance, as this will reinforce the cordial relationship between the two countries, exemplified by Malawi's constant support to Japan in the international arena.

Table 3.10.1 Country Assistance Policy of the Government of Japan for Malawi

ODA Basic Policy	Support for building the foundation for sustainable and self-reliant growth	
Priority Areas	Promotion of industrialization of agriculture	Diversification, structural reform, business mind, irrigation, logistics etc.
	Human resource development for self-reliant growth	Capacity building for teachers, improvement of education quality, leverage of acquisition, HRD in the government sector
	Foundation for growth against climate change and urbanization	Resilience against climate change, environment issues such as deforestation, insufficient power supply, water resource management, urban infrastructure
Remarks	Strengthening of partnership with Japanese companies, universities, local governments, other development partners as well as alumni and ex-trainees in Japan Pay attention to inclusion of vulnerable groups in the grassroots grant projects Pay attention to the Beautiful African City Platform	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Malawi

Malawi has formulated a long-term national vision Malawi 2063 and a five-year development plan MGDS, which includes ICT as a priority area. The second phase of the ICT Master Plan 2014-2031 (2017-2021) focuses on innovation and human capital development and the ICT industry's growth to improve workers' skills. As pointed out in the UN e-Government Survey 2020, the issue is that the Telecommunications Infrastructure Index, including the Internet penetration, is significantly lower than the Online Service Index and Human Capital Index.

The Country Assistance Policy of the Government of Japan is based on building a foundation for sustainable and independent growth. Its priority areas include industrialization of agriculture, human resources development for self-reliant growth, and building a foundation for growth against climate change and urbanization. It also mentions a need to strengthen cooperation with various partners such as Japanese companies, universities, local governments, NGOs, and other partners and utilize the network of students and trainees returned from Japan. As for JICA, Malawi Office considers the possibility of digital health. However, the Human Development Department of the Headquarters believes that it is necessary to search for specific fields within digital health as many partners extend assistance in the same area. A distance learning support at teacher training colleges is under consideration in the education sector. The World Bank is implementing a Digital Malawi Program that includes a digital ecosystem, connectivity, platform, and online services. There may be potential for effective or complementary collaboration.

Given the above examination, JICA Study Team intended to examine possible supporting programs with a roadmap based on the interviews with relevant agencies and organizations, and analysis of the current situation and issues. In particular, emphasis was placed on the industrialization of agriculture and digitization of public services contributing to human resources development. Simultaneously, the JICA Study Team examined the possibility of cooperation with Japanese companies, universities, local governments, etc., and cooperation with other partners such as the World Bank.

3.10.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation

1) Vision and Plans

Malawi's overarching ICT strategy is the National ICT Master Plan 2014-2031, which has been enacted and is currently under implementation. Other major ICT related strategies include Malawi's Digital Economy Strategy 2021-2026 for the digitization of the economy, National Cyber Security Strategy for cyber security, National Broadband Strategy for broadband, and National E-Government Strategy, which is to promote the digitization of government, and National E-Waste Strategy, which is a strategy for the safe disposal of electronic and electrical equipment.

2) Current Situation and Activities

ICT laws and regulations

ICT-related legislation and regulations are generally well formulated, however, there seem to be challenges regarding effective implementation of these acts and regulations. The following is a list of major ICT-related laws and regulations in Malawi.

Table 3.10.2 ICT related Laws and Regulations in Malawi

Basic ICT Law	Communications Act 2016 ICT Policy (under review)
National ID	National Registration Act National Registration Regulations
Electronic Signature	Electric Transaction Act and Electronic-Transactions Act 2016
Electronic Transactions	-ibid-
Personal Data Protection	Comprehensive law on personal data protection is yet to be formulated. Electronic Transactions and Cybersecurity Act No. 33 of 2016 contains provisions for personal data protection.
Cyber Security	Electronic Transactions and Cybersecurity Act No. 33 of 2016
Competition Law	Competition and Fair-Trading Act 1998 Consumer Protection Act 2003
Intellectual Property Protection Law	Trademarks Act, 2018 (Act No.2 of 2018) Copyright Act, 2016 (Act No.26 of 2016)

Source: Compiled by JICA Study Team based on the interview with ICT related MDAs.

Organization

As stipulated under the Malawi ICT Policy, the Malawi Information Technology Agency (MITA) is being established as the coordinating body for ICT-related projects. MITA will take over the role of the current Department of e-Government in the Ministry of Information and will coordinate procurement, innovation, research and digitization of all public sector. MITA will not be an ICT implementing agency but will be responsible for coordinating and overseeing the digitization of the public sector, as well as setting ICT-related standards and codes of ethics.

The ICT regulatory authority is Malawi Communications Regulatory Authority (MACRA). The Malawi Computer Emergency Response Team (CERT), the computer crisis response team in Malawi, is operated by the MACRA.

Current status of public service digitization

In addition to the National ID project that is supported by UNDP. The World Bank is currently providing pre-implementation support for the Digital Malawi Program (phase 1 of the 5-year project is scheduled to end in 2022), which creates digital ecosystem (policy formulation and institutional strengthening of MITA) and critical ICT infrastructure, and assists the Government to use digital platforms to improve the efficiency of public services.

Although the pace of digitization is slower than in other African countries, donor support has been steadily flowing into the ICT related areas and there is considerable growth potential in the use of digital technology. The digitization of public services has just begun and currently three systems are operational: 1) Integrated Financial Management Information System (IFMIS) for financial management, 2) Human Resource Management Information System (HRMIS) for human resource management, and 3) Malawi Traffic Information System (MaTIS) for the Road Traffic Department. Many other applications are needed to accelerate digitization of public service deliveries.

3) Challenging Area(s)

In addition to the needs to strengthening Government institutional capacities for policy and strategy implementations, following challenges exist in terms of human resources, infrastructure, and services.

ICT human resources

It is difficult to keep the ICT knowledge of government human resources abreast with the latest technological development. The practice of the Malawi Government of utilizing ICT professionals as a “common service,” which would shuffle ICT professionals among different ministries, is compounding to the difficulty of retaining competent ICT professionals and their knowledge to be retained in the Government institutions. Given the situation, it is important to train current Government staff and new staff with digital skills to strengthen the Government institutions.

Infrastructure and services

- Lack of internet infrastructure in the Government institutions. Of the 11,500 government offices supported by the World Bank, only 500 are connected. Even with Huawei's support to expand the infrastructure, it is still far from connecting all of the Government offices.
- Lack of training, server security, and data center monitoring necessary for effective use of the ICT infrastructure.
- Inadequate Internet bandwidth.
- Lack of applications for public service deliveries.

4) Activities of Development Partners

- UNDP: National ID
- World Bank: Digital Malawi Program
- China EXIM Bank: Fiber network development (Malawi National Backbone) and last mile development (radio network, etc.)

Other donor partner is working with relevant ministries to support digitization, etc. (e.g. WFP and Ministry of Agriculture, WHO and Ministry of Health, etc.)

5) Potential Assistance Needs

There seems to be little needs in terms of support required for formulation of ICT strategy/policy, legal, and regulatory matters. However, there seems to be considerable needs in strengthening human and institutional capacity of Government institutions to implement these policies and strategies. In this regard, capacity development for the MITA, as the overall coordinator for the Government ICT initiatives, will be critical and appropriate as a potential area of support.

6) Expected Areas to be Digitalized

Although it is not applicable for the ICT policy and legal system, digitalization would be effective in Malawi's development priority areas such as agriculture, health, education, etc.

7) Potential of Using Data for Innovation in Public Service Improvement

When the World Bank-led e-Government project is implemented effectively, it is expected that the data held by various ministries and agencies will be made available for variety of use cases. There will be possibilities for data-based citizen services deliveries and data-based policy planning and implementation. Moreover, by providing these data to the private sector, innovative services may be created.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Although there is a PPP framework for collaborating with private sector, the use of startups to solve Government challenges and to expand public services has not been instituted. It would be effective to establish a system to enable procurement of innovations by the Government institutions. In Malawi, National Commission for Science and Technology (NSCT) has been newly established to spearhead innovations but more concrete activities to involve innovators and private sectors are needed to build a strong innovation ecosystem.

(2) ICT Human Resource Development

1) Vision and Plan

National ICT Policy 2013

The National ICT Policy has 10 policy priority areas, and human resource development is the second priority after leadership. In human resource development, after the use of ICT in education and health services, the plan is to have a pool of highly skilled ICT personnel to promote research and innovation.

National ICT Master Plan 2014-2031

The second of the four strategic pillars of the ICT Master Plan is innovation and human resource development. The plan calls for the enhancement and education of ICT skills in both the public and private sectors, and research and development to transform ICT consumers into content creators and realize an imaginative knowledge-based society.

Malawi Digital Government Strategy 2019

The Digital Government Strategy draws a five-year roadmap as a guideline for the realization of digital government. The vision of digital government is "an efficient and accountable public service delivery system using digital dividends" and the mission is to support the delivery of convenient, accessible, and seamless public services through institutional strengthening, capacity building, and the use of integrated digital systems and platforms. One of the five strategic pillars of the strategy, which emphasizes digital inclusion, is capacity development of ICT professionals towards the realization of digital government. The pillar includes activities such as (i) transforming the National College of Information Technology (NACIT) as the centre of excellence in ICT capacity building, (ii) capacity building of ministry officials, (iii) capacity building of ICT professionals through institutional strengthening (development of career roadmap and job descriptions, and recruitment guidelines for competency assessment), (iv) capacity building of the private sector, and (v) the retention of ICT professionals after the Digital Foundation Project is completed.

Another strategic pillar is the establishment of an organizational framework, which includes (i) giving the e-Government Department the legal basis to lead all e-government matters, (ii) upgrading the heads of ICT departments in ministries to the director level, (iii) establishment of ICT steering and technical committees in central and local governments, and (iv) activation of ICT working groups for public-private-academic cooperation.

Malawi Digital Economy Strategy 2021-2026

The Malawi Digital Economy Strategy sets out a vision for structural transformation towards a digital economy that focuses on wealth creation through agricultural commercialization, industrialization, and urbanization, in line with the Malawi 2063, a long-term development plan. To realize the digital economy, the government plans to work on three levels: the digital core, which is the foundation of the infrastructure and human resources for the digital economy; the digital services provided by the public and private sectors, which are necessary to promote the digital economy; and the digital solutions for agriculture, health, and digitally traded services, which will promote the competitiveness of key industries and entry into new areas.

The digital core includes skills development, with (i) a secondary school completion exam pass rate of at least 80%, (ii) the acquisition of digital skills to use digital products and services, and (iii) improved access to higher education. Each of these activities is planned with a budget.

2) Current Situation and Activities

ICT human resource development¹³⁷

Public universities in Malawi (Chancellor College: CHANCO, Malawi University of Business and Applied Sciences: MUBAS, Malawi University of Science and Technology: MUST, and Mzuzu University) have established an education system to train ICT specialists from BSc to PhD level. CHANCO is known for fostering programmers, MUBAS for ICT engineering, and Mzuzu University for Data Scientists. CHANCO's faculty members are commissioned to build an information system for the Ministry of Health. Among the private universities, Unicaf University, Daeyang University, and DMI St. John the Baptist University have a reputation for fostering a certain level of ICT human resources. In addition, there are also Malawians who graduated from universities abroad such as India and the United States. The ratio of students who major in ICT is predominantly high for male.

The universities think that they are producing more ICT human resources than what public and private sectors can absorb, thus there is a surplus of ICT human resources. Therefore, they are trying to enhance the employability of students through internships and providing an entrepreneurship module to prepare them for starting their own businesses.

For technical education and vocational training stream, ICT specialization courses are offered at seven public technical colleges and community technical colleges.

ICT human resources in the public sector¹³⁸

The central government's ICT officers are cross-departmental common service, who are assigned to each ministry by the e-Government Department. Their human resource development system includes master's and doctoral degrees courses through Malawi Government scholarships, training by development partners who support related projects, and on-the-job training. As a whole, the ICT officers are lagging behind in updating their knowledge and are not strong enough to lead the digitization of public services, so the Digital Foundation Project has conducted a needs assessment of the necessary areas of expertise and is supporting 30 officers to obtain professional qualifications (e.g. cyber security). In the future, the e-Government Department function will be expanded, and transformed to MITA. It is planned that ICT officers will be managed according to their areas of expertise under MITA.

Although local councils have ICT officer positions, some have not filled the positions. As decentralization progresses, it is up to local councils to employ their own staff, but since ICT staff tend not to be given high priority, they are not filled, and in their absence, other staff take up dual responsibilities. The Local Authority Management Information System (LAMIS) has been established with the support of USAID/UKAid, which reached the end, and its core team of trainers (central government and 10 local council ICT officers) have

¹³⁷ Interview with Mzuzu University (9 July 2021), Malawi University of Business and Applied Sciences (27 July 2021), Malawi University of Science and Technology (28 July 2021), and Chancellor College of University of Malawi (28 July 2021).

¹³⁸ Interview with e-Government Department and NACIT (20 July 2021), Department of Human Resource Management and Development (21 July 2021), Ministry of Labour (21 July 2021), TEVETA (21 July 2021), Ministry of Local Government (23 July 2021), Malawi Institute of Management (23 July 2021), Staff Development Institute (26 July 2021), the Secretary of e-Government (29 July 2021), and Lilongwe City Council (18 August 2021).

already received training in operation and maintenance. The Ministry of Local Government plans that the training will be cascaded from the core trainers to other local council IT officers and seeks funding for that.

As a training institution, there is NACIT under the e-Government Department, which originally trained diploma holders to become ICT officers in the government, and of late, it also started offering bachelor courses. Compared to the four public universities mentioned above, however, it is lagging behind in terms of knowledge, equipment, and updating of the ICT environment for it to be considered a Center of Excellence, as is planned in the Malawi Digital Government Strategy 2019. The Government is implementing a project to strengthen its institutional capacity. Other public service training institutes are Malawi Institute of Management (MIM) and Staff Development Institute (SDI), which are under the umbrella of the Department of Human Resource Management and Development. The former has established ICT-related bachelor's and master's courses but is still awaiting accreditation by the National Council for Higher Education. The latter offers computer and basic application training for secretaries, and IFMIS training for accountants, according to the needs of civil servants.

ICT human resources in the private sector¹³⁹

General assessment of the private sector is that the university education tends to be more biased towards theory than practice, and it is said that a certain amount of retraining is required for graduates to be employed in the labour market. Private companies provide on-the-job training to their employees, and for ICT professionals, once they are employed, they are keen to update and enhance their skills voluntary through online training courses. In many cases, domestic universities have not been able to keep up with the highly specialized and advanced fields required by industry, and private companies are trying to catch up by having employees participate in overseas training programs, and universities try to solve it by forming alliances with overseas universities. Some ICT entrepreneurs have emerged, but the number of entrepreneurs who have received support from entrepreneurship development programmes and grew up to a certain scale is still small.

Capacity to use digital services¹⁴⁰

In urban and peri-urban areas, many people have smartphones and mobile money is widely used. On the other hand, in rural remote areas, it takes a long time just to download one simple word document. The Digital Foundation Project provides basic digital skills and entrepreneurship training to urban and rural youth through six Tech Hubs. In addition, the Jobs for Youth Project, supported by the African Development Bank provides training that combines ICT skills with soft skills such as entrepreneurship as part of its support for youth employment,

3) Challenging Area(s)

Issues related to human resource development that emerged from the field survey interviews are as follows:

- Government officials recognise G2G intra-governmental information management systems such as IFMIS, HRMIS, and LMIS as digitalized public services. In the future, it is necessary to raise awareness among them on the needs of digital public services targeting the nationals (G2C) and businesses (G2B).

¹³⁹ Interview with ICT Association of Malawi (21 July 2021) and Airtel Malawi (26 July 2021).

¹⁴⁰ Interview with mHub (30 July 2021)

- Universities are producing ICT specialists, but the public and private sectors have little employment capacity to absorb them. The slow progress of digitalization in both sectors also contributes to the smaller demand for their employment.
- Universities are opening new courses and revising existing courses based on needs assessment. But as ICT is an area where new technologies are developed at a rapid pace, it is necessary to establish a domestic human resource development system with a sense of speed.
- Retaining talented ICT officers in the government faces challenge because of the large skills gap with the private sector and poor conditions in the government sector. ICT officer position in local councils have many vacant seats as they resign due to lack of tasks to utilize their specialized skills and work in the environment where there is no ICT equipment. Both levels of government need to pay attention to career development of ICT officers, and to give the necessary ICT environment to them along with clear job descriptions.
- ICT officers at both central and local levels need to hire new skilled personnel while accelerating the upskilling of existing personnel, as the latter clearly lack ICT skills to drive the digitization of public services. The current system of transferring ICT officers with limited expertise across ministries departments and agencies could be a major obstacle for development partners to provide technical assistance in human resource development.
- Although the above policies, master plans, and strategies are in place, and activities and budgets have been planned, implementation is currently being driven by the support of the World Bank and the Chinese Government. In overall there seems to be a challenge in raising resources to fully implement all the activities lined up, including those for ICT human resource development.

4) Activities of Development Partners

The World Bank-supported Digital Malawi Program is one of the ICT-related flagship projects¹⁴¹ in the Malawi Growth and Development Strategy (MGDS III: 2017-2022). Phase 1 of the program is the Digital Foundation Project (2017-2022, total budget USD72.4 million)¹⁴², which supports digital ecosystems, digital connectivity, and digital platforms and services. The ecosystem component includes digital skills development and innovation environment development, and the platform component covers organizational strengthening necessary for digital public service delivery, including training of ministers, ministry senior management, government officials, and ICT professionals, change management promotion, policy and legal system development. It also covers digitization of government documents. The Program supports a major part of above-mentioned key policies, master plans and strategies so it is virtually defining the direction of digitization in Malawi.

The Skills for a Vibrant Economy Project, also supported by the World Bank (approved by the Government of

¹⁴¹ The other flagship project for ICT sector is National Fibre Backbone Project supported by the Chinese Government (loan by Chinese Ex-Im Bank and implemented by Huawei).

¹⁴² Interview with Digital Foundation Project Implementation Unit at Public Private Partnership Commission (27 July 2021).

Malawi in August 2021, with a total budget of USD50 million), will start around October 2021 and has yet to finalize detailed activities. The outline of the project is to support universities and TVET institutions to strengthen their capacity to develop skilled human resources, and there will be collaboration with the Digital Foundations Project on strengthening the capacity to develop ICT skilled human resources.

5) Potential Assistance Needs

There is an urgent need to create an organizational structure that can lead the digitalization of the nation, as well as to review and restructure the ICT common service system (management of human resource development with a system to establish expertise and update knowledge, increase the number of ICT officers, and review inter-departmental transfers).

6) Condition: Infrastructure, Policy, Human Resource, and etc.

If innovation is defined as the promotion of digital government, there is a need to review and strengthen the ICT common service system and implement change management throughout the government, as planned in the Digital Government Strategy.

(3) ICT Infrastructure

1) Vision and Plans

The Malawian vision and plans for ICT infrastructure are explained in the two policies shown below.

The National ICT Policy

The Ministry of Information issued its first policy in 2013, which outlines policies to introduce ICT into all government sectors and to develop information and communication networks that contribute to the development of local cities.

The Digital Broadcasting Policy

The Malawi Government's policy for the transition from analog to digital broadcasting, which is targeted for the period 2013-2018.

The Ministry of Information, Department of E-Government, Malawi Communications Regulatory Authority (MACRA) and Malawi Digital Broadcast Network Limited (MDBNL) will review the above two policies and restructure the vision and plan by June 2021.

2) Current Situation and Activities

International Backbone Network

As Malawi is a landlocked country, there are no landing stations for submarine cables.

Domestic Backbone Network

The major domestic backbone network in Malawi is constructed by the two projects shown below.

Table 3.10.3 Backbone Projects in Malawi

No.	Item	Details
1.	Project Name	National Fibre Backbone Project (Phase 1)
2.	Overview	2017~2018. Target root is from Mapanga to Chiradzulu and Zomba to Liwonde. It is a 1,230km fibre-optic cable network being interconnected among 28 cities.

3.	Administrator	Electricity Supply Corporation of Malawi (ESCOM)
4.	Source of Found	Chinese government (Implemented by Huawei)

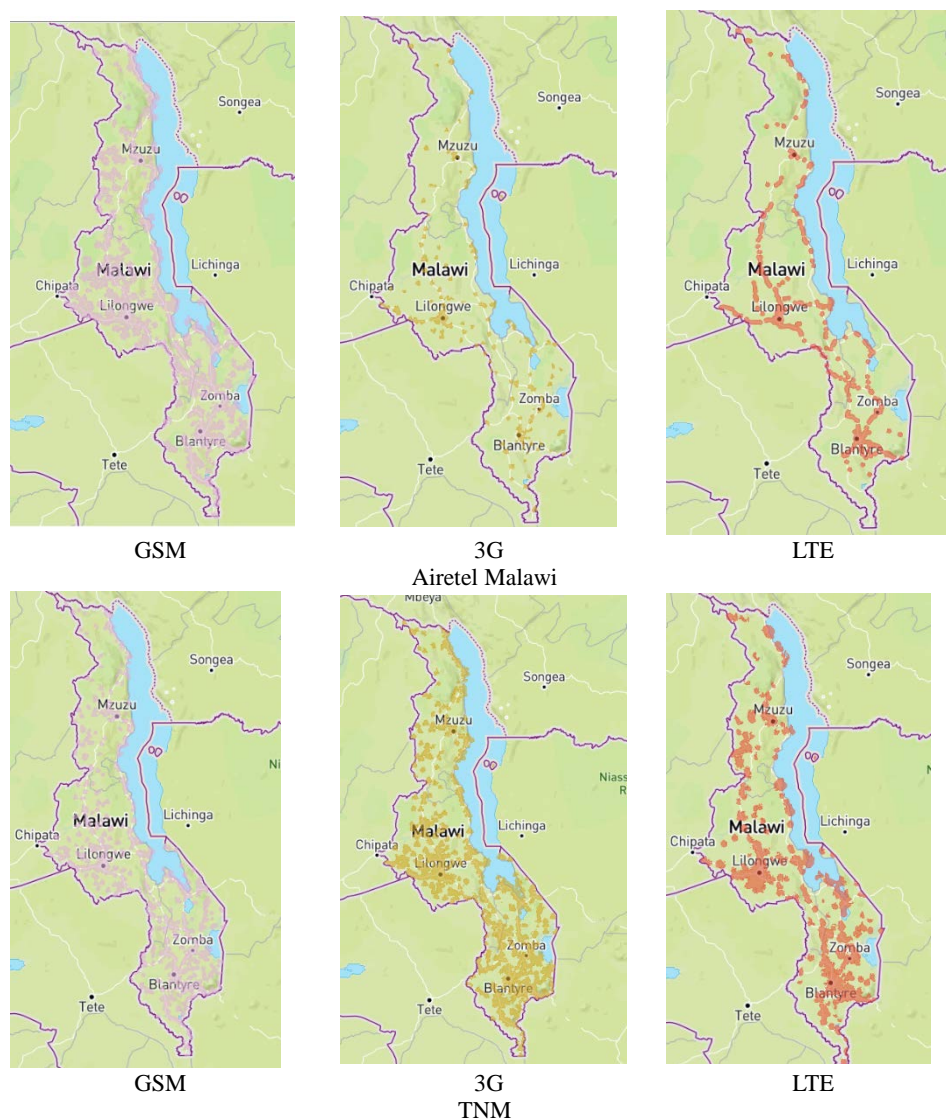
No.	Item	Details
1.	Project Name	National Fibre Backbone Project (Phase 2)
2.	Overview	2021~. Additional installation of 3,000km fibre-optic cable network.
3.	Administrator	Electricity Supply Corporation of Malawi (ESCOM)
4.	Source of Found	Chinese government (Implemented by Huawei)

Source: Contents compiled by JICA Study Team based on the interview with ICT infrastructure institutions.

Mobile Network

The mobile network in Malawi is covered by GSM, mainly in urban areas, and 3G and LTE are deployed in major cities and along the trunk lines. The mobile operators include Telekom Network Malawi (TNM), Airtel Malawi, Access Communications Ltd Malawi, and Malawi Telecommunications Limited (MTL).

Figure 3.10.1 Mobile Coverage of Airtel Malawi and TNM



Source: GSM Association

Data Centre

Currently, there is no datacenter in Malawi. With the support of World Bank, the national datacenter construction project is being planned.

Internet Exchange Point (IXP)

The IXP of Malawi named Malawi IXP is located at Blantyre, and the operation and maintenance of Malawi IXP are carried out by Malawi Internet Service Providers' Association.

3) Challenging Area(s)

Malawi started developing its telecommunication infrastructure relatively later than other African countries, and as a result, the ITU's ICT indicators are lower than those of other African countries. The domestic backbone connecting major cities has been constructed, but it does not cover rural areas, and the development of the last mile infrastructure is also an issue.

In addition, the Malawi's Research and Education Network (MAREN) is developing ICT infrastructure with support of World Bank for academic institutions such as national universities and research institutes. However, under the current COVID-19 pandemic, it is difficult to secure the necessary communication bandwidth for remote university lectures via the Internet.

4) Activities of Development Partners

As mentioned above, a domestic backbone is being developed with Chinese government funds, and a National Datacenter is currently being planned by the World Bank.

5) Potential Assistance Needs

Although several assistances have been provided by other donors and/or partners, there are still areas where ICT infrastructure is not yet in place, and the Government of Japan (GOJ) could provide support for these areas.

In addition, ICT infrastructure facilities could also be developed in line with other sectors' assistance plan.

6) Potential of Using Data for Innovation in Public Service Improvement

There is a possibility of using high-altitude/stratospheric drones to provide last-mile connectivity to rural areas. This technology is expected to provide a stable supply of high-speed wireless communications using drones that can meet the communication needs of rural, unelectrified areas, and is more cost-effective than ground ICT infrastructure that requires a time-consuming and costly construction. Swift Engineering, Inc. of the US has already successfully commercialized, test-flown, and test-communicated high-altitude/stratospheric drones in early 2020 and has begun providing solutions to meet the demand. Although HAPS Mobile, a member of the Softbank Group, is also developing this technology, it has yet to provide a sufficient solution like Swift Engineering, Inc.

(4) National ID

1) Vision and Plans

- Malawi National Registration Act (2015).

2) Current Situation and Activities

In 2016, a project to introduce a full-fledged national ID system started with the support of UNDP and other international donor organizations. The initial budget was 52 million US dollars, 40% of which is to be borne by the Malawi government, and the remaining 60% is to be borne by each donor. The project was successful due to meticulous planning, coordination among stakeholders, and effective campaign execution, and the registration rate of citizens aged 16 and over is now almost 100% (it was approximately 5% before the project started).

The Project is actively promoting cooperation with other sectors (election, agriculture, pension, finance, medical care, passport, etc.). As a result, it has realized concrete benefits such as effectively distributing subsidies, reducing fraud, cutting administrative costs, and in the health field, implementing vaccination efficiently. In the future, it is considering establishing a linkage with education, land registration, and civil registration as well.

3) Challenging Area(s)

- The scope of cooperation has expanded, and there is a shortage of corresponding ICT human resources to handle the pertinent tasks.
- Especially in local registration centers, there are infrastructure-related problems (unstable power supply and network).
- The budget for maintenance and operation of the system in the future is insufficient.
- It is necessary to promote the development of laws regarding the protection of personal information.
- The registration rate of civil registration is significantly low (2 to 3%), and it has not been digitized/digitalized yet.
- Interoperability with the private sector will lead to improved convenience for users, and at the same time, it will be a cost-sharing for the government operator side, thus consideration should be given.

4) Information Systems and Platforms

- Information System/Platform Name: National Registration and Identification System (NRIS)
- Main Data: National ID, biographic information (name, gender, etc.), biometric information (fingerprint, face photo)
- Owner of the Data/Operator: National Registration Bureau
- Source of Funding/Donor, etc.: UNDP, FCDO (UK), EU, Irish Aid, Norway, USAID, UNICEF

5) Activities of Development Partners

UNDP has become the leading agency, supporting as advisors in the respective fields such as ICT, Payment, Capacity Building, Logistics, and Monitoring and Evaluation. In addition to UNDP, funding is provided by FCDO (UK), EU, Irish Aid, Norway, USAID, and UNICEF.

6) Potential Assistance Needs

If conditions such as the legal system and ICT infrastructure are met in the future, there is room for

consideration of introducing an information exchange platform (similar to X-Road in Estonia).

7) Expected Areas to be Digitalized

- CRVS.

(5) E-Government

1) Vision and Plans

Vision 2020

Priority was given to eradicating poverty by means of ICT.

National ICT Master Plan 2014-2031

The emphasis is on innovation and human capital development, with a focus on growing the ICT industry and improving the skills of the workforce.

Malawi Vision 2063

A strategy has been developed for each industry to ensure that Malawi becomes a middle- and high-income country by 2063 through industrialization. In particular, there is an urgent need to adopt ICT to enhance the economic competitiveness internationally. ICT has been identified as a key enabler of economic infrastructure for success along with energy, roads, railways, water and airports.

Malawi's Digital Economy Strategy 2021-2026

In the strategy, the digital economy has been divided into three components - Digital Core, Digital Services and Digital Solutions - each with its own strategy for the period up to 2026. Agriculture, health, and digital trade services are particularly identified as priority areas under the Digital Solutions, which aim to enhance the competitiveness of the industrial sector.

2) Current Situation and Activities

The e-Government Department of the Ministry of Information is taking the lead in implementing development projects towards e-Government in line with the “Malawi’s Digital Economy Strategy 2021-2026” which is currently being revised by the Department. The MACRA, Malawi Posts Corporation (MPC), Malawi Broadcasting Corporation (MBC), the Malawi Telecommunication Limited (MTL) and Malawi Digital Broadcast Network Limited (MDBNL) are working to develop ICT under the jurisdiction of the Ministry of Information.

At present, various systems are being set up separately in each ministry and institution, however an e-government platform to integrate them has not yet been established. The plan is to integrate the systems of the National Registration Bureau (NRB), Public Procurement and Disposal of Assets Authority (PPDA), Immigration and Road Traffic. As for the NRB, it is currently working towards the implementation of the Digital Governance Framework, where the National ID is already linked to areas such as elections, agriculture, passports, social security, finance, human resource management and medical insurance.

In addition, MoLG has also established LAMIS to centralise data management and information flows across

district governments. LAIMS is a web-based integrated database that collects key indicators from each district's database.

As for the private sector, there are some start-up companies that develop applications with the support of international organizations. Many of them are ICT and business study graduates from universities and graduate schools in Europe and the United States who have returned to Malawi to start their own businesses, contributing to the digitalization of the industry.

3) Challenging Area(s)

- Most of the ICT development programs depend on the financial cooperation of foreign partners and sustainability after the end of their support is an issue.
- Lack of ICT specialists in various ministries and institutions. The capable ICT talents tend to choose the private sector.
- Vulnerable and inaccessible internet infrastructure not only in rural areas but also in urban areas (according to the survey conducted by the MACRA, the household internet access rate is 31.1% in urban areas and 5.9% in rural areas, compared to the national average of 10%).
- Low ICT literacy, especially in rural areas. Distrust of digitalization among the population.
- Low mobile phone ownership (37%, 2019) and high communication costs.

4) Activities of Development Partners

World Bank "Digital Malawi Program Phase1: Digital Foundation Project"

- Digitalization of the public sector and provision of digital solutions to the public.
- The total budget is USD 72.4 million.

World Bank "COVID-19 Emergency Response Project"

- An emergency response project to support the identification of infected people, surveillance, follow-up of infected people, and provision of diagnostic equipment.
- The budget is USD 7 million.

The Export-Import Bank of China "Fiber Backbone Phase2"

- To establish a high-speed fiber optic network to connect key economic sectors and government agencies.

USAID/UKAID "Local Government Accountability and Performance Project"

- The LAMIS was established at the county level as a local government monitoring information system.
- USAID, GIZ and the Dutch government are also supporting projects related to ICT development of agriculture.

5) Potential Assistance Needs

Malawi is in the early stages of forming the basic environment for the digitalization of the public sector. In that sense, the needs for support range from infrastructure development to the establishment of platforms. At the outset, however, there is a need to help establish MITA, which the Ministry of Information is in the process of establishing, and to train ministry officials for upgrading their ICT skills.

6) Expected Areas to be Digitalized

The establishment and use of a platform that will contribute to the industrialization of agriculture, a key industry, on the assumption that the World Bank project will improve network connectivity throughout Malawi. Currently, farmers often lose out on business opportunities due to lack of interactive communication, especially in rural areas where internet access rate is low. Digitalizing the connection between farmers and the market, through a service such as matching service, can help improve competitiveness, as advocated in the Malawi 2063.

7) Potential of Using Data for Innovation in Public Service Improvement

In case of the proposed project, it is expected that the increased registration of farmers will lead to the collection of personal data, accurate recording of production and shipment volumes, improved traceability of crops and monitoring of the market prices.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

Malawi has a relatively advanced ICT system, but the infrastructure and human resources have not kept pace with that. There is an urgent need to expand and improve the ICT infrastructure and develop human resources.

(6) Education / Edu-tech

1) Vision and Plans

National ICT Master Plan 2014-2031

Among four strategic pillars presented in the master plan, “Innovation and Human Development” is raised as second pillar following infrastructure development where comprehensive introduction of ICT into education sector.

Malawi’s Digital Economy Strategy 2021-2026

Outcomes for wide range of digitalization for economic development are categorized in three different levels, namely Digital Core, Digital Services, and Digital Solutions. Education is described in the Digital Core, the most important outcomes, and it aims to improve completion rate of secondary education by introducing ICT.

