Siem Reap Provincial Administration

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap

Project Completion Report

May 2025

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

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Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap
< Project Completion Report >

Table of Contents

List of Annexes

*ANNEX I～III are softcopy only.

*ANNEX IV～VI are internal reference only.

List of Figures

List of Tables

Chapter 1 Basic Information of the Project

1.1 Country

The Kingdom of Cambodia

1.2 Title of the Project

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap

1.3 Duration of the Project

May 2022 – May 2025

1.4 Background

hereinafter referred to as "During the Project period, the definition of the Siem Reap's Smart City Approach was also established. The Siem Reap Smart City Approach is a comprehensive initiative that maximizes the region's strengths while strategically leveraging digital technology to create a sustainable and attractive society for both residents and tourists. The approach begins by identifying and analyzing key issues and priority areas for urban development. From these findings, a roadmap is then formulated. When implementing the measures outlined in the roadmap, a "small start" strategy is employed to initiate actions in areas with the highest feasibility. The insights and experiences gained from the initial small-scale implementations are shared among industry, government, academia, and communities, thereby enhancing urban management capabilities through capacity development. In addition, the outcomes are proactively disseminated both domestically and internationally to attract new stakeholders and foster civic pride among Siem Reap residents. By repeating this implementation cycle, Siem Reap's sustainable development will be promoted, further contributing to the achievement of the Sustainable Development Goals (SDGs) while enhancing the overall well-being and quality of life for both residents and tourists. Through these efforts, Siem Reap is expected to gain greater value as an international tourist destination.

1.5 Overall Goal

A better urban environment in Siem Reap is realized with the Smart City Approach.

1.6 Project Purpose

To implement the Smart City Approach to solve urban issues in Siem Reap.

1.7 Implementing Agency

Siem Reap Provincial Administration (SRPA)

Chapter 2 Results of the Project

2.1 Results of the Project

2.1.1 Input by the Japanese Side

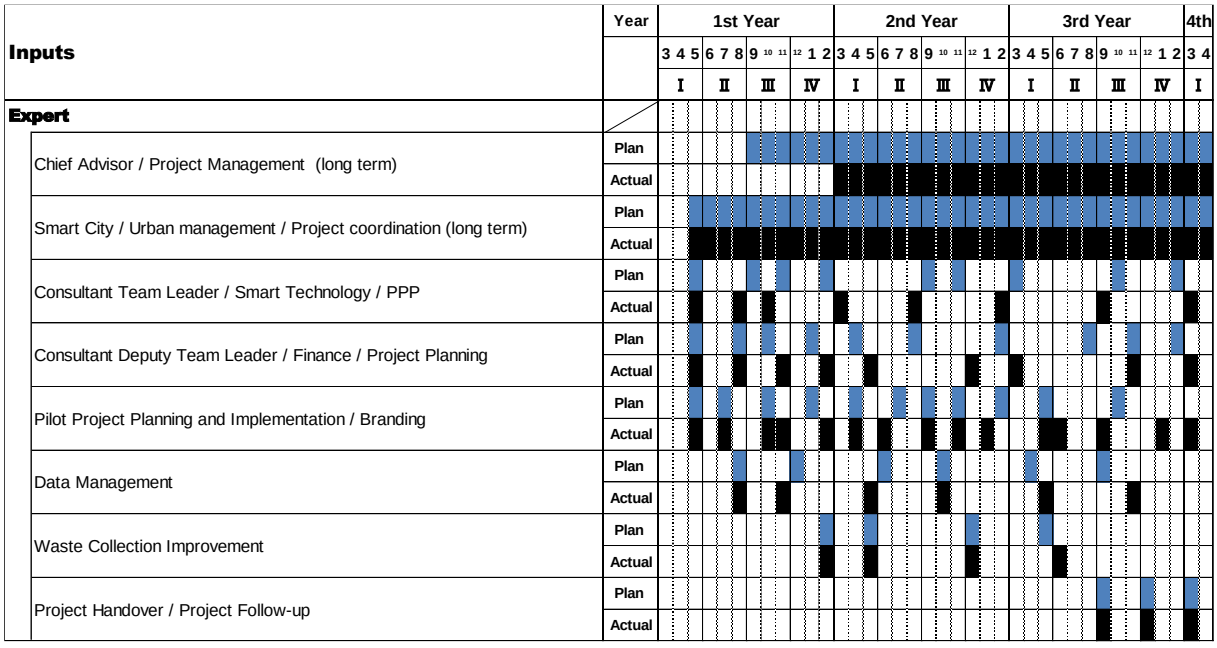
(1) Dispatchment of Experts

Two long-term resident experts and six experts from the JICA Consultant Team, on a trip-to-trip basis, were dispatched.

Table 2.1: Composition of Dispatched Experts

Team	Position	Name
Long-term Expert Team	Chief Advisor / Project Management Expert	Shigeki Miyake
	Smart City / Urban Management / Project Coordination Expert	Ryohei Ikeda
Consultant Team	Consultant Team Leader / Smart Technology / PPP Expert	Kuniomi Hirano
	Consultant Deputy Team Leader / Finance / Project Planning Expert	Kento Ozaki
	Pilot Project Planning and Implementation / Branding / Training Expert	Kai Kurimoto
	Data Management Expert	Hikaru Sugimoto
	Waste Collection Improvement Expert	Koki Takano
	Project Handover / Project Follow-up Expert	Hikaru Ebara

Source: Nippon Koei Co., Ltd.



Source: Nippon Koei Co., Ltd.

Figure 2.1: Summary of the Schedule of the Dispatchment of Japanese Experts

The demarcation of roles between the long-term expert team and the consultant team is outlined below[1].

[1] The descriptions of each activity are shown in 2.1.3.

Table 2.2: Demarcation of Roles of the Long-term Expert Team and the Consultant Team

Item	Related activities
Activities that are mainly related to the Long-term Expert Team	Activity 1-2, 1-3, 1-4, 2-2, 3-1, 3-3, 4-1, 4-3, and 4-5
Activities that are mainly related to the Consultant Team	Activity 1-1, 1-5, 2-1, 2-3, 2-4, 2-5, 3-2, and 4-6
Activities that are related to both teams	Activity 4-2 and 4-4

Source: JICA

(2) Acceptance of Training Participants

1) Training in Japan (as Part of the Project Activity)

i) Training Period

The training was conducted once in May 2023. The trainees were divided into two groups, management level and technical level, with each level following a different schedule.

- Management level: May 20, 2023 (Saturday) (Departure from Cambodia) - May 28, 2023 (Sunday) (Departure from Japan)
- Technical level: May 20, 2023 (Saturday) (Departure from Cambodia) - May 31, 2023 (Wednesday) (Departure from Japan)

ii) Objectives

The objectives of the training are identified below:

- To gain insight into Japan's smart city initiatives and the lessons learned, and to identify the necessary actions that individuals or their organizations should take to promote smart cities in Siem Reap and Cambodia.
- To facilitate networking between Siem Reap Province and the lecturers, including local governments, companies, universities, and organizations.

iii) List of Participants

Below is the list of participants who joined the training. The participants were representatives from the implementing agency, Ministry of Interior, APSARA National Authority, and Siem Reap Municipal Administration.

Table 2.3: List of Participants of the Training Program in Japan

No.	Name	Position	Level
1	H.E. Sor Vorin	Deputy Director General of the General Department Secretary of Administration, Ministry of Interior	Management
2	Mr. Yun Linne	Siem Reap Provincial Deputy Governor	Management
3	Mr. Ly Vannak	Administration Director, Siem Reap Provincial Administration	Management
4	Mr. Tip Piseth	Director of Planning and Investment Division, Siem Reap Provincial Administration	Management
5	Mr. Oeng Sophorn	Director of Inter-sectoral Division, Siem Reap Provincial Administration	Management

No.	Name	Position	Level
6	Mr. Bith Chankhan	Deputy Director of the Department in charge of Municipal, District, Commune and Sangkat Affairs, Ministry of Interior	Technical
7	Mr. Thoeurt Soviet	Deputy Director of Inter-sectoral Division, Siem Reap Provincial Administration	Technical
8	Mr. Khon Chanvuthy	Deputy Chief of Office of Development and Construction Management Office, Siem Reap Provincial Administration	Technical
9	Mr. Chhoeurt Chamnan	Officer of Investment Office, Siem Reap Provincial Administration	Technical
10	Mr. Mao Ousa	Officer of Information Office, Siem Reap Provincial Administration	Technical
11	Mr. Ngon Sotheadara	Senior Architect of the Department of Water, Forest and Infrastructure, APSARA National Authority	Technical
12	Mr. Lam Sokhak	Administration Director, Siem Reap Municipal Administration	Technical

Source: Nippon Koei Co., Ltd.

iv) Itinerary

The table below outlines the itinerary of the training.

Table 2.4: Itinerary of the Training Program in Japan

Day			Content	Stay	Move
0	May 20	Sat	Departure from Cambodia	-	Air
1	May 21	Sun	Arrival in Japan	Tokyo	Bus
2	May 22	Mon	Briefing of the training Lecture from JICA Lecture from the Cabinet office of Japan Site visit to Daimaruyu area	Tokyo	Bus
3	May 23	Tue	Site visit to Haneda Innovation City Travel from Tokyo to Takamatsu Courtesy call to Takamatsu City	Takamatsu	Bus and air
4	May 24	Wed	Lecture and site visit to Takamatsu City and Kagawa University	Takamatsu	Bus
5	May 25	Thu	Lecture and site visit to Kamikatsu Town	Kamikatsu	Bus
6	May 26	Fri	Lecture and site visit to Kakogawa City	Amagasaki	Bus
7	May 27	Sat	Site visit to Himejijo Castle	Amagasaki	Bus
8	May 28	Sun	(Management level) Travel from Japan to Cambodia (Technical level) Travel from Kansai to Tokyo	Tokyo	(Management level) bus and air (Technical level) public transport
Only technical level from below					
9	May 29	Mon	Lecture and site visit to Kashiwanoha	Tokyo	Public transport
10	May 30	Tue	Action plan presentation and wrap-up of the training	Tokyo	-
11	May 31	Wed	Travel from Tokyo to Cambodia	-	Bus and air

Source: Nippon Koei Co., Ltd.

2) Other JICA Trainings: Knowledge Co-Creation Program (Group and Region Focus)

i) Course Overview

The Knowledge Co-creation Program (Group and Region Focus) entitled “Methodology and Approaches to Realize Smart City,” has been organized and implemented by JICA Yokohama. JICA Yokohama launched this program as a three-year course in 2022, with Cambodia participating in every session. The program aims to provide participants with insights into Japan’s smart city experiences through fieldwork and case studies, further enhancing their understanding of technology utilization and stakeholder coordination.

ii) Training Period

- The year of 2022: September 2, 2022 (Friday) (Arrival in Japan) - September 15, 2022 (Thursday) (Departure from Japan)
- The year of 2023: September 22, 2023 (Friday) (Arrival in Japan) - October 5, 2023 (Thursday) (Departure from Japan)
- The year of 2024: August 29, 2024 (Thursday) (Arrival in Japan) - September 13, 2024 (Friday) (Departure from Japan)

iii) Objectives and Outcomes

The objective of this course is to equip participants with an understanding of methodologies and approaches for applying smart technologies to address urban challenges, drawing on Japan's experiences. Participants will also explore potential actions to implement these solutions and coordinate with stakeholders effectively.

The outcomes are set as follows:

- To gain an understanding of the policies and projects related to the smart city concept, technologies, and smart approaches (such as policy making based on data and the application of smart technologies) for solving urban challenges.
- To consider how smart approaches can be applied to address urban issues in the participants' respective countries.
- To prepare actionable plans for tackling urban issues in the participant's home countries.

iv) List of Participants

The following is a list in the participants of the Knowledge Co-Creation Program (Group and Region Focus) "Methodology and Approaches to Realize Smart City". In addition to SRPA, the implementing agency, participants also included representatives from the Siem Reap Municipality, relevant departments of the Siem Reap Province, and central government entities related to the implementation of a smart city.

Table 2.5: List of Participants of the Knowledge Co-Creation Program (Group and Region Focus) "Methodology and Approaches to Realize Smart City"

No.	Name	Position (at the time of the training program)	Year in training program
1	Mr. Tip Piseth	Director of Planning and Investment Division, Siem Reap Provincial Administration	2022
2	Mr. Oeng Sophorn	Director of Inter-sectoral Division, Siem Reap Provincial Administration	2022
3	Ms. Lim Phallika	Deputy Mayor, Siem Reap Municipality	2022
4	Mr. Meas Piseth	Officer, PR and International Cooperation Division, Siem Reap Provincial Administration	2022
5	Ms. Pol Chanreasey	Officer, General Department of Administration, Ministry of Interior	2023

No.	Name	Position (at the time of the training program)	Year in training program
6	Mr. Hoem Tola	Senior ICT Technical Official, Department of ICT for Rural Ministry of Post and Telecommunications	2023
7	Mr. Tan Kimang	Office Head, Technical Office, Department of Public Works And Transport, Siem Reap province	2023
8	Mr Soeung Sitha	Chief of Clean City Bureau, Siem Reap Department of Tourism	2023
9	Mr. Khuoch Vearythla	Director of Administration Division, Siem Reap Provincial Administration	2024
10	Mr. Rem Sophal	Chief of Capacity Development Office, Human Resource Management Division, Siem Reap Provincial Administration	2024
11	Mr. Moan Phanit	Senior Hydraulic Engineer, in charge of Irrigation and infrastructure office, Water Forestry and Infrastructure Management , APSARA National Authority	2024
12	Mr. Lim Chhayly	Senior Software Engineer, Digital Government Transformation, Digital Government Committee	2024
13	Mr. Bith Chankhan	Deputy Director of the Municipality, District, Commune, and Sangkat Administrative Affairs, General Department of Administration, Ministry of Interior	2024

Source: JICA Long-term Expert Team

v) Contents

The contents of the training are outlined below:

a) Preparatory Activity

To prepare the inception report on urban issues, smart city-related activities, and the level of understanding of administrative officers and citizens in the participants' cities and countries.

b) Program in Japan

Through the 1-2 week program, the participants gained an understanding of Japanese technologies and approaches for achieving a smart city through lectures, fieldworks, and case studies as specified below, further leading to the realization of smart cities in the participants' respective cities and countries.

- Smart city concept and advantages of smart cities in Japan
- Technologies to realize smart cities (including fieldwork)
- Approaches, implementation structure, and roadmaps to consider for smart cities (including fieldwork and case studies)
- Consensus building and coordination among stakeholders (including fieldwork and case studies)
- Preparation of action plans (strategies to apply and promote smart city approaches, proposal of actions to be taken)

(3) Equipment Provision

No equipment was supplied for the Project.

2.1.2 Input by the Cambodian Side

(1) Counterpart Assignment

Serving as the Project Director of the Project is the Governor of Siem Reap Province, while the Project Manager is the Deputy Governor. As members of the Project's Joint Coordination Committee (JCC), SRPA, as the counterpart organization, appointed a total of 24 representatives from the SRPA and other relevant departments and agencies. To support the project implementation, SRPA established the Siem Reap Smart City Secretariat within its organization. The Secretariat, consisting of 22 members, is responsible for supporting the Project's operations. The table below lists the structure of the secretariat.

Table 2.6: List of Counterparts (Siem Reap Smart City Secretariat)

No.	Position in the Smart City Secretariat	Position in SRPA
1	Director	Deputy Governor
2	Deputy Director	Director of Planning and Investment Division
3	Deputy Director	Director of Public Relations and International Cooperation Division
4	Deputy Director	Director of Human Resource Management Division
5	Deputy Director	Director of Inter-sectoral Division
6	Deputy Director	Director of Administration Division
7	Deputy Director	Director of Procurement Unit
8	Deputy Director	Director of Finance Division
9	Member	Chief of Investment Office
10	Member	Chief of International Cooperation Office
11	Member	Chief of Planning Office
12	Member	Chief of Information and Documentation Office
13	Member	Chief of Protocol and Documentation
14	Member	Chief of Human Development Office
15	Member	Deputy Chief of Protocol and Documentation
16	Member	Deputy Chief of Documentation and Information Office
17	Member	Deputy Chief of International Cooperation Office
18	Member	Officer of Investment Office
19	Member	Officer of Public Order and Safety Office
20	Member	Contracted Officer of Investment Office
21	Member	Contracted Officer of Documentation Office
22	Member	Contracted Officer of Documentation Office

Source: SRPA

(2) Provision of Office Space

An office space was provided for the JICA Expert Team by SRPA on the second floor of the Siem Reap Provincial Hall. Utility supplies, such as electricity and water, were also provided by the implementing agency to the JICA Expert Team.

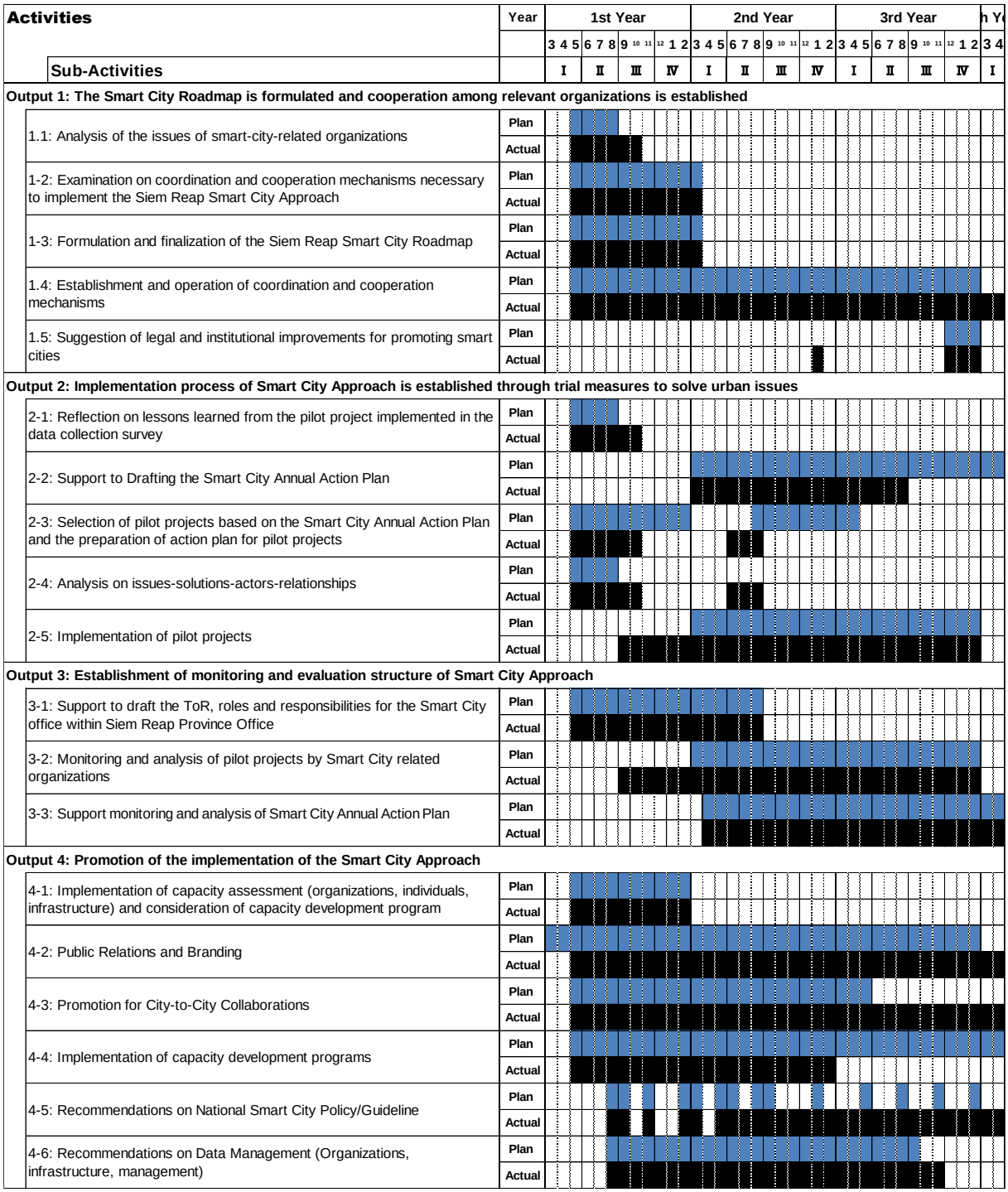
(3) Other Matters Borne by the Cambodian Government

In line with the annual budget plan of the implementing agency, the SRPA has allocated, or plans to allocate, a total of approximately KHR 220 million[2] in 2024 and 2025 for the operation and maintenance fees of the systems developed under the Project's pilot projects.

[2] Equivalent to approximately USD 56,000, according to the JICA monthly exchange rate in JFY 2024.

2.1.3 Activities

The results of the activities are summarized below, with detailed information of the activity results indicated in ANNEX (I).



Source: Nippon Koei Co., Ltd.

Figure 2.2: Summary of the Schedule of the Activities

(1) Activities Related to Output 1

1) Activity 1-1: Analysis of the Issues of Smart-City-Related Organizations

An analysis of the issues faced by smart city-related organizations, including ongoing projects, organizations of both the private and the academic sectors, update of related laws, roadmap approval procedures, and climate change mitigation and adaptation measures, were conducted.

2) Activity 1-2: Examination on Coordination and Cooperation Mechanisms Necessary to Implement the Siem Reap Smart City Approach

Information on the target items including "Status of on-going projects", "Involvement of stakeholders and inter-organizational collaboration", "Laws and regulations", "Roadmap approval procedure", and "Public-Private Partnership" were reviewed, and Smart City Consortium was proposed.

3) Activity 1-3: Formulation and Finalization of the Siem Reap Smart City Roadmap

This examination was done early in the project timeline, and the necessary recommendations were summarized in the Siem Reap Smart City Roadmap, which was approved by the Governor of Siem Reap Province in March 2023.

4) Activity 1-4: Establishment and Operation of Coordination and Cooperation Mechanisms

In Activity 1-2, the overall concept and operational framework of the coordination and cooperation mechanism were reviewed, followed by the development of a specific implementation structure, accompanied by a diagram, which was approved at the 4th JCC in September 2023. The updated structure was later approved during the 6th JCC meeting in September 2024.

5) Activity 1-5: Suggestions of Legal and Institutional Improvements for Promoting Smart Cities

At the National Smart City Task Force meeting hosted by the Ministry of Interior, the JICA Expert Team suggested incorporating the findings from the JICA project in the National Smart City Roadmap and further compiling them into the Smart City guidelines. The JICA Expert Team also proposed promoting the establishment of a smart city division/office within provincial administrations through an official ordinance.

Additionally, the JICA Expert Team provided advice to SRPA, including recommendations on outsourcing contracts for the operation and management of the systems developed in Pilot Projects.

(2) Activities Related to Output 2

1) Activity 2-1: Reflection on Lessons Learned from the Pilot Project Implemented in the Data Collection Survey.

Lessons learned from the smart parking Proof of Concept (PoC) of the data collection survey were summarized and reflected in the operation of the activities.

2) Activity 2-2: Formulation of the Smart City Annual Action Plan

The Siem Reap Smart City Annual Action Plan is developed each year to guide the implementation of the Smart City Roadmap. It defines the actions to be taken by the provincial government and other stakeholders, ensures alignment with the annual budgeting processes, and strengthens the monitoring system. The years of 2023, 2024, and 2025 Annual Action Plans have been prepared and validated, and the Annual Action Plan for 2026 has been drafted.

3) Activity 2-3: Selection of Pilot Projects Based on the Smart City Annual Action Plan and the Preparation of Action Plan for Pilot Projects

Below, eight pilot projects were selected based on the Smart City Annual Action Plan.

- Pilot Project (1): Illegal Parking Monitoring
- Pilot Project (2): Waste Collection Improvement
- Pilot Project (3): Tourism Statistics Digitalization
- Pilot Project (4): Government Internal Document Tracking
- Pilot Project (5): Urban Environment Monitoring by Sensors
- Pilot Project (6): Public Private Tourism Collaboration
- Pilot Project (7): Smart Waste Collection and Transportation
- Pilot Project (8): Data Platform System Development

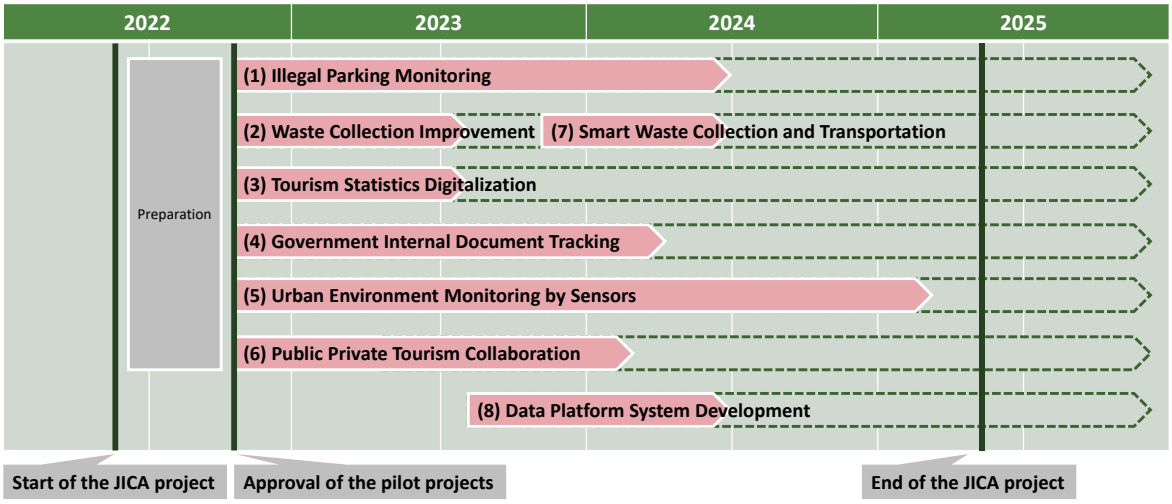
The action plan for each pilot project was prepared accordingly.

4) Activity 2-4: Analysis on Issues-Solutions-Actors-Relationships

The analysis of the issues-solutions-actors-relationships for each pilot project was conducted accordingly.

5) Activity 2-5: Implementation of Pilot Projects

The eight pilot projects were implemented in the following schedule, as seen below.



Source: Nippon Koei Co., Ltd.

Figure 2.3: Schedule of the Implementation of the Eight Pilot Projects

(3) Activities Related to Output 3

1) Activity 3-1: Support to Draft the ToR, Roles and Responsibilities for the Smart City Office within Siem Reap Province Office

The draft Terms of Reference (ToR), along with the roles and responsibilities of the Smart City Secretariat, were discussed during the roadmap update and subsequently incorporated into the revised roadmap.

2) Activity 3-2: Monitoring and Analysis of Pilot Projects by Smart City Related Organizations

Smart city-related organizations conducted the monitoring of the pilot project implementation and carried out analysis to improve the operations. The activities included periodic monitoring of the operating status of the systems and technical working group meetings. The table below shows the list of technical working groups related to the pilot projects during the project implementation.

Table 2.7: Technical Working Group Meetings for Pilot Project Monitoring

Date	Contents
July 21, 2022	Discussions on the first round of pilot projects
August 23, 2022	Proposals for the first round of pilot projects
October 21, 2022	Detailed proposals for the first round of pilot projects
February 6, 2023	Progress report of the pilot projects
February 21, 2023	Progress report of the pilot projects
March 31, 2023	Discussions on the illegal parking monitoring pilot project
May 16, 2023	Discussions on the urban environment monitoring pilot project
August 24, 2023	Discussions on the illegal parking monitoring pilot project
September 7, 2023	Discussions on the illegal parking monitoring pilot project
September 14, 2023	Discussions on the illegal parking monitoring pilot project
October 19, 2023	Discussions on the data platform system development pilot project
November 16, 2023	Discussions on the illegal parking monitoring pilot project and the document tracking system pilot project
December 27, 2023	Discussions on the solid waste collection pilot project
January 26, 2024	Discussions on the overall progress of the pilot projects

Date	Contents
February 20, 2024	Discussions on the solid waste collection pilot project
March 28, 2024	Discussions on the solid waste collection pilot project
May 10, 2024	Discussions on the illegal parking monitoring pilot project
May 20, 2024	Discussions on the data platform system development pilot project
May 28, 2024	Discussions on the solid waste collection pilot project
June 3, 2024	Discussions on the solid waste collection pilot project
June 17, 2024	Discussions on the solid waste collection pilot project
June 20, 2024	Discussions on the illegal parking monitoring pilot project
September 10, 2024	Discussions on the illegal parking monitoring pilot project
November 26, 2024	Discussions on the data platform system development pilot project

Source: Nippon Koei Co., Ltd.

3) Activity 3-3: Drafting the Smart City Annual Action Plan for the Following Year Based on the Monitoring and Analysis

The action plan is annually updated by incorporating findings and improvements from the previous year. The 2024 Action Plan built on the 2023 Action Plan and monitoring indicators, while the 2025 Action Plan reflected lessons from the 2024 implementation. The 2026 Action Plan was drafted based on the 2025 monitoring and analysis results.