National Education Sector Investment Plan 2020-2030

In this latest education sector development plan, ICT utilization appears in the context of ODeL (Open, Distance and eLearning). Development of ODeL Policy is described as the first step to realize other activities.

2) Current Situation and Activities

In primary education, VSO has been implementing project to provide iPads storing original learning material. About 30 iPads are distributed to a school in the project. VSO is the main stakeholder and Malawi Institute of Education (MIE) is also involved in localization of learning material.

In secondary education, the World Bank Project has just provided digital devices called Aptus developed by Commonwealth of Learning as trial activity which is basically offline educational resources repository. However, the Project does not have plans to procure digital devices for learners’ use. The nature of the activity may have piloting purpose to seek how these Aptus could be effectively utilized.

In teacher education, some of teacher training institutions are planning to shift from conventional distance education mainly using printed material to eLearning from next school year.

In order to promote and strengthen all kinds of distance learning, the Ministry has newly established ODeL Directorate in February 2021. The Directorate is now drafting a new policy for ODeL which may be approved within this year.

3) Challenging Area(s)

The chronic shortage of teachers has been a challenge in the education sector for many years. In addition to training new teachers, there is another issue of unqualified or underqualified teachers in secondary schools caused by a controversial policy to upgrade primary school teachers to secondary school with very limited upgrade training.

In primary education, lack of budget for curriculum revision is an urgent issue before digitalizing the material. USAID assists MIE in languages including English and Chichewa while DfID assists in mathematics, but funding for reviewing other subjects are yet to be identified.

In secondary education, broadcasting learning programmes has been conducted for many years. Now equipment for audio-visual studio for development of such material, that are not really digital but analog systems, are obsolete and require renewal. Printing machines for printing material for conventional distance learning are obsolete as well.

Assistances from donors are to equip teacher training institutions with ICT infrastructure for eLearning delivery, however, it seems that human resources to manage and maintain eLearning are in shortage, although the World Bank project has a component for capacity development of staff.

There seems to be an initiative to introduce ICT utilization in in-service teachers' Continuing Professional Development (CPD), however, funding is not sufficient. About a half of teacher CPD Centres have been equipped with ICT systems while others are not. It is not clear either if those centres are staffed with trained and skilled personnel with technical and administrative skills.

4) Activities of Development Partners

The World Bank Digital Foundation Project provides optic fiber network for MAREN whose members include Domasi College of Education and Nalikule College of Education that JICA has been assisting.

The World Bank Skills for a Vibrant Economy Project plans to assist ODeL capacity of facilities and staff for the two Teacher Training Colleges.

The World Bank Equity with Quality and Learning at Secondary School Project has just commenced to address the secondary education sector comprehensively including utilization of ICT.

5) Potential Assistance Needs

There are possible needs for further assistance for Teacher Training Colleges that plan to introduce eLearning adopting online learning through internet in the next school year, since they offer a new programme for Bachelor of Education. The World Bank Project assists in many ways but it is not really clear at this moment

if the assistance is adequate to run the new programme online. Further and continuous discussion with the World Bank may be needed.

The Ministry of Education is working on rationalizing teacher qualification to address issues of unqualified and underqualified teachers. JICA may have advantages to assist the Ministry from its experiences from Strengthening of Mathematics and Science in Secondary Education (SMASSE) Project assistance. There is possible integration of teacher data in the Education Management Information System (EMIS) for the management of teacher appraisal and promotion. (It should however pay attention to the possible resistance from the teacher union or similar bodies.)

6) Expected Areas to be Digitalized

There are expectations for further digitalization of material developed under the World Bank assistance in response to COVID-19 in the current continuing pandemic impact hindering face to face education.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

Further development of communication network for schools and procurement of digital devices for users such as learners and teachers

(7) Health

1) Vision and Plans

Health Sector Strategic Plan II (HSSP II) 2017-2022

The Health Sector Strategic Plan II (HSSP II) was developed with the vision to achieve a state of health for all the people of Malawi that would enable them to lead a quality and productive life. Objectives are listed below.

- Increase equitable access to and improve quality of health care services
- Reduce environmental and social risk factors that have direct impact on health
- Improve the availability and quality of health infrastructure and medical equipment
- Improve availability, retention, performance and motivation of human resources for health for effective, efficient and equitable health service delivery
- Improve the availability, quality and utilization of medicines and medical supplies
- Generate quality information and make it accessible to all intended users for evidence-based decision-making, through standardized and harmonized tools across all programs
- Improve leadership and governance (particularly setting direction and regulation) across the health sector and at all levels of health system
- Increase health sector financial resources and improve efficiency of their allocation and utilization

In terms of the health information systems, the HSSP II focuses on improving and harmonizing data collection and management at all levels of the health system through improving ICT capacity, data protocols and linkages between levels.

National Digital Health Strategy 2020-2025

The Ministry of Health (MoH) developed the National Health Information Systems Policy in 2015. Based on

the achievements and lessons from the 2011-2015 Digital Health Strategy, the National Digital Health Strategy 2020-2025 was formulated. The mission of the Strategy is to improve the delivery of health services by providing digital health solutions that are harmonized, sustainable, reliable, interoperable, secure and comply with standards in order to increase efficiency and enable provision of quality services at the point of service. The objectives are the following.

- Improved coordination of digital health investments to increase efficiency.
- Establish a reliable ICT infrastructure that enables utilization of digital health systems
- Build the capacity of clients, communities, health care workers, and IT personnel to participate in and benefit from digital health interventions
- Leverage technology to increase access to and quality of service delivery
- Improve security of information and ICT Systems
- Promote interoperability of digital health solutions to enable information sharing for continuity of care.
- Strengthen the sharing and accessibility of data across systems to enable use.

2) Current Situation and Activities

Policy implementation structure

In Malawi, the Digital Health Division under the Department of Planning and Policy Development, the Ministry of Health is in charge of the implementation of the Strategy. The Digital Health Technical Working Group (TWG) is regularly held to monitor and coordinate the various activities together with the development partners. The task force was established in April 2021 to conduct a situation analysis and compile recommendations on the subgroups of the EMR, birth and death registration and ID system, pharmacy/laboratory, surveillance, and health management information system.

Individual systems

- DHIS2 has been deployed throughout the region as a monitoring platform for routine health data.
- It is reported that the EMR is installed in about 15% of all health facilities.
- Regarding the community information systems, the MoH is collaborating with UNICEF, the University of Malawi and others on the establishment of the integrated community health information system (iCHIS). Currently, application development is almost complete, and pilots are planned to be carried out in the coming months.
- The Government Wide Area Network (GWAN) goes to the District Commissioner's Office and some health facilities for internet connectivity. It is reported that the mobile phone penetration of health care providers is high overall and that smartphones are used relatively frequently.

3) Challenging Area(s)

Overall

In Malawi, despite the progress on the maternal mortality ratio (MMR) and neonatal mortality rate (NMR), they are among the highest in Sub-Saharan Africa. While Malawi continues to hold a high burden of

communicable diseases as HIV/AIDS, neonatal disorders, and lower respiratory infection being the most common causes of death (2019, IHME), it is now facing growth in NCDs and its impact¹⁴³.

Digital Health

- Internet access to rural health facilities is generally poor.
- Regarding the operation and utilization of DHIS2, timeliness and completeness are among the major challenges. It is reported that there is a shortage of tools for data collection on the ground and the process of reflecting data from collection to the system is complicated and inefficient.
- There is no comprehensive EMR system, and various systems specialized for specific programs (such as HIV/AIDS or tuberculosis) are introduced. Digital and paper-based data are mixed in the field. Also, even within the same program, different software is used introduced by the different partners or departments and the systems are not connected.
- As a community health information system, many mHealth apps are registered with the MoH, but the app usage period is 5 years on average, and often ends when the donor's funds run out. MoH is calling for the participation of development partners to promote the above-mentioned iCHIS pilots and dissemination.
- Regarding infectious disease surveillance response (IDSR) and emergency response, the World Bank's research report¹⁴⁴ points out the inadequate accuracy and timeliness, no linkage with the laboratory, insufficient data analysis and utilization, and weakness of the emergency response system. It was reported by the development partner that it is a relatively new system and further supports are required to strengthen its operation and utilization of data collected in the system.
- There is a shortage of health personnel with appropriate ICT skills in general and there are few formal IT-trained personnel at district health departments and health facilities.
- In the Digital Health TWG in August 2021, it was mentioned that more supports are required for strengthening interoperability to promote data access and utilization.

4) Information Systems and Platforms

Table 3.10.4 List of Major Health Information Systems

System	Data	Owner/operator
HMIS (DHIS2 including tracker)	Aggregated health data for routine monitoring, birth and death registration	MoH
COVID19 system (under development)	COVID19 vaccination	MoH
iCHIS (DHIS2 tracker) (pilot)	Community based personal health data	MoH
IDSR	Infectious disease surveillance	MoH, Public Health Institute of Malawi
Master health facility registry	Health facility	MoH
EMR (various systems)	Personal health data	Health facility, partners
Logistics management information system (OpenLMIS)	Medical logistics	MoH
Integrated human resource management information system	Human resource for health	MoH

¹⁴³ HSSP II

¹⁴⁴ Disease surveillance, emergency preparedness and outbreak response in Eastern and Southern Africa, 2021”

(iHRIS)		
Laboratory information management system (LIMS)	Laboratory results	MoH
Physical assets management information systems (PAMIS)	Medical assets/equipment	MoH
Integrated financial management information system (IFMIS)	Financial information	MoH

Source: National Digital Health Strategy 2020-2025, MoH and development partners

5) Activities of Development Partners

- Global Fund: It supports the DHIS2 strengthening and dissemination.
- WHO: As a chair of the Health Data Collaborative, it takes the lead in providing support related to health information systems. In the current Country Cooperation Strategy (2017-2022), support for promoting the implementation of IDSR guidelines is one of the priority areas.
- World Bank: The COVID 19 emergency response project launched in 2020 mainly supports infection surveillance, follow-up of infected persons, provision of diagnostic equipment, etc. Vaccine procurement and information system strengthening was conducted with additional funding in 2021. As part of this funding, the provision of computers to all district health departments and training to district health data officers is implemented as a part of strengthening the IDSR system.
- USAID: It mainly supports HIV-related system construction, DHIS2 enhancement, community-level mHealth app project, etc.
- GIZ: It has been implementing the Malawi German Health Program since 2012. In addition to technical support to the MoH, DHIS2 utilization support is provided at health centers in four districts, and EMR (maternal and child health/reproductive health) introduction support is provided at one health center.

6) Potential Assistance Needs

- It is necessary to develop ICT infrastructures such as local networks and device availability, particularly in rural areas.
- Integration and standardization of EMR are required to be strengthened.
- The operation of the DHIS2 is required to be further enhanced
- Support for the construction and dissemination of an iCHIS is required.
- Development and operationalization of interoperability guidelines and standards among different systems need to be supported.
- The strengthening of the electronic IDSR (eIDSR) system and its operationalization need to be enhanced.

7) Expected Areas to be Digitalized

- Personal health data, infectious disease incidence

8) Potential of Using Data for Innovation in Public Service Improvement

By collecting and reporting data on priority infectious diseases in the digital platform, it enables to strengthen surveillance and response capacities by submitting and transmitting data on time. It is expected to contribute

to the reduction of morbidity and mortality due to epidemic-prone diseases as well as other public health events.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Adequate ICT infrastructure development at health facilities at all levels
- Ensuring interoperability between systems
- Confirmation of data security and adequate storage
- Confirmation of compliance with the personal data protection law

(8) Social Protection

1) Vision and Plans

National Social Support Policy (NSSP, 2012)¹⁴⁵

The National Social Support Policy (NSSP) is a comprehensive policy to promote social security in Malawi. The NSSP establishes guidelines for the design, implementation, coordination, monitoring and evaluation of social security programs in the country. The NSSP provides guidelines for the design, implementation, coordination, monitoring and evaluation of social security programs in the country¹⁴⁶.

Malawi National Social Support Programme II (MNSSP II, 2018-2023)¹⁴⁷

The goals of the National Social Support Policy are being implemented through the Second Malawi National Social Support Programme (MNSSP II), which prioritizes five thematic areas of (i) consumption support, (ii) resilient livelihoods, (iii) shock-sensitive social protection, (iv) social security and linkages with other programmes, and (v) strengthening social protection systems.

2) Current Situation and Activities

Social Protection

Malawi enacted its first laws on old age, disability, survivors, illness, maternity, and unemployment in 2000, 36 years after independence in 1964. In 2005, a social assistance program called "Improving Livelihoods through Public Works" was introduced. Social assistance expenditure is 0.41% of GDP, and the social assistance expenditure per poor person was USD 2.08 in 2015.

Digitalization

Unified Beneficiary Registry (UBR)

Malawi's Unified Beneficiary Registry (UBR) aggregates information on the socio-economic status of households and provides a basis for determining eligibility for social security programs. The UBR was designed to support the Social Cash Transfer Program (SCTP) and Public Works Program (PWP) processes. It is also a source of information on the socioeconomic status of households, which could be used for other programs such as the Farm Input Subsidy Program (FISP), humanitarian and shock response interventions, the Rural Savings

¹⁴⁵ https://www.usaid.gov/sites/default/files/documents/1860/Social_Support_Policy_July_2012.pdf

¹⁴⁶ UNICEF. (2021). "Protecting and Transforming Social Protection Spending during and beyond COVID-19".

¹⁴⁷

https://socialprotection.org/sites/default/files/publications_files/Malawi%20National%20Social%20Support%20Programme%20%28MNSSP%20II%29.pdf

and Loan Program (VSL), microfinance, nutrition programs, and scholarships¹⁴⁸

Digital Money

MOEPDPSR is working through the private sector (banks and mobile operators), the regulator Reserve Bank of Malawi (RBM), and development partners to develop an electronic payment solution (Harmonized EFT) for social protection beneficiaries. MOEPDPSR is exploring options for developing a Harmonized E-Payment Solution for social protection beneficiaries.

3) Challenging Area(s)

UBR

As there is no legal basis for UBR, the development of UBR legislation is a medium- to long-term issue. As a short-term challenge, the UBR's system relies on manual works in data entry and various work-flows. This requires seamless automation and integration of all key processes with minimal manual intervention, a platform for disaster recovery and business continuity, enhanced ICT infrastructure that can ensure the provision of a robust and resilient UBR IT environment, and local backup facilities for real-time data replication with local backup facilities are required.

Improving the quality of data collection and monitoring

The quality of data collection and monitoring is an issue that needs to be addressed. Errors occur during data collection and data input to the UBR. These errors have their causes in the data collection and are clearly attributable to the human element. Therefore, there is a need to streamline the data collection process to reduce such potential errors prior to the data collection process.

Monitoring and evaluation framework

A monitoring and evaluation framework has not been established. The establishment of a monitoring and evaluation framework is required as soon as possible to make future impact evaluation and evidence-based policy formulation and formation feasible.

Payment methods

The main challenge for Mobile Money Operators (MMOs) is the liquidity constraint, where the staff must pay the cash by hand. The liquidity problem was also affected in urban areas when the cash transfer of Covid-19 relief materials took place, as they could not meet the demand.

4) Information Systems and Platforms

System/Platform Name

- National Social Protection Registry (NSPR)

Main data

- Beneficiary and household information

Data ownership/operator

- Ministry of Economic Planning and Development and Public Sector Reforms (MOEPDPSR)

¹⁴⁸ UNDP. (2019). "The State of Social Assistance in Africa."

Funding sources/donors

- World Bank, GIZ, KfW, EU, FAO, and government funds

5) Activities of Development Partners

- World Bank: Malawi Social Support for Resilient Livelihoods project (2020~2024), USD 125 million (Grants)
- GIZ: Providing social protection for ultra-poor people in Malawi (2018~2021)
- EU: Nutrition and Social Protection in Malawi (2020)

6) Potential Assistance Needs

- A Single Registry
- Targeting and monitoring
- Interoperability
- Digital payments

7) Expected Areas to be Digitalized

- Establishment of the Single Registry
- Digitization of all household information
- Enhancement of interoperability with other management information systems
- Promotion of digital payments

8) Potential of Using Data for Innovation in Public Service Improvement

- Administrative big data on social protection and households can enhance the Evidence-Based Policy Making (EBPM).
- It is also possible to propose preventive measures required for each region and the effective allocation of resources such as cash transfers.

9) Condition: Infrastructure, Policy, Human Resource, etc.

- Strengthening of personal information protection laws.
- Develop laws and regulations to promote interoperability.

3.11 Mauritius

3.11.1 Survey Policy in the Target Country

(1) National Development Plan

The Mauritius government has formulated “Mauritius Vision 2030” with nine priority areas including 1) Innovative and Globally Competitive, 2) Building Bridges, 3) a Premier Investment Platform, 4) Energy Renewable Future, 5) Leading in Banking and Financing, 6) a History of Success, 7) Strength through Diversity, 8) Supporting All-Inclusive Growth, and 9) the Cyber Island.

(2) Country Assistance Policy of the Government of Japan

Since its independence in 1968, Mauritius has always achieved a peaceful transition of power through elections, and is a politically stable country where parliamentary democracy has taken root. The country also plays a central role in the Alliance of Small Island States (AOSIS), the Indian Ocean Rim Association (IORA), the Indian Ocean Commission (COI), etc., and has a vast exclusive economic zone. Therefore, it is in a position that can be the cornerstone of the “Free and Open Indo-Pacific Strategy” and is a strategically important country in the fields of diplomacy and fisheries.

Mauritius has a per capita GNI of USD 9,760 and is classified as a high- and middle-income country by DAC standards. In addition, it has stable governance and a good investment environment among African countries, and has realized a small but developed economy.

On the other hand, the country is in a geographical environment that is easily affected by climate change and the negative effects of the natural environment, such as rising sea levels and cyclones. Infrastructure development for better water supply and sanitation and eliminating traffic congestion has become an issue.

For this reason, Japan is expanding its support mainly in the fields of environment, climate change countermeasures, and disaster prevention, and at the same time, the global position of the Indian Ocean and the importance of the blue economy (marine economy) are increasing. Based on this, it is necessary to consider support for developing relationships as an economic partner, such as promoting investment by Japanese companies in Mauritius.

Table 3.11.1 Country Assistance Policy of the Government of Japan for Mauritius

ODA Basic Policy	Support for sustainable development and economic growth	
Priority Areas	Environment, climate change, and disaster management	Climate change (landslide, coastal erosion, meteorological field, etc.) Environment (water supply and sewerage, protection of tourism resources and marine environment, etc.)
Remarks	In formulating projects in environment, climate change, and disaster management, take into consideration the benefits not only to Mauritius but also to Indian Ocean countries. Given its strategic location, promote cooperation between the African continent and the Indian Ocean countries, mainly in the trade and investment fields. Consider cooperation for sustainable development of fisheries and marine resources.	

Source: Ministry of Foreign Affairs of Japan

(3) Survey Directions for Mauritius

Mauritius is ranked 63rd out of 193 countries and regions in the world, and the top in Africa, in the UN E-Government Survey 2020. Mauritius advances the digitalization of public services that contributes to the population, based on the “Digital Mauritius 2030 Strategic Plan” and the “Digital Government Transformation Strategy 2018-2022”. National ID was firstly introduced in 1986 on paper-basis, and has gradually been digitalized to date. A unique national ID number is currently issued upon every birth registration, and a digital national ID incorporated with a biometric data card is given at 18. A system is in place for individuals to utilize digitized public services. Besides, concerning personal information protection and information security, advanced efforts are being made, such as complying with the “General Data Protection Regulation (GDPR)” established by the EU. These practices can be useful in the formulation of supporting programs and roadmaps for other target countries.

The country assistance policy of the Government Japan for Mauritius included sewerage development, conservation of tourism resources and marine environment, and response to climate change, contributing to the country’s sustainable development and economic growth. JICA also regards Mauritius as a development partner rather than a recipient country, from which JICA can learn knowledge and experience applicable to other African countries.

Given the above examination, the JICA study team intends to learn Mauritius’s experience through interviews from relevant agencies and organizations, keeping in mind the possibility of application in other target countries and the private sector participation in the issues Mauritius is currently challenging. JICA Study Team also focuses on exchanging opinions on possible knowledge exchange where Japanese experience can be referential. In particular, Mauritius is presently developing a public key infrastructure (PKI) for utilizing national IDs as personal authentication for digitalized public services, where both success or failure of Japan’s My Number system and My Number card can suggest ideas.

3.11.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation:

1) Vision and Plans

Mauritius is the most digitally advanced country in Africa, and has enacted and successfully implemented various ICT policies, regulations, and sectoral strategies that are aligned with comprehensive national ICT strategy. Current holistic national ICT strategy is the Digital Mauritius 2030 Strategic Plan which spells out broad direction of using ICT for development in Mauritius. An accompanying strategy for Government transformation and digitization of public services is the "Digital Government Transformation Strategy 2018-2022", which is the basis for e-government in Mauritius.

As for different sectoral strategies, the e-Health strategy was enacted in 2008, but was not successfully implemented and is currently under revision. The e-Education strategy was drafted in September 2019, but has not yet been finalized. In addition to these two strategies, e-agriculture and e-social security strategies are also being implemented.

2) Current Situation and Activities

ICT laws and regulations

Aligned with the national ICT strategy, comprehensive sets of legal and regulatory frameworks that are necessary to accomplish Government transformation and effective digitalized public service deliveries are enacted and implemented. As such, here is no external support needed in this area. The only exception to the implementation is e-Health, implementation of which has been incomplete. Government acknowledges the challenge in the e-health area, and it is expected to make necessary revision to the strategy and policy and implement them.

Table 3.11.2 ICT related Laws and Regulations in Mauritius

Basic ICT Law	Information and Communication Technologies Act 2001 Mauritius Research and Innovation Council Act 2019 National Computer Board Act 1989
National ID	Mauritius: Act No. 60 of 1985: National Identity Card Act
Electronic Signature	Electronic Transactions Act 2000
Electronic Transactions	-ibid-
Personal Data Protection	Data Protection Act 2017 Data Protection (Fees) Regulations 2020
Cyber Security	Cybercrime Strategy 2017-2019 Computer Misuse and Cybercrime Act 2003
Competition Law	Competition Act 2007
Intellectual Property Protection Law	Patents, Industrial Designs and Trade Marks Act 2002 and the Copyrights Act 2014 * New Industrial Property Act is being formulated to strengthen IP regime in Mauritius.

Source: JICA Study Team based on the interviews to ICT regulation authorities

Organization

The Ministry of Information Technology, Communications, and Innovations (MITCI) is the organization that formulates and coordinates ICT policy in an integrated manner. The MITCT contains several Departments which act as implementing agencies of different policies. The MITCT, like other central Government ministries, is operated by a small team of people; testament to the efficiency of the Mauritian Government.

For the e-Government implementation, Department of Central Informatics Bureau (CIB) is the focal point agency implementing various different activities. The CIB also provides project management services for e-Government initiatives undertaken by other ministries and agencies. The CIB also provides project management services for e-government initiatives undertaken by the ministries.

The IT Security Unit (ITSU) is the department responsible for IT security in public institutions. It also handles IT security incidents for the Government.

The National Computer Board (NCB) is a parastatal organization that was established in 1988 to advocate the merits of ICT to Mauritian citizenry. The NCB also operates the Government Online Center (Government Data Center), which hosts the data and operations of all Government e-services in Mauritius. The NCB also runs the Government Intra Network (GIN), a government WAN, and MU-CERT, a computer incident response team. The MU-CERT has a partnership with JP-CERT in Japan.

In addition to these organizations, there is an Advisory Council to the Minister of ICT established by the ICT Act 2001. ICT related regulations are handled by the ICT regulator, Information and Communication Technologies Authority (ICTA).

Current status of public service digitization

The digitization of public services is most advanced within Africa with most services have been digitized.

“Data and operational Silos” between ministries and departments, which prevented integrated transactions within the Government and provisions of integrated services to the citizens, have been a problem in the past. However, with the construction of "Info-Highway," a middleware (interoperability framework) akin to the Estonia's X-Road, smooth transactions between different ministries are now possible and as a result, integrated services can be provided to citizens and to the Government. The "Info-Highway" is the first of its kind in Africa and is uniquely conceptualized and created by Mauritian Government. The implementation of the “Info-Highway” started in 2014, with the first three services being connected in September 2014. There was not much activity for the period between 2014 to 2016 but since August 2016, the system has been expanded with vigor. Currently 527 different services are provided through the "Info-Highway."

One of the integrated services provided for the citizens is “Mo-Kloud” ("My Cloud" in Mauritian Creole). It is a system for storing personal information and data (birth certificates, marriage certificates, digital vaccine passports, etc.) and conduct various different transactions from the personal site. It is similar to the electronic public service transaction system provided by the EU. This system has dramatically improved the delivery of services to citizens. As for the national digital ID system, there is Mo-Pass (based on Singapore's Sin-Pass as

a benchmark), which enables one-stop personal authentication and verification for various different services. As a result of a series of digitization initiatives, the usage rate of digitized services by the public in Mauritius is very high. For example, 99% of the public now file their income tax returns online.

3) Challenging area(s)

In Mauritius, all ministries (including ministries and parastatal organizations) have been digitized. As a result, challenge does not exist in terms of developing new projects or initiatives. Challenge exists, rather, in terms of updating the current digitalized services. There is clear need of updating current services offered by various ministries and agencies. However, due to resource issues, the updating of these services are slow to come by.

Other notable challenges include the following:

- Lack of recognition of Mauritius' digitization experiences by other countries
- e-Government solutions have not been able to shift from waterfall to agile development
- Lack of resources, both human and financial, to further expand e-Government
- Lack of reform within the Government institutions. Many Government organizations (e.g., departments) are not ready for further digitalization required for today's environment. These organizations have been trying to reform their organizational structure for many years but have not made significant progress to fully benefits the power of digitization
- Cumbersome Government procurement procedures which prevent timely procurement of goods and services required for digitization

4) Information System and Platforms

- Information System/Platform Name : Mo-Kloud ("My Cloud" in Creole)
- Main Data: National ID (Mo-Pass - bench-marked with Singapore's Sin-Pass), other IDs, various transaction data
- Owner of the Data/Operator : Government (ministries in charge). As in Estonia, the services of each ministry and agency are connected through the "Info-Highway" an interoperability framework and middle-ware, making it possible to provide various integrated services to its citizenry.
- Source of Funding/Donor, etc.: Self-Funded

5) Activities of Development Partners

Considering advanced stage of Mauritius' development, there is currently no significant ICT support from development partners. Instead, there are several partnership agreements forged between different countries. Example of these include a partnership with India to procure tablets for students, e-Government related partnership with Estonia, partnership between JP-CERT and MU-CERT, etc.

6) Potential Assistance Needs

Mauritius is a leader in digitization in the African region and has garnered ample knowledge about e-Government and digitization of public services. As such, there is no need for direct ICT related support to

Mauritius. However, there may be a room to help Mauritius to form and implement program such as the e-Governance Academy to disseminate its acquired knowledge and best examples to other African countries. In order to make such program viable, it is important to adapt the contents to suit the African context. The program should be designed to include not only the knowledge of Mauritius but also the best practices of other advanced countries in Africa (e.g., Kenya, South Africa, Rwanda, etc.) to ensure that the process of knowledge sharing and adaptation is more appropriate for the digitalization of public services in Africa.

7) Expected Areas to be Digitalized

The digitization of public services which use various different data is already available and it could serve as a benchmark for other African countries.

8) Potential of Using Data for Innovation in Public Service Improvement

The digitalization of the healthcare sector and reform of the Government institutions are the area where digitalization is lagging behind. In addition, there is still a need for organizational reform within different ministries and departments to fully capitalize the power of ICTs.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

Digitization is already well underway in Mauritius. The infrastructure is advanced and ecosystem is in place to enable innovation. However, as a small country with a small market, it needs to strengthen its human resources (including recruiting talents from other African countries) and expand its business outside the country to enable further innovations.

(2) ICT Human Resource Development

1) Vision and Plans

National Development Vision / Framework

Mauritius Vision 2030

The Mauritius Vision 2030 sets pillars of eradication of poverty, further openness and the promotion of innovation. In particular, it points out that the ICT sector is an important growth engine for Mauritius, and the use of advanced digital technology is heralded.

Digital Mauritius 2030 Strategic Plan

Digital Mauritius 2030 Strategic Plan, developed by Ministry of Technology, Communication & Innovation, sets Strategic Wages, which include Talent Management. It suggests improving ICT skills by providing training opportunities in the field of ICT.

Digitalization

Digital Government Transformation Strategy (2018-2022)

Digital Government Transformation Strategy (2018-2022) was developed by the Ministry of Technology, Communication & Innovation. It recommends supporting the delivery of technology-enabled digital services by making public servants and the private sector equip digital skills, and developing the digital capability of senior government officials to lead digital transformation through executive training. It also points out the need for continuous capacity building programmes for ICT staff supporting the digital ecosystem.

Human Resources Development

National Human Resource Development Plan Policy 2007-2010 (NHRDP II)

NHRDP II points out the shortage of skilled ICT personnel in the ICT sector, and recommends expanding training opportunities in the ICT sector through collaboration between the government and the private sector to develop ICT personnel, and to ensure job opportunities in the sector.

Public Sector

Public Sector Business Transformation Strategy

Public Sector Business Transformation Strategy was developed by the Ministry of Civil Service and Administrative Reforms in order to achieve efficient, innovative and creative public services based on the Mauritius Vision 2030. The strategy proposes business transformation of public sector business based on the use of digital technologies with the keywords such as “Digital Transformation” and “Smart Process”. It also mentions capacity building for public servants and calls for making public servants of all levels acquire digital skills. The Civil Service College Mauritius (CSCM) is mentioned as an institution that provides continuous training for public servants.

2) Current Situation and Activities

Government Initiatives for ICT Human Resource Development

- The Civil Service College Mauritius (CSCM) offers short-term training courses to public servants (including employees of central government as well as semi-private sector organizations, local government and state-owned enterprises), including a range of ICT-related courses. Since its establishment in 2016, CSCM has provided training programmes to more than 46,000 public servants. CSCM also offers distance training via an online platform developed with assistance of UNDP. The CSCM is currently working with governments of Madagascar and Egypt, and is keen to share its knowledge and experience with other countries.
- The Human Resource Development Council (HRDC) provides training in ten skill areas, and ICT is one of them. HRDC helps to improve the skills of the population by subsidising part of the cost of attending training programmes provided by private training providers. A variety of training programmes in ICT are offered.
- The Mauritius Institute of Training and Development (MITD), with 14 training centres in the country, offers a range of vocational training programmes, including training courses in the field of ICT. It also offers tailor-made training courses on request from private companies. In addition to this, when new technologies and equipment are introduced that are new to Mauritius, short training courses are provided by foreign experts at MITD. MITD is working with multinational companies such as Siemens, Rockwell Automation, Hager UK and ABB in Switzerland/Germany to conduct ToT for MITD staff and engineers.

Private Sector Initiatives for ICT Human Resource Development

- The Mauritius Information Technology Industry Association (MITIA), an industry association for the ICT sector, promotes the ICT industry in Mauritius and facilitates collaboration among its member companies.

This includes the provision of training programmes for employees of member companies.

3) Activities of Development Partners

UNDP provided financial support for the development of CSCM's online platform.

4) Potential Assistance Needs

Mauritius has made some progress in the digitization of public services compared with neighboring countries and can serve as a model for other countries to promote the digitization of public services. It seems that there is a need for assistance in the design and management of the third country training, as it would be possible to invite public servants in charge of digitalization of public services in neighboring countries to share their experiences and knowledge of digitalization of public services in Mauritius.

(3) ICT Infrastructure

1) Vision and Plans

Mauritius has the most developed ICT infrastructure in Africa in terms of penetration rate due to its small population and developed economy. It ranks top among 19 major African countries in the ICT Development Indicators of the International Telecommunication Union (ITU). Based upon National Broadband Policy 2012 -2020 (NBP2012) issued by Ministry of Information and Communication Technology in 2012, domestic fiber optic network as well as three (3) international gateways connecting with international line has been fully deployed until today. Those ICT infrastructures have been developed by the fund of Mauritius Telecom and Central Electricity Board (CEB). As the fixed network system in Mauritius has been sufficiently developed, further expansion of the infrastructure is currently not required.

Although the mobile penetration rate is statistically lower than in some African countries, the percentage of the population that actually has access to mobile services is larger than in other countries.

Meanwhile, there is an issue that the Internet access for the remote island located in the north of Mauritius is provided via satellite with limited bandwidth. Accordingly, enhancement of the Internet capacity is currently under consideration.

2) Current Situation and Activities

International Backbone Network

International gateways in Mauritius are located at three (3) cable landing stations, that is Baie Jacotet, Terre Rouge, Baie Jacotet, which are connected with South Africa, Reunion, India and Malaysia through international submarine cables.