(4) Activities Related to Output 4

1) Activity 4-1: Implementation of Capacity Assessment (Organizations, Individuals, Infrastructure) and Consideration of Capacity Development Program

A capacity assessment was conducted in 2022, serving as the basis for discussions on capacity development programs. Based on the assessment results, the following programs were proposed:

- On-the-job training
- Smart city training in Japan
- IT training based on the IT passport framework
- Basic IT training aligned with the pilot projects

2) Activity 4-2: Public Relations and Branding

In response to a request from the Cambodian side at the first JCC meeting in May 2022, JICA decided to assign a branding expert to the Project. Multiple discussions on public relations and branding strategies were held, continuously integrating outcomes in the implementation measures of the Smart City Roadmap. Additionally, counterparts and experts have conducted a series of lectures and briefings on a recurring basis. The key PR-related events are as follows:

Table 2.8: Key PR-related Events

Date	Contents
December 23, 2024	• PoC Competition for Solving Urban Issues
October 30, 2024	• The Sixth ASEAN-Japan Smart Cities Network High-Level Meeting
October 28, 2024	• Information Day of the Smart City ASEAN Learning Network (SCALe)
August 9, 2024	• Cambodia-Japan Smart City Networking Workshop
June 7, 2024	• Introduction to the JCI ASPEC Participants

Date	Contents
February 28, 2024	• Asia-Africa Knowledge Sharing Seminar for Smart Cities
February 6, 2024	• Signing of a Memorandum of Understanding (MOU) between Takamatsu City, Kagawa Prefecture
February 3, 2024	• Japan-Mekong Business Cooperation Committee Mission Visits Siem Reap
January 29, 2024	• Delegates from Preah Sihanouk Province came to visit Siem Reap and learned from Siem Reap Smart City implementation.
December 25, 2023	• International Symposium on Life Mechatronics 2023 held in Phnom Penh
December 18, 2023	• Siem Reap Smart City Seminar in Collaboration with Takamatsu City
November 23, 2023	• Thailand Smart City Expo 2023 in Bangkok
October 26, 2023	• The Fifth ASEAN-Japan Smart Cities Network High-Level Meeting
October 5, 2023	• The press tour came to Siem Reap on Japan's Official Development Assistance (ODA)
July 8, 2023	• Online Lecture Series "Event Commemorating the 70th Anniversary of Friendship between Japan and Cambodia"
March 24, 2023	• Takamatsu City and Siem Reap Province Signed a Letter of Intent
February 7, 2023	• Smart City Team Members of Takamatsu City Visited Siem Reap
December 5, 2022	• The Fourth ASEAN-Japan Smart Cities Network High-Level Meeting

Source: JICA Long-term Expert Team

3) Activity 4-3: Promotion for City-to-City Collaborations

Inter-city cooperation has been actively promoted throughout the Project. Notable achievements include an MoU with Takamatsu City on smart city initiatives and a study visit by 34 delegates from Preah Sihanouk Province. In addition, discussions were held with several cities including Abidjan (Cote d'Ivoire) on circular economy collaboration, Okinawa on peacebuilding, and Kota Town on expanding the existing sister city partnership with a focus on collaboration around smart city initiatives.

4) Activity 4-4: Implementation of Capacity Development Programs

Capacity development programs were implemented in alignment with Activity 4-1. Likewise, the training program in Japan was conducted in May 2023 (see Section 2.1.1(2)1) for details). Additionally, pilot projects deemed suitable for handover were transferred to SRPA with secured government funding. This was followed by system expansions aimed at developing counterpart capacity for continued advancement.

5) Activity 4-5: Recommendations on National Smart City Policy/Guideline

Throughout the project period, the project experts maintained a highly collaborative relationship with the Ministry of Interior (MoI). The Project contributed to national-level efforts through participation in the National Smart City Taskforce, which includes MoI and development partners. Other key contributions include input into the revision of the National Smart City Roadmap, and support for MoI-led events such as orientation workshops, and recommendations on Siem Reap's implementation framework such as the establishment of the smart city division.

6) Activity 4-6: Recommendations on Data Management (Organizations, Infrastructure, Management)

Through the implementation of the pilot project for data platform development, current challenges in data management were identified, and recommendations for data management were formulated based on three aspects: organization, data infrastructure, and data governance.

Table 2.9: Outline of the Recommendations on Data Management

Aspect	Outline
Organization	• Investment in IT human resources development • Securing sustainable funding • Strengthening interdepartmental coordination
Data Infrastructure	• Cloud infrastructure utilization and transition • Enhancing network infrastructure • Establishing data backup systems
Data Governance	• Establishing ICT-related policies • Developing data management rules

Source: Nippon Koei Co., Ltd.

2.2 Achievements of the Project

2.2.1 Outputs and Indicators

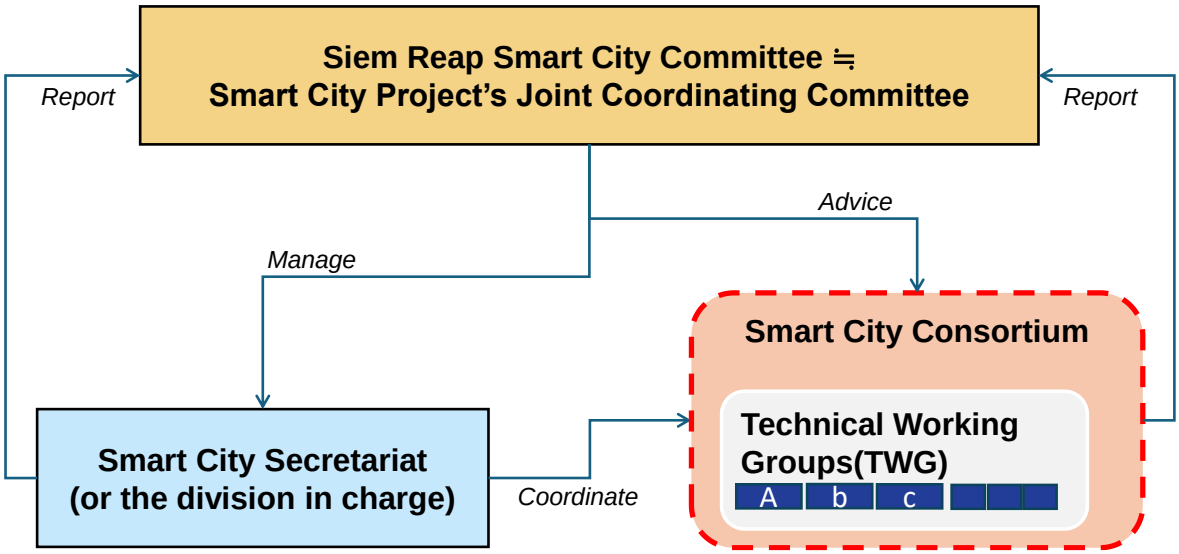
(1) Output 1: Establishment of Monitoring and Evaluation Structure of Smart City Approach

1) Indicator 1: Approval of the Siem Reap Smart City Roadmap by Siem Reap Provincial Administration

The Siem Reap Smart City Roadmap was approved during the Third Project JCC meeting in March 2023 and published in October 2023.

2) Indicator 2: Formulation of Effective Implementation Structures in which the Roles of Each Smart City-related Organization are Effectively Considered

A specific implementation structure, supported by a corresponding diagram, was developed and approved during the Fourth JCC in October 2023. Following a review of the Industry-Academia-Government-Community Platform (Smart City Consortium) structure, the implementation structure was reviewed and updated at the JCC meeting in September 2024.



Source: JICA Long-term Expert Team

Figure 2.4: Updated Implementation Structure Diagram for Siem Reap Smart

3) Means of Verification Indicated in the Project Design Matrix

i) Letter of Approval from the Governor of Siem Reap Province

As a result of discussions with SRPA, instead of issuing a Letter of Approval from the Governor of Siem Reap Province, the Governor's signature was included in the preface of the Siem Reap Smart City Roadmap.

ii) Implementation Structure Diagram

The implementation structure diagram of Siem Reap Smart is shown in Figure 2.4.

(2) Output 2: Implementation Process of the Smart City Approach is Established Through Trial Measures to Solve Urban Issues

1) Indicator 1: Formulation of a Smart City Annual Action Plan of Priority Projects Proposed in the Smart City Roadmap

Annual Smart City action plans from the year 2022 to 2025 were formulated in accordance with the priority projects indicated in the Smart City Roadmap.

2) Indicator 2: Formulation of Action Plans for Pilot Projects to Contribute to Improving Urban Environment

Action plans for the eight pilot projects were formulated, contributing to the improvement of the urban environment.

3) Means of Verification indicated in the PDM

i) The Smart City Annual Action Plan of the Smart City Roadmap

The annual action plans are in ANNEX (VI).

ii) The Action Plan of Pilot Projects

The initial action plans of pilot projects are in ANNEX (VI).

(3) Output 3: Establishment of Monitoring and Evaluation Structure of Smart City Approach

1) Indicator 1: Establishment of the Monitoring Structure of the Smart City Annual Action Plan

The establishment of the Siem Reap Smart City Secretariat was approved in February 2024, serving as a core monitoring and evaluation mechanism.

2) Indicator 2: Holding Meetings to Monitor the Smart City Annual Action Plan

The Secretariat has been holding regular meetings to monitor the action plans as planned in February, May and September.

3) Indicator 3: Examination and Implementation of Countermeasures to Reflect on the Monitoring Situation

The Secretariat prepared the annual action plans for 2024 and 2025 based on actual conditions, while the 2026 version was drafted.

4) Means of Verification indicated in the PDM

i) Monitoring Sheets of Pilot Projects

The generic monitoring sheet applicable to various types of pilot projects are in ANNEX (VI).

ii) Report of Pilot Project Implementation

The reports on the implementation of each pilot project are in ANNEX (VI).

iii) Pilot Project Implementation Manual

The pilot project implementation manual can be found in ANNEX (VI).

(4) Output 4: Promotion of the implementation of the Smart City Approach

1) Indicator 1: Advice on National Smart City Policy/Guideline

The Project contributed to the development and revision of the National Smart City Roadmap by providing continuous advice through participation in the National Smart City Task Force. Further details are provided in ANNEX (I).

2) Indicator 2: Advice on Data Management for the Smart City Approach

Advice on data management for the smart city approach was provided to SRPA and related authorities. The outline of the recommendations is indicated in Table 2.9, with the detailed information provided in ANNEX (I).

3) Means of Verification indicated in the PDM

i) The Minutes of Meetings of the Joint Coordination Committee

The meeting records of each JCC meeting are detailed in ANNEX (IV).

ii) Monitoring Sheets

The monitoring sheets of the Project can be found in ANNEX (V).

2.2.2 Project Purpose and Indicators

The purpose of the Project is “Smart City Approach will be implemented to solve urban issues in Siem Reap”, and below are the indicators according to the PDM.

(1) Indicator 1: Continuous Updates of the Smart City Annual Action Plan

The 2023, 2024, and 2025 action plans have been prepared, while the 2026 version was drafted in February 2024.

The counterpart has inherited the pilot projects and continues them using its own budget.

(2) Indicator 2: Implementation of Smart City Pilot Projects in line with Siem Reap Smart City Roadmap

A total of eight smart city pilot projects, in line with the Siem Reap Smart City Roadmap, were implemented.

2.3 History of PDM Modification

Due to the need for further discussion, the Project adopted the Two-step Planning Method. In this approach, the Project commences once a basic plan is established. During the first phase of the Project, a detailed plan including the revised record of discussions, the revised PDM, and related documents, are formulated.

Basic planning survey R/D + PDM・PO	⇒	Project implementation	
		(Phase 1) one year Detailed planning survey phase R/D + PDM・PO (revised)	(Phase 2) Core activity phase

Source: JICA

Figure 2.5: Conceptual Diagram of the Two Steps Planning Method

The JICA side and the Project Manager (Deputy Governor of Siem Reap Province, Mr. Yun Linne) agreed on the revision of the PDM on July 16, 2023.

2.3.1 Overall Goal

Below are the changes to the overall goal.

Table 2.10: Changes to the Overall Goal

Item	Initial Version	Updated Version
Narrative Summary	A better urban environment in Siem Reap is realized through Smart City Approach	A better urban environment in Siem Reap is realized through Smart City Approach
Objectively Verifiable Indicators	• Indicator 1: Satisfaction score of Citizen/tourist to Siem Reap • Indicator 2: Index related to smart city (to be determined in phase 1; no. of tourists, environmental indicators, traffic congestion, etc.)	• Indicator 1: Urban Environment indicators (number of tourists, environmental indicators, traffic congestion, etc.) • Indicator 2: Implementation of Smart City Projects
Rationale for Revisions	• The indicator "Satisfaction score of Citizen/tourist to Siem Reap" was removed, as no baseline survey was available for comparison. • Index related to smart city was renamed to urban environment indicators, as indicators such as tourist numbers, environmental conditions, and traffic congestion are more suited to the urban environment context. • Considering that several pilot projects are implemented in the project, it is anticipated that some of them will be scaled up within 3–5 years after project completion.	

Source: JICA

2.3.2 Project Purpose

Below are the changes to the project purpose.

Table 2.11: Changes to the Project Purpose

Item	Initial Version	Updated Version
Narrative Summary	Smart City Approach will be implemented to solve urban issues in Siem Reap	Smart City Approach will be implemented to solve urban issues in Siem Reap
Objectively Verifiable Indicators	• Indicator 1: xxx pilot project related to smart cities are implemented. • Indicator 2: The indicator related to the pilot project will be improved (indicators will be determined in the phase I)	• Indicator 1: Continuous updates of the Smart City Annual Action Plan • Indicator 2: Implementation of Smart City Pilot Projects in line with Siem Reap Smart City Roadmap

Item	Initial Version	Updated Version
Rationale for Revisions	• Rather than focusing on the number of pilot projects implemented, the revised indicators place greater emphasis on conducting before-and-after evaluations to ensure that each project effectively contributes to addressing urban issues.	

Source: JICA

2.3.3 Output 1 and Related Activities

(1) Output 1

Below are the changes to Output 1.

Table 2.12: Changes to Output 1

Item	Initial Version	Updated Version
Narrative Summary	Smart City Approach is formulated and cooperation among relevant organizations is established	The Smart City Roadmap is formulated and cooperation among relevant organizations is established
Objectively Verifiable Indicators	• Indicator 1: Smart city roadmap is approved by an authority (identified in phase 1) • Indicator 2: Seminars for Siem Reap officials on the smart city roadmap are held xxx times • Indicator 3: An effort to establish a coordination and cooperation mechanisms	• Indicator 1: Approval of the Siem Reap Smart City Roadmap by Siem Reap Provincial Administration • Indicator 2: Formulation of effective implementation structures in which the roles of each smart city-related organization are effectively considered
Means of Verification	• Minutes of meetings of the JCC meeting • Project Progress Report • Periodical Publication of Siem Reap	• Letter of approval from the governor of Siem Reap Province • Implementation structure diagram
Rationale for Revisions	• The term "Smart City Approach is formulated" was revised to "Smart City Roadmap is formulated" as the Smart City Approach is defined in the roadmap. • A visual implementation structure was introduced as an indicator to clarify the roles of various organizations involved in smart city initiatives, supporting effective coordination and role-sharing going forward.	

Source: JICA

(2) Activities Related to Output 1

Below are the changes in the activities related to Output 1.

Table 2.13: Changes to Activities related to Output 1

Item	Initial Version	Updated Version
Activities	<Phase 1> • 1-1: Review of smart city related organizations and analysis of their issues. • 1-2: Formulation and finalization of roadmap • 1-3: Consideration of coordination and cooperation mechanisms necessary to implement the roadmap <Phase 2> • 1-4: Establishment and operation of coordination and cooperation mechanisms • 1-5: Suggestion of legal and institutional improvements for promoting smart cities	<Phase 1> • 1-1: Analysis of the issues of smart-city-related organizations • 1-2: Examination on coordination and cooperation mechanisms necessary to implement the Siem Reap Smart City Approach • 1-3: Formulation and finalization of the Siem Reap Smart City Roadmap <Phase 2> • 1-4: Establishment and operation of coordination and cooperation mechanisms • 1-5: Suggestions of legal and institutional improvements for promoting smart cities

Source: JICA

2.3.4 Output 2 and Related Activities

(1) Output 2

Below are the changes to Output 2.