Domestic Backbone Network

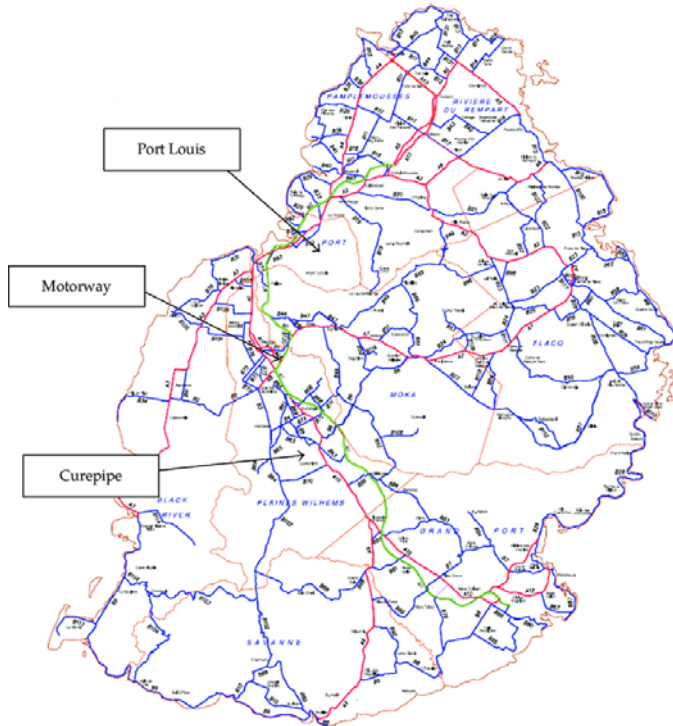
With the investment of Mauritius Telecom and the Central Electricity Board (CEB), 100% of the originally planned fiber optic cable network has been deployed.

The implementing agency in Mauritius is Ministry of Information and Communication Technology, and the regulator is the Information and Communication Technology Authority of Mauritius (ICTA). The main

funding source is loans from the major telecom operators.

According to the information from MITCI, the optical fiber cable is installed along the road network as shown in the figure below.

Figure 3.11.1 Route Map of Optic Fiber Network in Mauritius



Source: MITCI

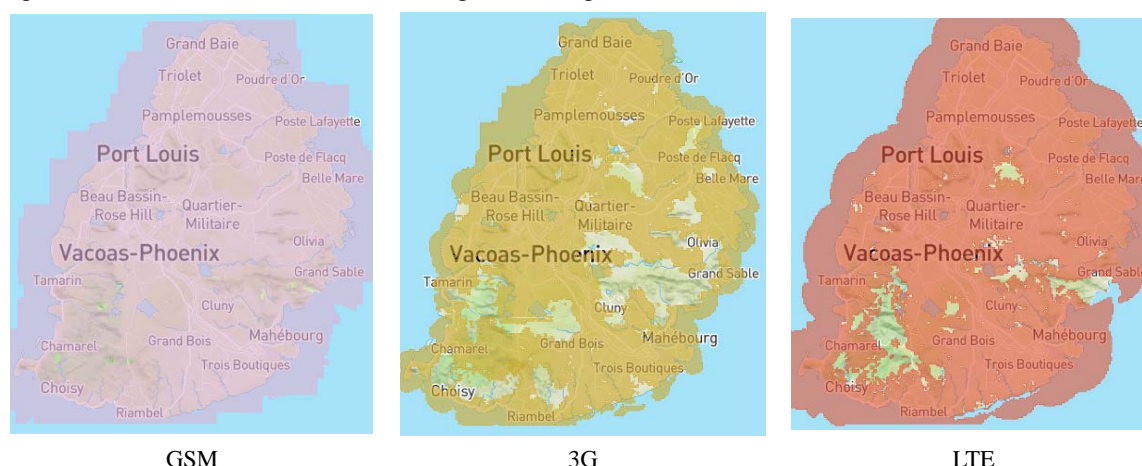
Mobile Network

The three major mobile network operators (MNOs) are Orange with its share of 54%, EMTEL (32%) and CHILI (14%) in Mauritius. The capital composition of each MNO is as follows;

- Orange (Orange S.A.(40%), Government of Mauritius (34%), SBM Investments Managers(19%))
- EMTEL (Cur Orange rimjee Jeewanjee & Company (50%), Millicom (50%))
- CHILI (Mahanagar Telephone Nigam (MTNL) (100%))

2G (GSM), 3G, and 4G (LTE) mobile coverage of each MNO reach almost the entire country of Mauritius as shown in figure below.

Figure 3.11.2 Mobile Network Coverage of Orange



Source: GSM Association

Data Centre

There are seven (7) Tier-3 level data centers built in Mauritius including the government online center. Apart from this, there is also a Tier-4 level data center established by Mauritius Telecom.

Table 3.11.3 List of Data Centre in Mauritius

Location	Data Centre	Tier Level
Port Louis	GOC (Government Online Centre)	Tier 3
	Continuity Mauritius Co Ltd & DR center	Tier 3
	EIS Data Centre & DR Centre	Tier 3
	Mauritius Computing Services Ltd (MCS) Data Centre & DR Centre	Tier 3
Arsenal	Emtel Data Centre	Tier 3
Quatre Bornes	Bhumishq Data Centre	Tier 3
	RogersCapital Data Centre	Tier 3
Rose Belle	Mauritius Telecom Rose Belle Data Centre	Tier 4

Source: JICA Study Team

IXP (Internet Exchange Point)

As for the IXP in Mauritius, the Mauritius Internet Exchange Point (MIXP) has been established in Maputo. MIXP is operated and maintained by various telecom operators and ISPs.

3) Challenging area(s)

One of the issues of the ICT infrastructure is the limited bandwidth for the remote island located in the north of Mauritius, as the Internet is provided via satellite. However, the enhancement of the Internet capacity is currently under consideration.

4) Activities of Development Partners

The main source of funding in ICT infrastructure is the telecom operators, and no funding has been provided by foreign organizations or donors. Meanwhile, in August 2019, the Government of Mauritius held discussions with the Estonian-UNDP team organized by the United Nations Development Programme (UNDP) and the Government of Estonia for the enhancement of digitization. The Estonian-UNDP team will identify potential challenges and issues in promoting digitization in Mauritius, analyze future plans and strategies, assist Mauritian government officials for better understanding of digitization. It is expected to be used in the

development of the digitalization roadmap led by the Ministry of Technology, Communication and Innovation of Mauritius.

5) Potential Assistance Needs

As mentioned earlier, almost all of the ICT infrastructure in Mauritius is being operated by the private sector, and it is not necessary to provide support for the expansion of the infrastructure, which has been developed to the level of advanced countries.

On the other hand, the remote island of Mauritius (Agaliga Island) is connected by satellite communication, and the capacity needs to be increased. Accordingly, there is a possibility of Japanese support for upgrading the satellite communication network.

(4) National ID

1) Vision and Plans

- Malawi National Registration Act (2015)

2) Current Situation and Activities

In 2016, a project to introduce a full-fledged national ID system was started with the support of UNDP and other international donor organizations. The initial budget was 52 million US dollars, 40% of which is to be borne by the Malawi government, and the remaining 60% is to be borne by each donor. The project was successful due to meticulous planning, coordination among stakeholders, and effective campaign execution, and the registration rate of citizens aged 16 and over is now almost 100% (it was approximately 5% before the project started).

They are actively promoting cooperation with other sectors (election, agriculture, pension, finance, medical care, passport, etc.). As a result, they have realized concrete benefits such as effectively distributing subsidies, reducing fraud, cutting administrative costs, and in the health field, implementing vaccination efficiently.

In the future, they are considering linkage with education, land registration, and civil registration as well.

3) Challenging area(s)

- The scope of cooperation has expanded, and there is a shortage of corresponding ICT human resources to handle the pertinent tasks.
- Especially in local registration centers, there are infrastructure-related problems (unstable power supply, network).
- The budget for maintaining and operating the system in the future is insufficient.
- It is necessary to promote the development of laws regarding the protection of personal information.
- The registration rate of civil registration is significantly low (2 to 3%), and it has not been digitized/digitalized yet.
- Interoperability with the private sector will lead to improved convenience for users, and at the same time, it will be a cost-sharing for the government operator side, and consideration should be given.

4) Information System and Platforms

- Information System / Platform Name: National Registration and Identification System (NRIS)
- Main Data: National ID, biographic information (name, gender, etc.), biometric information (fingerprint, face photo)
- Owner of the Data / Operator: National Registration Bureau
- Source of Funding / Donor, etc.: UNDP, FCDO (UK), EU, Irish Aid, Norway, USAID, UNICEF

5) Activities of Development Partners

UNDP has become the leading agency, supporting as advisors in their respective fields such as ICT, Payment, Capacity Building, Logistics, and Monitoring & Evaluation. In addition to UNDP, funding is provided by FCDO (UK), EU, Irish Aid, Norway, USAID, and UNICEF.

6) Potential Assistance Needs

If conditions such as the legal system and ICT infrastructure are met in the future, there is room for consideration of introducing an information exchange platform (similar to X-Road in Estonia).

7) Potential of Using Data for Innovation in Public Service Improvement

- CRVS

(5) E-Government

1) Vision and Plans

The " Digital Mauritius 2030 Strategic Plan " proposes the development of e-government as an opportunity for reengineering administrative processes, joining-up fragmented services and addressing the needs of business and citizens alike. Under e-government, Mauritius is stepping firmly into the fourth industrial revolution with digitalization spreading across the economy riding on technological applications fueled by big data, open data, smart mobile apps, data sharing through the award winning InfoHighway platform, identity verification through mobile phones, among others. E-government is regarded as one of the five fields that realize digital transformation, and the following issues are recommended there.

- Review and align procurement clauses to cater for new trends in technology and ICT deployment methods
- Routinizations of successful applications
- Framework Agreements for recurrent purchases
- Review existing Legal and Regulatory framework to sustain various E-government initiatives
- Re-engineering of user processes before application of technology
- Dedicated Business Product Owners in Ministries/Departments
- Multi-Channel Delivery to bridge digital divide
- End-to-end digital services with paperless transactions and payments
- Use data and analytics for monitoring and continuously improve quality of digital services
- Promote Tell-Us Once, One-Stop-shop and under one roof concepts
- Data should flow instead of paper – data sharing through the InfoHighway

- Promote Open Data for creation of innovative data-driven apps
- Ministries/Departments should follow the Project Management Manual for ICT projects

2) Current Situation and Activities

Mauritius depends a lot on the public private sector dialog based on the proximity of the different institutions to promote digital transformation. When the government has a new strategy, it is posted online and there is various validation workshop from different bodies so that everybody can exchange ideas and views and find a common solution forward.

The e-government "Info-Highway" is middleware like Estonia's X-Road that allows data to be traded between different ministries. Currently, 527 services are provided using "Info-Highway". As an integrated service for citizens, there is Mo-Kloud (meaning "My Cloud" in Mauritius Creole), which handles various certificates (birth certificate, marriage certificate, digital vaccine passport, etc.). Most of the data is currently provided online using MO-Pass, Mo-Kloud and "Info-Highway".

Internet access is available anywhere in the country. Poor households are supported by the government to make internet connection free. Education is free, internet connectivity to schools is in place, and the demand for online lessons is increasing due to the covid19 disaster. Free WIFI is also available at Village Force and community centers.

Regarding the digitization of other public services, the MRA (Mauritius Revenue Authority) has 99% of the people doing their tax return online with a very aggressive marketing strategy. The MRA application checks all the data that the user is entering in real time for all the data. With the Info Highway it will be able to connect to the other related info to the other ministries. Similar to the X-ROAD system in Estonia. Mauritius Post integrates its e-commerce platform to its website and works with the Ministry of Social Security to make pension funds payments through the Mauritius Post.

3) Challenging area(s)

- In terms of E-government today all ministries have some form of digitalization in place. They all have an IT system. Issues are more about renewing some solution as they are outdated. It becomes more difficult to implement due to budget constraints.
- Issues related to the active use of new services and processes.
- Connectivity with primary schools have been achieved but still pending for secondary schools. Issues were with tenders etc.
- Not adopted the agile development of the government system. Takes a lot of time to make things happen and it has become a huge problem for the government
- Public Procurement model is very lengthy and it's a very cumbersome process with a lot of check and balances which slows down a lot of projects
- Scarcity of ICT resources

4) Information Systems and Platforms

Government data center

- Activities of Development Partners:
- The E-government was developed independently by Mauritius without the support of other countries.
- Regarding national ID , in 2014 , MOU was signed with Singapore to carry out a national ID project.
- Procuring tablets (grant) in partnership with India. Comprehensive e-commerce cooperation has also been signed.
- Mauritius has a partnership with Estonia, which supported the reform of ministries and agencies of the Ministry of ICT and related organizations. There is a plan to create an integrated organization as a "digital transformation agency" instead of the current situation where each ministry is highly independent. It is currently under discussion with related ministries.
- As with the construction of Cyber Tower 1 in the IT Park with the support of the Government of India, international projects are being carried out mainly by private companies.

5) Potential Assistance Needs

- It is necessary to develop human resources for ICT in Mauritius.
- Although ICT has not been promoted much in the election process, support is needed when introducing ICT in voter registration. Currently, the staff of the Election Commission visits each household fills in the information on a paper-based questionnaire, returns to the office and manually inputs, but the household location information, voter ID information need to be integrated. The ZIP machine in South Africa is costly, so Japanese support is needed. E-voting has not yet been implemented (currently the law is being amended for e-voting).
- Opportunity for young Mauritius to study abroad at Japanese universities and institutions.

6) Potential of Using Data for Innovation in Public Service Improvement

Utilization of digital technology to update voter registration database (integration with household location information, voter ID information, etc.)

7) Condition: Infrastructure, Policy, Human Resource, and etc.

Resources problems. Not enough resources to run projects

(6) Education

1) Vision and Plans

- Education and Human Resources Strategy Plan: 2020 (issued in 2009)

“Strategic Goal 2 : Quality education for All” stipulate further promotion of utilization of ICT in classroom.

2) Current Situation and Activities

According to education statistics (Education Card 2019), 100% of basic education schools have PCs while so do about 50% of ECD institutions. Almost of 100% of basic education schools also have access to internet

while so do as well about 30% of ECD institutions. Any kind of utilization of ICT for the education purpose is also practiced in almost 100% of basic education schools while so is in about half of ECD institutions.

Website organized by the Ministry of Education provides Students Support Programme without registration or fees. 1,696 video material, 309 documented material 70 assessment material and 284 additional resources are available. Most of these services seems to be on demand on-way material.

With assistance extended by the Government of India, Early Digital Learning Programme is implemented in basic education, in which a certain number of tablet PCs are shared to a batch of schools for about a week and then to another batch of schools for another week, and so on. Platform for learners to access learning resources both in Windows and in Android.

3) Challenging area(s)

Utilization of ICT in education is already relatively high. Challenge for the next stage could be provision of more interactive services fully utilizing the environment where one device is given to one learner, so to say virtual classroom. As further services are introduced, management capacity of teachers for such functions may become a challenge.

4) Activities of Development Partners

The Government of India, assistance for implementation of Early Digital Learning Programme

5) Expected Areas to be Digitalized

Considering the relatively advanced status of provision of digital devices for learners, further digitalization for eLearning with modern LMS (learning Management System) may be feasible.

6) Potential of Using Data for Innovation in Public Service Improvement

If LMS is fully introduced, learning record may be utilized to manage and support learners for effective and efficient learnings.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

Staff development for management of LMS, learner support and teacher development as user of eLearning system

(7) Health

1) Vision and Plans

Health Sector Strategic Plan (2020-2024)

The Health Sector Strategic Plan (2020-2024) has been developed with the participation of all stakeholders, both public and private. For example, the WHO recommended "Societal Dialogue - an innovative means of governance for policy development" to include the views and opinions of health service providers and patient groups, and the development process was coordinated across ministries. It is a national health strategy with 25 strategic goals. The strategy is also fragmented, with 25 strategic goals. Some of them (such as NCDs) are characteristic of digital health and of Mauritius.

- Strategic goal 5: Reduce preventable and early morbidity, mortality and disability by addressing the risk

factors of NCDs.

- Strategic goal 18: Increase the interoperability of reliable information at all health care levels in health information systems for better decision-making.
- Strategic goal 19: Institutionalize disease surveillance surveys to improve the quality of health services
- Strategic goal 21: Ensure sustained access to affordable, safe, cost-effective and quality health care and medical technology to achieve SDG 3
- Strategic goal 24: Strengthen inter-agency cooperation and public-private partnerships
- Strategic goal 26: Support the development of medical tourism

2) Current Situation and Activities

Mauritius has a different demographic and disease structure compared to the countries covered by this survey, and it is urgent to address the aging population and chronic diseases (NCDs). To this end, the country is working to address the rising cost of health care due to the burden of NCDs, to restructure its health system to cope with an ageing population, to improve the efficiency of the health system through new digital technologies, and to strengthen its capacity to cope with the resurgence of infectious diseases and new infectious diseases such as the COVID-19 pandemic.

3) Challenging area(s)

The Health Sector Strategic Plan (2020-2024) identifies the challenges of health information systems. Key implications are that health information systems are not interoperable, are largely manual and patient records are rarely shared between facilities, and that the lack of a shared platform for health information systems and electronic health records has led to silos with each health facility implementing its own system, limiting information for strategic planning and appropriate monitoring of health services. The lack of a shared platform for health information systems and electronic health records limits the availability of information for strategic planning and appropriate monitoring of health services. It is also pointed out that the analysis of routine survey data collected is limited, and the large amount of valuable data obtained from health information systems is not fully utilized, resulting in less accurate statistical material for decision-making. Private hospitals and clinics do not have an established framework for submitting data to the Ministry of Health on a regular basis, and no database has been established to monitor the situation of all public and private health facilities.

4) Activities of Development Partners

At present, there appears to be no financial support or technical cooperation from development partners in digital health.

5) Potential Assistance Needs

In Mauritius, with its ICT infrastructure, human resources and domestic IT companies, there seems to be a great potential to support the digital health sector in addressing NCDs and ageing, which are considered to have a high affinity with digitalization. For example, telemedicine services for patients with chronic diseases such as diabetes could be linked to wearable devices for monitoring at home, checking medication and regular online consultations.

6) Expected Areas to be Digitalized

Development of telemedicine and health-related applications by start-up companies in Mauritius.

7) Potential of Using Data for Innovation in Public Service Improvement

The development of electronic medical records with a single patient ID and greater interoperability between other health information systems, as well as greater interoperability with other ministries and private companies through the promotion of e-government, will contribute not only to the development of evidence-based health policies and strategies through the analysis of medical histories, but also to the development of tailor-made drugs using healthcare big data. This could contribute to the development of tailor-made drugs.

8) Condition: Infrastructure, Policy, Human Resource, and etc.

The conditions (environment) for the digitalization of the health sector are as follows.

- Legislation on telemedicine and diagnosis
- The existence of matching Japanese companies and their commitment

(8) Social Protection

1) Vision and Plans

Marshall Plan (Marshall Plan Social Contract 2016)

The Marshall Plan identifies thirty-nine actions and project costs, organized in eleven sections. Social security, employment, social housing, education, health, environment, and equitable service delivery initiatives, including Rodriguez Island, were designed to address poverty and inequality. The plan devised an approach to address the root causes of social exclusion through a community-based approach to service delivery. Promoting gender equality and expanding opportunities for young people is a theme throughout the plan, as well as this plan is for all citizens. The success of the plan depends on: i) mobilizing society to support the plan and seek a new social contract to reduce poverty and inequality; ii) adopting a sound implementation structure and strengthening public institutions; iii) refocusing the National Empowerment Foundation (NEF); and iv) shifting CSR from "corporate social responsibility" to "corporate sustainability"; and v) setting clear poverty lines to identify the poorest and those in need¹⁴⁹.

2) Current Situation and Activities

<Social Protection>

Before independence in 1968, Mauritius had enacted laws on family allowances, work-related accidents, and old age, disability, and survivors. After independence, in 1975 and 1976, regulatory frameworks on sickness, maternity, and national pensions were introduced. The social assistance schemes were introduced before independence. The Government of Mauritius fully funds the social assistance program, and as of 2014, social assistance expenditure was 3.44% of GDP, amounting to USD 27,752.23 per poor person per year¹⁵⁰.

<Digitalization>

¹⁴⁹ https://www.un-page.org/files/public/marshall_plan_against_poverty_volume_1.pdf

¹⁵⁰ UNDP. (2019). "The State of Social Assistance in Africa."

Social Registry of Mauritius (SRM)

The Social Registry of Mauritius (SRM) is an information management system that registers the poor, identifies their socio-economic profile, and provides information to policy makers on effective demands for poverty reduction policies. It uses the Proxy Means Test (PMT) to determine the eligibility of applicants. Its main objective is to improve the targeting efficiency of social programs and to ensure that limited resources reach those who need them most. The SRM was launched in 2008 with the support of UNDP and was designed to improve the capacity of government agencies in strategic planning of social security, programme-based budgeting, and effective delivery of public services. The SRM became operational in 2012.

Cash Transfer Programmes and Digital Money

The cash transfer services under the empowerment scheme are based on the following conditions:

- Education of the child. Attendance rate of at least 90%.
- Economic empowerment of youth and adults: 90% or more attendance rate in training and job placements.
- Family empowerment. Family empowerment: participation in programs/training aimed at family welfare.
- Health. Health: adherence to immunization and vaccination schedules, prenatal and postnatal care.

Monitoring will be done by NEF and cash transfer procedures will be managed by the Department of Social Integration. Recipients are required to have an official bank account, and at this time, there is no digital money payment.

3) Challenging area(s)

SRM

- The SRM is used only to register beneficiaries and determine their eligibility for social security schemes. The SRM does not have an integrated management of social security programs under the empowerment plan, nor does it capture information on services provided.
- The SRM questionnaire used as a tool for family survey includes information on family composition, educational and occupational details of the members, living conditions and available facilities. However, this does not capture the specific needs of the families to develop interventions and plans for the implementation of empowerment programs. Therefore, further needs assessment by the NEF is needed.
- There is no centralized database on beneficiaries of social programs.
- No single-entry point for initial data capture, sharing and updating of information through a common platform.
- Lengthy administrative procedures are required for exchange and updating of SRM data.
- The NEF relies on the Department of Social Integration to receive the list of eligible applicants in a timely manner for timely implementation and follow-up of the project.

Proxy Means Testing (PMT)

- Proxy Means Testing (PMT) is a controversial targeting method and little research has been done on its effectiveness. The effectiveness of PMT needs to be thoroughly evaluated.

- PMT only captures data at a given point in time, but poverty is dynamic. The living conditions of households can change over time, and information about beneficiaries needs to be constantly monitored and updated regularly, but the current approach does not facilitate updating this information.
- The concept of PMT uses observable characteristics of a household and its members to estimate the income and consumption of that household. Households that own tablet PCs or televisions or have household members who receive social assistance (e.g., the sick), may influence eligibility decisions.
- Since the formulae in the PMT-based household targeting system need to be updated over time using household surveys, policymakers need to ensure that there is consistency with respect to time lags.

4) Information Systems and Platform

- System/Platform Name: Social Registry of Mauritius (SRM)
- Main data: Beneficiary and household information
- Data ownership/operator: Ministry of Social Integration, Social Security and National Solidarity
- Funding sources/donors: UNDP, government funds

5) Activities of Development Partners

- UNDP TA for SRM
- UNDP Marshall Plan Social Contract Drafting Support

6) Potential Assistance Needs

- A Single Registry
- Targeting and monitoring
- Interoperability
- Digital payments

7) Expected Areas to be Digitization

- Establishment of the Single Registry
- Digitization of all household information
- Enhancement of interoperability with other management information systems
- Promotion of digital payments

8) Potential of Using Data for Innovation in Public Service Improvement

Administrative big data on social protection and households can enhance the Evidence-Based Policy Making (EBPM). It is also possible to propose preventive measures required for each region and the effective allocation of resources such as cash transfers.

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Strengthening of personal information protection laws.
- Develop laws and regulations to promote interoperability.

3.12 Zambia

3.12.1 Survey Policy in the Target Country

(1) National Development Plan

The Government of Zambia has formulated “Vision 2030” with seven principles including, 1) Gender responsive sustainable development, 2) Democracy, 3) Respect for human rights, 4) Good traditional and family value, 5) Positive attitude towards work, 6) Peaceful coexistence, 7) Private-public partnership. In the “7th National Development Plan (7NDP) 2017-2021” which is in line with the Vision 2030, states action plans in the following five areas: A) Diversify and make economic growth inclusive (Export-oriented agriculture, Export-oriented mining, Tourism sector, Energy production and distribution, Access to markets, Transport systems and infrastructure, Water resources development and management, Enhanced ICT, Decent job opportunities, Research and development), B) Poverty and vulnerability reduction (Welfare and livelihoods of the poor and vulnerable), C) Reducing developmental inequities (Reduced inequity), D) Enhancing human development (Health and health related services, Education and skills development, Access to water supply and sanitation), E) Governance environment for a diversified and inclusive economy (Policy environment, Transparency and accountability, Inclusive democratic system of governance, Service delivery, Rule of law, human rights and constitutionalism, National values, principles and ethics).

(2) Country Assistance Policy of the Government of Japan

The Current Assistance Policy of the Government of Japan for Zambia revised in June 2018 is as follows.

Zambia has abundant mineral resources, including copper and cobalt which account for about 70 percent of the country's total exports. In addition to hosting the headquarters of the Common Market for Eastern and Southern Africa (COMESA) in Lusaka, the capital city of the country, the government is working on integrating former refugees from Angola and Rwanda into Zambia society, and the government has contributed to the peace and stability and economic development.

Zambia's has maintained high economic growth rates against the background of increased production of copper and recovery of international prices. However, since the latter part of 2014, internal economic conditions deteriorated due to a decline in copper production caused by electricity deficit as a result of low rainfall and a slump in the price of the metal on the international market. This exposed weakness of monoculture economy. In the background, there are medium- and long-term factors such as underdeveloped industries with high employment absorption capacity and high-risk rain-dependent agriculture. To be freed from the monoculture economy, in the medium and long term, it is important for the economy to diversify through further development of agriculture, manufacturing and tourism sectors and promote investment from within and outside the country through stabilization of the fiscal administration of the government. In addition, in 2017, there have been financial problems including the fiscal deficit, such as requesting the IMF to support the consolidation of the fiscal base.

Against this background, the Zambian government formulated the “Seventh National Development Plan (7NDP)” aimed at the realization of a diversified and resilient economy for the period from 2017 to 2021,

which was launched in June 2017.

Supporting such efforts by Zambia and supporting the departure from Zambia's monoculture economy will contribute to the strengthening of economic relations with Japan, and will contribute to not only Zambia, but also the peace, stability and prosperity of the region.

Table 3.12.1 Country Assistance Policy of the Government of Japan for Zambia

ODA Basic Policy	Promoting Growth of a Diversified and Resilient Economy Freed from Overdependence on Mining	
Priority Areas	Vitalization of industries	Technical cooperation for the private sector mainly SMEs and the agricultural sector
	Infrastructure and social services to support economic activities	Infrastructure, social services including education, human resource development, health, water supply and sanitation
Remarks	Keep dialogue with other partners as Zambia is one of the advanced aid cooperation countries Pay attention to reduce disparities (income gap between urban and rural areas)	

Source: Ministry of Foreign Affairs of Japan, June 2018

(3) Survey Directions for Zambia

In the 7th National Development Plan (7NDP), Zambia has listed "Enhanced ICT" among the 10 development outcomes of "Strategic Area: Diversify and make economic growth inclusive", and "Service delivery" is listed in the six development outcomes of "Strategic Area: Governance environment for a diversified and inclusive economy". Along with these, the digitalization of public services such as taxes and pensions are being promoted, but the UN e-Government Survey (2020) points out that Online Service Index and Telecommunication Infrastructure Index are low. Low reliability of the NRC may be one of causes, as it is still managed on a paper basis and duplicate numbers, forgery and fraud often happen. Another problem is that the birth registration rate is extremely low, in the 10% range.

The Country Assistance Policy of the Government of Japan is based on "Promoting Growth of a Diversified and Resilient Economy Freed from Overdependence on Mining". It focuses on industrial revitalization, infrastructure development, and improvement of social services. It should be noted that since aid coordination is progressing in Zambia, it is important to actively engage in dialogue with other donors to provide effective support and to consider correcting disparities when achieving economic growth. JICA Zambia office suggested paying attention to Smart Zambia's trend, which promotes cross-sectoral e-government. The health team of the JICA HQs suggested utilizing ICT indirectly in the planned project. The education team pointed out that there are cooperation assets such as technical cooperation projects in the past, although there are no projects under consideration.

Given the above examination, JICA Study Team examines the progress of digitization of national IDs, including the possibility of utilization in various sectors, e-government by Smart Zambia, and the possible use of ICT for diversifying industries, focusing on agriculture, and alleviating disparities between regions. JICA Study Team conducts interviews with related organizations to understand the current situation and issues, then proposes support programs with a roadmap.

3.12.2 Current Situation and Issues of Digitalization of Public Service

This section describes the current situation and issues related to digitalization of public services in the target country according to five sub-sectors of 1) education, 2) health, 3) national ID, 4) e-government, 5) social protection, as well as three transversal bases of 1) ICT human resource development, 2) ICT policy and legislation, and 3) ICT infrastructure.

(1) ICT Policy/Legislation

1) Vision and Plans

ICT Master Plan¹⁵¹

ICT Master Plan was formulated in June 2010 with the following objectives: Use ICTs to enhance democratic governance and enable effective debate, sharing and enhanced public participation in the legislative and policy-making processes; Support greater oversight by parliaments through the use of ICTs; Strengthen the capacity of parliamentarians in making decisions about the Information Society, advocating greater investments in ICTs as well as promoting pro-poor ICT applications and benefits within their constituencies and Create ICT parliamentary committees to support parliaments in their use of ICTs as well as in how Information Society issues are tackled from a national development perspective.

Specifically, the Master Plan is founded on five strategic priorities: 1. Strengthening the ICT Institutional Framework; 2. Strengthening ICT Infrastructure; 3. Strengthening Oversight, Legislative and Representative Functions; 4. Strengthening Oversight over ICT National and Subregional Policy and Strategies; and 5. Strengthening Community Development and Inter-Parliamentary Cooperation.

The overall content of the report is how to utilize ICT in the Zambian parliament, and does not include how to utilize ICT in the country as a whole, how to develop industry, how to develop human resources, or how to realize e-government.

New ICT Master Plan

The current ICT Master Plan was created in 2006 and is outdated, so it is currently under revision. The new ICT Master Plan is intended to address emerging issues. It needs to incorporate issues related to capacity building, development, innovation, and in general how ICTs can be used to support the business environment. The new ICT master plan was supposed to be introduced in 2021, but although it has been developed, it has been delayed because the minister was removed due to the elections and is now awaiting Cabinet approval. The new ICT Master Plan is expected to be announced probably in early 2022.

The new ICT master plan basically focuses on the government's public services being provided on digital platforms. This includes the development of infrastructure for access to and use of digital platforms. It also includes elements of promoting entrepreneurship and innovation in the ICT sector, and cross-cutting themes on legal and regulatory frameworks, including policy and institutional arrangements. Now that the plan has been formulated, the country aims to implement the goals of the plan but faces the challenge of covering the

¹⁵¹ National Assembly of Zambia, "ICT Master Plan June 2010"

entire infrastructure of the country due to the vastness of the country.

2) Current Situation and Activities

ICT Legislation

The creation of the ICT-related legal framework in Zambia was formulated after much benchmarking of global trends and laws that exist as of 2021. Specifically, the Electronic Communications and Transactions Act of 2009 was repealed and three new laws were enacted: the Cyber Security and Cyber Crimes Act, the Electronic Communications and Transactions Act, and the Data Protection Act. All of these laws were enacted in 2021. As such, they have been incorporated as appropriate at this point in time. On the other hand, the ICT sector is changing rapidly, and a dynamic framework is needed to capture these changes.

In areas such as electronic transactions, the financial sector and the ICT sector are merging their service offerings. Since these two sectors have their own regulations, it has been difficult to ensure that regulations from both sectors are strengthened. The Data Protection Act is a new law and requires the establishment of a Data Protection Committee. It has also been developed by taking lessons from other countries that have established data protection departments.

Table 3.12.2 ICT related Legal Framework in Zambia

Basic ICT Law	The Postal Services Act No. 22 of 2009, Electronic Communications and Transactions Act No. 21 the Information and Communications Technologies (ICT) Act No. 15 of 2009
National ID	Birth and Death registration Act
Electronic Signature	The Electronic Communications and Transactions Act, 2021
e-Commerce	The Electronic Communications and Transactions Act, 2021
Personal Data Protection Law	Data Protection Act 2021
Cyber Security Law	The Cyber Security and Cyber Crimes Act, 2021
Competition Law	The Competition and Fair-Trading Act
Intellectual Property Law	The Copyright and Performance Rights (Amendment) Act, 2010 (Act No. 25 of 2010) The Patents Act, 2016 (Act No. 40 of 2016) The Protection of Traditional Knowledge, Genetic Resources and Expressions of Folklore Act, 2016 (Act No. 16 of 2016)

Source: JICA Study Team

Organization

The ICT-related organizations in Zambia are as follows.

The Ministry of Transport and Communications

The Ministry of Transport and Communications is responsible for overall ICT policy in Zambia. As of August 2021, the Ministry is preparing a draft of a new ICT Master Plan. The ministry has also been working on the National Cyber Security Policy and Implementation Plan, which is a very important piece of legislation, policy strategy and framework that provides guidance to various stakeholders, and has also been working on the Postal Services Policy, taking into account the convergence of the ICT sector's use of postal services for business and public services. The Ministry of Transport and Communications has jurisdiction over the entire ICT sector, including Smart Zambia, although Smart Zambia is responsible for only the public service digitization planning and implementation.

ZICTA

ZICTA is responsible for the regulation of the ICT sector, including the management of spectrum resources, control of competition and pricing, consumer protection, approval of licenses for service providers, and regulation of service provision by providers.

Smart Zambia

Smart Zambia, an organization under the Cabinet Office, has been established to address the digitization of public services through e-government. With the support of the Ministry of Transport, Smart Zambia has formulated the Electronic Government Act, 2020. This Act empowers Smart Zambia in terms of how to coordinate public services and standardize approaches. With this Act, public service digitization is progressing and has been successful.

Current Status of Digitalization of Public Service

Smart Zambia is in the process of digitizing its public services on a platform called ZamPortal (<https://eservices.gov.zm/#/service-directory>), which seeks to integrate all government services offered. Currently, more than 50 services have been digitized, and ZamPortal integrates applications that provide services to citizens. Some of these services are provided as self-service, while others are of the type where the supply-side government employees are assisted by the operator providing the service. The main digitization has been in the transportation sector, where the Road Transport and Safety Agency could facilitate online payments for tax and bookings for fitness tests and certificates could be downloaded and printed. Immigration procedures such as visas, company registration, and licenses for the tourism and forestry sectors have also been digitized. The ZamPortal offers online services as well as online payment channels such as mobile money, Internet, banking, and visas.

ZamPortal has been developed as a platform which integrates all public services and enabled for each public service interoperable with the other public services. In addition, capacity has been built to enable interoperability between agencies, and so far, integration and interoperability between agencies has been achieved. However, this is a work in progress and some applications are not yet interconnected.

Service interoperability is a work in progress, but the portal is located in a data center managed by Smart Zambia, which facilitates the process of connecting and developing services. The ZamPortal is standardized in the government cloud environment and hosted in the national data center, and is accessible through the cloud.

However, the government has not yet digitized its national ID system and currently it is being developed. The government uses biometrics and facial recognition, but the integration is yet to be completed. The government is also working to develop APIs to connect with other systems in the future. The digitization of the national ID covers all births, marriages, and deaths, and the system is already being developed and upgraded. The timeline is for the system to be ready for production by the end of 2021 and released in the first quarter of 2022. The system is being developed by the German company Dermalog. The company is also trying to digitize about 160 services, most of which are not yet complete.

3) Challenging area(s)

The focus is on central government services and there is insufficient direct support directed to local government services, even though many people interact with the government through local government services.

In terms of cyber security, national CIRTs exist, but sector CIRTs do not. The Ministry of Transport and Communications is considering the development of these sector CIRTs. In addition, the national CIRTs are under the regulatory authority, ZICTA, which needs to review how to support the development of sector CIRTs, including their composition, types of skills, and improved capabilities and reporting.

Local software developers are few in number and low in capacity, which prevents them from improving the speed of public service digitization.

ICT equipment is very expensive in Zambia, computers are very expensive and most people rely on cell phones to access online services. Furthermore, computers are not easily available. To facilitate the digitization of public services, many people need to understand how to use a PC, and for this to happen, PCs need to be affordable.

With the increased use of the Internet, all cell phone companies have increased their bandwidth capacity, but that capacity has not benefited rural areas as much as urban areas. There is also a need to increase the types of technology available in rural areas to enable institutions such as schools and clinics and individuals to access government services online.

4) Activities of Development Partners

The new ICT basic plan is apparently being developed with support from several organizations, but I could not confirm the details. The national ID system is being developed by the German company Dermalog.

5) Potential Assistance Needs

Local governments are the first point of contact for accessing government services. In terms of specific areas where JICA can assist, local governments have issues such as permits, licenses, business licenses, construction permits, etc., and there is potential to assist in these areas. Local government agencies appear to be unaccountable for the money they collect for services, and there is also poor record keeping and unpredictable processes that slow down services, which could also be supported.

It is recommended to introduce a Sector CIRT (Sector Cyber Incident Response Team) as a framework for inter-sectoral reporting. For better coordination, processes and technical capabilities need to be developed at different levels, including the national level. There is an urgent need for capacity building and organization to implement and enforce this. In addition, tools to improve operations are needed.

Capacity building of software developers is important.

The cost of ICT equipment is high in Zambia. Therefore, it is important to attract investors who can assemble computers and cell phones locally to make them affordable. Selling products that are already assembled will lower costs. Improvement of communication environment in rural areas is needed.

6) Condition: Infrastructure, Policy, Human Resource, and etc.

In Zambia, the communication environment is poor in rural areas, but in order to support digitization, it is necessary to improve the communication environment.

(2) ICT Human Resource Development

1) Vision and Plans

National Development Vision / Framework

Vision 2030

Vision 2030 sets a goal for Zambia to become a middle-income country by 2030. The vision aims for the well-being of all citizens through embodying; 1) Gender responsive sustainable development, 2) Democracy, 3) Respect for human rights, 4) Good traditional and family value, 5) Positive attitudes towards work, 6) Peaceful coexistence, and 7) Private-public partnership. It also states that access to ICT will be improved to create an information and knowledge-based society by 2030.

Seventh National Development Plan 2017-2021

Seventh National Development Plan 2017-2021 sets out development outcomes and strategies in the following five strategic areas covering the five-year period of 2017-2021; i) Economic diversification and job creation, ii) Poverty and vulnerability reduction, iii) Reducing developmental inequalities, iv) Enhancing human development, and v) Creating a conducive governance environment for a diverse and inclusive economy, 4) strengthening human resource development. In the area of iv) Enhancing human resources development, the plan calls for strengthening access to skills training and enhancing the role of science, technology and innovation. The Plan points out a shortage of ICT human resources is an issue, while the public's need for ICT is growing rapidly. To address this, the plan calls for increased investment in ICT infrastructure and human resource development, and the formulation of legal frameworks.

SMART Zambia e-Government Master Plan

SMART Zambia e-Government Master Plan sets a vision that Zambia transforms into an information and knowledge-based society and economy with consistent and widespread use of ICTs by all citizens, and lists the goals and targets to achieve this. Four goals are set out in terms of human resource development.

Human Resource Development for Public Servants

Public Service Training and Development Policy (PSTDP)

PSTDP was developed by the Public Service Management Division (PSMD). It has been long overdue and does not meet the skills needs of today's public servants, for example, there is no mention of ICT. It is also not always clear which organizations of the government is responsible for providing training to public servants.

Public Service ICT Human Capital Development

Public Service ICT Human Capital Development, developed by the Smart Zambia Institute in 2019, aims for establishing guidelines to identify the skill sets required to provide effective and efficient public services, based on industry knowledge and strategies and objectives of the government. The plan organizes the target groups into three categories, namely, (i) ICT professionals in the public sector, (ii) public sector workforce, and (iii)

citizens, and outlines the skills required for the personnel in the respective categories.

2) Current Situation and Activities

Government Initiatives for ICT Human Resource Development

As part of the Smart Zambia project, a Smart Centre was established in 2016 to promote ICT human resource development. The Smart Centre, located at the Zambia ICT College, offers ICT-related professional education and vocational training courses. At the Smart Centre, foreign private companies such as Cisco and Huawei, and also development partners such as the EC Council, International Information System Security Certification Consortium (ISC)/ISACA and ICDL, as well as public institutions, also offer training courses.

The Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA) regulates the vocational training institutions that provide technical, vocational and educational training in the various fields under its jurisdiction and accredits the programs offered by these institutions. These vocational training institutions include schools offering vocational training in ICT. Ministry of Higher Education plans to establish a Centres of Excellence (CEOs) to serve as models for vocational training institutions in the field of ICT. Ministry of Higher Education is strengthening the initiatives for distance learning as a response to the spread of COVID-19.

ICT technical staff have been seconded from Smart Zambia to various ministries to promote ICT in public services.

Private Sector Initiatives for ICT Human Resource Development

The Information and Communication Technology Association of Zambia (ICTAZ) is a semi-private industry association established under a government legislation enacted in 2018. ICTAZ works closely with the Ministry of Transport and Communication and representatives from the ministry also attend meetings of ICTAZ. The Ministry of Transport and Communication also provides financial support to ICTAZ. ICTAZ works to raise the skill level of ICT practitioners in the country by organizing general meetings that bring together members from across the country to discuss various aspects of technology, and monthly technical meetings to discuss emerging issues such as the digitization of public services.

3) Challenging Area(s)

Issues in the policy level

It is not necessarily clear what role the PSMD, which is responsible for the recruitment, transfer and development of the entire civil service, is expected to play in the promotion of Smart Zambia and e-government, and the demarcation with the Smart Zambia Institute on the promotion of ICT skills among public servants.

ICT Skill of Public Servants

Most processes in government organizations are still carried out manually and the level of digitalization is low. A recent improvement is the sharing of memos by email.

Improving the ICT skills of public servants (including the skills for ICT policy formulation and implementation) is seen as essential for promoting the digitalization of public services. However, the PSMD's

current Public Service Training and Development Policy (PSTDP) does not meet the needs of public servants in the ICT/digital age. PSMD is responsible for developing a human resource development plan to improve the ICT skills of public servants, but this has been delayed due to lack of resources.

There is no systematic and continuous training for public servants.

ICT Human Resources Skills Gap in the Labor Market

The demand for workers in the ICT sector is high. However, there is a shortage of certain advanced skills and this results in a gap between supply and demand of ICT professionals in labor market.

4) Potential Assistance Needs

In order to promote the digitalization of public services, there is a need to support the strengthening of the capacity of public servants (central and government) to plan and develop digital policies.

5) Condition, Infrastructure, Policy, Human Resources, and etc.

The development of human resources in the field of ICT should be promoted by private sector as well as the government. Governments are required to create a supportive environment for private sector initiatives.

(3) ICT Infrastructure

1) Vision and Plans

The majority of citizens in Zambia use mobile lines, and statistics from the Zambia Information and Communication Technology Authority (ZICTA) show that at the end of the fourth quarter of 2018, Zambia had 100,444 fixed telephone lines and 44,711 fixed broadband connections.

However, the government is moving to a higher level of support for ICT, including the recent launch of a national broadband strategy. With this, the government is aiming to increase the bandwidth of fiber-optic lines from submarine cable lift port connections, and among the infrastructure, fixed broadband has been steadily upgraded since 2014.

On the other hand, the market for fixed broadband has been sluggish, mainly due to the high cost of construction, which has kept service prices high.

If the optical communication infrastructure is improved in the future, it is estimated that the broadband price for end users can be reduced by up to 50%, and if this is realized, it is expected to promote the use of broadband services by companies and individuals.

2) Current Situation and Activities

International Backbone Network

The country of Zambia is connected by fiber optic cables to Tanzania, Mozambique, Zimbabwe, Namibia, Botswana and other neighboring countries except Angola.

Domestic Backbone Network

The telecom sector in the Zambian country has been experiencing sustained growth, and furthermore, the penetration of 3G and 4G services is expected to drive the growth until 2028. Recently, UZI Zambia has been

granted a license as the fourth mobile operator and is preparing to enter the market, which will promote price competition and network development in the market. On the other hand, continuous interventions in the telecom sector have slowed down business development in some cases due to tighter regulations and operational impediments, which has become a risk factor in the market.

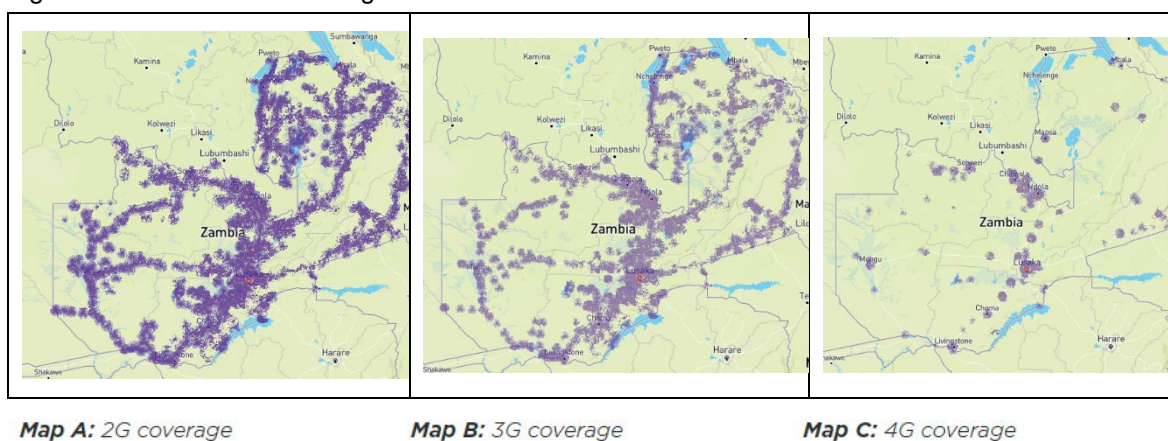
The implementing and regulatory agency is the Zambia Information and Communication Technology Authority (ZICTA). The main sources of funding are the Zambian government, Chinese companies, and loans from Chinese banks.

Mobile Network

The three main companies are MTN Zambia (41%), Airtel Zambia (38%), and Zamtel (21%). The capital structure of each major company is as follows.

- MTN Zambia (MTN (100%))
- Airtel Zambia (Airtel (100%))
- Zamtel (Zambian government (100%))

Figure 3.12.1 Mobile Coverage of MTN Zambia



Source : GSM Association

Data Centre

Three (3) data center listed below are established and operated in Lusaka, capital of Zambia. The safety level of each data centers is Tier-3.

- Zambia National Data Center
- Liquid Telecom
- NetOne Data Lusaka Data Center

IXP (Internet Exchange Point)

The IXP of Zambia named Zambia Internet Exchange Point (ZIXP) is located at Lusaka, and the operation and maintenance of ZIXP are carried out by Zambia Internet Exchange Point Association.

3) Challenging area(s)

The utilization rate of fixed-line and fixed-broadband lines by the general population is low, and the following issues are faced

In terms of the last mile to rural areas, there is a not only lack of fixed lines in rural areas, and also the mobile network is poor.

The number of users of fixed-line services has been sluggish due to the high price of services.

4) Activities of Development Partners

There has been a wide range of business expansion and financing, mainly by Chinese companies. China has been cooperating with Zambia since 2004, helping to build the country's mobile communications infrastructure, starting with the introduction of 3G technology in 2009. 2012 saw the launch of "Smart Zambia" in collaboration with ZTE, with both Phase 1 and Phase 2 of the project financed by China's state-owned banks. Both Phase 1 and Phase 2 of the project have been financed by the State Bank of China.

The Zambian government signed a partnership with Huawei for the Smart Zambia project in June 2019. Zambian officials said this will create jobs for many young people and allow them access to technologies such as 5G.

5) Potential Assistance Needs

Although several assistances have been provided from other donors and/or partners, there are still areas where ICT infrastructure is not yet in place, and the Government of Japan (GOJ) could provide support to these areas. In addition, ICT infrastructure facilities could also be developed in line with other sectors' assistance plan.

6) Potential of Using Data for Innovation in Public Service Improvement

As mentioned above, the solution of the last mile problem, such as the development of optical communication infrastructure, is the only supportive measure left for Japan, but there is room for proposals for the sub-gigabit wireless communication lines used for electric meters and water meters in Japan.

(4) National ID

1) Vision and Plans

7th National Development Plan (7NDP)

Development results of "economic diversification and job creation" 8 items of the 10 pillars include "strengthening of information and communication technology", and 6 development results of "improvement of governance environment for diverse and comprehensive economy" "Improvement of service provision" is mentioned as the fourth item of the pillar, and the digitization of public services including ID linkage is being promoted.

National Strategic Action Plan for Reforming and Improving Civil Registration and Vital Statistics

Being revised by DNPRC (Department of National Registration, Passport and Citizenship) under the Ministry of Home Affairs. DNPRC is aiming to further promote digitalization by establishing a legal framework.

INRIS (Integrated National Registration Information System)" project

This is a situation to centrally manage registrations from birth to death with a single number, and information such as national ID, birth registration, marriage notification, divorce notification, and death registration will be integrated. In addition, NAPSA (Pension Organization) assigned as DNPRC and project manager (PM) is planned to realize data linkage (interoperability) with other sectors, create a database of biometric authentication, and implement it on national registration cards), Members are selected from stakeholders, and the INRIS project team is being formed and implemented.

2) Current Situation and Activities

Organization

The above-mentioned DNPRC under the Ministry of Interior is centrally in charge of national ID and resident registration.

Current status and situation of national ID and resident registration

The registration rate of national ID is as high as 84% (Ministry of Interior) due to the registration of voters. On the other hand, birth registration, which is an essential requirement for resident registration, is low (15%), and death registration is also low (20%). In addition, since it is not currently linked with marriage / divorce registration, it is not possible to respond to changes in first and last names. The Ministry of Interior expects that the registration rate will improve to 80% by linking the system of the INRIS project.

Situation for ID integration between national ID and resident registration

ID integration is being promoted by the INRIS project mentioned above. In Phase 1 until 2017, the national ID module and registration module will be incorporated, and the data of birth registration and death registration will be installed on the same platform. Phase 2 from 2018 (scheduled until 2021) has a budget scale of 230 million yen, and Dermalog, which has been involved since Phase 1 and is familiar with the project requirements, has been assigned as a vendor to upgrade the system and deploy biometric authentication equipment (planned for 2021). 150 kits / at least one in all states), laser printers (1), user training (capacity building), awareness-raising programs for residents (enlightenment activities), etc. Regarding network connection, the Smart Zambia Institute (SZI) is centrally implementing with Zam Tel. From now on, it will shift to "Phase 3" in the five years from 2022. The budget scale is 930 million yen. The focus is on "issuing IC cards with biometric authentication function", first aiming to issue 3 million cards in 2022, and then aiming to issue 3-4 million cards / year. In addition, there are plans to deploy laser printers in all states, full-scale data linkage with other sectors (interoperability), realization of network connection between District offices (currently 10 out of 110 districts have been completed), etc. It has become.

Current status and situation of data linkage (interoperability) with other sectors

NAPSA, the PM of the INRIS project, is "Ministry of Agriculture (improving the quality of life of farmers)" "Ministry of Health (improving birth registration)" "Ministry of Community Development / Social Services (identifying beneficiaries / preventing double benefits)" "e-wallet" was listed, and the Ministry of Interior DNPRC listed "Ministry of Agriculture," "Ministry of Health," "Ministry of Community Development and Social Services," "Ministry of Education," and "Revenue Agency." According to DNPRC, members are

selected from these organizations to form a steering committee and are in discussions.

Standardization of national ID system and card specifications in neighboring countries and regional communities (Southern Africa region) Not particularly implemented in Zambia. According to the Interior Ministry DNPRC, Zambia's INRIS project is not considered a success and therefore there are no plans to expand to other countries at this time. The policy is to proceed in a straightforward manner in accordance with UNDP's Legal ID Agenda protocol. In addition, the EU and the African Union have given guidelines, and each country is making adjustments in accordance with them, therefore DNPRC does not expect the system to differ significantly between countries.

3) Challenging area(s)

ID integration to promote digitalization seems to be proceeding smoothly, but the following issues are raised.

- Financial support. Although Phase 3 has a budget of 930 million yen, it is very difficult to achieve the annual card issuance target of 3-4 million units with 150 biometric authentication equipment kits, and with one laser printer, all printing is Lusaka. You need at least one in each state because you will be concentrating on. And the cost of purchasing a smart card is the biggest bottleneck. (Now NAPSA answer)
- Network connection (especially in rural areas). Install LAN and secure internet connection to connect the registration offices in various places nationwide and the central main server. Mobile connection is not stable. (DNPRC answer above)
- Progress. The policy has been put out and the concept is neat, but the progress is not good. There is a strong view that this matter needs to be positioned as a priority initiative, but there is also advice that it is better not to intervene in this point because it involves political issues (DNPRC).
- Legal development. Since the legal system for personal information protection is not yet in place and there is no centralized government agency, it is important to improve the operation system as well as the legal system.

4) Information System and Platforms

- System / Platform name: INRIS (Integrated Resident Registration Information System)
- Main data: National ID registration data, resident registration data (including birth, marriage, divorce, death)
- Data ownership / operator: DNPRC / INRIS Project under Ministry of Home Affairs

5) Activities of Development Partners

Currently, UNDP (UN's Legal ID Agenda) is providing hardware kit procurement and user training support, and UNICEF has developed "Mobile VRS (Vital Registration System)" as "Universal Birth Registration Project in Africa".

6) Potential Assistance Needs:

Situation for system integration and data mutual cooperation are already being carried out mainly by the INRIS

project implementation team and the Smart Zambia Institute, but followings areas are to be supported by JICA:

- Procurement support for smart cards scheduled to be introduced in the INRIS project "Phase 3", operation on the platform, technical support such as authentication;
- Technical support for API construction to have data interoperability with other sectors (Since vendor lock is not applied, the technology is not vendor-specific and anyone can enter support); and
- Awareness-raising activities and field activities to encourage residents to register.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

As a support plan, one of the potential needs exists in "farmer registration" in "support for bi-directional e-extension service " in "ZIAMIS" developed by the Ministry of Agriculture and Smart Zambia Institute (SZI) by data interoperability with INCRIS. It is conceivable that JICA will support it, but as mentioned above, the MoHA (DNPRC) and INRIS executive teams are already looking to collaborate with the agricultural sector.

In the process of deepening the examination of support plans and support needs, it is important to consider whether it can be tailored as a real solution or involve related parties.

(5) E-Government

1) Vision and Plans:

The Zambian Ministry of National Development Planning has formulated the Seventh National Development Plan covering the period 2017-2021 with the goal of achieving diversified and robust economic development. The plan identifies ICT as a growth driver in socio-economic development. In addition to the lack of ICT infrastructure and weaknesses that have led to poor connectivity and communication capabilities, the plan also identifies the lack of ICT human resources in both the public and private sectors as an additional challenge. In addition, the lack of ICT human resources in both the public and private sectors is another challenge. In response to this, the government will focus on increasing investment in ICT infrastructure and human resource development, and developing a legal framework to provide access to ICTs for a wide range of citizens and promote the use of ICTs in business (e-commerce).

2) Current Situation and Activities:

The government operates ZamPortal (Government Service Bus: GSB) (<https://ZamPortal.gov.zm/>), E-Government that provides digitized public services to citizens, and has established a "One-Stop Shop for All Public Services in Zambia" and integrates applications that provide services to citizens. Some of the services are self-service, some are operator-assisted, and some are online applications followed by a visit to a government office. The platform aims to serve as a payment platform for various government goods and services, allowing payment through alternative means such as mobile money and internet banking, in addition to Visa and credit cards, but at present it is not yet fully functional as a payment platform. The national ID system has not been digitized, and the integration with ZamPortal has not been completed yet. APIs to connect with other systems will be developed in the future. About 160 services need to be listed on ZamPortal, most of which are yet to be completed.

A platform that could be integrated with ZamPortal is the Zambia Electronic Single Window (<https://zesw.gov.zm/zesw/>). The platform is primarily for the import and export of agricultural produce and commodities by government agencies involved in border trade, and will allow for higher and faster clearance and payment of goods. The Zambia Revenue Authority (ZRA) manages its own digital platform connected to banks.

ZIAMIS (Zambia Integrated agriculture Management Information System) is an integrated platform jointly developed by the Ministry of Agriculture and Smart Zambia as a tool to manage programs in the agricultural sector. It is web-based and available 24 hours a day, 7 days a week. It registers 2.9 million farmers nationwide, suppliers nationwide, agro-dealers, participating banks, various categories of ministry staff (including staff from other ministries such as fisheries and livestock), non-governmental organizations (NGOs), and international organizations. It is also integrated with banks, manufacturers, agro-dealers, and other interest groups through APIs; ZamPortal and ZIAMIS systems are not yet connected.

The sub-modules of the system are: i) the Set-up dashboard which gives an overall view of the system; ii) the Universal Farmer Register; iii) the Farmer Input Support Programme (FISP); iv) E-extension Services; v) market information; vi) various monitoring tools; vii) real integration – excel and real-time; and viii) planned modules not yet included on ZIAMIS portal which include food security monitoring, nutrition information, crop management, livestock information management etc.

At present, about 2,000 extension workers provide e-extension outputs to farmers at a ratio of 1 extension worker to 1,000 farmers, which is far below the 1:400 ratio recommended by FAO (Food and Agriculture Organization of the United Nations). The system sends messages to farmers and extension workers at the 1) agricultural camp 2) block level 3) district level 4) state level and 5) national level. Currently, two private organizations, Cropsolve Zambia Limited and CABI, have stepped forward. Cropsolve sponsored bulk SMSs on the effective use of agricultural chemicals including the disposal of the containers; giving environmentally friendly tips to 500,000 farmers via SMS. CABI on the other hand has sent 12m SMSs to farmers countrywide. The Ministry is open to collaborating with more private companies.

3) Challenging area(s)

- Not all the five million farmers are registered in ZIAMIS; it is necessary to remove ghost farmers and duplicated-registered farmers; and completing accurate farmer registration.
- Farmers who receive e-vouchers from the Farm Input Support Program (FISP) do not finish payment on time and remain to be supported as beneficiaries, and the number of new beneficiary farmers cannot be increased.
- The e-extension service provided by ZIAMIS communicates information in one direction and could not provide feedback on farmers' responses and needs, which cannot be used for agricultural policy formulation.
- Utilization of ZIAMIS data has not yet progressed (used for statistical data, not yet at the stage of being reflected in policy)

- ZamPortal does not provide end-to-end services, and integration with other ministries' databases and national IDs is a challenge.
- Limited access to digitized public services due to the digital divide in rural areas.

4) Information Systems and Platforms

The Zambia Electronic Single Window is expected to be integrated into the main digital platform or ZamPortal, the national backbone for connecting information systems.

5) Status and content of support by development partners

EU/FAO: "Sustainable Intensification of Smallholder Farming Systems in Zambia: SIFAZ"

A EUR12 million project funded by the European Union and FAO, covering 16,000 farmers in 27 districts, to capture all markets in the country, including farm gate prices, district markets (district-level communal markets, retail markets, wholesale markets, and cross-border markets), and all commodities sold in these markets' classification. This system shows which commodities are sold where and at what prices, helping people to make informed production and purchasing decisions.

6) Potential Assistance Needs:

Provide two-way e-extension services

The current e-extension service is a one-way system that only sends information to farmers, but this needs to be upgraded so that both farmers and extension agents can receive feedback at the community level to facilitate planning. Local indigenous knowledge is also important for the Ministry of Agriculture to plan for research and development purposes. There needs to be a two-way system of feedback on the services being provided and what is happening in the field. There is a need to support the development and enhancement of models to enable feedback. The Ministry of Agriculture has been looking for collaborative partners to do this for the last year.

A study of the impact of ZIAMIS on the private sector

ZIAMIS impact study on the private sector has never been done before and the issue of partnerships with the private sector and the impact of ZIAMIS on the private sector needs to be considered. JICA could support ZIAMIS financially and technically and conduct the necessary assessment. In terms of timing, the above assessment is important because the government is implementing a five-year national development plan from 2017 to 2021, and this year when the five-year plan ends, data from the agricultural sector, which is identified as a key sector, will provide evidence for new policies to be formulated.

Registration of farmers in ZIAMIS

Currently, there are about 5 million farmers in Zambia, but only 2.9 million are registered and 2.1 million farmers are unregistered. Since the Farmer Input Support Programme (FISP) supports only registered farmers, there is a need to expand the number of farmers covered by the FISP through registration of unregistered farmers.

7) Potential of Using Data for Innovation in Public Service Improvement

There is a need for an interactive system to provide feedback on the agricultural extension services being provided and what is happening in the field.

8) Expected Areas to be Digitalized:

Support for registered farmers using ZIAMIS data, support for promoting linkages with agriculture-related vendors, and reflection on agricultural policy

9) Condition: Infrastructure, Policy, Human Resource, and etc.:

For outsourcing to local software developers, Smart Zambia is required to oversee all software development through an internal team seconded to the line ministry.

(6) Education / Edu-tech

1) Vision and Plans

Vision 2030

This vision was developed in 2006. As to education development, updating curriculum and improvement of education indicators such as literacy and enrollment are stipulated but not about ICT at that point of time.

Education and Skills Plan 2017-2021

This five years plan was co-developed by two ministries, namely the Ministry of General Education and the Ministry of Higher Education in 2017. As to reference to ICT, utilization of ICT in learnings as well as teacher development are stipulated as strategic focus in statement of new services of education.

2) Current Situation and Activities

The Ministry has started eLearning platform services in collaboration with Zamtel. Offered services are online learning resources for major subjects in secondary education. Those for year 8 and 9 are completed and year 10 is under development. The main target is students of Open Secondary School who learn more in distance mode, but general secondary school students should also benefit from these. Although Zamtel extends their assistances, users still are required to bear their own minimum costs.

There are Open Learning Centers established for students of Open Secondary Schools. Efforts to make those more suitable for students to learn there through online material are required.

As to digital textbooks, there needs to be discussion and negotiation with publishers regarding copy rights issue.

NSC (National Science Centre) under Ministry of General Education mandated to promote STEM Education has developed and been operating online learning platform called LMP (Learners Management Platform) for those selected schools for promotion of STEM Education. It has been awarded in Hackathon competition in Zambia in 2021, which shows its appreciation by community.

3) Challenging area(s)

The following issues are pointed out by the Ministry officers among a lot of issues surrounding.

- Funding for digital primary education resources development is not identified.
- Majority of people do not own digital devices to access online resources and number of Open Learning

Centers and capacity to accept learners in terms of number of devices available are not satisfactory.

- Audio visual studios to develop online material are obsolete.

4) Activities of Development Partners

According to the Ministry officers, the following are major assistances from development partners.

- WB Zambia Education Expansion Project is under implementation with comprehensive components, although ICT utilization is not highlighted.
- UNESCO assisted online material development
- UNICEF assisted development of radio education programs

5) Potential Assistance Needs

The following are assistance needs based on information gathered.

- Renewal of audio-visual studio to develop online material as well as training for technical officers to be engaged in the material development
- Procurement of digital devices for learners as well as establishment of learning centres and installation of devices

6) Expected Areas to be Digitalized

Developed online learning material may accelerate the process of comprehensive digitalization of education services.

7) Condition: Infrastructure, Policy, Human Resource, and etc.

As general condition, communication infrastructure issue is applicable here as well. As to further digitalization of learning material, placing appropriate copy right regulation and their actual timely enforcement are necessary.

(7) Health

1) Vision and Plans

National Health Strategic Plan 2017-2021

The National Health Strategic Plan (NHSP) 2017-2021 aims “to provide equitable access to cost effective, quality health services as close to the family as possible” and prioritizes the following areas.

- Primary health care
- Maternal, neonatal and child health, youth and adolescent health
- Communicable diseases, especially malaria, HIV and AIDS, STIs and TB
- NCDs
- Diseases outbreaks and epidemic control, public health surveillance
- Environmental health and food safety
- Health service referral systems
- Health promotion and education

- Community health
- Social determinants of health

Zambia eHealth Strategy 2017-2021

Zambia eHealth Strategy 2017-2021 was developed to promote effective and efficient delivery of health to all Zambians using ICTs. Strategic priorities are listed below.

Service Delivery - Investment and sustainability, interoperability, eHealth coordination team, security, data exchange standards, data governance, alternative energy, clearing house, capacity building, infrastructure, eHealth usability criteria, lobby for the creation of ACT

eLearning - to improve and aid health practitioners obtain Continuous Personal Development (CPD) through availing eLearning opportunities

2) Current Situation and Activities

Policy implementation structure

It was mentioned in the eHealth Strategy that the eHealth TWG is to be established which will function on the lines of the SWAp mechanisms and develop guidelines, standards and an implementation plan.

Individual systems

DHIS2 has been introduced as a monitoring platform of routine health data throughout the region. Performance scores are generally high at 80-90%.

An EMR system called SmartCare was introduced in 2004 and is used in about 1590 hospitals and health centers. The web-based update version of EMR called SmartCare Plus has been developed and started to be introduced in the facilities to replace the SmartCare.

<Infectious disease surveillance response (IDSR) system>

Zambia has applied the WHO IDSR guidelines and was reported to have developed its own guidelines. On the other hand, it was also informed that there is no guideline that comprehensively describes the detailed methods.

ZNPHI (Zambia National Public Health Institute) compiles data from all provinces and publishes it on the website of "The Health Plus"¹⁵². It covers 22 diseases. The person in charge of each provincial health department collects data from each health facility and reports it to the central level.

There are also reports of immediately notable diseases¹⁵³. The provincial health departments mainly contact the central level by phone or e-mail, and subsequent follow-ups are also carried out centrally.

The use of DHIS2 tracker has started and it is linked to DHIS2, but it is reported that it is hard to say that it is fully functioning.

¹⁵² <http://znphi.co.zm/thehealthpress/>

¹⁵³ According to the World Bank report "Disease surveillance, emergency preparedness and outbreak response in Eastern and Southern Africa, 2021", those are cholera, measles, H1N1, whooping cough, rabies, TB, Typhoid, yellow fever, acute flaccid paralysis, dysentery, and plague.

The case of COVID19 is reported and managed by another system different from DHIS2 tracker.

The Centers for Disease Control and Prevention (CDC) is supporting the ZNPFI to develop a case based surveillance (CBS) digitization system¹⁵⁴ for HIV/AIDS, tuberculosis, and COVID19. Once the system is installed and functioned properly, it will not be difficult to add other diseases.

3) Challenging area(s)

Overall

In Zambia, HIV/AIDS, neonatal disorders, and stroke are the most common causes of death (2019, IHME). The burden of infectious diseases such as HIV/AIDS and tuberculosis and maternal and child health issues are on the decline, and that of the NCDs such as stroke is increasing instead.

Digital Health

It was informed that the SmartCare Plus is not intended to cover all functions and health data at the health facilities, but rather established as a standard. Further efforts to ensure interoperability between the SmartCare Plus and different health systems are required. It is desirable to utilize available solutions introduced by various partners and agencies to effectively share and utilize personal health data.

A unified patient ID has yet to be developed. It is being considered together with the establishment of national ID.