Table 2.14: Changes to Output 2

Item	Initial Version	Updated Version
Narrative Summary	Implementation process of Smart City Approach is established through trial measures to solve urban issues	Implementation process of the Smart City Approach is established through trial measures to solve urban issues
Objectively Verifiable Indicators	• Indicator 1: xxx Pilot project is implemented. • Indicator 2: An analytical report (issues-solutions-actors-relationships) will be prepared	• Indicator 1: Formulation of a Smart City Annual Action Plan of priority projects proposed in the Smart City Roadmap • Indicator 2: Formulation of action plans for pilot projects to contribute to improving the urban environment
Means of Verification	• Project Progress Report • Report of Pilot project and the roadmap	• The Smart City Annual Action Plan of the Smart City Roadmap • The action plan of pilot projects
Rationale for Revisions	• The formulation of annual action plans was added to clarify the necessary steps, budgeting, and coordination required for implementing the priority projects identified in the Smart City Roadmap, which targets outcomes in 2035. • The revision was made to ensure that pilot projects are clearly linked to specific urban challenges.	

Source: JICA

(2) Activities Related to Output 2

Below are the changes to the activities related to Output 2.

Table 2.15: Changes to Activities related to Output 2

Item	Initial Version	Updated Version
Activities	<Phase 1> • 2-1: Identification of the pilot projects to be implemented • 2-2: Reviewing of lessons learned from the pilot project implemented in the data collection survey. • 2-3: Analysis on issues-solutions-actors-relationships <Phase 2> • 2-4: Implementation of pilot projects based on Roadmap	<Phase 1> • 2-1: Reflection on lessons learned from the pilot project implemented in the data collection survey. • 2-2: Formulation of the Smart City Annual Action Plan • 2-3: Selection of pilot projects based on the Smart City Annual Action Plan and the preparation of action plan for pilot projects • 2-4: Analysis on issues-solutions-actors-relationships <Phase 2> • 2-5: Implementation of pilot projects

Source: JICA

2.3.5 Output 3 and Related Activities

(1) Output 3

Below are the changes to Output 3.

Table 2.16: Changes to Output 3

Item	Initial Version	Updated Version
Narrative Summary	Establishment of monitoring and evaluation system of Smart City Approach	Establishment of monitoring and evaluation structure of Smart City Approach

Item	Initial Version	Updated Version
Objectively Verifiable Indicators	• Indicator 1: The function of one-stop contact point is established in Siem Reap province • Indicator 2: Capacity development measures prepared by Project are implemented	• Indicator 1: Establishment of the monitoring structure of the Smart City Annual Action Plan • Indicator 2: Holding meetings to monitor the Smart City Annual Action Plan • Indicator 3: Examination and Implementation of countermeasures to reflect on the monitoring situation
Means of Verification	• Report of Pilot project and the roadmap • Capacity development program • Organizational structure of Siem Reap	• Monitoring Sheets of Pilot Projects • Report of Pilot Projects implementation • Pilot project implementation manual
Rationale for Revisions	• A monitoring and evaluation structure was added to allow coordination of all smart city projects, even if they are managed by different organizations. • Monitoring meetings were included to review progress and incorporate lessons learned into the following year's action plans. This is expected to support the practical implementation of the priority projects in the Smart City Roadmap.	

Source: JICA

(2) Activities Related to Output 3

Below are the changes to activities related to Output 3.

Table 2.17: Changes to Activities related to Output 3

Item	Initial Version	Updated Version
Activities	<Phase 1> • 3-1: Implementation of capacity assessment (organizations, individuals, infrastructure) and consideration of capacity development program • 3-2: Support to draft the ToR, roles and responsibility for the Smart city office which will be opened in Siem Reap • 3-3: Establishment of a one-stop contact point for strengthening private-sector collaboration, etc. • 3-4: Knowledge sharing with various stakeholders <Phase 2> • 3-5: Implementation of capacity development program • 3-6: Systematization of operation of one-stop contact point	<Phase 1> • 3-1: Support to draft the ToR, roles and responsibilities for the Smart City office within Siem Reap Province Office <Phase 2> • 3-2: Monitoring and analysis of pilot projects by Smart City related organizations • 3-3: Drafting the Smart City Annual Action Plan for the following year based on the monitoring and analysis

Source: JICA

2.3.6 Output 4 and Related Activities

Output 4 was added as an additional output for the Project.

(1) Output 4

Below are the changes to Output 4.

Table 2.18: Changes to Output 4

Item	Initial Version	Updated Version
Narrative Summary	-	Promotion of the implementation of the Smart City Approach
Objectively Verifiable Indicators	-	• Indicator 1: Advices on National Smart City Policy/Guideline • Indicator 2: Advices on Data Management for the Smart City Approach

Item	Initial Version	Updated Version
Means of Verification	-	• The minutes of meetings of the Joint Coordination Committee • Monitoring Sheets
Rationale for Revisions	• The inclusion of national-level policy recommendations is intended to support the advancement of smart city initiatives in Siem Reap through broader policy alignment. • Recommendations related to data management were included to promote the development of practical systems and policies for data collection, sharing, and utilization among relevant stakeholders.	

Source: JICA

(2) Activities Related to Output 4

Below are the changes to activities related to Output 4.

Table 2.19: Changes to Activities related to Output 4

Item	Initial Version	Updated Version
Activities	-	<Phase 1> • 4-1: Implementation of capacity assessment (organizations, individuals, infrastructure) and consideration of capacity development program • 4-2: Public Relations and Branding • 4-3: Promotion for City-to-City Collaborations <Phase 2> • 4-4: Implementation of capacity development programs • 4-5: Recommendations on National Smart City Policy/Guideline • 4-6: Recommendations on Data Management (Organizations, infrastructure, management)

Source: JICA

Chapter 3 Results of the Joint Review

3.1 Results of the Joint Review Based on the DAC Evaluation Criteria

The results of the joint review, based on the Development Assistance Committee (DAC) evaluation criteria, are presented below. The scores for each perspective are between 1 to 4, with 4 being the highest. Detailed evaluation criteria are shown in the "Writing Guidelines for Project Completion Report" and the "Writing Guidelines for the Six DAC Evaluation Criteria in the Project Completion Report", as issued by JICA.

3.1.1 Relevance

Based on the following perspectives, the relevance of this Project is rated as "4".

(1) Relevance with National Development Policies

In 2024, following the inauguration of a new government, the existing Rectangular Strategy was revised and replaced with the National Pentagonal Strategy, which introduced a new pillar focused on the digital domain, emphasizing the importance of leveraging digital technology for urban management. Furthermore, the Digital Government of Cambodia Policy 2022–2035, formulated by the Ministry of Post and Telecommunications (MPTC), has been steadily promoting the modernization and integration of government management systems and public services, as well as governance with transparency. In addition, Cambodia has initiated the National Smart City Strategy, in line with the National Smart City Roadmap. The dissemination and expansion of smart city policies are anticipated to have a significant impact moving forward. These policies are clearly aligned with the objectives of the Project.

(2) Relevance with Development Needs

The project purpose was formulated in response to a significant local demand in Siem Reap, aiming to transform it into a smart city. Siem Reap was selected as a model city by the ASEAN Smart Cities Network (ASCN). The city's goal is to become more livable, smart, clean, safe, and sustainable, demonstrating a clear alignment between the project's objectives and local needs.

3.1.2 Coherence

Based on the following perspectives, the coherence of this Project is rated as "4".

(1) Coherence with JICA Projects

The outline below details the specific collaborations with other JICA projects (technical cooperation, ODA loans and grants, grassroots technical cooperation, private sector partnership programs, JICA Overseas Cooperation Volunteers) and the expected synergies and interconnections to be achieved.

- Other Technical Cooperation Projects: The Project's experts participated in a symposium co-organized by the JICA Strengthening Engineering Education and Research for Industrial Development Project, the Institute of Electrical Engineers of Japan, and the Institute of Technology of Cambodia (ITC). The Project expert delivered presentations on smart city initiatives, along with a smart city study tour in Siem Reap for the symposium participants. Notably, ITC has since become a core member of the Siem Reap Smart City Consortium.
- Other Technical Cooperation Projects: This Project has closely coordinated with the JICA Project for the improvement of cyber resilience through regular information sharing, including discussions on digital policy within the central government of Cambodia and the progress of the Siem Reap Project. The Project's counterpart also joined the training programs organized by the Cyber Resilience Project. Additionally, the two projects also held joint discussions on participant selection for the Knowledge Co-Creation Program entitled "Methodology and Approaches to Realize Smart City".
- SDGs Business Model Formulation Survey with the Private Sector: JICA conducted the survey entitled "SDGs Business Model Formulation Survey with the Private Sector for Introducing Infrastructure Measurement Survey with Remote Sensing Technology Using Drones in Cambodia", with the company implementing the survey joining the Siem Reap Smart City Consortium as a core member following an invitation from the JICA experts.
- Collaboration with Epson: The Project was selected as a model initiative under the JICA-Epson partnership[3]. Following discussions, Epson agreed to provide projectors on loan, which were utilized in collaborative activities with JICA Overseas Cooperation Volunteers and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ).
- JICA Overseas Cooperation Volunteers: The Project utilized the aforementioned Epson projectors to support events that connected elementary schools in Siem Reap and Japan, in addition to contributing to a variety of other volunteer activities. In the field of waste management, which is an important aspect of the smart city context, a new JICA Overseas Cooperation Volunteer is scheduled for dispatch to the Siem Reap Municipality following consultations with the municipality and coordination with the JICA Cambodia Office.

(2) Coherence with Other Projects

The outline below specifies the collaborations with other Japanese projects and support from other development partners (mutual complementarity, alignment, and coordination), along with the expected synergies and interconnections to be achieved.

- Smart City Taskforce for Cambodia: The MoI led the establishment of a National Smart City Taskforce to guide the evolution of Cambodia's smart city development agenda, comprising experts

[3] On 25th March 2022, the JICA signed a memorandum of comprehensive cooperation with Seiko Epson Corporation (Epson) with the purpose of contributing to addressing challenges in developing countries and achieving the SDGs.

from JICA, GIZ, United Nations Office for Project Services (UNOPS), UN-Habitat, and MoI. The taskforce holds regular meetings, workshops, and consultation sessions, which have contributed to the development of the National Smart City Roadmap and Strategy. Through this taskforce, the Project's experts actively shared insights from Siem Reap, thereby increasing awareness on the city's progress.

- Smart JAMP[4]: The implementation period of the Project, including its data collection survey, partially overlapped with that of the Smart City supported by Japan ASEAN Mutual Partnership (Smart JAMP) initiatives. Under Smart JAMP, digital applications in the tourism sector were explored and an urban/tourism data platform was considered to integrate culture and technology in Siem Reap, thereby supporting the promotion of the Smart City Roadmap. To ensure coordination and harmonization between the two projects, regular JCC meetings were held, and the survey results were effectively shared and utilized. Through these efforts, the two projects were able to complement each other while maintaining a clear division of focus.
- ASEAN-Japan Smart Cities Network High-level Meeting: The Ministry of Land, Infrastructure, Transport, and Tourism has been holding face-to-face events since 2022, and the Project Manager and experts participated in all three events during the project period. At the meetings, the Project Manager introduced the activities of the Project.
- The 70th Anniversary of Friendship Between Japan and Cambodia: This project was officially registered as a 70th anniversary commemorative event. Furthermore, a JICA expert gave a presentation on the smart city project in the event entitled "70th Anniversary of Japan-Cambodia Friendship, Online Lecture Series".
- Collaboration with GIZ's Projects: Under the MoU (August 2023 to March 2025), the Project collaborated with GIZ's Improved Service Delivery for Citizens in Cambodia (ISD) and ASEAN Municipal Solid Waste Management Enhancement (AMUSE) on waste management in Siem Reap. This partnership includes awareness workshops, pilot projects across several communes, application development, and stakeholder coordination, fostering sustainable waste practices and community engagement.
- Trial of Smart City Assessment with ISO 37151+37153 (Surveyed by Japan's Ministry of Economy, Trade and Industry (METI)): Fujitsu Research Institute conducted a trial evaluation of Siem Reap's smart city progress using International Organization for Standardization (ISO) standards under Japan's METI program. The evaluation indicators were utilized to finalize the Smart City Roadmap.

(3) Coherence with International Frameworks

By establishing collaborative structures, the Project ensures that a wide range of stakeholders (government, private sector, academia, and community) participate in inclusive decision-making. This serves as a core aspect of Sustainable Development Goal (SDG) 11, which states, "Make cities and

[4] Smart JAMP (Smart City supported by Japan ASEAN Mutual Partnership): Launched by the Japanese government in December 2020 during the Japan-ASEAN Smart Cities Network (ASCN) High-Level Meeting, Smart JAMP supports smart city development across ASEAN.

human settlements inclusive, safe, resilient, and sustainable". Additionally, the pilot projects of the Project, such as illegal parking monitoring and waste management, make the city more livable by directly addressing urban safety and cleanliness. Through regular monitoring and data-driven analysis, the city can adapt and become more resilient against emerging challenges. Together, these elements exhibit the essence of SDG 11 by making Siem Reap an inclusive, safe, resilient, and sustainable city.

3.1.3 Effectiveness

Based on the following perspectives, the effectiveness of this Project is rated as "4".

(1) Level of Achievement of the Project Purpose

The four outputs achieved in the Project contributed to the achievement of the purpose of the Project ("Smart City Approach will be implemented to solve urban issues in Siem Reap"). The project purpose was achieved within the project period, as indicated in 2.2.2.

3.1.4 Efficiency

Based on the following perspectives, the efficiency of this Project is rated as "4".

(1) Project Cost

The project cost borne from the Japanese side was within the allocated budget.

(2) Project Period

The project period was within the planned period. The schedule of the Project is further detailed in 2.1.3.

(3) Causal Relationship

The activities and input were effective in achieving the outputs and the project purpose, in terms of timing, appropriate amount, and appropriate characteristics. As the Project progressed, and the scope of the pilot projects were fixed, experts that were relevant to the sector of each pilot project were dispatched as necessary. The budget for the pilot project was flexibly executed both from the long-term expert team, the consultant team, and the implementing agency, to meet the vast changing needs for urban environment improvement in Siem Reap.

3.1.5 Impact

Based on the following perspectives, the impact of this Project is rated as "3".

(1) Prospects to Achieve the Overall Goal

It is expected that the achievement of the purpose of the Project contributes to the achievement of the overall goal. When the overall goal is achieved, the activities conducted in Siem Reap can serve as a model that other provincial administrations can refer to. Hence, the achievement of the overall goal may influence the development plans of Cambodia. However, indicators to assess the achievement of the overall goal, especially those listed as examples in Indicator 1 "Urban environment indicators (number of tourists, environmental indicators, traffic congestion, etc.)", have the following difficulties:

- Some indicators, including the number of tourists, are hugely influenced by external factors. These factors include tourism activities related to private businesses in Siem Reap, ministerial tourism policies and measures of Cambodia and overseas countries, and the socio-economic situation of Cambodia and overseas countries[5].
- Some indicators, including environmental indicators, were not collected at the beginning of the Project or as of the date of submission of this report. Thus, it is difficult to assess improvements based on these indicators.

(2) Causal Relationship

The causal relationship between the overall goal and the project purpose is not straightforward. Although it is expected that the achievement of the project purpose will contribute to the achievement of the overall goal to a certain extent, as indicated in 3.1.5(1), there are various external factors that may significantly influence the achievement level of the overall goal.

(3) Ripple Effect

If the achievement of the project purpose is widely recognized as a leading example in Cambodia, positive ripple effects to the national smart city policies and provincial smart city policies in other provinces may occur. There are no expected negative ripple effects.

3.1.6 Sustainability

Based on the following perspectives, the sustainability of this Project is rated as "4".