IDSR system

It is reported that the operation of the IDSR system is not unified in each province, and the kind of information sent to the central level also differ. While the DHIS2 tracker is used as a common IDSR platform, there are some provinces compiling data in the Excel sheet and sending it by Gmail without a password. The utilization is also low in the provinces where the training of IDSR/DHIS2 tracker for public health workers on the ground has not adequately motivated them.

There is a wide range of reporting rates and timeliness. While data are supposed to be compiled and released monthly on The Health Press, sometimes it is not regularly done. Quality of reporting is affected when natural disasters such as floods occur.

It is not linked to the laboratory, thus there is no surveillance system based on diagnosis in the laboratory.

Follow-up for cases that are not the immediately notable diseases is done by the provincial health department, but the method differs by province.

4) Information Systems and Platforms

Table 3.12.3 List of major health information systems

System	Data	Owner/operator
DHIS2	Aggregated health data for routine monitoring	MoH
IDSR (DHIS2 tracker)	Communicable disease surveillance	MoH, ZNPFI
SmartCare (SmartCare Plus)	EMR	MoH, health facilities
eLMIS	Medical logistics	MoH

¹⁵⁴ SQL database with a power BI interface for dashboard development

iHRIS (integrated human resource information system)	Human resource for health	MoH
C-HMIS (Community health management information system) (pilot)	Community health information	MoH, UNICEF etc

Source: Zambia eHealth Strategy, development partners.

5) Activities of Development Partners

- Global Fund: It supports building capacity and paying salaries to Community Health Assistants, who collect information in the community.
- World Bank: It provides COVID19 Emergency Assistance
- WHO: It supports the strengthening of health systems to achieve UHC, namely capacity building of the MoH, support for creating guidelines, development of standardization/interoperability frameworks, training for responding to ICD11, etc.
- UNICEF: It mainly supports the construction of community-level health information systems
- USAID: It supports the development of eLearning courses for healthcare professionals in maternal, child, reproductive health and nutrition programs. CDC provides support for the development of SmartCare Plus and support for strengthening the communicable disease surveillance system centered on HIV/AIDS.

(8) Social Protection

1) Vision ad Plans

National Social Protection Policy (NSPP, 2014)¹⁵⁵

The National Social Protection Policy (NSPP) is based on the premise of four steps: protection, prevention, promotion, and transformation. Based on this premise, the policy consists of four pillars: Social Assistance, Social Security/Social Insurance, Livelihood and Empowerment, and Protection.

Integrated Framework of Basic Social Protection Programmes (IFBSPP, 2018)¹⁵⁶

The Integrated Framework of Basic Social Protection Programmes (IFBSPP) is expected to contribute to the following:

- Clearly defining program targets, specifying the names of programs to be expanded and their roll-out plans, as well as identifying programs to be phased out, integrated, or merged, and finally identifying innovative programs to be added;
- Sharing of key linkages within social security programs and with interventions in other policy areas;
- Improving the impact of government interventions by streamlining the delivery of non-contributory social security and reducing fragmentation;
- Strengthening the building of coherent and interlinked systems of program delivery at the policy, administrative and implementation levels;
- Improved resource mobilization for social security, leading to more efficient resource allocation; and

¹⁵⁵ <https://www.social-protection.org/gimi/gess/RessourcePDF.action?ressource.ressourceId=54164>

¹⁵⁶ <https://www.social-protection.org/gimi/gess/RessourcePDF.action;jsessionid=67Hr7bj8uHfcK1NlhZ-K1t-atlfCuIFmZN30KBmqcr0h7cxceFP9!539423187?id=56789>

- Developing institutional coordination, governance and management models for non-contributory social security and their reflection in monitoring and evaluation.

2) Current Situation & Activities

Social Protection

In Zambia, a regulatory framework for occupational accidents covering illness, childbirth, old age, disability, and survivors was established prior to independence in 1964. In 2000, a social assistance program, the Public Welfare Assistance Scheme, was introduced with the aim of aiding the most vulnerable and enabling individuals to meet their basic needs and have the capacity to overcome poverty and vulnerability. In 2011, social assistance expenditures amounted to 0.03% of GDP, equivalent to an annual expenditure of USD 0.66 per poor person.

Digitalization

Zambia Integrated Social Protection Information System (ZISPIS):

The Zambia Integrated Social Protection Information System (ZISPIS) was introduced in 2020 in 17 provinces. The MCDSS is the owner of ZISPIS, which is managed by the Smart Zambia Institute (SZI). The system aims to cover all social security programs and manage the entire process from registration to payment for all beneficiaries, and it is expected to serve as the backbone of social security programs.

3) Challenging area(s)

ZISPIS

The ZISPIS system relies on manual works in various business processes as well as data entry. Therefore, there is a need for ZISPIS to be updated to seamless automation with minimal manual work. In addition, data linkage between ZISPIS and the information management systems of other ministries and agencies has not been established.

Data collection and updating and improvement of proxy means testing

The quality of data collection for identifying poor households and the length of the data updating period have been identified as challenges. Therefore, there is a need to collect comprehensive data on households and shorten the period for updating household data through interoperability with information exchange systems of other ministries and agencies. In addition, it is necessary to reduce targeting errors by improving the quality of the proxy means test, a method for identifying beneficiary households, to achieve effective allocation of limited resources.

Monitoring and evaluation framework

A monitoring and evaluation framework has not yet been established. It is necessary to establish a monitoring and evaluation framework as soon as possible to realize future impact evaluation and evidence-based policy planning and formulation.

Payment methods

The main challenge of mobile money payments is the liquidity constraint of mobile money operators (MMOs),

which requires staff to pay cash in hand. The liquidity issue was also affected when cash transfers of Covid-19 relief materials were made.

4) Information Systems and Platforms

- System/Platform Name: Zambia Integrated Social Protection Information System (ZISPIS)
- Main Data: Beneficiary and household information
- Data Ownership/Operator: Ministry of Community Development and Social Services (MCDSS) / Smart Zambia Institute (SZI)
- Funding Sources/Donors: World Bank, UNICEF, FAO, DFID, GIZ, government funds

5) Activities of Development Partners

- World Bank (2015 ~ 2020) GIRLS' EDUCATION AND WOMEN'S EMPOWERMENT AND LIVELIHOOD PROJECT (GEWEL) USD207 million
- UNICEF (2020) Zambia Integrated Social Protection Information System (ZISPIS) Pilot Programme Assessment

6) Potential Assistance Needs

- A Single Registry
- Targeting and monitoring
- Interoperability
- Digital payments

7) Potential of Using Data for Innovation in Public Service Improvement

Administrative big data on social protection and households can enhance the Evidence-Based Policy Making (EBPM). It is also possible to propose preventive measures required for each region and the effective allocation of resources such as cash transfers.

8) Expected Areas to be Digitalized

- Establishment of the Single Registry
- Digitization of all household information
- Enhancement of interoperability with other management information systems
- Promotion of digital payments

9) Condition: Infrastructure, Policy, Human Resource, and etc.

- Strengthening of personal information protection laws.
- Develop laws and regulations to promote interoperability.

4 Examination of Cross-Cutting Issues

4.1 Findings and Recommendations through Examination of 16 Countries

In Section 2.1, the 16 target countries were classified into four groups from the viewpoint of digitization of public services based on the E-Government Development Index (EGDI) of UN E-Government Survey 2020 with its basis: Online Service Index (OSI), Telecommunications Infrastructure Index (TII), and Human Capital Index (HCI) of each country.

Based on the surveys by country described in Chapter 3, the characteristics and findings of each of the four groups of countries are summarized in the table below.

This operation has verified the characteristics and the direction for support described in Table 2.1.1. It was confirmed that the hypothesis was considered to be correct. In addition, many useful findings and suggestions were obtained from the countries in quadrant I and from other countries.

Table 4.1.1 Characteristics and Useful Findings in Quadrant I

Countries	Characteristics	Useful Findings
Mauritius	<ul style="list-style-type: none"> Promotion of digitization of public services (including infrastructure development) through dialogue and cooperation between public institutions and the private sector In-house development of E-Government “Info-Highway” similar to X-Road in Estonia, “Mo-Kloud” integrated service for citizens One-stop personal authentication with Mo-Pass, a national digital ID system Developed communication infrastructure enabling availability of the Internet throughout the country Africa’s most integrated social registry covering social assistance and social insurance 	<ul style="list-style-type: none"> Promotion of digitization of public services through public-private partnership (PPP) Applicability of Info-Highway to other countries (many African countries have inquiries about the applicability of the platform) Knowledge of infrastructure development by private companies in a country with a small land area Subsidies for training in the ICT sector conducted by the private sector
South Africa	<ul style="list-style-type: none"> One of the largest social registries in Africa covering all social assistance Developed communication infrastructure throughout the country Limited interoperability between the systems due to the existence of duplicated various systems 	<ul style="list-style-type: none"> Although the leadership of the Government is important for the success of public service digitization, the leadership and governance at provincial and ministerial levels are also a challenge in large countries. Formulation of strategies and plans specializing in human resource development in the ICT sector
Ghana	<ul style="list-style-type: none"> Ghana.Gov, an online government payment platform based on the Ghana Interbank Payment & Settlement Systems Platform (GhIPSS), enabling e-commerce interoperability Intention to evolve Ghana.Gov into One-Stop Service Center Rural infrastructure development in 	<ul style="list-style-type: none"> Online payment technology on e-government platforms Participation of private companies in the digitization of public services (setting the ratio of start-up companies in government procurement, etc.) Development of last-mile infrastructure in rural and remote areas through a public-

	<ul style="list-style-type: none"> collaboration with private companies by using USF Promotion of digitalization of public services but insufficient public recognition High ICT infrastructure development rate in Africa 	<p>private partnership</p> <ul style="list-style-type: none"> Insufficient outreach to citizens for utilization of digitalized public services Human resource development in the ICT sector through innovation and promotion of entrepreneurship Last-mile connectivity by the development of wireless backbone
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Source: JICA Study Team

The three countries believed that the findings would help support other Sub-Saharan African countries, as public services have been digitized ahead of other countries. The challenges and weaknesses that the three countries currently face can also occur in other countries. Therefore, it would be appropriate to provide opportunities for technical exchange by introducing Japan’s experience and knowledge upon the training programs by theme in Japan or third countries. In addition, it would also be appropriate to extend digitalization support for other Sub-Saharan African countries with this consideration.

Table 4.1.2 Characteristics and Findings in Quadrant II

Countries	Characteristics	Necessary Actions
Côte d’Ivoire	<ul style="list-style-type: none"> Formulation of “Digital Economy Strategy 2030” by the end of 2021 with EU assistance E-government portal site providing open-source information, but not able to apply services The slow progress of digitalization of administrative procedures (available only in the capital and digital divide in rural areas) Backbone covering the whole country to be completed by the end of 2022 (2,000 km completed out of 7,000) No budget available and no roadmap for digitizing public services 	<ul style="list-style-type: none"> Government initiative under the new strategy Private sector involvement (improved interoperability between new government-citizen (C2G, G2C) payment platforms and existing government payment portals, reduction of the digital divide in rural areas, etc.) Improved digital literacy Improvement of planning and implementation capacity for digitization of public services
Gabon	<ul style="list-style-type: none"> Insufficient government initiative in digitizing public services Establishment of e-government supported by WB (delayed in integration due to different digitalization progress of various public services) Interoperability between some digitalized public services in place Infrastructure development with the support of WB and AfDB, and high subscription rate of mobile phone Social registry underway Stagnated digitalization of public services progress due to insufficient budget and capacity for implementation Low ICT literacy due to limited access to PCs and smartphones No systematic and consecutive training programs due to lack of human resource development plan for civil servants, 	<ul style="list-style-type: none"> A new organization under consideration in charge of digitalization of public services covering all necessary activities to replace ANINF The mindset of government employees Elimination of digital divide in rural areas and ICT literacy education Development of policies and guidelines for ICT human resource development Promotion of digitalization of maternal and child health sector supported by JICA in cooperation with WB including improvement of awareness in both supply and demand sides of services

	<p>including the knowledge on ICT</p> <ul style="list-style-type: none"> • The slow progress of digitalization of health data compared to other countries due to lack of awareness among concerned people (comprehensive digital health support to improve awareness including residents by WB) 	
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Source: JICA Study Team

The two countries in this group are relatively lagging in the digitalization of public services, despite the widespread ICT infrastructure among the people. There are various issues, such as low digital literacy and high data communication charges. It would be desirable to support them mainly through technical cooperation to disseminate the digitalization of public services benefiting the citizens by utilizing the ICT infrastructure developed under the initiative of the Government.

Table 4.1.3 Characteristics and Findings in Quadrant III

Countries	Characteristics	Necessary Actions
Zambia	<ul style="list-style-type: none"> • ZamPortal includes applications for 68 different public services to provide a payment platform. • ZIAMIS for program management in the agricultural sector is available 24 hours a day, seven days a week. • Smart Zambia centrally manages the digitization of ministries. • Lack of communication infrastructure in most rural areas. • The number of broadband users is sluggish due to high usage fees. • Limited access to digitalized public services due to the digital divide in rural areas. • Social registry in operation • Delegation of authority for digitalizing public services to Smart Zambia is an example of successful practices. • Active utilization of external resources through partnerships with overseas private companies is observed in developing ICT human resources. • Digitalization in the health sector is relatively advanced. The unified electronic medical record system for medical facilities was introduced in 2004 upon offline system because the Internet was not in place. Currently, Zambia is upgrading the system using the Internet. On the other hand, a system usable even offline is under development by the private sector. It may be a reference in the area or country where the Internet is unavailable. 	<ul style="list-style-type: none"> • Infrastructure development in rural areas • Improvement of digital literacy • Expansion of interactivity of ZIAMIS and cooperation with the private sector • Issues such as lack of skills of software companies and expensive ICT devices
Cameroon	<ul style="list-style-type: none"> • Centralized governance, but no e-government initiative exists. 	<ul style="list-style-type: none"> • Institutional and policy development • Infrastructure development

	<ul style="list-style-type: none"> • Ministries' systems are not integrated, and there is no interoperability among systems • No government policy framework for data storage, open data policy neither. • A social registry is under construction. • Systems are not interconnected due to a lack of coordination. • ICT infrastructure is insufficient in quantity and quality due to an ICT infrastructure development master plan. • The broadband fee remains high due to the monopoly of the market, and the number of users is stagnated. 	<ul style="list-style-type: none"> • Improvement of digital literacy • National leadership for digitization of public services
Angola	<ul style="list-style-type: none"> • A social registry under construction • Insufficient government budget and capacity for digitalization • It has been pointed out that the Government's budget and the ability to execute digitalization are low. • Due to the widespread corruption, vested interest holders to digitization enhance traceability. • The high user fee of the Internet also hinders the progress of digitalization. • Digitalization of the health sector is still under way, but an advantage exists that partners negotiated with MNO to make DHIS2 free of charge. It is often difficult to change the mindset of government officials (such as digitalization), but the degree of interest and absorption is high. As a result, approaches from both the bottom and the top should work. • The disparity in communication infrastructure exists between urban areas (coastal) and rural areas (inland). 	<ul style="list-style-type: none"> • Expansion of communication infrastructure to rural areas (inland areas) • The MOU on ICT and meteorology signed with the Finnish Government is expected to develop infrastructure.
Malawi	<ul style="list-style-type: none"> • Slower development of communication infrastructure than other African countries • Internet connection and power supply are unstable not only in rural areas but also in urban areas • The digitalization of public services is slower than in other African countries, and e-government has not been established. • Social registry in operation • The communication backbone between major cities is developed for 3,000 km out of 4,230 km, but the coverage rate in rural areas is relatively low. 	<ul style="list-style-type: none"> • Last-mile development by utilizing USF • Public awareness activities to provide digitalized public services from the perspective of the citizens (dissemination of good practices in the successful countries) • Information sharing to establish a system enables innovative government problem solutions and public services through start-ups, etc. • Infrastructure development to reduce the digital divide between rural and urban areas
Madagascar	<ul style="list-style-type: none"> • Communication infrastructure development is limited to urban areas, and the coverage in rural areas is low. • 11,000 km of optical fiber is laid by TELMA. • The construction of e-government is under way, but e-government has not been 	<ul style="list-style-type: none"> • Infrastructure development to reduce the digital divide between rural and urban areas • Examination of the development of policies and guidelines for ICT human resource development • Appropriate regulation and support by the

	<p>established yet.</p> <ul style="list-style-type: none"> No systematic and continuous training on the policies is required to promote the digitalization of public services. A low penetration rate of ICT devices in rural areas harms education. 	<p>Government when the investment of the private MNO precedes</p> <ul style="list-style-type: none"> Policy measures to popularize devices in rural areas or consideration of import tax easing
Ethiopia	<ul style="list-style-type: none"> Only six institutions provide digitalized public services, no e-government exists The Government intends to approve bank-led financial services and fintech and telecom companies. Due to unstable connection, low ITC literacy, and expensive access charges, low internet usage rate hinders digitalized public services. The opening of a monopoly telecommunications market is expected for future infrastructure development. Insufficient broadband communication infrastructure outside major urban areas 	<ul style="list-style-type: none"> Further development of institutional and policy aspects Infrastructure development Improvement of digital literacy Reduction of communication charges

Source: JICA Study Team

This group includes many Sub-Saharan African countries that are latecomers to digitalizing public services. However, from the results of surveys, some countries, such as Zambia and Malawi, can rapidly digitalize public services and embody leap frogs.

On the other hand, some countries, such as Angola, Madagascar, and Ethiopia, take time to digitalize public services, benefiting a wide range of citizens, as local network access is a fundamental obstacle. For these countries, it is advisable to prioritize the assistance to make the information sharing between bases in health or education services, for example, more effective and efficient by digitalization, rather than the support of portal sites or e-government to which everyone can access. This also can benefit a wide range of citizens but indirectly. For making the support more efficient in cross-border areas, as described later, it is advisable to apply approaches on standard systems or tools based on the context of each country, active utilization of the experiences of private companies, and collaboration with other development partners. This is evidenced by the widespread use of DHIS2 in health information systems. JICA has also widely applied cooperation approaches adjusted according to the context of each country. Therefore, it is desirable to consider a long-term roadmap for supporting the digitalization of public services.

Table 4.1.4 Characteristics and Findings in Quadrant IV

Countries	Characteristics	Necessary Actions
Nigeria	<ul style="list-style-type: none"> Federal e-government is currently under construction. The reliability and interoperability of the federal e-government are to be improved. The federal e-government operated on a PPP basis has overlapped responsibilities and unclear coordination procedures. The low utilization rate of e-government for public services Unsecured interoperability among systems 	<ul style="list-style-type: none"> Security and reliability of SERVICES.GOV.NG to be improved. Public awareness of services available on the e-government Enactment of cyber security in financial transactions and data protection Human resource development of local government officials in charge of ICT Rural infrastructure development Implementation capacity development of

	<ul style="list-style-type: none"> • The digital platform developed does not work correctly. • Insufficient progress of digitalization in rural areas • Established e-Government Training Center (e-GTC) to provide training on e-government for civil servants with the support of KOICA. • No ICT infrastructure development master plan exists. 	<p>governmental institutions</p> <ul style="list-style-type: none"> • Capacity development of civil servants toward e-government through the e-Government Training Center (e-GTC)
Kenya	<ul style="list-style-type: none"> • eCitizen offers 300 digital public services and online payment methods • e-Citizens are mainly used in urban areas and not at the county level. e-Citizen and Huduma Center, a physical base, work closely for digital public services provision. • While decentralization is in process, digitalization is led by the Government. The challenge lies in how to reflect the intentions of the counties. • Civil society is involved in digitization, such as financial inclusion and digital tools in peacebuilding. • The private sector is active in health, for better or for worse. There are cases where each hospital introduces a different system for each module, even within the same hospital. As a result, digital system operation remains ineffective. Standardization is currently underway, but standardization of the existing systems can be difficult. • The national backbone of 6,400 km is under construction with about 85% completion. Plans to build national data centers also exist. 	<ul style="list-style-type: none"> • Last-mile infrastructure development utilizing PPP and new technology • Strengthening of ICT human resources development of counties • Consideration of unit system at county level (national unification or standardization within the county, etc.) under decentralization process • Extension of communication infrastructure development to rural areas after completion of the backbone infrastructure
Rwanda	<ul style="list-style-type: none"> • IremboGov offers about 100 public services and online payment methods (Web and USSD) • A private company runs Irembo Gov in cooperation with the Government. • 90% of users apply services through IremboGov encouraged by the agents. • 4G networks cover 90% of the population, but many people cannot use the Internet due to the high price of data bundles and devices. • Social registry in operation • Built a blueprint for digital health and a framework for data consolidation early, formulated detailed standardization guidelines to introduce the system. Digitalization seems effectively undertaken in cooperation with partners under the strong leadership of the Ministry 	<ul style="list-style-type: none"> • Improvement of the digital divide in rural areas (widespread of low-priced devices) • Reduction of internet connection fee

	of Health.	
Uganda	<ul style="list-style-type: none"> • e-citizen portal provides 107 public services to citizens. It is not a centralized interface but transferring to services provided by the respective ministry. • As for the digitalization of the Government, all fields of G2G, G2C, G2B are being undertaken as a front end. Digitization of back-end processes is also in process. • Estonian e-Governance Academy supports e-government and national cyber security. • CSOs in Uganda play a major role in formulating and enforcing ICT policies. • National backbone 12,000 km is well developed, while low coverage in rural areas. • The number of mobile subscriptions is also lower than the African average 	<ul style="list-style-type: none"> • "Cultural change" includes "change management" of government officials • Efforts to improve user access to digitalized public services through the agent model of Huduma Center in Kenya and Rwanda
Mozambique	<ul style="list-style-type: none"> • The communication network of 3,680 km of state-owned MNO is in place but has not been extended to rural areas. • The number of mobile subscriptions is also lower than the African average. • Mozambique is one of the "Early Adopters" for ICT development in Africa. The establishment of basic strategies, policies and legal systems, and regulations for achieving the information society was established in the very beginning compared to other African countries. 	<ul style="list-style-type: none"> • Support for the last mile problem • Training on ICT in advanced countries such as Mauritius and e-government in Nigeria at the e-government training center (e-GTC). • Expansion of public services by opening public and private data, supporting the development of private companies, including start-ups in the form of POC, and incorporating it into government services.

Source: JICA Study Team

The target countries in this group are actively working to promote the digitization of public services while actively making good use of the private sector, despite the issue that ICT infrastructure is not sufficiently widespread among the citizens.

Therefore, it would be appropriate for this group to introduce good practices in the world, useful findings of the countries in quadrant I or same quadrant IV, as benchmarks. If Japan supports the digitalization of public services benefiting a wide range of citizens (e-government, public service portals or platforms, etc.), it would be desirable to target the countries in this group or equivalent in terms of a possible appearance of results and effects.

4.2 Cross-Border Support based on Sector Analysis

Through analysis of the measures undertaken across the 16 countries by sector, JICA Study Team examined useful data utilization in the future and possible cross-border support programs.

(1) Education

1) Positioning in the Country Assistance Policy of the Government of Japan

Education is listed in the country assistance policy of Japan in most of the target countries. However, the digitization of education remains at the level of ICT in learning, distance learning, school management, etc., as the measures undertaken by the target countries. There were a few examples of utilizing the acquired data in all cases.

2) Overview of the Measures Undertaken

Although digitalization of the learning content is gradually undertaken, beneficiaries are limited in the current situation in Sub-Saharan Africa. It is also necessary to clarify copyright issues. Therefore, it is conceivable to promote the supports through the private sector for the time being.

Utilization of ICT for distance learning, including teacher training, issues related to the access to the communication networks, availability of devices, affordability of communication charges, improved ICT literacy, etc., are to be solved in addition to the above-mentioned learning contents issues.

3) Current Status and Potential of Data Utilization

Considering the current state of communication infrastructure, the number of countries where each school is connected to the Internet is minimal. Therefore, priority is given to data utilization for improving efficiency and strengthening education management between decentralized local education offices and the central ministry via regional education offices. It is necessary to wait for the widespread communication infrastructure and devices to utilize the data to improve each student's learning outcomes.

4) Possibility for Cross-Border Support

Given the above-mentioned current measures and the possibility of data utilization, there is a possibility of cross-border support by developing JICA's cooperation assets such as training for science and mathematics teachers and improving the learning environment through the school management committee.

Table 4.2.1 Measures Undertaken (Education Sector)

Country	CAP	Other Partner	Measures Undertaken	Future Data Use	Assessment
Mauritius	NA	NA	Both public and private schools are connected to network.	A	Need to improve public schools' connectivity.
South Africa	A	NA	The province is responsible. Situation differs by region.	A	No support needs were identified.
Ghana	A	WB	An e-Learning platform exists (Edmodo)	PA	Consider the possibility of boosting the private sector.
Gabon	PA	UNESCO, China, etc.	PCs are in place, but	A	As no cooperation asset

			connectivity varies by school.		exists, intervention may be difficult.
Côte d'Ivoire	NA	WB, AFD, China, etc.	Distance learning under Covid-19 with student ID	A	Support needs for learning content and course management.
Zambia	PA	WB, UNICEF, UNESCO, etc.	Online learning, OLCC development, teaching materials	A	Consider utilization of cooperation assets.
Cameroon	PA	NA	No digitalization efforts were identified.	NA	Possibility of support is low.
Angola	A	WB, UNICEF, etc.	Using tablets offline, use for school management	A	In the stage of using ICT offline.
Malawi	A	WB, USAID, UKaid, VSO	Digital teaching materials and tablets, teacher training school	A	Consider utilization and dissemination of cooperation assets.
Madagascar	A	WB, Canada	Use of tablets in INSET, use of radio broadcasting	A	Better to start with support between the bases.
Ethiopia	A	WB, etc.	Use of D-TEST, Digital textbook, student ID	A	Consider possibility of ICT in the ongoing education project.
Nigeria	PA	WB, UNICEF, etc.	ICT Education is a part of Education Strategy 2022	A	Facilities are a priority over ICT in the northeastern regions.
Kenya	NA	NA	NA	PA	Consider utilization of cooperation assets.
Rwanda	A	MCF, AFD, USAID, UKaid	Measures to improve IT literacy for teachers and students etc.	A	Support for the dissemination of ICT education
Uganda	A	WB	Free basic education, partly online learning, is applied.	NA	Collaboration with the WB is possible.
Mozambique	A	UNICEF, GPE, USAID, CIDA	Formulated EPS2029, distance learning, University LMS	A	Contribution to HRD meeting the needs of society.

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable

Source: JICA Study Team

(2) Health Sector

1) Positioning in the Country Assistance Policy of the Government of Japan

The health sector is included in the priority areas of the Country Assistance Policy of Japan in most target countries. The main contents are wide-ranging, such as health system for achieving universal health coverage (UHC), maternal and child health, nutrition improvement, chronic illness, and support for strengthening surveillance system. On the other hand, there is no specific mention of digitalization in the health sector.

2) Overview of the Measures Undertaken

In many target countries of the survey, health information systems such as DHIS2 and electronic medical records in tertiary medical facilities in urban areas have already been introduced. On the other hand, it has

become a major issue in many countries that different introduced systems by partners or programs are difficult to connect for data utilization and operate efficiently and sustainably. The health information system platform is generally integrated into DHIS2. However, digital systems for personal health information are not sufficiently standardized. Ensuring interoperability among the systems is one of the priority goals. Each country is promoting the strengthening of the collaborative system with related organizations, including partners, and the integration of the system. Still, the level is different due to the difference in leadership and coordination ability to promote digitalization.

In addition, many target countries are interested in telemedicine as one of the ways to deal with the shortage and uneven distribution of medical doctors. In South Africa and Mauritius, where digitalization is progressing, Doctor to Client telemedicine for chronic diseases and Covid-19 support were implemented by utilizing apps developed by local companies. On the other hand, for the countries where digitalization is still immature, it is indispensable to carry out infrastructure development such as electric power and Internet, legislation regarding personal data protection, secure data storage, strong political leadership, development of ICT-related private companies simultaneously for promotion of digital health including telemedicine.

3) Current Status and Potential of Data Utilization

The health sector seems to have a high affinity with digital data, but it is necessary to improve the interoperability of health information systems and avoid silos. Suppose digitalization progresses with a unified patient ID (foundational ID) ideally. In that case, it will be useful to contribute to tailor-made treatment by analyzing each patient's medical history, reflecting into medical policy and strategy based on evidence by converting big medical data and reducing medical expenses.

4) Possibility for Cross-Border Support

Although the health information system is completed in a country, it is useful to introduce good practices such as effective mechanisms, such as applications and introduction strategies of standard electronic medical record systems, to other countries. In addition, a surveillance system for early detection and sharing of infectious diseases or travel permission (vaccination certificate, negative certificate, etc.) within the region by using an app such as Covid-19, which already exist as JICA's cooperation assets, can be developed jointly with local companies in each country.

Table 4.2.2 Measures Undertaken (Health Sector)

Country	CAP	Other Partner	Measures Undertaken	Future Data Use	Assessment
Mauritius	NA	NA	Health strategy 2024, Non-infectious disease, anti-aging	A	Issues exist such as interoperability, but no need for support
South Africa	A	WB, WHO	Digital health strategy formulated, promotion of UHC	A	Needs for non-infectious disease, telemedicine
Ghana	A	WHO	e-health strategy, EMR, telemedicine	A	Possibility of boosting the private sector
Gabon	A	WB, WHO	Health information	A	Possibility of

			M/P, started major activities		collaboration with WB
Côte d'Ivoire	A	WHO	Telemedicine strategy 2022, legislation, HRD, etc.	PA	Need for support exists, but it is a long way off
Zambia	A	USAID/CDC, WB, WHO, UNICEF	Promotion of eHealth strategy	A	Introduction to the planned new JICA project
Cameroon	NA	USAID/CDC, WHO, GF, GIZ	Promotion of digital health strategy	A	High needs exist, but coordination among partners is necessary
Angola	A	WHO, USAID, UNICEF, PSI, WB	Health information strategy to be updated, promotion of DHIS2	A	Possibility of extended JICA's cooperation assets
Malawi	NA	GF, USAID, WB, WHO, GIZ	Digital health strategy, DHIS2, EMR, etc.	A	Already many partners exist, coordination is necessary
Madagascar	A	WB, USAID, WHO, WFP, etc.	Comprehensive health strategy is only for air pollution action plan	A	To begin with a base-to-base support
Ethiopia	A	USAID, WHO, etc.	Telemedicine, health information platform, EMR	A	Support for telemedicine-based on the Japanese knowhow
Nigeria	A	WHO, UNICEF, USAID, GIZ, etc.	Health ICT strategy 2020 to contribute to UHC	A	Priority area of Japan's country assistance policy
Kenya	A	WB, WHO, GF, USAID, etc.	Promotion of implementation of eHealth policy	A	Expansion of cooperation assets to public-private services
Rwanda	NA	WB, WHO, GF, USAID	Digital health strategy, promotion of comprehensive actions	A	Possibility for sharing experiences with other countries
Uganda	A	WB, USAID, UNICEF	Medical equipment management, core hospital, DHIS2	A	Possible improvement in association with national ID and CRVS
Mozambique	A	WB, USAID, WHO, UNICEF, etc.	Digital health strategy under revision	A	Possibility of extended JICA's cooperation assets

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable

Source: JICA Study Team

(3) National ID

1) Positioning in the Country Assistance Policy of the Government of Japan

Digitization of national ID and civil registration is one of the most important factors for achieving the SDGs target 16.9 “By 2030, provide legal identity for all, including birth registration” and realizing e-government. However, many countries have challenges to be solved as premise including digitization of paper-based documents, development of ICT infrastructure (including electric power), coordination among stakeholders, enforcement of related legal systems, strengthening of human resource development, etc. for the introduction, dissemination, and utilization of digitalized national ID. On the other hand, most countries where measures underway have already secured basic financial sources, and it seems that they do not need Japan's support in

the short term. As the support for digitalization of national ID may not be specified in the country assistance policy of Japan in many cases, it is necessary to consider the possibility of supporting country by country.

2) Overview of the Measures Undertaken

Efforts to digitalize national ID and civil registration differ greatly according to the preconditions of each country. The registration rate is high in advanced countries, and data linkage and utilization are progressing. However, in countries where the introduction has not yet progressed, it is necessary to prioritize and steadily proceed with efforts from grasping the current situation, formulating a master plan, roadmap and vision, while forming consensus among important stakeholders.

3) Current Status and Potential of Data Utilization

Digitalization of national ID and civil registration will be the basis for realizing interoperability in various fields and enable data linkage and utilization between sectors. Countries where measures are progressing lead to concrete benefits such as expanding convenience for the people, supporting vulnerable groups, reducing fraud, etc. Therefore, it may be useful to consider the possibility of extension in other countries by extracting the success factors.

4) Possibility for Cross-Border Support

It may be possible to transfer knowledge and capacity-building support from countries where the dissemination and utilization are progressing to countries where it is not progressing. However, since the situation varies from country to country, careful planning and agreement among the parties concerned are essential. In addition, there is a possibility of supporting the promotion of standardization and utilization in border control, keeping in mind regional economic communities such as EAC and ECOWAS.

Table 4.2.3 Measures Undertaken (National ID)

Country	CAP	Other Partner	Measures Undertaken	Future Data Use	Assessment
Mauritius	A	Referred to Singapore	Prime Minister Office sees civil registration and national ID	A	Registration rate is almost 100%, a model to other countries
South Africa	NA	NA	Switching to smart cards	A	Proceeding by themselves, and no need of external support
Ghana	NA	NA	Promotion of Ghana Card	A	Need to promote the utilization for various purposes
Gabon	NA	WB, France	Ministry of Interior sees civil registration and national ID	A	Requested to digitize archive civil registration data
Côte d'Ivoire	NA	WB	Digital ID of common specification in ECOWAS	A	Examine need for support in cooperation with WURI by WB
Zambia	NA	NA	Ministry of Home Affairs is conducting INRIS Project	PA	Full-scale digitalization and linkage with other services are expected
Cameroon	PA	WB, UNDP, GIZ, UNICEF	Digitalization of national ID is stagnated	A	Need for support for digitalization of civil registration is high

Angola	NA	UNICEF	Ministry of Justice is in charge of national ID	A	Expansion of utilization in e-government is necessary
Malawi	PA	UNDP	ID is linked with election, agriculture, social protection, etc.	A	Low civil registration rate remains a problem to solve
Madagascar	NA	WB	WB's PRODIGY is currently digitalizing national ID	PA	There may be no room for direct intervention
Ethiopia	NA	WB, UNICEF, etc.	Switching from paper-based Kebele cards to digital ID	PA	Indirect contribution is expected
Nigeria	PA	WB	NIMC carries out an ID project at Federal Government level	A	Consider a possible contribution to WB's ID project
Kenya	NA	NA	Switching to new cards, enactment of privacy protection law	NA	Strengthening of birth registration is necessary
Rwanda	NA	WB	Strengthening of linkage with various services is underway	A	Extension to other countries, connectivity in rural areas
Uganda	PA	WB, UNICEF	NIRA is in charge of both civil registration and national ID	A	Possibility for application in various areas
Mozambique	NA	UNICEF, WB	Ministry of Justice: CR and Ministry of Interior: national ID	A	Utilization in various areas is expected but difficult to involve

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable
Source: JICA Study Team

(4) e-Government

1) Positioning in the Country Assistance Policy of the Government of Japan

While the country assistance policy of Japan refers promotion of digitalization in specific sectors such as health, education, or agriculture in some countries, Rwanda is the only country that directly mentions e-government.

It is mentioned to support ICT utilization in both the public and private sectors in Rwanda, where "VISION 2020" stipulates a knowledge-based economy and expects positive ICT utilization across sectors. In addition, Japan is a leading donor in the ICT sector and water and sanitation in terms of division of roles among the donor community.

2) Overview of the Measures Undertaken

Each country has formulated an agenda, policies, and plans for future digitalization and prepared for the digitalization of public services. However, concerning implementation, except for some countries, many countries have just digitalized some operations only in urban areas. Especially in rural areas, ICT infrastructure is fragile, and facilities such as PC and Wi-Fi are not sufficiently supplied. Combined with the low digital literacy of people and unstable power supply, the provision of digitalized public services is stagnated.

Even in countries with e-government platforms, the information provision stage is limited to linking the website of multiple ministries and agencies. There are still many countries where the application is not possible, or

possible online service is incomplete, not full end-to-end service but needed manual or paper-based operation by staff. In addition, the lack of interoperability between databases of multiple ministries and agencies and the lack of interoperability between national IDs and digitized public services hinders the smooth use of services. As for payment methods for services, mobile money payments are being adopted or are being adopted in many countries in parallel with cash payments. Concerning mobile money, various methods of banks, fintech, and mobile operators can be used in some countries by establishing interoperability between financial and non-financial institutions. In contrast, payments by mobile operators with a high market share are dominant in some other countries.

3) Current Status and Potential of Data Utilization

In countries where e-government is progressing, and public services are digitalized, tailor-made services based on national transaction data will be expanded and reflected in policies, online information disclosure, transaction transparency will be improved, and administrative procedures will be carried out. It is possible to provide innovative services to citizens by utilizing the data of each ministry, statistical bureau, and the private company that can be expected to improve the reliability and speed of the service and contribute to cost reduction by automation and dematerialization.

On the other hand, most e-government efforts are expected in the future, and only a limited number of countries have reached the stage where data can be utilized. In such countries, it is conceivable to start by linking national ID with the registration of agricultural workers, who make up the majority of the working population in each country, and provide digitized public services. In addition, it is necessary to wait for the provision of communication infrastructure and devices. The construction of a platform that links the central and local governments will contribute to grasping the trends of industries in each region and provide useful information to local industries.

It is also necessary to open ministries' data to promote efficient utilization. In countries where civil society has developed, countries that have formulated strategies in collaboration with private companies from the early stages, it was observed that users more accept digitalized services by reflecting the needs of individuals and companies. Timely decision-making will be possible based on real-time data analysis by establishing interactive data sharing between the Government and citizens.

4) Possibility for Cross-Border Support

It is conceivable to provide face-to-face and online learning opportunities to share good practices in countries with advanced public service digitalization, as proposed in Mauritius. In doing so, the training program will provide a benchmark by collecting cases from other countries, such as the case of Smart Africa, which implements flagship projects in each African country, and then formulate a curriculum that suits the context of each target country and finally provide it face-to-face or online training program. At the time of implementation, pay attention to ensuring the sustainability of the operating organization, and while using the existing facilities, use online lessons together to make the business sustainable. The training program will make the scale as small as possible and raise funds, including private companies engaged in ICT while conducting activities.

Given the current state of socio-economic indicators in each target country, it is too early to pursue a sense of level like SEED-Net (ASEAN University Network /Southeast Asia Engineering Education Development Network), which has gained a certain reputation in Southeast Asia. However, it is thought that the idea of virtual networking universities in the African continent and multiple universities in Japan, and the conception of financial source not relying on only Japan's ODA but utilizing growing needs for human resource development in higher education (especially in the field of science and technology) in each country can be developed into "African version of SEED-Net (Africa University Network /Sub Sahara African Engineering Education Development Network)" regarding the SEED-Net business model in the medium to long term even under Covid-19 circumstances.

At present, it is worth considering online lessons in collaboration with relevant educational institutions in each country, including Tumba College of Technology (including PRC and ICT) in Rwanda, which is a cooperation asset of JICA, Nakawa Vocational Training School in Uganda, Centre de formation professionnelle et technique (CFPT) in Senegal, which is a core vocational training schools in West Africa, or Université Virtuelle de Côte d'Ivoire (UVCI), Orange Digital Academy by telecommunications company Orange, etc.

The e-government development in South Africa is advanced compared to other countries, and it has accepted training from other African countries. It is also worth considering South-South cooperation support using this existing system.

Table 4.2.4 Measures Undertaken (e-Government)

Country	CAP	Other Partner	Measures Undertaken	Future Data Use	Assessment
Mauritius	PA	MOU with India, Estonia, etc.	Info-Highway and Mo-Kloud	A	99% of the population pays taxes online.
South Africa	PA	NA	e-gov. framework formulated but stagnated due to silo	A	Developing by themselves, no need for external support
Ghana	PA	ITU, GIZ, Korea, etc.	Consolidating all public services to GhanaGov	A	Community-level digitization support is needed.
Gabon	PA	WB, AfDB, etc.	No cross-cutting e-government has not yet established.	A	There are various needs.
Côte d'Ivoire	PA	WB, UNDP, USAID, etc.	Public services, investment promotion, agriculture, etc.	A	There is a wide range of support needs.
Zambia	PA	EU, FAO	Agriculture: ZIAMIS, Public services: ZamPort	A	Popularization and deployment of ZamPort and ZIAMIS
Cameroon	PA	India, Israel, GIZ	Information systems of each ministry, trade portal, etc.	A	There are many partners and little room for intervention.
Angola	PA	WB, AfDB	Launched portals for agriculture, fisheries, health, education, etc.	A	Considering the possibility of support in specific priority areas.
Malawi	PA	WB, China, USAID, UKaid	Each ministry has an individual system, e-	A	E-government is in the future, and needs are

			government is not yet		great.
Madagascar	PA	WB, GIZ, UNICEF, etc.	Cross-ministry e-government plan by UGD	A	Considering the possibility of support in the agricultural sector
Ethiopia	PA	WB, UNDP, KOICA, etc.	Six institutions are planning digital public services	A	Demarcation of roles with other partners is required.
Nigeria	PA	WB, Korea	E-government project is underway.	A	Looking at indirect cooperation with WB ID project.
Kenya	PA	WB, Singapore, etc.	eCitizen, Hudma Centers are in operation	A	They play a central role in providing public services.
Rwanda	A	NA	Ministries' electronic services, extended connection of Irembo	A	Support for expansion to other countries using Irembo
Uganda	PA	WB, MDA, UNCDF, etc.	e-Citizen portal for 16 government agencies	A	Interoperability and promotion of e-government are needed.
Mozambique	PA	WB	GovNET, tax administration system, driving licenses	A	Contribution to improved efficiency of administration.

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable

Source: JICA Study Team

(5) Social Protection

1) Positioning in the Country Assistance Policy of the Government of Japan

The country assistance policy of Japan refers to social protection as a priority area in a few countries. Of the 16 target countries, South Africa is the only country that has set “support for reducing economic and social disparities” as a priority area. On the other hand, Japan has promoted UHC as a policy goal and basic policy in the “Basic Policy for Peace and Health” in 2015. It is essential to expand social security systems in developing countries, including 16 target countries, to help all poor access basic services to achieve UHC goals.

2) Overview of the Measures Undertaken

In 2012, UN adopted a decision focusing on UHC. After recognizing its importance, the introduction and installation of a social protection system in developing countries were accelerated. On the other hand, common issues include segmentation of services among multiple ministries, NGOs, development partners, and the private sector, lack of coordination capacity of the Government, and waste of budget due to inappropriate targeting of beneficiaries, etc. To cope with these issues, information systems on social protection called “social registry” or “single registry” have proceeded. Among the 16 target countries, efforts have been undertaken in three countries: Mauritius, South Africa, and Kenya. Other 13 countries are following these three.

Figure 4.2.1 Social Registry Types: Width and Depth of Integrated Data and Information

Sharing data to integrate service delivery and citizen focus					Argentina, Mauritius	Chili, Turkey
Using external data for registration/eligibility					Uruguay	
Using external data for verification (Mature level ↑)		Rwanda, Uganda	Indonesia, Brazil, Pakistan, Philippines, Kenya	South Africa		
No integration (Rollout level)		Ethiopia, Mozambique, Nigeria, Zambia	Ghana, Malawi			
No integration (Planning/Pilot level)	Angola, Gabon, Cameroon, Côte d'Ivoire, Madagascar					
↑ Depth Breadth→	Social assistance program (No integration, Planning/Pilot level)	Social assistance program (No integration, Rollout level)	Selected social assistance programs (Mature level →)	All social assistance programs	Social assistance & social insurance programs	Other social sectors

Source: JICA Study Team based on Barca, V. (2017). "Integrating Data and Information Management for Social Protection: Social Registries and Integrated Beneficiary Registries".

3) Current Status and Potential of Data Utilization

Mauritius has realized the provision of a one-stop service for social assistance and social insurance programs regarding data utilization through social and single registries. It promotes citizen data sharing, which is highly appreciated worldwide (Barca, 2017). In this point of view, Mauritius is positioned as a model country for social registries and single registries in Africa. Going forward, the governments of the 16 countries surveyed will analyze the current situation through evidence-based policy making (EBPM) using evidence-based policy making (EBPM) that utilizes social security administrative big data through the further development of social registries and single registries. It is expected to provide solutions that measure future forecasts and policy effects, formulate preventive measures required for each region, and effectively allocate cash benefits.

4) Possibility for Cross-Border Support

Given the current state of governments working to reform one-stop social protection services through digitalization at the national level, cross-border support can be considered in the future, but not at present.

Table 4.2.5 Measures Undertaken (Social Protection)

Country	CAP	Other Partner	Measures Undertaken	Future Data Use	Assessment
Mauritius	NA	UNDP	Social registry (SRM) in operation	A	Need for improvement exists, but it can be handled by itself.
South Africa	A	NA	Social security and relief benefit system are in operation.	A	Developed by themselves, needed for Covid-19 measures
Ghana	NA	WB, EU, UKaid, USAID	Poverty alleviation, employment, UHC, school lunch, etc.	PA	Insufficient support compared to digitalization needs
Gabon	A	WB, UNICEF	There is a plan for a	A	There is a need, but it is

			single registry		premature.
Côte d'Ivoire	A	WB	UHC, social protection single registry	A	Cooperation with WURI supported by WB is conceivable
Zambia	A	WB, UNICEF, FAO, GIZ	Integrated social security system is underway.	A	Need for support, although coordination of partners is required.
Cameroon	NA	WB	Integrated social registry is being piloted.	A	Efficient coordination with civil registration data is desired.
Angola	A	WB, EU, UNICEF	SIGAS is built and being expanded nationwide	A	There is a need, but it is premature.
Malawi	NA	WB, GIZ, KfW, EU, FAO	Integrated beneficiary registry is being expanded nationwide.	A	Need for support is high although coordination of partners required.
Madagascar	A	WB, UNICEF	Integrated beneficiary registration, promotion of CRVS	A	Direct intervention seems difficult
Ethiopia	NA	WB	Pension, employment, social security, UHC, etc.	A	It is premature.
Nigeria	PA	WB, UNICEF	NRS provides benefits, NHIS provides UHC, etc.	A	Contribution indirectly to WB ID project
Kenya	NA	WB, UKaid	Integrated registry is underway	A	Possibility of private insurance to supplement social security
Rwanda	NA	WB	Building integrated registry	A	Needs operational support
Uganda	PA	WB	National social security fund, benefits, registry	A	Support for social security in line with national ID and CRVS
Mozambique	A	WB	Implement measures under social security policy 2024	A	Possible contribution to poverty reduction

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable

Source: JICA Study Team

(6) ICT Human Resource Development

1) Positioning in the Country Assistance Policy of the Government of Japan

In all target countries, ICT human resource development is not explicitly mentioned in the country assistance policy of Japan. On the other hand, the importance of human resource development is described in the country assistance policy of most target countries. In view of the recent digitalization trend, it is clear that efforts to develop human resources in the ICT field, which are pointed out to be particularly lacking, are necessary.

2) Overview of the Measures Undertaken

Although the importance of ICT human resource development is recognized in all the target countries, there are differences in the contents and methods of their efforts. ICT human resources development includes training

ICT engineers who develop hardware and software of products and services and the capacity development of government officials who promote digitalization through policy-making and legislation. In addition, it is also necessary to pay sufficient attention to the digital skills of the general public upon digitalizing public services. In many of the target countries. In many of the countries surveyed, there were many cases of efforts to develop advanced ICT human resources through collaboration with universities and external private companies and efforts to develop digital skills of government officials at national training institutions. There were also examples of efforts by development partners and NGOs to improve the digital skills of the general public.

3) Current Status and Potential of Data Utilization

This is not applicable.

4) Possibility for Cross-Border Support

Among the target countries, Mauritius has a certain degree of progress in digitalizing public services compared to neighboring countries, and it can serve as a model for other African countries. It is possible to invite government officials in charge of the digitalization of public services in neighboring countries to Mauritius and share their experiences and knowledge of digitalization of public services as third-country training. In Cameroon, the Kaizen project is being implemented with the support of JICA. It is possible to contribute to developing ICT human resources by utilizing digital technology in various Kaizen activities. From the perspective of developing ICT human resources, it is conceivable to consider the active use of digital technology in Kaizen projects in other countries.

JICA is conducting training on ICT, including its utilization, targeted for governmental officials from African countries in themed training programs. Since it is considered very useful for government officials in charge of digitalizing public services in various countries to learn and discuss together in Japan for a certain period, it is worth examining the contents of the training courses currently being conducted and further as well as to expand the scale of training courses (number of courses, number of participants, etc.) so that more trainees can take the opportunity to attend.

To realize the digitalization of public services, each country needs to secure ICT human resources and increase the mobility of these ICT human resources. To confirm the skills and expertise of ICT human resources, it is conceivable to introduce a digital badges system (open badges) that can electronically prove qualifications and visualized certifications. By centrally managing information on the digital skills of workers in a database, it will be possible to improve the employment environment and mobility through job matching.

Table 4.2.6 Measures Undertaken (ICT Human Resource Development)

Country	CAP	Other Partner	Measures Undertaken	Assessment
Mauritius	PA	UNDP	Enriched human resource development programs	Possibility to expand and cooperate with the digitalization of public services in third countries
South Africa	PA	EU	Government-led HR development such as MICT SETA	Human resources development according to priority issues is necessary
Ghana	PA	WB	Promote HR development at ADC,	Development of advanced ICT human resources

			AITI-KACE, etc.	
Gabon	PA	WB	HR development for health and e-government	ICT human resource development needs are high.
Côte d'Ivoire	PA	Huawei, Orange	A leading university in West Africa for ICT HR development	Systematic involvement of the private sector is desired.
Zambia	PA	WB	ICT course, vocational training at Smart Center	It is necessary to formulate a civil servant HR development plan.
Cameroon	PA	GIZ, KOICA	Civil servant training center, training at ministries	ICT HR development needs that lead to economic growth
Angola	PA	China	Huawei operates technical training centers	There is no room for intervention.
Malawi	PA	WB, AfDB	Advanced ICT skill human resource development plan	It is necessary to review the training and management system of government ICT professionals.
Madagascar	PA	Canada, France, China, etc.	Training at ENAM, Chamber of Commerce, etc.	Consider targeted interventions with needs.
Ethiopia	PA	WB, Huawei, UNDP, CISCO	Digital skills action plan formulated, in the implementation stage	There is little room for intervention.
Nigeria	PA	Korea	Conducted civil servant training at e-GTC	HR development considering matching with employment.
Kenya	A	Carnegie M Univ., Huawei, Microsoft	Digital talent project, White Box, etc.	Support for the digital divide is required.
Rwanda	A	WB, GIZ, Korea	Inviting universities from US, opening RCA, etc.	Development of advanced ICT human resources
Uganda	PA	Huawei, Sisco	ICT HR development by universities, Government, and China	Human resource development leads to economic growth
Mozambique	PA	Italy, UNDP, Cisco, Huawei, etc.	Training organized by universities and private companies	Fostering advanced ICT HR development in cooperation with universities

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable

Source: JICA Study Team

(7) ICT Policy and Legislation

1) Positioning in the Country Assistance Policy of the Government of Japan

Among the 16 target countries, the strengthening of ICT is mentioned in the country assistance policy of Japan for Rwanda: Human Resources Development to support growth and job creation (science and technology, education, and training). In addition, education, ICT, and community development are part of Gabon's development issues. Dispatching experts to support the policy and strategy formulation, such as Rwanda, and providing consecutive training in OJT (online or offline) are rare cases. Most supports are dispatching

volunteers or thematic training programs in Japan or third countries. In the survey, necessity for strengthening formulation and implementation was pronounced by various organizations in charge of ICT. However, as ICT policy support is not recognized as a priority area in many target countries, ICT is used within specific sectors.

2) Overview of the Measures Undertaken

In the 16 target countries, some ICT-related laws remain to be renewed. However, major important ones are generally in place. Many countries also have strategies and policies for digitalizing public services. Some countries still have outdated ones, but they are aware of revision. Organizations that lead the digitalization of public services are also in place in each country.

The target countries can be classified into the following categories according to the progress of digitalization.

1. Ideal countries where digitalized and tailor-made public services work in a coordinated manner: Mauritius
2. Countries where digitalization is progressing and efforts are being made to improve interoperability: Rwanda
3. Countries where regions/counties and ministries are making overlapping efforts. Although digitalization is progressing, strengthening interoperability is an issue: South Africa, Kenya, Ghana, Zambia, Nigeria
4. Countries where digitalization of public services began but is still developing: Uganda, Mozambique, Côte d'Ivoire, Cameroon
5. Countries where digitalization of public service is in the planning or early stages: Gabon, Angola, Madagascar, Ethiopia, Malawi

In general, the condition for the ideal progress of digitalization of public services includes the ICT environment (electricity, communication infrastructure, human resources, ICT private companies), people's acceptance of change by digitalization, people's reliance on the Government, the existence of high-level leadership such as the president. In addition, the size of the country or population for transparent governance is also a factor.

3) Current Status and Potential of Data Utilization

ICT policy is related to ICT laws and strategies, not to actual digitization. Data utilization is limited to the evidence-based reflection into ICT policy.

4) Possibility for Cross-Border Support

Since the implementation capacity for promoting the digitalization of public services differ from country to country, sharing knowledge and practices of ICT strategies and policies (or innovative use of data, etc.) in the form of South-South cooperation or establishing an e-Government Academy in ideal countries such as Mauritius can be conceived for providing useful cross-border support in line with the African context.

Table 4.2.7 Measures Undertaken (ICT Policy and Legislation)

Country	CAP	Other Partner	Measures Undertaken	Assessment
Mauritius	A	NA	Digital strategy and e-government strategy already formulated	Policy and institutional settings can be models for other countries.
South Africa	A	NA	e-government and	Support for interoperability

			digitalization of public services strategy	improvement between ministries and provinces.
Ghana	A	WB	Revision of digital strategy (ICT4D)	Technical advisor to ICT administration was requested.
Gabon	A	WB, AfDB	Digitalization strategy formulated; Challenge is implementation	Advisor to ICT policy was requested.
Côte d'Ivoire	A	EU, China	Digital strategy 2030 was formulated.	It is considered needs for support of the implementation of strategy
Zambia	A	NA	ICT related law was revised in 2021	Needs for strengthening of implementation capacity in e-government and cybersecurity
Cameroon	A	KOICA	Digital strategy 2020 is being revised.	Needs for support of ICT strategy implementation
Angola	A	China	Legislation and technical innovation are touted.	There is little room for intervention.
Malawi	A	UNDP, WB, GIZ	ICT master plan 2031, digital economy strategy 2026	Strengthening of implementation capacity is necessary.
Madagascar	A	WB, UNDP, EU, France	ICT strategy is being updated; efforts are made by UGD	Needs for technical support to UGD
Ethiopia	A	WB	Comprehensive ICT strategy is being formulated.	Consider the wide perspective of support, including utilization of spatial data, etc.
Nigeria	A	NA	Federal gov.: policy, affiliated agencies: implementation	Coordination among federal gov., provinces, and municipalities needs to be strengthened.
Kenya	A	NA	National ICT policy, digital economy master plan	Measures for decentralization are needed.
Rwanda	A	WB, AfDB, GIZ, Korea	ICT component at upper-level plans, etc.	Support for utilization of knowledge and experience and expansion to other countries.
Uganda	A	WB, MDA, Estonia, etc.	Comprehensive ICT strategy is being formulated.	Promoting digitalization of public services
Mozambique	A	WB, UNICEF, China 他	Promoting e-government mainly by INAGE	Support for strengthening of ICT administration through INAGE

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable
Source: JICA Study Team

(8) ICT Infrastructure

1) Positioning in the Country Assistance Policy of the Government of Japan

ICT infrastructure is directly referred to in the country assistance policy in Angola and Côte d'Ivoire. In Angola, the reconstruction of roads, railroads, ports, and communication infrastructure is listed as a development issue and electric power and water infrastructure. In Côte d'Ivoire, support for transportation (roads, ports), water

and sewage, energy, ICT, etc., is clearly stated as development issues.

ICT infrastructure is indirectly positioned as part of economic infrastructure in other target countries.

2) Overview of the Measures Undertaken

Although the ICT infrastructure as the basis for the digitalization of public services, especially the national broadband backbone development status, differs from country to country, each Government formulates a national broadband policy and constructs it accordingly. In addition, there are many cases where this construction is being carried out with the support of other countries. On the other hand, developing the last mile to connect to the backbone in rural areas is a hard challenge in many countries. It is thought that the last mile is mainly built by private telecommunications carriers, but there is a tendency to only expand to areas where income can be expected. The Government needs to identify and develop the area where profits are not expected, but connectivity is necessary.

3) Current Status and Potential of Data Utilization

ICT infrastructure plays an important role in distributing information and data, but it does not produce data that can be directly utilized.

4) Possibility for Cross-Border Support

There are cases where wide-area support is provided across countries as corridor development for roads and transportation infrastructure. It is conceivable that such a cross-border corridor project can include ICT infrastructure. Specifically, it is considered to build a communication network including optical fiber pipes along the corridor. Especially in landlocked African countries, the expansion of the international backbone laid in neighboring countries will increase domestic communication volume. For example, the JICA Study Team learned that Malawi was considering a system that did not connect to foreign countries due to the high charge of the international backbone. From the perspective of reducing connection fees by expanding the international backbone, it is necessary to consider the possibility of wide-area support.

Table 4.2.8 Measures Undertaken (ICT Infrastructure)

Country	CAP	Other Partner	Measures Undertaken	Assessment
Mauritius	PA	NA (by the private sector)	Needs for increased capacity of network in remote islands	Consider the possibility of LEO or drones
South Africa	PA	NA	Providing affordable broadband to people by 2030	No major issues
Ghana	PA	WB, China	Last-mile connectivity through GIFEC, Huawei, etc.	There is little room for intervention.
Gabon	PA	WB, AfDB	Relatively high coverage rate of Internet	Considering the possibility of utilizing innovative technology
Côte d'Ivoire	A	China, etc.	Domestic backbone reinforcement by 2,000 km	China is developing ICT infrastructure, and there is little room for intervention.
Zambia	PA	China	Infrastructure is greatly influenced by	There is little room for intervention

			China	
Cameroon	PA	China, AfDB	Domestic backbone construction supported by China	There is room for area expansion and capacity enhancement.
Angola	A	China	Domestic backbone expansion plan by 3,000 km	Last-mile connectivity needs to be strengthened
Malawi	PA	China, Finland	Fiber nets connect eight cities, inland areas are undeveloped	Considering the possibility of a high-altitude drone, etc.
Madagascar	PA	(by MNO)	Limited backbone and communication network	Support needs are great.
Ethiopia	PA	Private sector	Privatization of mobile business and start of private entry	Supporting Japanese companies with the mobile business as a foothold.
Nigeria	PA	China, WB	Major city connected by fiber network with Chinese funding	There is little room for intervention.
Kenya	PA	WB, China, etc.	Improvement of last-mile connection by using USF	Last-mile connectivity needs to be improved.
Rwanda	PPA	WB, Korea, etc.	Improvement of last-mile connectivity by using USF, etc.	There is little room for intervention.
Uganda	PA	MOU with China, MNO	Domestic backbone of 12,000 km	There is a last-mile connection issue.
Mozambique	PA	WB, China, Vietnam	Construction of ADSL and CDMA by 3,860 km, etc.	Although there is a last-mile connection issue, it is difficult for intervention.

Note: CAP: Country Assistance Policy of Japan
A: Applicable, PA: Partly applicable, NA: Not applicable
Source: JICA Study Team

4.3 Collaboration with Other Development Partners

Based on the proposed support programs described in Chapter 3, JICA Study Team examined the possibility of cooperation with other development partners.

(1) World Bank (WB)

As described in Section 2.3, WB implements or prepares plans for digitalization support projects in Africa with different approaches such as developing and utilizing national digital IDs based on the ID4D initiative, building e-government based on the digital economy initiative, and digitizing in other sectors.

Upon implementing a project related to the digitalization of public services, WB collaborates with other international organizations (for example, UNCDF when utilizing mobile money, FAO when introducing digital technology in the agricultural field, etc.) or employs specialists with digitization technology from private companies. Therefore, it is quite possible that WB does not have the appropriate digitization personnel for the project. Japan can dispatch experts, then work together in combination with financial cooperation.

As for the utilization of digital technology, financial sustainability is one of the issues. Even if the benefits are recognized in the pilot stage, the activities are often suspended when the project is completed. Because the government subsidy is gone, and the beneficiaries are not willing to pay for it. World Bank is conscious of the importance of considering who will ultimately bear the costs in implementing and deploying the digital technology by sharing the information obtained through POC to the pilot stage among the parties concerned. Therefore, it is quite important to discuss with the partners how to secure the financial source by the recipient government and beneficiaries when collaborating with other partners in a digitalization project. Cooperation with private companies is one of the ways to continue the activities after completing the project. It is worth considering working with appropriate start-up companies. It is also possible to pick up technology that promotes innovation and provides a fund in a matching grant. It is necessary to carefully judge that the technology is the one that the beneficiaries desire. It is also a good idea to choose the areas that JICA and Japanese companies can work on from among the technologies confirmed to some extent through the pilot project stages of the World Bank.

Among the projects proposed in Chapter 3, the ones that may collaborate with WB are listed in the table below.

Table 4.3.1 Possible Projects in Collaboration with World Bank

Country	Possible Projects in Collaboration with World Bank
Mauritius	NA
South Africa	NA
Ghana	<ul style="list-style-type: none"> Strengthening the operation of the integrated social security registry through collaboration with the “Ghana National Household Registry (GNHR).”
Gabon	<p>Examination of the possibility for collaboration with the Digital Gabon project in the following areas:</p> <ul style="list-style-type: none"> Support for digitalization of Maternal and Child Health Handbook (It is expected that access and quality of medical care will be improved by promoting digital health in maternal and child health supported by Japan, with the awareness reform of both service providers and users in mind.) Establishment of the National Datacenter Technical support for ICT policy implementation

	<ul style="list-style-type: none"> • Support for digitalization of civil registration
Côte d'Ivoire	<ul style="list-style-type: none"> • Support for extension of Agriculture Digital Platform in cooperation with E-Agriculture Project (2018-2023) by WB (extension support for the e-Agri platform under the current technical cooperation project PROLIL) • Support for establishment of National Datacenter based on the Projet d'Appui au Renforcement de l'Administration Numérique (PARAE) (the Government has intention to seek financial support from AfDB) • Support for the establishment of effective and efficient social protection in cooperation with the Social Protection and Economic Inclusion Project (2019-2024) by WB
Zambia	<ul style="list-style-type: none"> • Capacity development project for digitalization of social protection services in cooperation with Girls' Education and Women's Empowerment and Livelihood Project (GEWEL) by WB (2015-2020) and Zambia Integrated Social Protection Information System (ZISPIS) Pilot Programme Assessment by UNICEF (2020)
Cameroon	NA
Angola	NA
Malawi	<ul style="list-style-type: none"> • 1) Formulation of ICT Policy and advocacy support of MITA, 2) Support for the establishment of distance learning system among universities in cooperation with Digital Malawi Program Phase I: Malawi Digital Foundations Project (2017-2022) by WB • Capacity development project for digitalization of social protection services in cooperation with Malawi Social Support for Resilient Livelihoods project (2020-2024) by WB, Providing social protection for ultra-poor people in Malawi by GIZ, and Nutrition and Social Protection in Malawi (2020) by EU.
Madagascar	<ul style="list-style-type: none"> • Capacity development for e-government implementation in cooperation with PRODIGY by WB, which supports UDG (Dispatch of expert)
Ethiopia	<ul style="list-style-type: none"> • Utilization of possible Japan's knowledge and technology in spatial information in cooperation with Ethiopia Digital Foundations Project (2021-2026) (utilization of spatial data analysis for solving social issues, micro satellite development, and technical support, use of high-altitude drones for data collection, promotion of digital technology in the agriculture, manufacturing and tourism sectors and innovation under Digital Ethiopia 2025, expansion of digitalized public and private services) • Technical and financial cooperation for the establishment of Ethiopian Electronic Single Window (eSW) in cooperation with WB, KOICA, EAC, which are the existing donors
Nigeria	NA
Kenya	<ul style="list-style-type: none"> • Formulation of ICT policy, dispatch of experts for strengthening the implementation capacity, and co-financing for improving last-mile connectivity in rural areas in cooperation with Kenya Digital Economy Acceleration Project (pipeline) by WB • Co-financing with WB for scale-up promotion of birth registration
Rwanda	<ul style="list-style-type: none"> • Support for utilization of data analysis and private companies for solving social issues (capacity development in soft skills such as policy-making leadership and management) • Capacity development of government officials for the newly introduced National Social Protection Registry (NSPR) in cooperation with Human Capital for Inclusive Growth Development Policy Financing by WB
Uganda	<ul style="list-style-type: none"> • Social security program policy support based on NUSAF 3, which ended in 2012
Mozambique	<ul style="list-style-type: none"> • Strengthening of implementation capacity for Instituto Nacional de Governo Electrónico (INAGE) and related organizations in cooperation with Digital Governance and Economy Project (EDGE) by WB • Support for joint POC between Japanese and local companies • Community-based maternal and child health improvement project

Source: JICA Study Team

(2) European Investment Bank (EIB)

When co-financing in Africa, EIB can cover up to 50% of the creditable project valuation, with a minimum amount of EUR 12.5 million. Therefore, the candidate project for collaboration will be more than EUR25 million (about JPY 3.3 billion). On the other hand, EIB does not have grant aid, and it is challenging to work

in countries supported by IMF in accordance with the Debt Sustainability Standards.

The digitalization areas EIB supports in Africa include network technology and e-government, and support for financial and agriculture sectors are also started but a little behind. EIB has financed traditional infrastructure so far. However, in light of the high demand for the telecommunications sector in Africa, where there are still many people who cannot connect to the Internet, EIB started to support the expansion of communication networks and lines in rural areas. In entrepreneurship support, EIB has been investing in many venture capital funds, some of which are already closed.

EIB investigated and summarized various digital technology utilization cases by start-up companies that support Covid19 in a report¹⁵⁷. According to the report, EIB finances an Ethiopian fintech company used for public services payment, and FALCO, a French company implementing a project to provide a solution to the public safety net (food program). Many of the start-ups listed in the report offer a variety of simple and life-saving technologies developed locally in Africa but do not require vast amounts of funds. Thus EIB intends to continue to finance them. It may be possible that such companies will be introduced as local partners to couple with Japanese companies to develop their businesses, leading to JICA Overseas Loan and Investment Program for Japanese start-up companies. For example, suppose a Japanese company can build a business with local companies selected through the “Public Service Digitalization Competition” proposed in Zambia. In that case, there is room to consider the possibility of collaboration between EIB and JICA.