(1) Policies and Systems

Since the organizational structures developed during the project period have been legally declared in written form by the implementing agency, it is anticipated that political and institutional backup has been secured for the sustainability of the Project's effect. Given that the activities launched during the

[5] For example, during the project period (2022-2025), the global situation of COVID-19, the institutional response (including quarantine measures) to COVID-19 of the royal government of Cambodia and other countries, and the post-pandemic response of tourism related private businesses have greatly affected the number of tourists.

Project align with the development needs of the area, it is anticipated that these activities will continue and expand. All activities launched in the pilot project have no institutional barriers for expansion.

(2) Organization and Structure of the Implementing Agency

By the end of the Project, the organization and structure of the implementing agency necessary to sustain the project effects (including responsibilities and structures within and between organizations, as well as availability of human resources) were established. The implementing agency has demonstrated sufficient ownership of the activities launched in the Project. However, as indicated in 4.4, the operational status of the activities launched in the Project need to be monitored.

(3) Technical Capacity of the Implementing Agency

By the end of the Project, the implementing agency demonstrated sufficient technical capacity by utilizing external resources to sustain the Project's effectiveness. The technologies used in the pilot projects are applicable to other fields, and the implementing agency possesses the technical capability to expand by utilizing external resources.

(4) Financial Capacity of the Implementing Agency

Based on the financial balance of the implementing agency (current status of securing public and private funding, maintenance budget allocation, etc.), it is highly likely that the financial resources necessary to sustain the effects of the Project will be secured in the future. The operation and maintenance budget for all systems developed in the pilot project of the Project is secured for 2025 and is expected to be secured from 2026 onwards.

3.2 Key Factors Affecting the Implementation and Outcomes

No risks affecting the implementation and outcomes were identified before or during the implementation of the Project.

3.3 Evaluation of the Results of the Project Risk Management

3.3.1 Results of the Risk Management

No risks affecting the implementation and outcomes were identified before or during the implementation of the Project.

3.3.2 Results of the Utilization of the Lessons Learnt from Previous Projects

Lessons learned from previous projects[6], its implications to the Project[7], and the results of its utilization are as follows.

Table 3.1: Lessons learned from Previous Projects and Implications to the Project

Project Name	Lessons learnt and implications to the Project	Results of utilization
The Project on Capacity Development in Urban Development Sector in Mongolia	In order to achieve legal and organizational improvements, it is important to establish an effective promotional system involving a wide range of stakeholders at the start of the Project. Similarly, collaboration among a broad range of stakeholders is essential to achieving the project goals. Therefore, in the early stages of the Project, the implementation structure is being built through consultations with related organizations, while applying past knowledge of smart city-related structure building.	In "Activity 1-2: Examination on Coordination and Cooperation Mechanisms Necessary to Implement the Siem Reap Smart City Approach " and "Activity 1-4: Establishment and Operation of Coordination and Cooperation Mechanisms", the JICA Expert Team held discussions with various relevant organizations to formulate the Smart City Secretariat and the Smart City Consortium.
The Project for Traffic Demand Management of Historical Area in Istanbul, Turkey	Periodic workshops and seminars held during the project implementation, especially for third parties, to share progress and receive comments, have led to the successful application of "smart parking" in other areas, which was conducted as a social experiment. Such workshops and seminars are effective in reflecting the results of social experiments and capacity building in actual measures. This lesson will also be applied to this Project when considering pilot projects.	In "Activity 4-2: Public Relations and Branding ", the JICA Expert Team and the implementing agency conducted various workshops and seminars for third parties to disseminate the outline of the activities conducted in the Project.

Source: JICA, Nippon Koei Co., Ltd.

3.4 Lessons Learnt

Below are the key lessons learned through the implementation of the Project.

(1) Significance of Updating the Relevant Planning Documents in the Early Stages of the Project

The Smart City Roadmap was updated in the first year of the Project and was approved one year after the beginning of the Project. Therefore, the Smart City Roadmap reflected the latest situation and needs in Siem Reap, and many activities in the Project became consistent with the Smart City Roadmap.

(2) Significance of Discussions between the JICA Expert Team and the Implementing Agency on Post-pilot Project Operation and Maintenance of the Systems Developed in the Pilot Projects

During the selection and planning of pilot projects, the JICA Expert Team and the implementing agency not only discussed and agreed on the pilot project implementation but also addressed the operation and maintenance structure and budgeting of the systems[8] after the pilot project period. These discussions

[6] According to the pre-implementation evaluation report of the Project.
[7] According to the pre-implementation evaluation report of the Project.
[8] The systems indicated in this paragraph include "illegal parking monitoring system", "document tracking system", "environmental monitoring system", and "Siem Reap smart city data platform".

resulted in a smooth handover of the systems developed in the pilot project from the JICA Expert Team to the implementing agency and led to the secure sustainability of the outcomes.

(3) The Significance of a Step-by-Step Agile Update Development of Systems Developed in the Pilot Project

Much of the pilot projects implemented in the Project included the development and trial usage of new systems. Through the trial usage during the implementation of the pilot projects, unforeseen issues for further expansion and usage were identified. During the Project, the JICA Expert Team and the implementing agency worked together to modify the systems step-by-step and perform agile development of the system with outsourced companies. This led to more effective system development and better outcome in the Project[9].

(4) The Significance of Collaboration between Private and Academic Organizations for Effective Public Relations

During the project period, the JICA Expert Team and the implementing agency had discussions and exchanged information with various entities in the private, public, and academic sectors related to smart city. This opened up multiple opportunities for the JICA Expert Team and the implementing agency to disseminate the activities and achievements of the Project in certain events[10].

(5) The Significance of Iteratively Defining "Value" under the Siem Reap Smart City Approach

During the project period, the Siem Reap Smart City Approach was clarified as a comprehensive initiative that leverages digital technology to create a sustainable, attractive society for both residents and tourists. By adopting a small-start strategy, the pilot projects successfully delivered tangible improvements in local capacity and stakeholder engagement, thereby generating a measurable value. However, as the concept of "value" can vary depending on the focus and stakeholders of each initiative, it is important to continuously reassess and redefine the concept of "value" in each phase of development.

3.5 Performance

Below are significant contributions from external organizations to support the achievement of the project purpose.

- The Ministry of Interior of the Kingdom of Cambodia played a key role by actively engaging in discussions on institutional measures to establish effective coordination mechanisms.

[9] For the following projects, further expansion was carried out after the completion of the pilot phase and the handover to the counterpart: Pilot Project (4): Government Internal Document Tracking, Pilot Project (7): Smart Waste Collection and Transportation, Pilot Project (8): Data Platform System Development
[10] The list of events is shown in Table 2.8.

- The Embassy of Japan in Cambodia contributed by participating in project events, sharing relevant information with experts, and delivering speeches to counterparts.
- The Consular Office of Japan in Siem Reap emphasized the Project's significance as a symbol of mutual partnership between the Kingdom of Cambodia and Japan.
- The Ministry of Land, Infrastructure, Transportation, and Tourism of Japan contributed to promoting the Project's activities and outcomes by providing opportunities for presentations to the implementing agency on several occasions, including the ASEAN-Japan Smart Cities Network High-level Meeting.
- The Infrastructure Management Department and the Yokohama Center of JICA contributed to the technical capacity development of the implementing agency and officers of related organizations by providing opportunities to join the Knowledge Co-creation Program, "Methodology and Approaches to Realize Smart City".
- The Infrastructure Management Department of JICA contributed to the promotion of the Project's activities and outcomes by providing presentation opportunities to the implementing agency at the Asia-Africa Knowledge Sharing Seminar for Smart Cities.
- Takamatsu City of Japan contributed to the technical development of the implementing agency and officers of related organizations by conducting online lectures and consulting sessions.
- GIZ contributed to the dissemination of the Project's activities and outcomes by providing presentation opportunities to the JICA Expert Team and the implementing agency on several occasions in Siem Reap.
- Members of the Cambodia Smart City Task Force—comprising the Ministry of Interior of the Kingdom of Cambodia, GIZ, UN-Habitat, and UNOPS—contributed by providing opportunities for the JICA Expert Team to provide recommendations on national smart city policy/guideline, which is one of the activities to achieve Output 4.

3.6 Additionality

As indicated in 3.1.2, the Project collaborated with various stakeholders, including other JICA projects and initiatives. This would not have been possible without the presence of JICA and its dedication to development in Cambodia over the past decades.

Chapter 4 For the Achievement of Overall Goals After the Project Completion

4.1 Prospects to Achieve the Overall Goal

There is a good probability that the overall goal will be achieved. However, the indicators used to assess the achievement of the overall goal, especially those listed as examples under indicator 1 "Urban environment indicators (number of tourists, environmental indicators, traffic congestion, etc.)", present the following difficulties:

- Some indicators, including the number of tourists, are hugely influenced by external factors such as the tourism activities of private businesses in Siem Reap, ministerial tourism policies and measures of Cambodia and overseas countries, and socio-economic situation of Cambodia and other countries.
- Some indicators, including environmental indicators, were not clearly identified and collected at the beginning of the Project or as of the date of this report's submission. Thus, it is difficult to assess the improvements of these indicators.

Therefore, Indicator 1 "Urban environment indicators (number of tourists, environmental indicators, traffic congestion, etc.)" requires careful discussions to determine which specific indicators should be adopted.

4.2 Plan of Operation and Implementation Structure of the Cambodian Side to Achieve the Overall Goal

4.2.1 Plan of Operation

The implementation agency and relevant authorities shall continue smart city-related activities as stipulated in the Smart City Roadmap. Detailed actions for each year shall be planned and specified in the annual action plans.

4.2.2 Implementation Structures

- Smart City Secretariat (or Smart City Division in SRPA, which may be established in the future): Responsible for promoting smart city-related activities within SRPA
- Smart City Committee: Facilitates inter-organizational discussions and decision-making within the public sector in Siem Reap
- Smart City Consortium: Facilitates inter-organizational discussions and decision-making among the public, private, academic sector, and the community in Siem Reap

4.3 Recommendations for the Cambodian Side

It is recommended for the Cambodian side to review and update the contents of the Smart City Roadmap (especially the sections related to the priority projects for implementation over the next five years), to ensure that the document reflects the current situation of Siem Reap. The updated Roadmap should also take into account emerging urban issues beyond what is indicated in the current version, as well as areas within existing sectors that still require continued attention.

4.4 Monitoring Plan from the End of the Project to Ex-post Evaluation

JICA, through the Infrastructure Management Department and/or Cambodia Office, is recommended to conduct annual monitoring of the operational status of the various initiatives launched under the Project, such as organizational structure, systems developed under the pilot project, through interviews with SRPA.

Siem Reap Provincial Administration

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap

Project Completion Report

Annexes Volume - I

May 2025

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

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JR
25-008

Siem Reap Provincial Administration

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap

Project Completion Report

Annex (I)
Result of the Project

May 2025

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap
< Project Completion Report Annex (I): Result of the Project >

Table of Contents

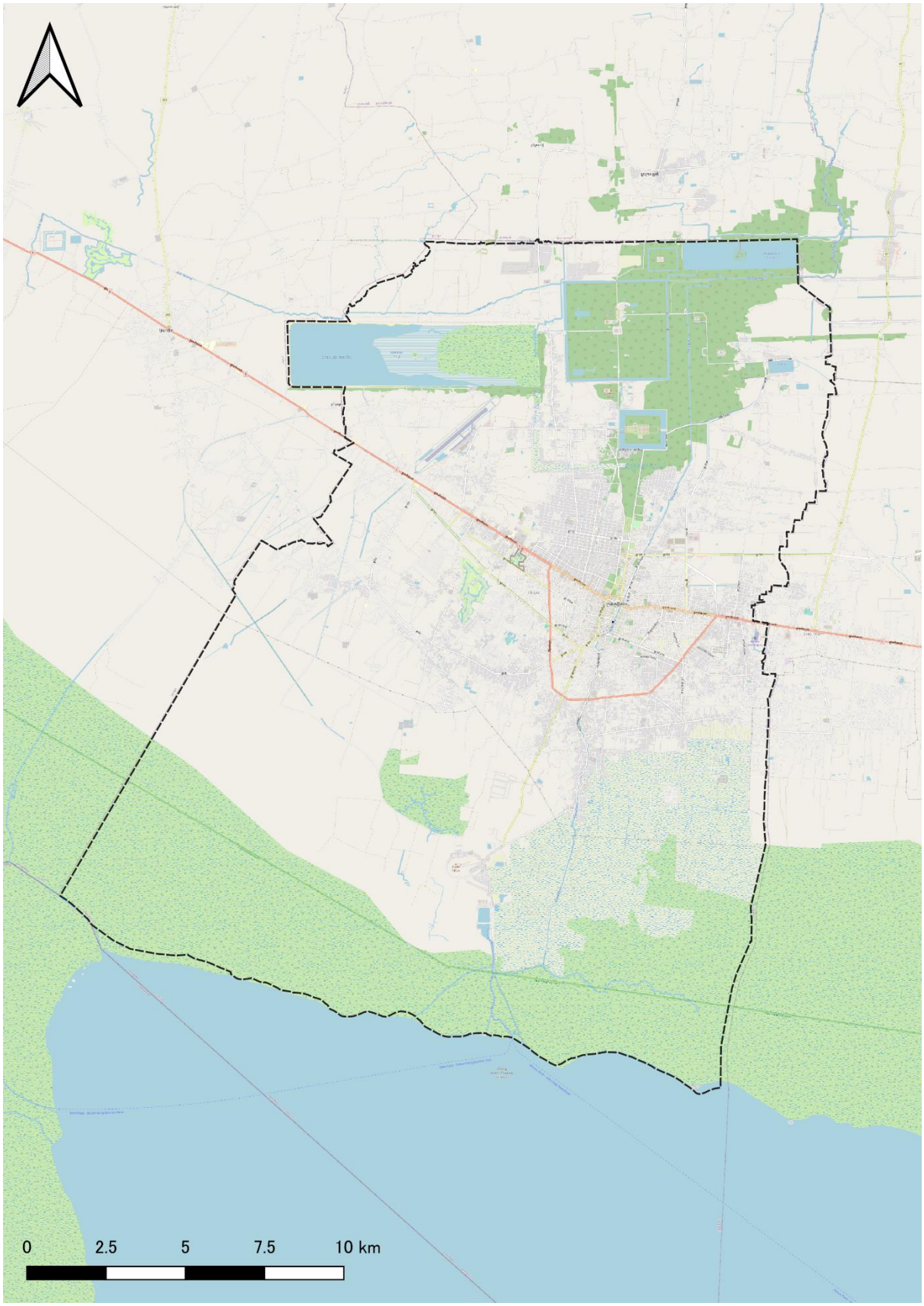
List of Figures

List of Tables

List of Abbreviations

Abbreviation	Official Term
AD	Administration Division
ADB	Asian Development Bank
AMUSE	The ASEAN Municipal Solid Waste Management Enhancement Project
API	Application Programming Interface
APSARA National Authority	Authority for the Protection of the Site and the Management of the Region of Angkor
ASCN	The ASEAN Smart City Network
ASEAN	The Association of South-East Asian Nations
AWS	Amazon Web Services
CADT	Cambodia Academy of Digital Technology
CCTV	Closed-Circuit Television
The Consortium	The Smart City Consortium
COVID-19	The Novel Coronavirus
Data Collection Survey	Data Collection Survey on Urban Improvement in Siem Reap City
DCFA	Siem Reap Provincial Department of Culture and Fine Arts
DLMUPC	Siem Reap Provincial Department of Land Management, Urban Planning and Construction
DoE	Siem Reap Provincial Department of Environment
DoI	Siem Reap Provincial Department of Information
DoP	Siem Reap Provincial Department of Planning
DoT	Siem Reap Provincial Department of Tourism
DPTC	Siem Reap Provincial Department of Post and Telecommunications
DPWT	Siem Reap Provincial Department of Public Works and Transport
DTS	Document Tracking System
EV	Electrical Vehicle
GAEA	Global Action for Environmental Awareness
GIZ	The German Corporation for International Cooperation
GDP	Gross Domestic Product
GPS	Global Positioning System
ISD	The Project for Improved Service Delivery for Citizens in Cambodia
IT	Information Technology
ITEE	Information Technology Engineers Examination
JASA	JSA and APSARA Safeguarding Angkor
JCM	Joint Crediting Mechanism
JSA	The Japanese Government Team for Safeguarding Angkor
JAXA	The Japan Aerospace Exploration Agency
JCC	Joint Coordination Committee
JCI ASPAC	The Junior Chamber International Asia Pacific
JICA	The Japan International Cooperation Agency
KGI	Key Goal Indicator
KPI	Key Performance Indicator
LLMs	Large Language Models
LoRaWAN	Long-Range Wide Area Network
MLIT	The Ministry of Land, Infrastructure, Transport and Tourism of Japan

Abbreviation	Official Term
MLMUPC	The Ministry of Land Management, Urban Planning and Construction of the Kingdom of Cambodia
MoE	The Ministry of Environment of the Kingdom of Cambodia
MoI	The Ministry of Interior of the Kingdom of Cambodia
MOU	Memorandum of Understanding
MPTC	The Ministry of Post and Telecommunication of the Kingdom of Cambodia
MPWT	The Ministry of Public Works and Transportation of the Kingdom of Cambodia
NLP	Natural Language Processing
NUM	The National University of Management
ODA	Official Development Assistance
PDM	Project Design Matrix
PDO	Protocol and Documentation Office
PoC	Proof of Concept
The Project	The Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap
PPP	Public-Private Partnership
QCBS	Quality and Cost-Based Selection
R/D	Record of Discussions
SCALe	Smart City ASEAN Learning Network
SDGs	Sustainable Development Goals
SPC	Special Purpose Company
SPV	Special Purpose Vehicle
SRPA	The Siem Reap Provincial Administration
SSDaP	Siem Reap Smart Data Platform
T&M survey	Time and Motion survey
TWG	Technical Working Group
UN-Habitat	The United Nations Human Settlements Programme
UNIDO	The United Nations Industrial Development Organization
UNOPS	The United Nations Office for Project Services
USD	United States Dollars



Source: Nippon Koei Co., Ltd. (Unless noted otherwise, base maps by the JICA Expert Team are from OpenStreetMap and OpenStreetMap Foundation, and the administrative boundary data is from Siem Reap Provincial Administration)

Figure: Map of Siem Reap

Chapter 1 Outline of the Project

1.1 Background

Cambodia experienced consistent economic growth of over 7% annually from 2012 to 2019, beginning with a recorded gross domestic product (hereinafter referred to as "GDP") growth rate of 7.3% in 2012. In July 2016, the country achieved lower middle-income status. However, the economy was impacted by the novel coronavirus (hereinafter referred to as "COVID-19") since 2020. In response, Cambodia is working on an intensified infrastructure and human resource development to become an upper middle-income country by 2030 for the benefit of the next generation.

Siem Reap City, the capital of Siem Reap province, is a tourism-driven urban center and home to the World Heritage Site of Angkor. As of 2019, the city had a population of approximately 245,000, yet the number of visitors reached approximately 2.86 million per year as of 2010 and 4.26 million as of 2019, accounting for 70% of all foreign tourists in Cambodia visiting this city. Despite this growth in tourism, infrastructure and social services struggled to cope with this increase. Worsening traffic congestion due to the rapid rise in the number of automobiles, environmental degradation caused by increased waste and sewage emissions, and rising crime have contributed to the deterioration of urban life and the urban environment for both citizens and tourists. Due to the impact of COVID-19, Cambodia's overall tourism in 2020 saw an 80.2% decreased in tourist arrivals (from approximately 6.61 million to 1.3 million) and a 79.4% drop in tourism revenue (from USD 4.9 billion to USD 1 billion). These declines have had significant implications from both economic and labor perspectives. Looking ahead, the number of tourists in Siem Reap Province is expected to increase to approximately 18 million annually by 2035, according to the Tourism Development Master Plan Siem Reap (2021-2035). Additionally, it is essential to analyze both the existing issues and emerging challenges resulting from COVID-19 and to improve the urban environment to meet the diverse demands of future tourists in the post-pandemic era.

Siem Reap Province began its smart city momentum in 2018, when the city was selected as Cambodia's Smart City Demonstration City in conjunction with the adoption of the Association of Southeast Asian Nations (hereinafter referred to as "ASEAN") Smart City Network (hereinafter referred to as "ASCN") framework document at the ASEAN Summit. In 2019, the Siem Reap Provincial Administration (hereinafter referred to as "SRPA") established the Smart City Committee. Subsequently, in 2021, the central government established the Smart City Coordination Committee, composed of the heads of Cambodian ministries and agencies, with the approval of the Prime Minister Despite the clearly defined roles and responsibilities of each organization, both committees have made no progress in implementing concrete activities. Furthermore, collaboration with private sectors and academic institutions, which are actors that should be incorporated in the promotion of smart city, has yet to begin.

Under these circumstances, SRPA requested for technical cooperation from the Government of Japan to address the urban challenges under the smart city framework. In response, the Japan International Cooperation Agency (hereinafter referred to as "JICA") conducted the "Data Collection Survey on Urban Improvement in Siem Reap City" (hereinafter referred to as "the Data Collection Survey") from February 2020 to February 2022. The Data Collection Survey identified the need to strengthen capacity building of relevant agencies by supporting public sector organizational structuring and public-private partnership (hereinafter referred to as "PPP") for the promotion of smart cities and the implementation of smart technologies, together with a proposed roadmap for the smart city in Siem Reap.

"The Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap" (hereafter referred to as "the Project") aims to address specific urban issues through the application of smart technologies, while simultaneously strengthening administrative systems and building partnerships with private companies. Doing so enables relevant authorities to gain experience and establish the foundation for realizing a smart city. As Siem Reap City is a built-up city, the Project emphasizes the implementation of a smart city approach, which involves various stakeholders, such as citizens, public organizations, private companies, and academic institutions. This approach focuses on solving existing urban issues and enhancing urban management through the appropriate use of smart technologies.

1.2 Basic Items of the Project

The following are the basic items of this project.

1.2.1 Overall Goal

A better urban environment in Siem Reap is realized with the Smart City Approach.

1.2.2 Project Objective

To implement the Smart City Approach to solve urban issues in Siem Reap.

1.2.3 Expected Outputs

- Output 1: The Smart City Roadmap is formulated and cooperation among relevant organizations is established
- Output 2: Implementation process of the Smart City Approach is established through trial measures to solve urban issues
- Output 3: Establishment of a monitoring and evaluation system for the Smart City Approach
- Output 4: Promotion of the implementation of the Smart City Approach

1.2.4 Project Site / Target Area

- Siem Reap City and surrounding areas

1.2.5 Beneficiaries

- Direct beneficiaries: SRPA officials, government officials
- Ultimate beneficiaries: Citizens of Siem Reap and tourists

1.2.6 Implementation Period

- May 2022 – May 2025

1.2.7 Partner Organizations

(1) Implementing Agency (Main Counterpart)

- Siem Reap Provincial Administration (SRPA)

(2) Related Authorities

- The Ministry of Interior (hereinafter referred to as "MoI")
- Siem Reap Provincial Department of Public Works and Transport (hereinafter referred to as "DPWT")
- Siem Reap Provincial Department of Environment (hereinafter referred to as "DoE")
- Siem Reap Provincial Department of Post and Telecommunications (hereinafter referred to as "DPTC")
- Siem Reap Provincial Department of Land Management, Urban Planning and Construction (hereinafter referred to as "DLMUPC")
- Siem Reap Provincial Department of Tourism (hereinafter referred to as "DoT")
- Siem Reap Provincial Department of Planning (hereinafter referred to as "DoP")
- Siem Reap Provincial Department of Culture and Fine Arts (hereinafter referred to as "DCFA")
- Siem Reap Provincial Department of Information (hereinafter referred to as "DoI")[1]
- Authority for the Protection of the Site and the Management of the Region of Angkor (hereinafter referred to as "APSARA National Authority")
- Angkor Enterprise
- Siem Reap Provincial Police
- Siem Reap Military Police
- Siem Reap City Hall

[1] DoI was added to the project stakeholders during the Project's implementation period, corresponding to the establishment of the proposed new Siem Reap Smart City Secretariat.

Chapter 2 Overall Activities

Here, the overall activities are listed.

2.1 Joint Coordination Committee

The JCC is the highest-level decision-making body in the Project, with the roles as follows;

- Review of project progress
- Supervision, evaluation, and approval of the project plan
- Approval of the project's regular activity plan
- Appointment of JCC members
- Exchange of views on key subjects

2.1.1 The 1st JCC Meeting

The 1st JCC meeting was held on the 24th May, 2022 at the meeting room in Siem Reap Provincial Hall.

Table 2.1.1: Information of the 1st JCC Meeting

Date/Time	24th May, 2022 9:00 ~ 11:00
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Governor (H.E. Mr. Tea Seiha)
Attendees	SRPA, APSARA National Authority, Provincial departments, Siem Reap City Hall, JICA Expert Team
Discussion Points	• Work plan of the Project

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd., SRPA

Figure 2.1.1: The 1st JCC Meeting

Below are the main points agreed on in the 1st JCC meeting.

- The implementation structure and the contents of the Project

- The existing Record of Discussions (hereinafter referred to as "R/D"), that includes annexes that determine the Project contents, shall be modified within 12 months (by April 2023) as necessary, based on the planned activities and discussion.
- The 2nd JCC will be held in October 2022 to discuss the progress of the Project.
- By the time of the 2nd JCC, Project Expert Team shall prepare the list of candidate sister city, which has similar characteristics in relation to smart city.

2.1.2 The 2nd JCC Meeting

The 2nd JCC meeting was held on the 31st October, 2022 at the meeting room in Siem Reap Provincial Hall.

Table 2.1.2: Information of the 2nd JCC Meeting

Date/Time	31st October, 2022, 2022 9:00 ~ 12:00
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Ms. Manny Raingsey)
Attendees	SRPA, Ministry of Interior, APSARA National Authority, Provincial departments, Siem Reap City Hall, MLIT, JICA, JICA Expert Team
Discussion Points	• Progress of activities

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd., SRPA

Figure 2.1.2: The 2nd JCC Meeting

Below are the main points agreed on in the 2nd JCC meeting.

- The 3rd JCC will be held jointly with Siem Reap Smart City Committee in February or March 2023.
- The SRPA and the JICA Expert Team will initiate a discussion with the Ministry of Interior for further cooperation regarding the national smart city roadmap.
- All JCC members confirmed the main points of draft final version of Siem Reap Smart City Roadmap as the JICA Expert Team explained. All JCC members will make an additional comment on the Roadmap by the end of November 2022 if any. SRPA and the JICA Expert Team will coordinate the discussion with other stakeholders on the Siem Reap Smart City Roadmap, such as the central government and other development partners. SRPA and the JICA Expert Team will

modify the contents of the Siem Reap Smart City Roadmap based on the comments and further discussion with the stakeholders. After integrating the comments from JCC and the discussion, the Siem Reap Smart City Roadmap will be finalized in the 3rd JCC.

- The six pilot projects proposed by the SRPA and the JICA Expert Team were approved in terms of contents, implementation structure (key stakeholder and roles), approximate cost, and schedule. If there are any adjustments according to further preparation, it can be made with the approval of the Project Director, Project Manager (the Deputy Governor of Siem Reap Province), or the chair of the Technical Working Group of the Project (Administration Director).
- Establishment of the Siem Reap Smart City Consortium was confirmed.
- The contents of the city collaboration and candidate cities were agreed by the JCC members. SRPA and the JICA Expert Team will initiate a dialogue with the candidate cities.

2.1.3 The 3rd JCC Meeting

The 3rd JCC meeting was held on the 2nd March, 2023 at the meeting room in Siem Reap Provincial Hall.

Table 2.1.3: Information of the 3rd JCC Meeting

Date/Time	2nd March, 2023
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Mr. Yun Linne)
Attendees	SRPA, APSARA National Authority, Provincial departments, Siem Reap City Hall, JICA Expert Team
Discussion Points	• Revision of the roadmap • Progress of the implementation of the pilot project

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd.

Figure 2.1.3: The 3rd JCC Meeting

Below are the main points agreed in the 3rd JCC meeting.

- All JCC members agreed to finalize the updated Siem Reap Smart City Roadmap. The roadmap will be updated as needed.

- SRPA and the JICA Expert Team will continue the discussion with MoI for further cooperation on the national smart city roadmap.
- The progress of the 1st round of pilot projects was confirmed.
- The direction of city collaboration has been agreed by the JCC members. SRPA and the JICA Expert Team will continue the discussion with Takamatsu City.

2.1.4 The 4th JCC Meeting

The 4th JCC meeting was held on the 5th September, 2023.

Table 2.1.4: Information of the 4th JCC Meeting

Date/Time	5th September, 2023
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Mr. Yun Linne)
Attendees	SRPA, APSARA National Authority, Provincial departments, Siem Reap City Hall, JICA Expert Team

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd., SRPA

Figure 2.1.4: The 4th JCC Meeting

Below are the main points discussed in the 4th JCC meeting.

- The reorganized Project's framework is to be explained and approved. The Project's framework included, (a) Project Design Matrix (hereinafter referred to as "PDM"), (b) Plan of Operation (hereinafter referred to as "PO"), (c) Project Implementation Structure, (d) List of Members of the JCC.
- The direction of the publication of Siem Reap Smart City Roadmap is to be confirmed. (Output 1)
- Effective implementation structures including the roles of each smart city related organization are to be proposed and confirmed (Output 1).
- The progress of the contribution to the smart city initiatives at the national level, the capacity development and the City-to-City Collaborations are to be reported and confirmed (Output 4).
- The draft Smart City Annual Action Plan of the Smart City Roadmap Priority Projects is to be confirmed. (Output 2)

- The progress of the pilot projects of the Project is to be confirmed (Output 2).
- The additional pilot projects were proposed, and their direction is to be approved (Output 2).
- The monitoring structure for the Smart City Annual Action Plan is to be confirmed (Output 3).
- The 5th JCC will be held jointly with Siem Reap Smart City Committee in February or March, 2024.

2.1.5 The 5th JCC Meeting

The 5th JCC meeting was held on the 5th March, 2024.

Table 2.1.5: Information of the 5th JCC Meeting

Date/Time	5th March, 2024
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Mr. Yun Linne)
Attendees	SRPA, APSARA National Authority, Provincial departments, Siem Reap City Hall, JICA Expert Team

Source: Nippon Koei Co., Ltd.

Source: SRPA

Figure 2.1.5: The 5th JCC Meeting

Below are the main points discussed in the 5th JCC meeting.