In addition, in response to requests for the digital transformation of health centers and improvement of facilities in the public sector, which are being actively carried out in Africa under Covid-19, there is a possibility of exploring cooperation between EIB and JICA, including Japanese private companies working in the digital transformation of the health sector through public-private partnership (PPP). Although EIB sounded to the JICA Study Team possibility for collaboration in the World Bank’s “Digital Identification for Development Project (in progress)” in Nigeria to which EIB and AFD co-finance¹⁵⁸, it is likely that the possibility is low as Japan has a policy for not supporting national ID project in Nigeria.

¹⁵⁷ EIB, “Africa’s Digital Solutions to tackle Covid 19”, July 2020

¹⁵⁸ Interviewed on February 24, 2021

(3) Collaboration with Smart Africa

Smart Africa, which has had dialogues on the possibility of cooperation with JICA at the World Economic Forum and TICAD, is collaborating with the World Bank and Softbank. It is likely to collaborate officially with Smart Africa to utilize its functions in the future.

Smart Africa, which aims to make Africa a single digital market, is implementing its 3-Year Strategy 2020-2022, including 1) building acceptable infrastructure within Africa, 2) promoting and facilitating business development and investment in Africa, and 3) birth and development of a digital society. The table below shows flagship projects in the countries recognized as advanced cases in the respective fields. Smart Africa implements the project according to four stages: concept level, blueprint level, pilot level, financing/implementation level. Although e-health, digital ID, e-government, start-up development in various areas where JICA has interests do not always match the flagship projects of Smart Africa, it is worth considering a possibility to collaborate with Smart Africa and disseminate the best solutions to other African countries by integrating the acquired lessons learned from JICA projects.

Table 4.3.2 Major Flagship Projects of Smart Africa

1) Construction of acceptable infrastructure within Africa	
One Africa Network (Smart Africa)	Implementation stage for standardization of roaming (cellular and data, etc.)
Smart city (Rwanda)	Pilot project implementation stage of Smart Waste management systems, etc. Considering deployment in other countries.
Bulk Capacity Purchase	Implementation stage of unification and consolidation of internet bundle among member states.
Inter-African Cross Border Connectivity	Cross-border connectivity by Wi-Fi or optic fiber cables.
Broadband access and Smart Village Project	At the blueprint level, formulating a master plan and guidelines for project implementation.
Cloud Data Centers (Djibouti) Connect schools using fiber optics and the Internet Giga Africa (Smart Africa) Digital Terrestrial TV Migration (Smart Africa) Green Energy (South Africa)	Concept level
2) Business development and investment promotion and facilitation in Africa	
Start up and Innovation Ecosystem (Tunisia)	At the implementation stage with financing
Digital ID-SATA (Benin) Artificial Intelligence (South Africa)	Still at the blueprint stage, about to start the pilot stage.
Internet Governance (Burkina Faso), Cybersecurity (Côte d'Ivoire), Blockchain (South Africa)	The blueprint will be available within 2021.
3) Acceleration of birth and development of a digital society	
Smart Africa Scholarship Fund (Burkina Faso) Smart Africa Digital Academy (Smart Africa),	This year, Smart Africa focuses on developing human resources and decision-makers.
Digital Economy: all Smart Africa affiliated member states will formulate National Digital Strategy (Kenya)	The blueprint has been completed, currently in the pilot stage. Digital Economy Index is underway and measuring digital transformation progress among the member states.
E-Government (Sierra Leone)	Implemented as one of the five pillars of the digital economy
E-Payment (Ghana), Over the Top (OTT) Study (South Africa),	The blueprint is almost done.

Agritech (Zimbabwe), ICT Skills and Capacity building (Burkina Faso)	
Smart women and girls (Smart Africa), e-Health (South Africa), Smart devices (Smart Africa)	Concept level

Source: JICA Study Team based on the information of Smart Africa

(4) Other Development Partners

JICA may cooperate with other development partners in the following areas.

Table 4.3.3 Possible Projects in Collaboration with Other Development Partners

Country	Possible Projects and Development Partners
Nigeria	<ul style="list-style-type: none"> • “Support for human resources development of civil servants that contributes to the promotion of e-government” in collaboration with KOICA
Cameroon	<ul style="list-style-type: none"> • Based on the e-Government Master Plan formulated between the Ministry of Posts and Telecommunications and KOICA, support for implementing plans for digitization of public services in collaboration with KOICA.
Gabon	<ul style="list-style-type: none"> • Support for building a National Datacenter in collaboration with AfDB, which is implementing ICT infrastructure development projects
Angola	<ul style="list-style-type: none"> • Collaboration with UNICEF: Monitoring and evaluation system strengthening project for maternal and child health and reproductive health • Promote birth registration by using biometric data in collaboration with UNICEF, UN LIA, etc. which support CRVS
Zambia	<ul style="list-style-type: none"> • Support for building interactive e-extension functions on ZIAMIS in collaboration with EU and FAO “Sustainable Intensification of Smallholder Farming Systems in Zambia (SIFAZ).”

Source: JICA Study Team based on the interviews in each target country

5 Appendixes

Appendix 1: Implemented Survey Schedule

Appendix 2: List of Interviewees and Study Team Members

Appendix 1: Implemented Survey Schedule

Date		Interview
Nov 23, 2020	Mon	ID4D, World Bank
Nov 30, 2020	Mon	Nippon Biodiesel Fuel Co., Ltd.
Dec 8, 2020	Tue	NEC Global Business Unit
Dec 21, 2020	Mon	JICA Private Sector Partnership and Finance Department
Dec 22, 2020	Tue	JICA Global Environment Department
Dec 22, 2020	Tue	JICA Human Development Department (Social Protection)
Dec 24, 2020	Thu	JICA Human Development Department (Education)
Dec 24, 2020	Thu	JICA Human Development Department (Health)
Jan 5, 2021	Tue	JICA Governance and Peacebuilding Department (STI-DX Unit)
Jan 13, 2021	Wed	JICA Human Development Department (Education)
Jan 15, 2021	Fri	JICA Human Development Department (Health)
Jan 20, 2021	Wed	ZA: JICA Africa Department and South Africa Office
Jan 22, 2021	Fri	RW: JICA Africa Department and Rwanda Office
Jan 28, 2021	Thu	KE: JICA Africa Department and Kenya Office
Jan 29, 2021	Fri	GH: JICA Africa Department and Ghana Office
Jan 29, 2021	Fri	JICA Human Development Department (Education)
Feb 4, 2021	Thu	RW: JICA Africa Department and Rwanda Office
Feb 8, 2021	Mon	KE: World Bank Kenya Office and Headquarters
Feb 9, 2021	Tue	KE: JICA Kenya Office, Human Development Department (Education)
Feb 15, 2021	Mon	GH: JICA Ghana Office (Education Sector)
Feb 18, 2021	Thu	GH: JICA Ghana Office (Health Sector)
Feb 19, 2021	Fri	KE: JICA Kenya Office (Health Sector)
Feb 22, 2021	Mon	ZA: JICA Africa Department and South Africa Office
Feb 24, 2021	Wed	CM: JICA Africa Department and Cameroon Office
Feb 24, 2021	Wed	European Investment Bank
Feb 26, 2021	Fri	CI: JICA Africa Department and Côte d'Ivoire Office
Mar 4, 2021	Thu	KE: Ministry of ICT
Mar 4, 2021	Thu	KE: Ministry of Health (JICA UHC Expert)
Mar 5, 2021	Fri	JICA Africa Department and Madagascar Office (Mauritius)
Mar 8, 2021	Mon	KE: World Bank (Health Sector)
Mar 8, 2021	Mon	RW: ICT Chamber
Mar 9, 2021	Tue	KE: TVET Authority
Mar 9, 2021	Tue	KE: World Health Organization (WHO)
Mar 16, 2021	Tue	MU: JICA STI-DX Unit and DX Study Team
Mar 12, 2021	Fri	KE: ICT Authority
Mar 12, 2021	Fri	KE: Keicho County
Mar 15, 2021	Mon	KE: Ministry of Education (CEMASTEA, NI3C, NEMIS)
Mar 17, 2021	Wed	KE: Kenya School of Government (Centre of Research and Advanced Training)
Mar 17, 2021	Wed	ZA: Intelligent Systems
Mar 18, 2021	Thu	ZA: Information Technology Association of South Africa (ITA)
Mar 18, 2021	Thu	KE: Moringa School
Mar 18, 2021	Thu	KE: USAID
Mar 18, 2021	Thu	KE: KICT Net
Mar 18, 2021	Thu	KE: Computer Industry and Service Association of Kenya (CISAK)
Mar 18, 2021	Thu	RW: National Identification Agency (NIDA)
Mar 19, 2021	Fri	ZA: Institute of IT Professionals South Africa (IITPSA)
Mar 22, 2021	Mon	JICA Kenya Office (Social Protection Sector)
Mar 22, 2021	Mon	RW: Smart Africa
Mar 23, 2021	Tue	JICA Peacebuilding Unit and G5 Sahel Study Team
Mar 23, 2021	Tue	JICA Africa Department and Nigeria Office
Mar 24, 2021	Wed	KE: National Registration Bureau
Mar 24, 2021	Wed	ZA: Center for Public Service Innovation (CPSI)

Mar 24, 2021	Wed	RW: Rwanda Coding Academy
Mar 25, 2021	Thu	MZ: JICA Africa Department and Mozambique Office
Mar 25, 2021	Thu	KE: Adventist University of Africa
Mar 25, 2021	Thu	RW: Rwanda Utilities Regulatory Authority
Mar 26, 2021	Fri	RW: Ministry of ICT and Innovation
Mar 26, 2021	Fri	KE: Impact Africa Network
Mar 26, 2021	Fri	AO: JICA Africa Department and Angola Office
Mar 29, 2021	Mon	ZA: Council for Medical Scheme (CMS)
Mar 29, 2021	Mon	RW: MARA Group
Mar 30, 2021	Tue	ZA: Council for Scientific and Industrial Research (CSIR)
Mar 30, 2021	Tue	RW: KOICA
Mar 31, 2021	Wed	UG: JICA Africa Department and Uganda Office
Mar 31, 2021	Wed	RW: Smart Africa ICT
Mar 31, 2021	Wed	RW: Rwanda Information Society Authority (RISA)
Apr 1, 2021	Thu	MW: JICA Africa Department and Malawi Office
Apr 1, 2021	Thu	KE: KICTA Net
Apr 1, 2021	Thu	RW: National Identification Agency
Apr 2, 2021	Fri	RW: Airtel Money
Apr 7, 2021	Wed	ZA: World Bank South Africa Office (Health)
Apr 7, 2021	Wed	KE: ICT Authority
Apr 8, 2021	Thu	RW: Ministry of Education
Apr 9, 2021	Fri	ZA: Department of Public Service and Administration
Apr 9, 2021	Fri	ZA: Department of Higher Education and Training
Apr 12, 2021	Mon	ZA: Human Resource Development Council of South Africa
Apr 12, 2021	Mon	RW: Smart Africa
Apr 12, 2021	Mon	RW: Smart Africa
Apr 13, 2021	Tue	RW: Rwanda Polytechnic IPRC Tumba
Apr 13, 2021	Tue	GH: National Health Insurance Authority
Apr 13, 2021	Tue	GH: National Health Insurance Authority
Apr 14, 2021	Wed	ZA: WHO
Apr 14, 2021	Wed	RW: Smart Africa
Apr 14, 2021	Wed	GH: National Health Insurance Authority
Apr 15, 2021	Thu	MW: JICA SHEP Expert
Apr 17, 2021	Sat	ZA: State Information Technology Agency
Apr 19, 2021	Mon	GH: Institute of ICT Professionals
Apr 19, 2021	Mon	GH: National Health Insurance Authority
Apr 20, 2021	Tue	ZA: Department of Telecommunications and Postal Services
Apr 21, 2021	Wed	ZA: Department of Health
Apr 21, 2021	Wed	ZA: South Africa Social Security Agency
Apr 23, 2021	Fri	KE: JICA Africa Department and Kenya Office
Apr 23, 2021	Fri	RW: Local Administrative Entities Development Agency
Apr 23, 2021	Fri	GH: National Entrepreneurship and Innovation Programme
Apr 26, 2021	Mon	KE: Communications Authority of Kenya
Apr 26, 2021	Mon	RW: IREMBO
Apr 26, 2021	Mon	RW: GIZ
Apr 28, 2021	Wed	RW: World Bank Rwanda Office
Apr 29, 2021	Thu	GH: eCampus
Apr 29, 2021	Thu	GH: iSpace Foundation
Apr 30, 2021	Fri	NG: JICA Human Development Department (Education) and Nigeria Office
Apr 30, 2021	Fri	ZA: Department of Social Development
May 4, 2021	Tue	ZA: Media, Information and Communication Sector Education Authority
May 5, 2021	Wed	GH: Ghana Investment Fund for Electronic Communications (GIFEC)
May 5, 2021	Wed	GH: Rancard Business
May 11, 2021	Tue	UNDP Headquarters (UNLIA)

May 11, 2021	Tue	KE: Department of Civil Registration
May 13, 2021	Thu	ZA: Economic Policy Research Institute (EPRI)
May 13, 2021	Thu	RW: Ministry of Health
May 13, 2021	Thu	CM: Innovas
May 13, 2021	Thu	CM: Zixtech
May 14, 2021	Fri	GH: Ghana Health Service
May 14, 2021	Fri	GH: Ghana Health Service
May 18, 2021	Tue	GH: Ministry of Health
May 18, 2021	Tue	CM : Ministère de la fonction publique et de la réforme administrative
May 18, 2021	Tue	CM: World Bank (Social Protection)
May 19, 2021	Wed	GH: Edukanea
May 20, 2021	Thu	GH: Civil Service Training Center
May 20, 2021	Thu	RW: Digital Ambassador Program
May 21, 2021	Fri	CM: USAID
May 21, 2021	Fri	CM: WHO
May 24, 2021	Mon	UG: Uganda Registration Services Bureau (URSB)
May 26, 2021	Wed	MG: JICA Africa Department and Madagascar Office
May 26, 2021	Wed	CI : Autorité de régulation des télécommunications/TIC (ARTCI)
May 28, 2021	Fri	CI : Ministère de l'économie numérique et de la poste (MENP)
May 28, 2021	Fri	CI: MENP Conseil technique
May 29, 2021	Sat	GH: National Information Technology Authority (NITA)
May 31, 2021	Mon	KE: JICA Africa Department and Kenya Office
May 31, 2021	Mon	CI: SEEDS SARL (Startup in Health)
May 31, 2021	Mon	RW: World Bank (Health)
Jun 1, 2021	Tue	ZM: JICA Africa Department and Zambia Office
Jun 1, 2021	Tue	CM : Ministère de la santé publique
Jun 1, 2021	Tue	CI : Ministère de l'économie numérique et de la poste
Jun 1, 2021	Tue	UG: National Information Technology Agency (NITA)
Jun 1, 2021	Tue	AO: JICA Maternal and Child Health Expert
Jun 2, 2021	Wed	CM : Bureau national de l'état civil (BUNEC)
Jun 2, 2021	Wed	CM : Sosenu Tics sarl WDC
Jun 3, 2021	Thu	ET: JICA Africa Department and Ethiopia Office
Jun 3, 2021	Thu	MG: JICA Agriculture TCP
Jun 4, 2021	Fri	UG: National Identification and Registration Authority (NIRA)
Jun 7, 2021	Mon	UG: National Social Security Fund (NSSF)
Jun 7, 2021	Mon	UG World Bank Uganda Office
Jun 7, 2021	Mon	MG: JICA Nutrition TCP
Jun 8, 2021	Tue	JICA Africa Department and Gabon Office
Jun 8, 2021	Tue	CM : Institut supérieur de management public (ISMP)
Jun 8, 2021	Tue	CI : Technchange
Jun 8, 2021	Tue	MG: JICA Education TCP
Jun 9, 2021	Wed	CM : Ministère des postes et télécommunication
Jun 9, 2021	Wed	CM : Ecole nationale d'administration et de magistrature (ENAM)
Jun 9, 2021	Wed	CM : Ecole Supérieure des Sciences et Techniques de l'information (ESSTIC)
Jun 10, 2021	Thu	CM : Chambre de Commerce (CCIMA)
Jun 10, 2021	Thu	CM : CDC
Jun 10, 2021	Thu	CI : Agence Nationale du Service Universel -TIC (ANSUT)
Jun 10, 2021	Thu	CI : Amazon du Web
Jun 11, 2021	Fri	CI : Agence Nationale du Service Universel -TIC (ANSUT)
Jun 11, 2021	Fri	CM : GIZ
Jun 11, 2021	Fri	MW: JICA Human Development Department (Education)
Jun 11, 2021	Fri	MG: JICA Infrastructure TCP
Jun 12, 2021	Sat	CM : Université de Yaoundé
Jun 15, 2021	Tue	UG: Center for Policy Analysis

Jun 15, 2021	Tue	MW: UNDP
Jun 15, 2021	Tue	MG: JICA Solid Waste Management TCP
Jun 16, 2021	Wed	KE: Digital Opportunity Trust
Jun 16, 2021	Wed	CI : Action contre la Faim (ACF)
Jun 16, 2021	Wed	UG: Civil Service College
Jun 16, 2021	Wed	ZM: UNDP
Jun 18, 2021	Fri	CI : UNETEL
Jun 18, 2021	Fri	CM : UNDP
Jun 18, 2021	Fri	UG: Nakawa Vocational Training Institute
Jun 18, 2021	Fri	ET: Digital Opportunity Trust
Jun 21, 2021	Mon	MW: Agricultural Commodity Exchange
Jun 21, 2021	Mon	MW: Tradeline Corp.
Jun 21, 2021	Mon	NG: Federal Ministry of Education
Jun 22, 2021	Tue	MW: Lilongwe University of Agriculture and Natural Resources
Jun 22, 2021	Tue	MW: Ministry of Agriculture, Irrigation & Food Security
Jun 22, 2021	Tue	MW: Farmers Union
Jun 22, 2021	Tue	UG: Ministry of Gender, Labour and Social Development
Jun 22, 2021	Tue	MZ: JICA Mozambique Office (Health Sector)
Jun 23, 2021	Wed	UG: Uganda Communication Commission
Jun 24, 2021	Thu	MW: JICA Health Expert
Jun 24, 2021	Thu	NG: National Information Technology Development Agency (NITDA)
Jun 28, 2021	Mon	CM : Agence de régulation des télécommunications (ART)
Jun 28, 2021	Mon	CI : Ministère de la santé et de l'hygiène publique
Jun 28, 2021	Mon	CI : Ministère de l'éducation nationale
Jun 28, 2021	Mon	MW: National Registration Bureau (NRB)
Jun 29, 2021	Tue	CI : Ministère de l'Agriculture et du Développement Rural
Jun 29, 2021	Tue	CI : WHO
Jun 29, 2021	Tue	CI : IVOICEL
Jun 29, 2021	Tue	MZ: Agro-Negócio para o Desenvolvimento de Moçambique (ADM)
Jun 30, 2021	Wed	CI : Commission Electorale Indépendante (CEI)
Jun 30, 2021	Wed	MW: Malawi Communications Regulatory Authority (MCRA)
Jun 30, 2021	Wed	JICA Africa Department and South Africa Office
Jun 30, 2021	Wed	ZM: JICA Infectious Disease Expert
Jul 1, 2021	Thu	CM: Tales
Jul 2, 2021	Fri	RW: JICA Africa Department and Rwanda Office
Jul 2, 2021	Fri	NG: Nigeria Computer Society
Jul 5, 2021	Mon	JICA Africa Department and Ghana Office
Jul 5, 2021	Mon	CI : Caisse Nationale d'Assurance Maladie (CNAM)
Jul 5, 2021	Mon	AO: Ministério da Saúde
Jul 6, 2021	Tue	ZA: JICA Africa Department and South Africa Office
Jul 6, 2021	Tue	MG: Office national de nutrition (ONN)
Jul 7, 2021	Wed	NG: National Health Insurance Scheme
Jul 7, 2021	Wed	MZ: Centre of Informatics of the Eduardo Mondlane University
Jul 7, 2021	Wed	AO: PSI
Jul 8, 2021	Thu	CI : Groupement des Opérateurs du Secteur des TIC (GOTIC)
Jul 8, 2021	Thu	NG: Administrative Staff College of Nigeria (ASCON)
Jul 8, 2021	Thu	MZ: WHO
Jul 9, 2021	Fri	UG: World Bank Uganda Office
Jul 9, 2021	Fri	MW: Mzuzu University
Jul 9, 2021	Fri	MW: GIZ
Jul 9, 2021	Fri	NG: Federal Ministry of Health
Jul 9, 2021	Fri	AO: Nell Corp
Jul 9, 2021	Fri	ET: ID4/Africa Ambassador, Office of the Prime Minister
Jul 12, 2021	Mon	CI : World Bank Côte d'Ivoire Office

Jul 12, 2021	Mon	ZM: Smart Zambia
Jul 12, 2021	Mon	ET: Ministry of Labor and Social Affairs
Jul 13, 2021	Tue	UG: Ministry of Gender, Labor & Social Development
Jul 13, 2021	Tue	MW: Baobab Health Trust
Jul 13, 2021	Tue	MZ: AMPETIC
Jul 13, 2021	Tue	MZ: Instituto Nacional de Tecnologias de Informação e Comunicação
Jul 13, 2021	Tue	ZM: e-MSISKA
Jul 13, 2021	Tue	ZM: Ministry of Community Development and Social Services
Jul 13, 2021	Tue	ET: World Bank Ethiopia Office (Social Protection, ICT HRD)
Jul 14, 2021	Wed	GH: JICA Africa Department and Ghana Office (e-Government)
Jul 14, 2021	Wed	MZ: ILO
Jul 14, 2021	Wed	AO: Information Technology and Institutional Communication
Jul 14, 2021	Wed	AO: USAID
Jul 14, 2021	Wed	ZM: National Pension Scheme Authority (NAPSA)
Jul 14, 2021	Wed	ZM: World Bank (Education)
Jul 14, 2021	Wed	ZM: Ministry of Home Affairs
Jul 14, 2021	Wed	ET: Ministry of Innovation and Technology
Jul 15, 2021	Thu	MZ: Instituto Nacional de Tecnologias de Informação e Comunicação
Jul 15, 2021	Thu	MU: UNDP
Jul 15, 2021	Thu	AO: Consultant for Ministry of Higher Education
Jul 16, 2021	Fri	MU: Ministry of Information Technology
Jul 16, 2021	Fri	MU: Civil Service College Mauritius
Jul 17, 2021	Sat	AO: Ministry of Public Administration, Labor and Social Security
Jul 19, 2021	Mon	MW: Ministry of Economic Planning & Development
Jul 19, 2021	Mon	MW: Ministry of Education, Science and Technology
Jul 19, 2021	Mon	AO: UNICEF
Jul 19, 2021	Mon	AO: Ministério da Educação
Jul 19, 2021	Mon	UG: Institute of ICT
Jul 19, 2021	Mon	MZ: Ministry of State Administration and Public Service
Jul 19, 2021	Mon	ZM: Bongo Hive
Jul 20, 2021	Tue	MW: Ministry of Information
Jul 20, 2021	Tue	MW: Nalikule Teachers Training College
Jul 20, 2021	Tue	MW: Padziwe
Jul 21, 2021	Wed	MW: Ministry of Labour
Jul 21, 2021	Wed	MW: Department of Human Resource Management and Development (DHRMD)
Jul 21, 2021	Wed	MW: ICT Association of Malawi
Jul 21, 2021	Wed	GH: JICA Africa Department and Ghana Office (Health Sector)
Jul 21, 2021	Wed	MG: Unité Suivi et Evaluation de l'ONN
Jul 21, 2021	Wed	ZM: Paycode
Jul 22, 2021	Thu	MW: VSO Unlocking Talent through Technology
Jul 22, 2021	Thu	MW: Ministry of Education, Science and Technology
Jul 22, 2021	Thu	UG: Collaboration on International ICT Policy for East and Southern Africa
Jul 22, 2021	Thu	MZ: Ministry of Labour Young employment
Jul 22, 2021	Thu	ET: Ministry of Revenue
Jul 22, 2021	Thu	GA: JICA Maternal and Child Health Expert
Jul 22, 2021	Thu	ZM: World Bank Zambia Office (legal Identity)
Jul 23, 2021	Fri	MW: Ministry of Education, Science and Technology
Jul 23, 2021	Fri	MW: Ministry of Local Government
Jul 23, 2021	Fri	MW: Malawi Institute of Management
Jul 23, 2021	Fri	MW: UNICEF
Jul 23, 2021	Fri	CI : Institut Universitaire d'Abidjan (UIA)
Jul 26, 2021	Mon	MU: National Computer Board
Jul 26, 2021	Mon	MW: Ministry of Education, Science and Technology
Jul 26, 2021	Mon	MW: Staff Development Institute

Jul 26, 2021	Mon	MW: Airtel
Jul 26, 2021	Mon	MW: World Bank Malawi Office (Health)
Jul 26, 2021	Mon	MW: World Bank Malawi Office (Social Protection)
Jul 26, 2021	Mon	NG: Federal Ministry of Communications and Digital Eco
Jul 26, 2021	Mon	AO: Ministério da Justiça e dos Direitos Humanos
Jul 26, 2021	Mon	AO: World Bank Angola Office
Jul 26, 2021	Mon	ZM: Technical Education, Vocational, and Entrepreneurship Training Authority
Jul 26, 2021	Mon	ZM: World Bank Zambia Office (Education)
Jul 27, 2021	Tue	MU: Human Resource Development Council
Jul 27, 2021	Tue	MU: Mauritius Post
Jul 27, 2021	Tue	MW: Blantyre Teacher Training College
Jul 27, 2021	Tue	MW: Malawi University of Business and Applied Sciences (MUBAS)
Jul 27, 2021	Tue	NG: Adamawa Provincial Ministry of Education
Jul 27, 2021	Tue	AO: Ministry of Economy and Planning
Jul 27, 2021	Tue	ZM: Zambia Information and Communication Technology Authority (ZAICTA)
Jul 27, 2021	Tue	ZM: Smart Zambia (Agriculture)
Jul 27, 2021	Tue	ET: Geospatial Information Institute
Jul 28, 2021	Wed	MW: Public Private Partnership Commission
Jul 28, 2021	Wed	MW: Domasi College of Education
Jul 28, 2021	Wed	MW: Chancellor College, University of Malawi
Jul 28, 2021	Wed	MW: Malawi University of Science and Technology (MUST)
Jul 28, 2021	Mon	MG: UNICEF (Social Protection)
Jul 28, 2021	Mon	MG: UNICEF (Health)
Jul 28, 2021	Wed	ZM: Software Company
Jul 29, 2021	Thu	UG: Uganda Investment Authority (UIA)
Jul 29, 2021	Thu	MW: Principal Secretary for E-Government
Jul 29, 2021	Thu	MU: Office of Electoral Commission
Jul 29, 2021	Thu	MZ: Ministério da Saúde
Jul 29, 2021	Thu	MZ: Ministério da Justiça, Assuntos Constitucionais e Religiosos (MJCR)
Jul 30, 2021	Fri	CM: JICA Africa Department and Cameroon Office
Jul 30, 2021	Fri	CI: JICA Africa Department and Côte d'Ivoire Office
Jul 30, 2021	Fri	MU: Mauritius Institute of Training and Development
Jul 30, 2021	Fri	MW: Malawi Research and Education Network
Jul 30, 2021	Fri	MW: mHub
Jul 30, 2021	Fri	MW: Lilongwe City Council
Jul 30, 2021	Fri	MZ: Ministério dos Transportes e Comunicações
Jul 29, 2021	Thu	ZM: Ministry of Agriculture
Jul 30, 2021	Fri	ZM: ICT Association of Zambia
Jul 30, 2021	Fri	ET: Ethiopian Space Science and Technology Institute (ESSTI)
Aug 2, 2021	Mon	ET: Civil Service University
Aug 3, 2021	Tue	MU: National Empowerment Foundation
Aug 3, 2021	Tue	MW: Digital Health Taskforce Meeting
Aug 3, 2021	Tue	MZ: Instituto de Formação em Administração Pública e Autárquica
Aug 3, 2021	Tue	MZ: World Bank Mozambique Office
Aug 3, 2021	Tue	ZN: Ministry of Agriculture
Aug 3, 2021	Tue	ZM: ILO
Aug 3, 2021	Tue	MG : Ministère de l'agriculture, de l'élevage et de la pêche
Aug 3, 2021	Tue	ET: Vital Events Registration Agency (VERA)
Aug 3, 2021	Tue	ET: Information Network Security Agency
Aug 4, 2021	Wed	NG: Nigerian Communications Commission (NCC)
Aug 4, 2021	Wed	AO: Ministério da Energia e Águas
Aug 4, 2021	Wed	AO: WHO
Aug 4, 2021	Wed	MG : UNICEF (Social Protection)
Aug 4, 2021	Wed	MG : E-Gouvernance Madagascar

Aug 4, 2021	Wed	ET: National Bank of Ethiopia
Aug 5, 2021	Thu	MZ: Universidade Eduardo Mondlane
Aug 5, 2021	Thu	MZ: Ministry of Transport and Communications (MTC)
Aug 5, 2021	Thu	MZ: National Institute of Communications (INCM)
Aug 5, 2021	Thu	MG : Ecole Nationale d'Administration de Madagascar
Aug 5, 2021	Thu	ZM: Ministry of Communications and Transport (MCT)
Aug 5, 2021	Thu	ZM: Public Service Management Division (PSMD)
Aug 5, 2021	Thu	ZM: Zambian Bureau of Standards
Aug 6, 2021	Fri	UG: PSF Board/ICT chamber chairman
Aug 6, 2021	Fri	MU: Ministry of ICT and Innovations
Aug 6, 2021	Fri	MZ: Instituto Nacional de Governo Electrónico (INAGE)
Aug 6, 2021	Fri	MZ: World Bank Mozambique Office (Digital Project)
Aug 6, 2021	Fri	MZ: Ministério da Saúde
Aug 6, 2021	Fri	MG : World Bank Madagascar Office
Aug 6, 2021	Fri	MG : INFor Madagascar
Aug 6, 2021	Fri	GA : Agence Nationale des Infrastructures Numériques et des Fréquences (ANINF)
Aug 7, 2021	Sat	NG: Federal Inland Revenue Service (FIRS)
Aug 9, 2021	Mon	MW: World Bank (Education)
Aug 9, 2021	Mon	MG : UNICEF
Aug 9, 2021	Mon	ZM: FAO
Aug 9, 2021	Mon	ET: Ministry of Education
Aug 10, 2021	Tue	ZM: Ministry of Labor and Social Security
Aug 10, 2021	Tue	ZM: WHO
Aug 10, 2021	Tue	ZM: CDC
Aug 10, 2021	Tue	GA : OXILYUM
Aug 11, 2021	Wed	MZ: World Bank Mozambique Office (Health)
Aug 11, 2021	Wed	ZM: Ministry of Higher Education
Aug 11, 2021	Wed	ZM: Zambia Development Agency (ZDA)
Aug 12, 2021	Thu	MZ: Ministério da Ciência e Tecnologia, Ensino Superior
Aug 12, 2021	Thu	MW: Ministry of Gender, Children, Disability and Social Welfare
Aug 12, 2021	Thu	MG : Chambre de Commerce et d'Industrie d'Antananarivo
Aug 12, 2021	Thu	ZM: World Bank (social Protection)
Aug 12, 2021	Thu	GA : SCIENTIA AFRICA
Aug 12, 2021	Thu	ET: Winner Systems
Aug 12, 2021	Thu	ET: UNICEF
Aug 13, 2021	Fri	MG : Institute National de Formation Administrative
Aug 13, 2021	Fri	GA : Ministère des Affaires sociales et des Droits de la femme
Aug 16, 2021	Mon	UG: JICA Africa Department and Uganda Office
Aug 16, 2021	Mon	MW: WHO
Aug 17, 2021	Tue	MU: Mauritius Information and Technology Industry Association
Aug 17, 2021	Tue	AO: Agência de Investimento Privado e Promoção das Exportações (AIPEX)
Aug 17, 2021	Tue	ZM: Department of Standards and Curriculum
Aug 17, 2021	Tue	ZM: Department of Open and Distance Education
Aug 17, 2021	Tue	ZM: Department of Teacher Education and Specialized Services
Aug 17, 2021	Tue	ET: Technology and Innovation
Aug 18, 2021	Wed	GA : Banque des États de l'Afrique Centrale
Aug 19, 2021	Thu	MU: Ministry of Social Integration, Social Security and National Solidarity
Aug 19, 2021	Thu	ET: Ethiopian Education and Research Network
Aug 19, 2021	Thu	ET: Ethiopian Education and Research Network
Aug 20, 2021	Fri	GA : Ecole nationale d'administration (ENA)
Aug 21, 2021	Sat	GA : Ministère de la santé
Aug 24, 2021	Tue	ET: Ministry of Peace
Aug 25, 2021	Wed	MZ: UNICEF
Aug 25, 2021	Wed	GA : WHO