- The contents of the updated mechanism for the smart city implementation were confirmed. (Output 1, 2 and 3)
- Activities on Smart City Promotion and Capacity Development were confirmed (Output 3 and 4)
- The Smart City Annual Action Plan of 2024 of the Smart City Roadmap was confirmed. (Output 2 and 3)
- The Draft Smart City Annual Action Plan of 2025 of the Smart City was confirmed. (Output 2 and 3)
- The progress of the pilot projects of the Project was confirmed (Output 2).
- The 6th JCC will be held jointly with Siem Reap Smart City Committee in August or September 2024.

2.1.6 The 6th JCC Meeting

The 6th JCC meeting was held on 19th September 2024.

Table 2.1.6: Information of the 6th JCC Meeting

Date/Time	19th September, 2024
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Mr. Yun Linne)
Attendees	SRPA, APSARA National Authority, Provincial departments, Siem Reap City Hall, JICA Expert Team

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd.

Figure 2.1.6: The 6th JCC Meeting

Below are the main points discussed in the 6th JCC meeting.

- The mechanism of the smart city implementation including the institutional structure, action plan for Siem Reap Smart (Output 1, 2 and 3)
- The updated smart city annual action plan of 2025 of Siem Reap Smart (Output 2 and 3)
- The progress of the pilot projects of the Project (Output 2).
- Activities on smart city promotion and capacity development (Output 3 and 4)
- The items to be followed (Output 1, 2, 3, 4)
- The schedule of the final JCC meeting, to be held jointly with Siem Reap Smart City Committee

2.1.7 The 7th JCC Meeting

The 7th JCC meeting was held on 5th March 2025.

Table 2.1.7: Information of the 7th JCC Meeting

Date/Time	5th March, 2025
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Mr. Yun Linne)
Attendees	SRPA, APSARA National Authority, Provincial departments, Siem Reap City Hall, JICA Expert Team

Source: Nippon Koei Co., Ltd.

Below are the main points discussed in the 7th JCC meeting.

- Confirmed the overall structure of the Project's objectives, outcomes, and activities as outlined in the PDM and verified that the Project successfully achieved its stated objective and outcomes.
- Agreed to continue developing and updating an annual action plan aligned with the Smart City Roadmap, and to conduct monitoring in accordance with this plan to ensure ongoing improvements and adaptability.
- Verified the successful conclusion of all pilot projects implemented during the Project.
- Confirmed the draft results of the review of the project based on the DAC evaluation criteria
- Identified and discussed the lessons learned from the Project's outcomes, acknowledging their importance for applying the recommendations to future initiatives.

Source: SRPA, Nippon Koei Co., Ltd.

Figure 2.1.7: The 7th JCC Meeting

2.2 Technical Working Group

The Technical Working Groups (hereinafter referred to as "TWG"s) were formed in accordance with specific activities led by the SRPA and the JICA Expert Team. During the 1st JCC meeting, all JCC members confirmed that TWG plays a key role on the daily base activities and the TWG makes initial examination and preparation, and report to the Project Director accordingly. It is also confirmed that the TWG Chair will report to the JCC for the endorsement of the examinations, proposals, and activities done by TWGs. Each related organization will nominate related staff to TWG. The details of the TWG are as below.

- Chair: Siem Reap Administration Director
- Mandate:
  - Holding a regular meeting related to the Project.
  - Examining and proposing of the contents of the pilot project(s) which will be done in the Project.
  - Establishing and managing the task forces for implementation of the Project's activities as necessary.

- Monitoring: TWG will inform the progress to the Project Director and the JCC members accordingly, and the Project Director and the JCC members will give necessary approvals to TWG.

From the 4th JCC, the TWGs are separately organized by the smart city secretariat in accordance with the pilot projects. The TWG meetings were held as follows.

Table 2.2.1: TWG Meetings

Name of meeting	Date	Contents
1st TWG Meeting	28th June, 2022	• (Output 1) The update of the Smart City Roadmap
2nd TWG Meeting	21st July, 2022	• (Output 2) Discussions on the 1st round of pilot projects • (Output 2) Details of the pre-pilot project
3rd TWG Meeting	23rd August, 2022	• (Output 1) Reports of interest by the Ministry of Interior towards smart city • (Output 2) Proposals of the 1st round of pilot projects
4th TWG Meeting	21st October, 2022	• (Output 1) The update of the Smart City Roadmap • (Output 2) Detailed proposals of the 1st round of pilot projects • (Output 4) City collaboration
5th TWG Meeting	23rd November, 2022	• (Output 1) Lecture on data management policies and facilities • (Output 4) Report of the academia workshop
6th TWG Meeting	6th February, 2023	• (Output 1) The update of the Smart City Roadmap • (Output 2) Report of the progress of the pilot projects • (Output 4) Presentation by Takamatsu city
7th TWG Meeting	21st February, 2023	• (Output 1) The finalized Smart City Roadmap • (Output 2) Report of the progress of the pilot projects • (Output 4) Directions of the city collaboration with Takamatsu city
8th TWG Meeting	31st March, 2023	• (Output 2) Discussions on the illegal parking monitoring pilot project
9th TWG Meeting	16th May, 2023	• (Output 2) Discussions on the urban environment monitoring pilot project
10th TWG Meeting	24th August, 2023	• (Output 2) Discussions on the illegal parking monitoring pilot project
11th TWG Meeting	7th September, 2023	• (Output 2) Discussions on the illegal parking monitoring pilot project
12th TWG Meeting	14th September, 2023	• (Output 2) Discussions on the illegal parking monitoring pilot project
13th TWG Meeting	19th October, 2023	• (Output 2) Discussions on the data platform system development pilot project
14th TWG Meeting	16th November, 2023	• (Output 2) Discussions on the illegal parking monitoring pilot project and the document tracking system pilot project
15th TWG Meeting	27th December, 2023	• (Output 2) Discussions on the solid waste collection pilot project
16th TWG Meeting	26th January, 2024	• (Output 2) Discussions on the overall progress of the pilot projects
17th TWG Meeting	20th February, 2024	• (Output 2) Discussions on the solid waste collection pilot project
18th TWG Meeting	28th March, 2024	• (Output 2) Discussions on the solid waste collection pilot project
19th TWG Meeting	10th May, 2024	• (Output 2) Discussions on the illegal parking monitoring pilot project
20th TWG Meeting	20th May, 2024	• (Output 2) Discussions on the data platform system development pilot project
21st TWG Meeting	28th May, 2024	• (Output 2) Discussions on the solid waste collection pilot project
22nd TWG Meeting	3rd June, 2024	• (Output 2) Discussions on the solid waste collection pilot project
23rd TWG Meeting	17th June, 2024	• (Output 2) Discussions on the solid waste collection pilot project
24th TWG Meeting	20th June, 2024	• (Output 2) Discussions on the illegal parking monitoring pilot project
25th TWG Meeting	10th September, 2024	• (Output 2) Discussions on the illegal parking monitoring pilot project
26th TWG Meeting	26th November, 2024	• (Output 2) Discussions on the data platform system development pilot project • (Output 4) Discussions on data management

Source: Nippon Koei Co., Ltd.

Following the 6th JCC, the TWGs were officially positioned within the framework of the Smart City Consortium. This structure ensures the continued operation of the TWGs beyond the project's completion. Further details on the future operational structure are provided in 3.4.5.

2.3 Individual Meetings with Relevant Stakeholders

2.3.1 Meetings with the Public Sector

Meetings with the public sector (including those of other countries and donors) were held during the Project as follows.

Table 2.3.1: Meetings with the Public Sector

Date	Organization	Discussion Points
16th May, 2022	SRPA (Project Core Team)	• Work plan of the Project
23rd May, 2022	DoT	• Work plan of the Project
23rd May, 2022	DPWT	• Work plan of the Project
23rd May, 2022	DPTC	• Work plan of the Project
23rd May, 2022	Siem Reap Provincial Police	• Work plan of the Project
26th May, 2022	SRPA (Project Core Team)	• Work plan of the Project
26th May, 2022	APSARA National Authority	• Work plan of the Project
27th June, 2022	Ministry of Public Works and Transport	• Data center installation plans
15th July, 2022	SRPA (Project Core Team)	• Plans for the next TWG meetings
15th July, 2022	SRPA (Project Core Team)	• Implementation of the pre-pilot project and infrastructure inside the provincial hall
29th July, 2022	DoT	• Tourism statistics management
29th July, 2022	SRPA (Administration Division)	• Branding and promotion using SNS
1st August, 2022	SRPA (Project Core Team)	• Branding and promotion strategies
2nd August, 2022	DoE	• Waste management pilot project
3rd August, 2022	SRPA (Administration Division)	• Internal document tracking pilot project
4th August, 2022	Ministry of Public Works and Transport	• CCTV cameras installation plans
15th August, 2022	Consular Office of Japan in Siem Reap	• Outline of the Project
15th August, 2022	DoE Siem Reap City Hall	• Waste management pilot project
16th August, 2022	DoT	• Tourism statistics digitalization pilot project
19th August, 2022	DoT	• Tourism statistics digitalization pilot project
22nd August, 2022	SRPA (Project Core Team)	• Plans for the next TWG meetings
23rd August, 2022	DPTC	• Data security policies
24th August, 2022	SRPA (Administration Division)	• Telecommunication network inside the provincial hall
25th August, 2022	GIZ	• Outline of the Projects
29th August, 2022	DoT	• Tourism statistics digitalization pilot project
2nd September, 2022	DoT	• Tourism statistics digitalization pilot project
13th October, 2022	Siem Reap Provincial Police	• CCTV pilot project
18th October, 2022	SRPA (Project Core Team)	• Plans for the next TWG meetings
2nd November, 2022	SRPA (Deputy Governor)	• Progress of the project
3rd November, 2022	Siem Reap City Hall	• Waste management pilot project
18th November, 2022	SRPA (Administration Division)	• Internal document tracking pilot project
8th December, 2022	Ministry of Environment	• Waste management pilot project
6th February, 2023	GIZ	• Waste management pilot project
6th February, 2023	SRPA Siem Reap City Hall DoE	• Waste management pilot project
13th February, 2023	SRPA Siem Reap City Hall DoE	• Waste management pilot project
15th February, 2023	DoT	• Tourism statistics digitalization pilot project
6th March, 2023	Consular Office of Japan in Siem Reap	• Courtesy Call
22nd March, 2023	MPTC	• Internal document tracking pilot project
28th March, 2023	DoT	• Tourism statistics digitalization pilot project
29th March, 2023	APSARA National Authority	• Training in Japan
30th March, 2023	Takamatsu City	• Training in Japan
5th/25th, April, 2023	Takamatsu City	• Training in Japan and collaboration with SPRA

Date	Organization	Discussion Points
7th April, 2023	SRPA	• Internal document tracking pilot project explanation meeting
19th April, 2023	Kakogawa City	• Training in Japan
19th April, 2023	Pangea LLC, Kamikatsu town	• Training in Japan
20th April, 2023	APSARA National Authority	• Urban environment monitoring pilot project
26th April, 2023	SRPA	• Internal document tracking pilot project explanation meeting
10th, May, 2023	SRPA Siem Reap City Hall APSARA National Authority	• Training in Japan
8th, May, 2023	Counsellor of the Cabinet office of Japan	• Training in Japan
15th May 2023	SRPA	• Internal document tracking pilot project explanation meeting
18th May 2023	MPTC	• Data Management
23rd May, 2023	SRPA (Administration Division)	• Internal document tracking pilot project
29th May, 2023	SRPA Siem Reap City Hall DoE	• Waste management pilot project report
14th June, 2023	GIZ	• MOU on the collaboration between JICA and GIZ
16th June, 2023	SRPA	• finalization of PDM, Smart City Progress Evaluation and others
27th June, 2023	GIZ	• Cooperation with the government data platform (MIS)
28th June, 2023	Phnom Penh Municipal Administration	• Inspection of Traffic Control Center
29th June, 2023	APSARA National Authority	• Urban environment monitoring pilot project
18th July, 2023	JICA volunteer	• Possibility of future cooperation
20th July, 2023	DPWT	• Sewage treatment plant
28th July, 2023	GIZ	• MOU on the collaboration between JICA and GIZ
18th August, 2023	DoT	• Tourism statistics digitalization pilot project
28th August, 2023	SRPA	• Additional pilot projects
31st August, 2023	SRPA	• Pre-JCC meeting
13th September, 2023	SRPA	• Progress of the pilot projects
21st September, 2023	SRPA	• Explanation of the document tracking system
18th October, 2023	SRPA Siem Reap Provincial Police	• Explanation of the illegal parking monitoring system
20th October, 2023	DPWT DoT	• Data platform development pilot project
13th November, 2023	SRPA	• Additional features of the document tracking system
14th November, 2023	Siem Reap Provincial Police	• Usage situation of the illegal parking monitoring system
6th December, 2023	SRPA	• Explanation of the document tracking system
14th December, 2023	Ministry of Environment	• Waste collection improvement pilot project
15th December, 2023	GIZ	• Waste collection improvement pilot project
19th December, 2023	GIZ	• Waste collection improvement pilot project
3rd January, 2024	SRPA	• Data platform development pilot project
18th January, 2024	SRPA	• Logo usage terms
18th January, 2024	APSARA National Authority	• Urban environment monitoring pilot project sensor implementation
24th January, 2024	APSARA National Authority	• Urban environment monitoring pilot project sensor implementation
24th January, 2024	SRPA	• Operation and maintenance of the document tracking system
30th January, 2024	SRPA	• Data platform development pilot project
9th February, 2024	GIZ	• Waste collection improvement pilot project
14th February, 2024	GIZ	• Waste collection improvement pilot project
7th March, 2024	Siem Reap Provincial Police	• Illegal parking monitoring pilot project
19th March, 2024	GIZ	• Waste collection improvement pilot project
20th March, 2024	JAXA	• Future collaborations

Date	Organization	Discussion Points
27th March, 2024	Japan Junior Chamber, Kanto Branch	• Project Site Inspection
29th March, 2024	Counsellor of the Cabinet office of Japan	• General affairs
8th May 2024	Takamatsu City	• Future collaborations
16th May 2024	JAXA	• Conduct the meeting with JICA, MLIT and MLMUPC
27th May, 2024	GIZ	• Waste collection improvement pilot project
4th June, 2024	SRPA	• Data platform development pilot project
25th June, 2024	APSARA National Authority	• Urban environment monitoring pilot project
25th July, 2024	Consular Office of Japan in Siem Reap	• Reporting session
3rd July, 2024	SRPA	• Progress of the pilot projects
4th July, 2024	DoE	• Data platform development pilot project
2nd August, 2024	GIZ	• Future collaborations
7th August, 2024	DoP	• Data platform expansion
7th August, 2024	DLMUPC	• Data platform expansion
8th August, 2024	MoI UNOPS	• Revised National Smart City Roadmap and KPIs.
9th August, 2024	MLIT	• Digital Twin Initiative in Japan
4th September, 2024	SRPA	• Illegal parking monitoring pilot project
25th September, 2024	Siem Reap Provincial Police	• Illegal parking monitoring pilot project
27th September, 2024	SRPA	• Progress of the pilot projects
27th September, 2024	Siem Reap City Hall	• Waste management pilot project
28th October, 2024	SRPA Siem Reap City Hall	• Waste management pilot project
31st October, 2024	SRPA	• Site visit in Yokohama
22nd November, 2024	Siem Reap City Hall	• Waste management pilot project
26th November, 2024	SRPA	• Pre-pilot project
27th November, 2024	Run Ta Ek City Hall	• General matters
9th December, 2024	Siem Reap City Hall	• Sambour district waste management
18th December, 2024	SRPA	• Waste management pilot project
27th January, 2025	APSARA National Authority	• Urban environment monitoring pilot project
28th January, 2025	Siem Reap Provincial Police	• Illegal parking monitoring pilot project
18th February, 2025	SRPA APSARA National Authority Waseda University	• Urban environment monitoring pilot project

Source: Nippon Koei Co., Ltd.