Aug 25, 2021	Wed	GA : Agence Nationale des Infrastructures Numériques et des Fréquences (ANINF)
Aug 25, 2021	Wed	GA : SING
Aug 26, 2021	Thu	MG : Ministère de l'Education Nationale
Aug 26, 2021	Thu	MG : Ministère de l'intérieur et de la décentralisation (PRODIGY)
Aug 26, 2021	Thu	ET: Addis Ababa Science and Technology University
Aug 30, 2021	Mon	MW: JICA Africa Department and Malawi Office
Aug 30, 2021	Mon	MZ: USAID
Aug 31, 2021	Tue	ET: World Bank Ethiopia Office
Aug 31, 2021	Tue	ET: Ministry of Health
Aug 31, 2021	Tue	GA : Direction générale de la documentation et de l'immigration
Sep 2, 2021	Thu	MZ: JICA Africa Department and Mozambique Office
Sep 2, 2021	Thu	ZA: Water Research Commission
Sep 2, 2021	Thu	ET: Addis Ababa University Institute of Technology
Sep 2, 2021	Thu	GA : Municipalité de Libreville
Sep 2, 2021	Thu	GA : Caisse nationale de sécurité sociale (CNSS)
Sep 2, 2021	Thu	GA : Direction générale des impôts
Sep 8, 2021	Wed	ET: Information Communication Technology Association Ethiopia
Sep 8, 2021	Wed	GA : IBOGA
Sep 10, 2021	Fri	GA : Ministre de la communication et de l'économie numérique
Sep 10, 2021	Fri	GA : Ministre de l'éducation nationale
Sep 15, 2021	Wed	MU: JICA Africa Department and Madagascar Office
Sep 16, 2021	Thu	ZM: JICA Africa Department and Zambia Office
Sep 16, 2021	Thu	NG: JICA Africa Department and Nigeria Office
Sep 17, 2021	Fri	ZM: Zambia Multi-Service Provider Payment System
Sep 21, 2021	Tue	AO: JICA Africa Department and Angola Office
Sep 21, 2021	Tue	G5: JICA Africa Department, Peacebuilding Unit and STI-DX Unit
Sep 24, 2021	Fri	GA : Ministère emploi, fonction publique, travail et formation professionnelle
Sep 28, 2021	Tue	UG: Ministry of ICT & National Guidance
Sep 30, 2021	Thu	ET: Sumitomo Corporation
Oct 6, 2021	Wed	ET: JICA Africa Department and Ethiopia Office
Oct 11, 2021	Mon	GA: JICA Africa Department and Gabon Office
Oct 13, 2021	Wed	MG: JICA Africa Department and Madagascar Office
Oct 25, 2021	Mon	GA: World Bank Gabon Office

Appendix 2: List of Interviewees and Study Team Members

List of Interviewees:

1. Kenya

JICA Kenya office

ISOKAWA

TAKAHASHI

OKAMURA

YOSIDA (UHC advisor)

External Cooperation

- World Bank Kenya office
Ms. Jennifer Gui, Senior Digital Specialist (Washington D.C.)
Ms. Lavanya, Digital Development Specialist

ICT Policy Organization / Implementing Agency

- Ministry of ICT, Innovation and Youth Affairs
Mr. Richard Kiare, Principal ICT Officer/Head of Policy
- ICT Authority
Dr. Katherine Getao, CEO. Ms. Zilpher Owiti
- Community Authority of Kenya (CAK)
Dr. Emma Ann Otieno, Manager, Fund Mobilization & Management, Universal Service Fund
- NellCorp(Software Developer)
Mr. Assis Ngolo
- Software Developer, Consultant for Ministry of Higher Education and Technical School ICT Teacher
Ms. Silvia Castro

ICT Human Resource Development

- Jomo Kenyatta University of Agriculture and Technology (JKUAT)
Mr. Michael W. Kimwele, Director, School of Computing and Information Technology (SCIT)
- Kenya Technical and Vocational Education and Training Authority (TVETA)
Dr. Otta Osawa, Deputy Director, Research and Development
Mr. Wilberforce Imbayi, ICT Officer
Mr. Andrew Too, Technical Assistant, Director General's Office
- ICT Authority (ICTA)
Ms. Zilpher Owiti, Director, Capacity, Innovation and Partnership
- Kenya School of Government (KSG)
Dr. Antony Kamakia, Head of Centre for Research and Advanced Training

Ms. Vera Obonyo, Deputy Director, Centre of eLearning and Development Institute (eLDI)

Mr. Nathan Karanja, eLearning Coordinator, eLDI

- Moringa School

Ms. Nelly Agyemang-Gyamfi, Country Director

- Adventist University of Africa

Dr. Lossan Bonde, ICT Director, Program Director for MSc in Applied Computer Science, Assistant Professor

Health /Social Protection

- World Bank

Dr. Kenneth Munge, Health Economist

- WHO

Dr. Leonard Cosmas, Health Officer/health information and digital health

- Kericho County Health Department

Dr. Betty Langat - County Director for Health

- Ministry of Public Administration, Labor and Social Security

Mr. Evaristo Tone

Education

- Ministry of Education, Centre for Mathematics, Science and Technology Education in Africa (CEMASTE), National ICT Innovation and Integration Centre (NI3C), National Education Information Management System (NEMIS)

Mr. Elyas Abdi – Director General, MoE,

Mr. Nganga Wanaina - Deputy Director, MoE,

Ms. Jacinta Akasta, Director, CEMASTE

Mr. Francis Karanja - Head, NI3C

Mr. Owanga Aduonga – Head, NEMIS

Other Public Service

- KICTANet, Community Networks

Mr. Twahir Hussein Kassim

- Impact Africa

Mr. Mark Kalake, CEO. Ms. Phyllis Mburu, Ms. Joy Ndinda, Mr. Wycliffe Barasa

- USAID Kenya

Mr. Olutomi Olutola, Mr. Joseph Mungai

2. Rwanda

JICA Rwanda office

NAGASE

AKAI

External Cooperation

- World Bank Kenya office in charge of Rwanda project
Ms. Jennifer Gui, Senior Digital Specialist (Washington D.C.)
Ms. Lavanya, Digital Development Specialist
- GiZ
Mr. Olaf Seidel, Programme Director, GiZ Digital Solutions for Sustainable Development (DSDS)
- WB Rwanda
Mr. Wilson Mnyenzi, Rwanda Digital Acceleration Project
- KOICA
Mr. Tony Myung Keun Choi, Deputy Country Director (Manager), KOICA Rwanda Office
- Smart Africa Secretariat
Ms. Grace Nyakanini, Project Manager

ICT Policy Organization / Implementing Agency

- Ministry of ICT and Innovations (MINICT)
Ms. Esther Kunde, Director General, Innovation & Emerging Technologies
- Rwanda Information Society Authority (RISA)
Ms. Gloria INGABIRE - Enterprise Architecture - Division Manager
- Rwanda Utility Regulatory Authority (RURA)
Mr. Fiacre Mushimire Senior Manager Technology Innovation
Mr. Jean Claude Niyokwizerwa, Manager DOA & DXS
- IREMBO
Mr. Arthur Franzon, Senior Strategy Manager

ICT Human Resource Development

- Ministry of education
Mr. Leon Mwumvaneza
- IPRC Tumba
Ms. Rita Clemence MUTABAZI, Principal
- Rwanda Coding Academy
Dr. Papias Niyigena, Director
- Local Administrative Entities Development Agency (LODA)
Mr. GATSINZI Justine, Division Manager, Social Protection Programs Division
- ICT Chamber
Mr. Alex Ntale, CEO

- Digital Opportunity Trust
Mr. Jane Jamieson / Executive Advisor
Ms. Violette Uwamutara / Regional Advisor, Africa and Country Director
- Mara Group
Mr. Eddy Sebera, Managing Director

National ID / Civil Registration

- National Identification Agency (NIDA)
Ms. Josephine Mukeshimana– Director General
- NIDA Registration Centre
Mr. Mugisha Adams, from Nyagatare registration office

Health / Social Protection

- Local Administrative Entities Development Agency (LODA)
Mr. Justin Gatsinzi, Division Manager, Social Protection Division
- World Bank Rwanda
Mr. Silas Udahemuka
Mr. Wilson Muyenzi
- Ministry of Health
Dr. Edith Munyana, Coordinator of Digitalization Efforts
- WHO
Dr. Kasonde Mwinga, Rep, Dr. Candide Tran Ngoc, HMIS

Education

- Ministry of Education
Mr. Leon Mwumvaneza
- IPRC Tumba
Ms. Rita Clemence MUTABAZI, Principal

Other Public Service

- ICT Chamber
Mr. Alex Ntale, CEO
- IREMBO
Mr. Arthur Franzon, Senior Strategy Manager
- GIZ
Mr. Olaf Seidel, Program Director, Digital Solutions for Sustainable Development
- KOICA
Mr. Tony Myung Keun Choi, Deputy Director

- Airtel Money
Mr. Pierre Kayitana, Managing Director
- Mara Group
Mr. Eddy Sebera, Managing Director
- Digital Opportunity Trust
Mr. Jane Jamieson / Executive Advisor
Ms. Violette Uwamutara / Regional Advisor, Africa and Country Director

3. Ethiopia

JICA Ethiopia office

TAKANO
TOGUCHI
KUROSAKA
NAKAGAWA
SHIMIZU)
HARA (expert in start-up)

External Cooperation

- World Bank Ethiopia office
Dr. Tim Kelly, Lead ICT Policy Specialist

ICT Policy Organization / Implementing Agency

- Ministry of Innovation and Technology (MINT)
Dr Fekede Getahun, Senior Strategic Advisor, Digital Transformation Program
- Ethiopian Space Science & Technology Institute (ESSTI)
Dr Yeshurun Alemayehu, Deputy Director-General

ICT Human Resource Development

- Civil Service University
Mr. Yitbarak Ibrahim
- Winner Systems Software Solutions
Mr. Filmon Birhanu, CEO
- Technology and Innovation Institute (Tech-In)
Ms. Zebib Getachew, Information System and Infrastructure Development Directorate
- Federal Ministry of Science and Higher Education (MOSHE)
Dr. Kuribachew Gizaw, ICT Specialist at Ethiopian Education and Research Network (EthERNet)
- Addis Ababa Science and Technology University
Dr. Hussen Seid, Head of Software Engineering Department

- Addis Ababa University Institute of Technology
Mr. Surafel Berhanu, Information Technology Professional, ICT Section

ICT Infrastructure

- Sumitomo Corporation
TAKAHASHI
KUSHITANI
TAKAHASHI
HOSHINO
YAMAMOTO

National ID / Civil Registration

- Ministry of Peace
Mr. Eyob Alemu
- Immigration, Nationality and Vital Events Authority (INVEA)
Mr. Gezahegn Mekonen
- UNICEF
Mr. Nikodimos Alemayehu (Civil Registration Representative)

Health / Social Protection

- MoH
Mr. Amanuel BIRU, Senior Digital Health Advisor in Health Information Technology Directorate
- Ministry of Labor and Social Affairs
Mr. Feleke Jember, Director of Seftynet Program

Education

- D-TEST, FMoE, Ethiopia
Mr. Yonas Bekele – Director, Digital Technology Centre, General Directorate
- Mr.– Data Collection Economist Education
- World Bank Ethiopia Office
Mr. Kirill Vasiliev – Education Task Team Leader, GEQUIP-E
Mr. Ademe Zeyede Hailu, Data Collection Economist, Education, GEQUIP-E

Other Public Service

- Geospatial Innovation and Analytics Center Head, the FDRE Geospatial Information Institute (GII)
Mr. Muluaem Yeshitela
- National Bank of Ethiopia (NBE)
Mr. Wondesen, ICT Director

- Ethiopian Electronic Single Window Program Office, Ministry of Revenues
Mr. Robel Tesfaye (Delegate of Ministry of Revenue), Program Director
- World Bank
Dr. Tim Kelly, Lead Policy Specialist
- ICT-Ethiopia (ICT-ET - ICT Industry association)
Mr. Yilkal Abate, Vice President

4. Uganda

JICA Uganda office

UCHIYAMA

YAMAMOTO

IMAMURA

INOUE

ICT Policy Organization / Implementing Agency

- National Information Technology Agency (NITA)
Ms Rowena Turinawe <rowena.turinawe@nita.go.ug> , Business Development Manager
- Ministry of Information Communication Technology and National Guidance,
Mr Michael Ocerro, the Assistant Commissioner E-services
Mr. Silas Ngabirano, the Assistant Commissioner Information Management Services
- Uganda Communications Commission
Ms. Christine Mugimba, Director of ICT and Research
Mr. Micahel Bamwesigye, Head Of Information Technology & Security
- Ministry of Information Communication Technology and National Guidance,
Mr Kenneth Bagarukayo, Commissioner
Mr. Richard Mukaga – Project Coordinator
- The Collaboration on International ICT Policy for East and Southern Africa (CIPESA)
Ms. Ashnah Kalemera, Programmes Officer
- PrivateSector Foundation Uganda (PSF-U)
Mr. Badru Ntege - Board Member, Chairman - ICT Chamber

ICT Human Resource Development

- Uganda Civil Service College (CSC)
Ms. Savia Mugwanya, Commissioner
- Uganda Institute of ICT (UICT)
Dr. Frederick Kitoogo, Principal

National ID / Civil Registration

- NIRA (National Identification and Registration Authority)
Ms. Rosemary Kisembo, Executive Director
- URSB (Uganda Registration Service Bureau)
Mr. Arthur Kwesiga, Director ICT

Health / Social Protection

- World Bank Uganda office
Mr. Colins Chansa, Team leader, Mr. Franklin Mutahakana, RMNCAH specialist
- Ministry of Gender, Labour and Social Development
Mr. Emmanuel Yeka
- Uganda Investment Authority: UIA
Mr. Eria Kaweireku, Senior Investment Executive, Small and Medium Enterprises, Division
- National Social Security Fund: NSSF
Mr. Fredick Mayanja, Mr. Edison Kakitahi Katemba

Education / Other Public Service

- Department of Water and Sanitation
Mr. Albert Mmbidi, Director of Official Development Assistance
- Teacher & Instructor Education & training (TIET) Department, Ministry of Education and Sports
Mr. Kamwana Jonathan, Commissioner
- Nakawa Vocational Training College (NVTI), Ministry of Education and Sports
Mr. Fread Muwanga, Principal
- PrivateSector Foundation Uganda (PSF-U)
Mr. Badru Ntege - Board Member, Chairman - ICT Chamber
- World Bank Headquarters
Ms. Julia Liberman – Senior Operations Officer (USEEP)
Ms. Hongyu Yang- Senior Education Specialist (TTL CERP project)

5. Mozambique

JICA Mozambique office

NISHINOIRI

KOBAYASHI

MIYASHITA

External Cooperation

- World Bank Mozambique office
Mr. Tiago C Peixoto, Officer in charge of Digital Governance and Economy Project

ICT Policy Organization / Implementing Agency

- Instituto Nacional de Tecnologias de Informação e Comunicação (INTIC)
Dr. Eng. Lourino Alberto Chemane, CEO
- Instituto Nacional de Governo Electrónico (INAGE)
Dr. Alberto Banze, Chief of the Planning and Coordination department
Eng. Carlos MANHIÇA
- Ministério Dos Transportes E Comunicação (MTC) & Instituto Nacional das Comunicações de Moçambique (INCM)
Eng. Horacio Parquinio, National Director of Communications
Eng. Massingue APALA- INCM
Eng. Francisco CHATE - MTC

ICT Human Resource Development

- Associação Moçambicana de Profissionais e Empresas de Tecnologias de Informação (MAPETIC)
Mozambican Association of Information Technology Professionals and Companies)
Mr. Hikesh Hasmukh – Vice President for Software AMPETIC
- Centre Of Informatics of Eduardo Mondlane University (CIUEM)
Mr. Luis Neves DOMINGOS-CIUEM
- Ministério da Administração Estatal e Função Pública
Mr. Feliciano Chavana – National Director of ICT
- Instituto de Formação em Administração Pública e Autárquica (IFAPA)
Mr. João Carlos Machava – deputy director of professional training

National ID / Civil Registration

- National Directorate for Civil Registration and Notary (DNRN)
Dr. Anselmo Canda
Dr. Sergio Sueia

Health / Social Protection

- Ministry of Health, Mozambique
Dr. Ivan Manhica, Deputy Director, Department of Planning and Cooperation
Dr. Francisco Langa, Head of Department of Continuous Training
- WHO
Mr. Claudio Muinga
- World Bank
Dr Humberto Cossa, Health officer
Mr. Tiago C Peixoto, Officer in charge of Digital Governance and Economy Project
- USAID

Dr. Monique Mosolf, Health specialist

- UNICEF

Dr. Frederico Brito, Health specialist

- Ministry of Labour

Mr. Eduardo Chimela and Mr. Patrício Tivir

- ILO

Mr. Marcos David

Education

- Ministry of Education and Human Development personnel

Mr. Adelino Jorge

- Ministry of Science, Technology and Higher Education

Eng. Constantino Sotomane

- Universidade Eduardo Mondlane

Professor Dr. Xavier Muianga

6. South Africa

JICA South Africa office

TSUBOTA

ICT Policy Organization / Implementing Agency

- Department of Public Service and Administration (DPSA)
Deputy Director-General for Government Technology, Mr. Mandla Ngcobo
- The Department of Communications and Digital Technologies (DCDT)
Deputy Director-General, Information Society, Mr. Mlindi Mashologu
- The State Information Technology Agency (SITA)
Acting Executive, Digital Strategy, Ms. Busisiwe Vilakazi

ICT Human Resource Development

- Institute for Intelligent Systems (IIS), University of Johannesburg
Dr. Babu Sena Paul, Director
- Information Technology Association of South Africa (ITA)
Mr. Thabo Mofokeng, President
- Institute of Information Technology Professionals South Africa (IITPSA)
Mr. Adrian Schofield
- Center for Public Service Innovation (CPSI)

Mr. Pierre Schoonraad

- Department of Higher Education and Training (DHET)

Ms. Trudi van Wyk, Chief Director, Social Inclusion and Quality

- Human Resource Development Council of South Africa (HRDC-SA)

Dr. Rodney Manyike, Secretariat

Ms. Margret Molefe, Senior Administrative Officer, Programme Policy, Research, Information Systems and Special Projects

- Media, Information and Communication Technologies Sector Education and Training Authority (MICT SETA)

Mr. Moloti Nkun, CIO

Health / Social Protection

- CSIR

Ms. Adele Botha, Chief Researcher

- World Bank

Mr. Casey Torgusson, Senior Digital Development Specialist based in Washington DC,

Mr. Thulani Matsebula, Senior Health Economist based in Pretoria,

- WHO

Dr. Rajesh Narwal, Health Systems Advisor and Coordinator

- National Department of Health (NDoH)

Mr. Arnold Phiri, Project Manager, ICT,

- South Africa Social Security Agency (SASSA)

Ms. Dianne Dunkerley, Executive Manager

- Economic Policy Research Institute

Dr. Michael Samson, Director of Research

Mr. Mauricio Boehl Gutierrez

Education / Other Public Service

- Department of Water and Sanitation

Mr. Albert Mmbidi, Director of Official Development Assistance

- Water Research Commission

Ms. Mamohloding Tlhagale, Manager, International Division

Ms. Hlengiwe Cele, Project Manager, International Division

7. Ghana

JICA Ghana office

OZAWA

FUKUHARA

SHIZUME

ICT Policy Organization / Implementing Agency

- Rancard(Software developer)
Mr. John Gyimah, Business Operation
- e-Transform Ghana Project(World Bank)
Ms. Clara Pinkrah-Sam, Digital Entrepreneurship & BPO Expert

ICT Human Resource Development

- Institute of ICT Professionals, Ghana (IIPGH)
Mr. Richard Kafui Amanfu, Director of Operations
- Civil Service Training Centre (CSTC)
Mrs. Dora Dei-Tumi, Principal

Health / Social Protection

- National Health Insurance Authority (NHIA)
Ms. Freda Lamptey, Data Analyst
- NHIA
Mr. Silas Agyekum, Claims Manager
- NHIA
Mr. George Asamoah-Baah, Deputy Director, Budget & Management Accounting
- NIHA
Mr. Samuel Abbey, Senior Manager, quality Assurance
- Ghana Health Service (GHS)
Mr Dominic K. Atweam, Policy Planning Monitoring and Evaluation Division
- GHS
Dr. Wisdom Atiwoto, Policy Planning Monitoring and Evaluation Division
- Ministry of Health (MoH)
Mr. Sam Ampomah, Head of IT

Education

- Ghana Society for Education Technology
Mr. Ernest Gavor, Co-Founder & Director, Innovation & Strategy
- Edu Kanea
Mr. Emmanuel Gamor, Founding CEO
- eCampus
Mr. Cecil Senna Nutakor, Founding CEO

Other Public Service

- GIFEC (Ghana Investment Fund for Electronic Communications)
Ms. Abema Nyamesem, Sr. Manager, Sustainability & Partnership
- iSpace Foundation
Mr. Josiah Eyison, CEO
- National Entrepreneurship and Innovation Plan (NEIP)
Mr. Franklin Owusu-Karikari, Director of Business Support, Office of The President
- National Information Technology Agency (NITA)
Mr. Solomon Richardson, head of technical services, NITA

8. Nigeria

JICA Nigeria office

SASAKI

KONAN

ICT Policy Organization / Implementing Agency

- E-government Department, Federal Ministry of Communications and Digital Economy
Director, Oluwaseun Winsala (and Others)
- National Information Technology Development Agency (NITDA)
Dr. V. O. Olatunji, eGovernment Director
Mr. Bernard Ewah, eGovernment Director
Dr. Yahya Onimisi, DG's Office, others
- Nigerian Communication Commission (NCC)
Engr. A. K Nwaulene
- Bamijoko
Augusta N, others

ICT Human Resource Development

- Nigerian Computer Society (NCS)
Dr. Sina Shodiya, President
Dr. Muhammad Sirajo Aliyu, Deputy President
Mr. Iyiola Ayoola, Executive Secretary
Ms. Lilian Nkammuo
- Administrative Staff College of Nigeria (ASCON)
Mrs. C. U Gayya, Mni, Director General
Mr. B. O. Einaiyejuni, Director of Studies
Mr. A. Alabi, Director of Studies
Mrs. B. O. Akhiojemi, Director of Studies

Health / Social Protection

- Federal Ministry of Health
Elveran Ikky
- National Health Insurances Scheme
Dr. Kurfi Abubakar, Head, International Collaborations Division

Education

- Federal Capital Territory Education Secretariat, FCT Administration, Nigeria
Mr. Kolawole – Director, Science and Technology, Education Secretariat
Mr. Akanya David – Head of Department, Planning, R&D and ICT
- Federal Ministry of Education, ICT Directorate
Mr. Abubakar Isah– Director, ICT Directorate, FMoE

Other Public Service

- Federal Inland Revenue Service (FIRS)
Ms. Chiaka Okoye, Director, Mr. Kunle, Director, ICT
- E-government Department, Federal Ministry of Communications and Digital Economy
Mr. Oluwaseun Winsala, Director

9. Angola

JICA Angola office

HANZAWA

NOMOTO

ICT Policy Organization / Implementing Agency

- NellCorp (Software Developer)
Mr. Assis Ngolo
- Software Developer, Consultant for Ministry of Higher Education and Technical School ICT Teacher
Ms. Silvia Castro

National ID / Civil Registration

- Ministério da Justiça e dos Direitos Humanos
Mr. Nelson Dias, Director, Director, Gabinete de Tecnologias de Informacao e Comunicacao
Institucional

Health / Social Protection

- Ministry of Health Angola

Dr Antonio Silva, Monitoring and Evaluation Coordinator, Dr Maria Geogina Marques,
Head of Department of Study and Statistics (GEP)

- USAID
Mr. Nilton Sebastiano
- UNICEF
Mr. Hirondina Cucubica
- PSI
Ms. Anya Fedorova
- WHO
Mr. Dalton Agostihno
- JICA Maternal and Child Project
MOCHIDA
- World Bank
Ms. Carissima Maria José
- Ministry of Public Administration, Labor and Social Security
Mr. Evaristo Tone

Education

- Ministério da Educação
Mr. José Diogo; Chefe de Departamento de Tecnologia de Informação, Gabinete de Tecnologias de
Informação e Comunicação Institucional Ministério da Educação

10. Malawi

JICA Malawi office

SAKONJYU
MITSUNAGA

ICT Policy Organization / Implementing Agency

- Malawi Communications Regulatory Authority (MACRA)
Mr Henry Silika, Director of Telecommunications
Mr. Ben Chistsonga, Director of Finance
- Ministry to Information and Communications Technology
Mr. Francis Bisika, Principal Secretary for E-Government and Public Sector ICT
- PPP commission (PPPC)
Mr. Chimwemwe Matemba, Project Manager of Digital Foundations Project

ICT Human Resource Development

- UNDP Advisor
Mr. Tariq Malik (National ID)
- National Registration Bureau
Mr. Moses Chiwoni, Deputy Director
- University of Mzuzu
Mr. Reuben Moyo, lecturer and Head of the Information and Communication Technology (ICT)
- MoE
Ms. Loyce Chimkwasa-Fatch, Chief Economist, Policy and Planning Unit
- MoE
Dr. Chomora Mikeka, Director
- Ministry of Information Department of e-Government
Mr. Francis Bisika, Principal Secretary
Mr. Maganiza Chipula, Director
- National College of Information Technology (NACIT)
Ms. Alice Kanjadza, Principal
- Andromeda (Start-up)
Mr. Pilirani Kumasewera, CEO
- Ministry of Labour
Mr. Mr. Aubrey Diverson Matemba, Director
- The Technical, Entrepreneurial and Vocational Education and Training Authority: TEVETA
Mr. Eliot Mulanje, Director of Quality Assurance
- Office of the President and Prime Minister Department of Human Resource Management and Development: DHRMD
Mr. Ismail Mogra, Senior Deputy Director (Human Resource Development)
- ICT Association of Malawi: ICTAM
Mr. Bram Funzulani, President
- Ministry of Home affairs
Mr. Sylvester Gawamadzi, Deputy Director – M&E
- Lilongwe City Council
Ms. Andrina Chalowa, Systems Analyst, IT Section
- Malawi Institute of Management : MIM
Mr. Nelson Mabvumbe, Registrar
- Staff Development Institute: SDI
Mr. Davies Botoman
- Airtel Malawi
Mr. Policarp Ndekane, Director of Airtel Money
- Malawi University of Business and Applied Sciences : MUBAS
Dr. Thokozani Chimkono, Lecturer in Information Technology, Computer and Information Technology

Department

- Public Private Partnership Commission: PPPC
Mr. Chimwemwe Matemba, Project Manager, Digital Malawi
- Malawi University of Science and Technology: MUST
Dr. Bennet Kankuzi, Head of Department of Computer Science and IT
- University of Malawi Chancellor College: CHANCO
Ms. Bridget Nyirongo, Head of ICT Department
- mHub
Mr. Daniel Mvalo, Technical Manager
- Malawi Research and Education Network: MAREN
Mr. Solomon Dindi, Chief Executive Officer

National ID / Civil Registration

- National Registration Bureau (NRB)
Mr. Moses Chiwoni, Deputy Director
- UNDP Legal Identity Agenda
Mr. Tariq Malik, Chief Technical Advisor

Health / Social Protection

- JICA 5S KAIZEN TQM Project
TATENO, NISHIKIDO, SUZUKI
- Palladium Health Plus/MoH advisor Malawi
Mr Kenneth Chimpeni, adviser to the head of digital health, Ministry of Health
- GIZ
Mr Paul Dielemans
- World Bank
Ms. Chiho Suzuki, Tanzania WB office, Mr. Collins Zamawe, Malawi WB office
- WHO
Dr. Solome NAMPEWO
- PPP Commission
Mr. Chimwemwe Matemba, Project Manager of Digital Foundations Project
- Baobab Health Trust
Mr Chiyembekezo Chekani, Mr. Gonjetso, Ms Chimwemwe
- Ministry of Economic Planning and Development and Public Sector Reforms
Mr. Dalitso Kalimba, Deputy Director, Poverty Reduction & Social Protection Division
- World Bank Malawi
Mr. Massimo Sichinga, Social Protection

- Ministry of Gender, Children, Disability and Social Welfare
Mr. Laurent Kansinjiro

Education

- MoE, Balaka Secondary School (District Boarding S.S.)
Ms. Catherine S. Gobola-Gunde, Principal
- MoE, Blantyre Teacher Training College
Mr. Stanley Kwerengwe, Principal
- MoE, Chancellor College, Centre for Education Research and Training
Dr. Elizabeth Meke, Acting Director, Senior Research Fellow
- MoE, Central West Education Division Office
Ms. Juliana Kamanga, Desk Officer
- MoE, Domasi College of Education
Mr. Davis E. Mina, Acting Principal
- MoE, Directorate of Teacher Education and Development (DTED)
Mr. Justus Nkhata, Chief Research Monitoring and Evaluation
- MoE, EMIS Section, Planning
Mr. Dalitso Chabwera, Head
- MoE, Lilongwe District Council Office
Dr. Matha Magera-Sinera, Director, Education, Youth and Sports
- MoE, Malawi Centre for Distance Education
Mr. Henry Gwede, Deputy Director
- MoE, Malawi Institute of Education
Dr. Fritz Kadyoma, Executive Director
- MoE, Nalikule College of Education
Dr. Denis Khasu, Principal
- MoE, Department of Open, Distance and eLearning
Dr. Valeta, Director
- Padziwe (Start up)
Mr. Pilirani Kumasewera (PK), CEO
- MoE, South West Education Division Office
Mr. Kenneth Kanchewa, Planner, Planning Section
- UNICEF Malawi Office
Ms. Milandu Mwale
- VSO Malawi Office
Ms. Kate Debenham, Unlocking Talent Project, Digital Education Manager
- WB Skills for A Vibrant Economy (SAVE) Project, Ms. Veronica Grigera, Team Leader
Dr. Vanwyk Khobidi Mbubzi Chikasanda

Other Public Service (Agriculture)

- Ministry of Agriculture, Irrigation and Natural Resources (MoAI&WD)
Dr. Jonathan Nkhoma, Director of the Dept. of Extension Services (DES)
- Farmers Union of Malawi (FUM)
Mr. Jacob Nyirongo, CEO
- Lilongwe University of Agriculture and Natural Resources (LUANAR)
Mr. Joseph Phaso, Bunda College Registrar, Mr. D. Ngwira, IT Manager
- Tradeline Corporation Limited (TCL)
Mr. Calvin Kamchacha, Group CEO
- Agricultural Commodity Exchange for Africa (ACE)
Mr. Peter Pemba, ICT Manager
- JICA MA-SHEP Project
NIWA

11. Mauritius

JICA Madagascar office

SUGIMOTO

MIYAZAKI

NAKAMURA

ARAKAWA

ICT Policy Organization / Implementing Agency

- Ministry of IT, Communications and Innovations
Mr. Rajinish Hawabhay, Chief Technology Officer
- ICT Authority
Mr Dick Christophe NG SUI WA, Chairperson
Dr Krishna Oolun, Director

ICT Human Resource Development

- Civil Service College Mauritius (CSCM)
Prof. (Dr.) Ramesh Durbarry, Director General
- Human Resource Development Council (HRDC)
Mr. Sharma Seechurn (Research & Development Coordinator)
Mr. Ravisha Subramanyan
- Mauritius Institute of Training and Development (MITD)

Mr. Ravindra Kumar Shabajee, Training Coordinator

Ms. Azleen Goburdhun, Research Assistant

- Mauritius Information Technology Industry Association (MITIA)
Kem Mohee, President
Vincent Bourelly, Vice Treasurer
Taariq Hussain Budullah, Assistant Secretary

Social Protection

- Ministry of Social Integration, Social Security and National Solidarity
Mrs Ramsamy Minackshi, Mr Kodi Ramanah Tage Narayen, Mr Sayib Jalim
- National Empowerment Foundation
Mr Jean Francois Chaumiere, Mr Yushveer Ragnuth
- UNDP
Dr. Tony Muhumuza, Anirood Meeheelaul, Dr. Anjalee Dabee, Renooka Beejan, Shakil Beedassy,
Vichitra Purdassee

Other Public Service

- Mauritius Post
Mr. Giandev Moteea, Chief Executive Officer
- Office of Electoral Commission
Mrs Rosun
- Ministry of Information Technology, Communications, and Innovations
Mr Rajnish Hawabhay, CTO

12. Zambia

JICA Zambia office

MATSUI

MATSUMURA

ISHIDA

IMAMURA (Expert of Infection disease)

ICT Policy Organization / Implementing Agency

- The Ministry of Transport and Communications
Mr. Austin Sichinga
- Zambia Information and Communication Technology Authority (ZICTA)
Mr Bernard Banda
- Smart Zambia
Mr. Milner Makuni

- The Zambian Bureau of Standards (ZABS)
Mr. Brian Mweemba
- Zambia Development Agency
Mr. Mukula Makasa- CEO
- E-Services at the National Pension Scheme Authority (NAPSA) (Software Developer)
Mr. Elton Makaliki

ICT Human Resource Development

- Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA)
Mr. Chibesakunda
- Information and Communication Technology Association of Zambia (ICTAZ)
Mr. Clement Sinyangwe, Acting Association Vice President and Chairperson Membership National Level
- Public Service Management Division (PSMD)
Mr. John Tembo
- Ministry of Higher Education
Amos Mumba

National ID / Civil Registration

- Ministry of Home Affairs- Department of National Registration, Passports and Citizenship (DNPRC)
Mr. Matheews Siyanga, Registrar ID, INRIS Project Administrative Officer
Mr. Lisuba Kabanda, Regional Passport and Citizenship Officer, Deputy Manager, INRIS Project
- National Pension Scheme Authority (NAPSA) (INRIS Project) Project Manager)
Dr. Greg Nsofu, Director Information and Communication Technology, NAPSA
- World Bank (ID)
Ms. Soujanya Krishna, Senior Private Sector Specialist

Health / Social Protection

- WHO
Dr. Kagulura Solomon
- CDC
Dr. Bwalya Chiteba, Chief for Health Informatics
- Ministry of Community Development and Social Services (MCDSS) HQ
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