2.3.2 Meetings with the Private Sector

Meetings with the private sector were held during the Project as follows.

Table 2.3.2: Meetings with the Private Sector

Date	Organization	Discussion Points
17th May, 2022	VERY WORDS	• Site visit to POPLE station
19th May, 2022	Japan Parking Technology	• Smart parking pilot project
20th May, 2022	Asian Gateway	• Activities related to smart city in Siem Reap
24th June, 2022	SOKEN Engineering	• Pre-pilot project
29th June, 2022	KDDI	• Pre-pilot project
19th July, 2022	Siem Reap Tourism Club	• Activities related to smart city in Siem Reap
22nd July, 2022	SOKEN Engineering	• Pre-pilot project
1st August, 2022	SOKEN Engineering	• Pre-pilot project
5th August, 2022	Neural Pocket	• Illegal parking monitoring pilot project
9th August, 2022	ALSOK	• Illegal parking monitoring pilot project
10th August, 2022	SOKEN Engineering	• Pre-pilot project
16th August, 2022	Siem Reap Tourism Club	• Activities related to smart city in Siem Reap
24th August, 2022	SOKEN Engineering	• Pre-pilot project
30th August, 2022	Siem Reap Tourism Club	• Activities related to smart city in Siem Reap
5th September, 2022	Siem Reap Tourism Club	• Activities related to smart city in Siem Reap
6th September, 2022	SOKEN Engineering	• Pre-pilot project
6th September, 2022	KDDI	• Pre-pilot project
15th September, 2022	PLAN-B	• Illegal parking monitoring pilot project

Date	Organization	Discussion Points
26th September, 2022	Amazon Web Services	• Data management
29th September, 2022	SOKEN Engineering	• Pre-pilot project
30th September, 2022	GEOTRA	• Data management
30th September, 2022	CIESF	• IT training
13th October, 2022	KDDI	• Telecommunication environment
17th October, 2022 ~ 20th October 2022	SOKEN Engineering	• Pre-pilot project implementation
27th October, 2022	PLAN-B, FORVAL	• Illegal parking monitoring pilot project
27th October, 2022	GEOCRAFT	• Infrastructure data management
27th October, 2022	FORVAL, ESS	• Illegal parking monitoring pilot project
1st November, 2022	GAEA	• Solid waste management
4th November, 2022	FORVAL	• Illegal parking monitoring pilot project
14th November, 2022	SpaciaNet, Beniten	• Internal document tracking pilot project
15th November, 2022	FORVAL	• Illegal parking monitoring pilot project
15th November, 2022	PLAN-B	• Internal document tracking pilot project
18th November, 2022	Sumitomo Corp.	• Activities related to smart city in Siem Reap
29th November, 2022	Sumitomo Corp.	• Activities related to smart city in Siem Reap
1st December, 2022	HIS	• Activities related to smart city in Siem Reap
5th December, 2022	Beniten	• Internal document tracking pilot project
13th December, 2022	Asian Gateway	• Activities related to smart city in Siem Reap
26th December, 2022	CIESF Cambodia	• IT training
5th January, 2023	Beniten	• Internal document tracking pilot project
27th January, 2023	Beniten	• Internal document tracking pilot project
30th January, 2023	Beniten	• Internal document tracking pilot project
10th February, 2023	Japanese Physical Therapy Association	• Activities related to smart city in Siem Reap
15th February, 2023	Siem Reap Tourism Club	• Activities related to smart city in Siem Reap
2nd March, 2023	Beniten	• Internal document tracking pilot project
3rd March, 2023	SOKEN Engineering	• Pre-pilot project
11th March 2023	SOKEN Engineering Sophia Asia Center	• Way of collaboration
13th March, 2023	FORVAL	• Illegal parking monitoring pilot project
3rd and 4th April, 2023	SOKEN Engineering	• Way of collaboration
4th April, 2023	Beniten	• Internal document tracking pilot project
7th April, 2023	Japan Research Institute for Social Systems	• People Flow
9th April, 2023	Angkor Tiger FC and Renova, Inc	• Renewable energy
10th April, 2023	FORVAL	• Illegal parking monitoring pilot project
13th April, 2023	Urban Living Solutions Cambodia Co., Ltd	• Eco development in the Angkor Heritage Area
23rd April 2023	CIESF Cambodia	• IT Passport training
24th April, 2023	FORVAL	• Illegal parking monitoring pilot project
26th April, 2023	GAEA	• Atmosphere Investigation
2nd May, 2023	GAEA SRPA Siem Reap City Hall	• Inspection of waste collection situation in Sla Kram district
11th May, 2023	Council for Area Development and Management of Otemachi, Marunouchi, and Yurakucho	• Training in Japan
12th May, 2023	KDDI Phnom Penh Office	• Future collaboration
16th May, 2023	SOKEN Engineering	• Pre-pilot project
19th May, 2023	FORVAL	• Illegal parking monitoring pilot project
5th June, 2023	Fujitsu Research Institute	• Siem Reap Smart City Progress and Evaluation
11th June, 2023	CIESF Cambodia	• Future collaboration
27th June, 2023	FORVAL	• Illegal parking monitoring pilot project
28th June, 2023	Beniten	• Internal document tracking pilot project
30th June, 2023	Chuo Kaihatsu Cooperation	• Future collaboration
30th June, 2023	MinebeaMitsumi Inc.	• Information sharing
7th July, 2023	SOKEN Engineering	• Pre-pilot project
26th July, 2023	Beniten	• Internal document tracking pilot project
1st August, 2023	SOKEN Engineering	• Pre-pilot project
4th August, 2023	Fujitsu Research Institute	• Evaluation of smart cities

Date	Organization	Discussion Points
23rd August, 2023	FORVAL	• Illegal parking monitoring pilot project
30th August, 2023	Beniten	• Internal document tracking pilot project
2nd October, 2023	Beniten	• Internal document tracking pilot project
18th October, 2023	Angkor Tiger FC	• Possibility of future collaboration
16th November, 2023	SOKEN Engineering	• Pre-pilot project
22nd November, 2023	Beniten	• Internal document tracking pilot project
22nd November, 2023	FORVAL	• Data platform development pilot project
13th December, 2023	GAEA	• Waste collection improvement pilot project
14th December, 2023	GAEA	• Waste collection improvement pilot project
25th December, 2023	GAEA	• Waste collection improvement pilot project
27th December, 2023	Beniten	• Internal document tracking pilot project
16th January, 2024	Beniten	• Internal document tracking pilot project and the data platform development pilot project
31st January, 2024	Beniten	• Internal document tracking pilot project and the data platform development pilot project
13th February, 2024	GAEA	• Waste collection improvement pilot project
28th February, 2024	Beniten	• Internal document tracking pilot project and the data platform development pilot project
29th February, 2024	Go Global IT	• Waste collection improvement pilot project
6th March, 2024	FORVAL	• Illegal parking monitoring pilot project
21st March, 2024	Go Global IT	• Waste collection improvement pilot project
22nd March, 2024	Beniten	• Data platform development pilot project
27th March, 2024	Beniten	• Internal document tracking pilot project and the data platform development pilot project
27th March, 2024	KUMONOS Corporation	• Future Collaboration
8th May, 2024	Beniten	• Data platform development pilot project
13th May, 2024	FORVAL	• Illegal parking monitoring pilot project
28th May, 2024	Luma	• Garbage trucks GPS monitoring system
29th May, 2024	Beniten	• Data platform development pilot project
3rd June, 2024	Go Global IT	• Waste collection improvement pilot project
7th June, 2024	GAEA	• Waste collection improvement pilot project
26th June, 2024	Beniten	• Data platform development pilot project
28th June, 2024	KUMONOS Corporation	• Future Collaboration
31st July, 2024	Beniten	• Data platform development pilot project
22nd August, 2024	GAEA	• Waste collection improvement pilot project
26th August, 2024	FORVAL	• Illegal parking monitoring pilot project
27th August, 2024	Beniten	• Data platform development pilot project
28th August, 2024	Beniten	• Data platform development pilot project
11th September, 2024	GAEA Go Global IT	• Waste collection improvement pilot project
25th September, 2024	Beniten	• Data platform development pilot project
27th September, 2024	GAEA	• Waste collection improvement pilot project
21st November, 2024	SOKEN Engineering	• Pre-pilot project
18th December, 2024	GAEA	• Waste collection improvement pilot project

Source: Nippon Koei Co., Ltd.

2.3.3 Meetings with the Academic Sector

Meetings with the academic sector were held during the Project as follows.

Table 2.3.3: Meetings with the Academic Sector

Date	Organization	Discussion Points
12th May, 2022	Cambodian-Japan Cooperation Center	• Outline of the Project
25th August, 2022	NUM	• Outline of the Project
11th November, 2022	University of South-east Asia	• Academia workshop preparation
14ht November, 2022	Asia Euro University	• Academia workshop preparation
15th November, 2022	NUM	• Academia workshop preparation
15th November, 2022	Institute of Technology of Cambodia	• Academia workshop preparation
18th November, 2022	Cambodia Academy of Digital Technology	• Tourism statistics digitalization pilot project
14th December, 2022	Nara Institute of Science and Technology	• Smart tourism activities in Nara

Date	Organization	Discussion Points
2nd March, 2023	JAPAN-APSARA Safeguarding Angkor	• Way of collaboration
16th/17th March, 2023	Waseda University	• Inspection of Fire Drills
23rd March, 2023	Waseda University	• Urban environment monitoring pilot project
10th/19th April, 2023	Waseda University	• Urban environment monitoring pilot project
2nd May, 2023	CADT	• Tourism statistics digitalization pilot project
9th May, 2023	Waseda University	• Disaster prevention in Siem Reap's Old Market
10th May, 2023	Kagawa University	• Training in Japan
6th June, 2023	Waseda University	• Urban environment monitoring pilot project
10th July, 2023	Waseda University	• Urban environment monitoring pilot project
10th August, 2023	Waseda University	• Urban environment monitoring pilot project
29th August, 2023	Waseda University	• Urban environment monitoring pilot project
30th August, 2023	Waseda University	• Urban environment monitoring pilot project
31st August, 2023	University of Tokyo	• Domestic support committee meeting
12th October, 2023	Waseda University	• Urban environment monitoring pilot project
24th October, 2023	Waseda University	• Data platform development pilot project
10th November, 2023	Waseda University	• Urban environment monitoring pilot project
29th February, 2024	Waseda University	• Urban environment monitoring pilot project
15th May, 2024	Nagaoka University	• Future collaboration
5th June, 2024	Waseda University	• Urban environment monitoring pilot project
28th June, 2024	University of South East Asia	• Proposal for the consortium
1st July, 2024	Waseda University	• Urban environment monitoring pilot project
24th July, 2024	University of Tokyo	• Domestic support committee meeting
28th August, 2024	NUM	• SCALe Info Day
29th August, 2024	Waseda University	• Urban environment monitoring pilot project
30th August, 2024	Waseda University	• Urban environment monitoring pilot project
12th September, 2024	Waseda University	• Urban environment monitoring pilot project
25th September, 2024	Waseda University	• Urban environment monitoring pilot project
27th January, 2025	Waseda University	• Urban environment monitoring pilot project
28th January, 2025	Waseda University	• Urban environment monitoring pilot project
10th February, 2025	University of Tokyo	• Domestic support committee meeting

Source: Nippon Koei Co., Ltd.

Chapter 3 Activities for Output 1

Here we list the detailed activities for Output 1.

3.1 Activity 1-1: Analysis of the issues of smart-city-related organizations

This activity was conducted from the beginning of the Project until October 2022. All information related to this activity is as of October 2022.

(1) Ongoing Projects

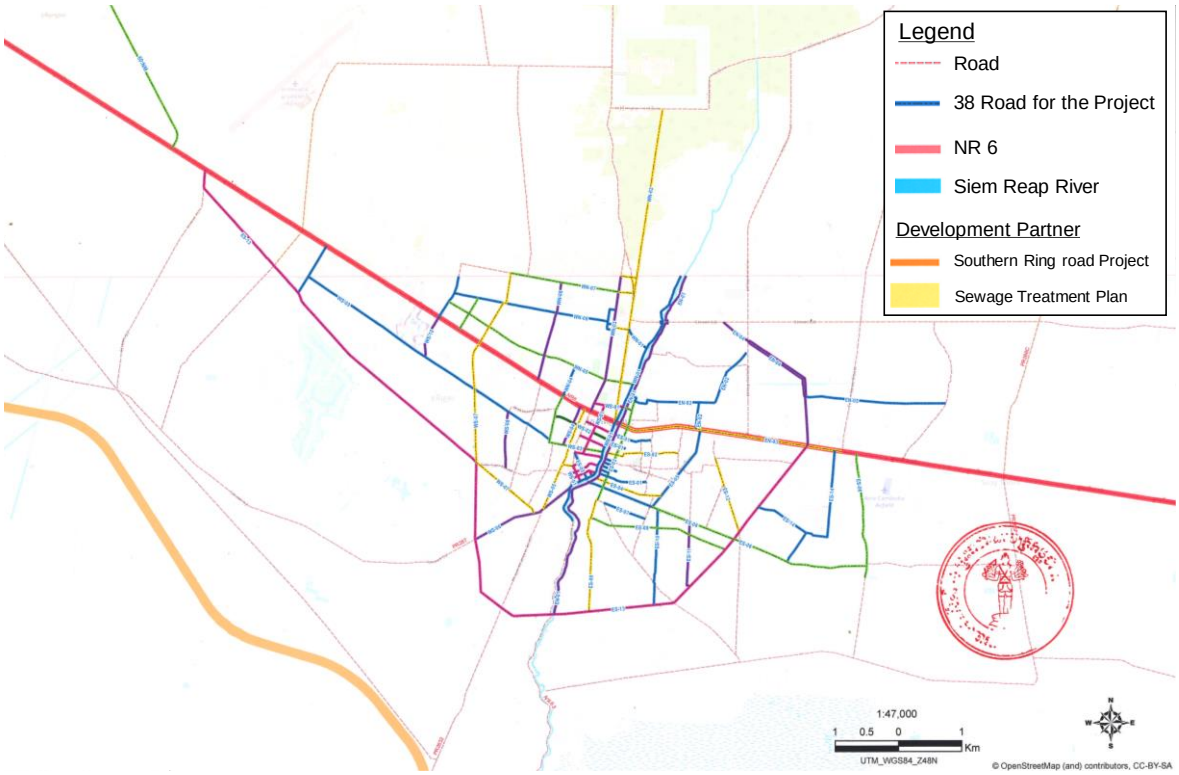
1) 38-Road Construction Project

On November 29, 2020, the official inauguration ceremony was held in Siem Reap with Prime Minister Hun Sen and the "38 Road Construction Project" began in Siem Reap Province. Its official completion was announced on April 4, 2022. The project budget is set at over USD 150 million and mainly consisted of road projects budget for construction and improvement work of the roads with total length of 109 km (USD 150 million) and other projects budget for construction works of rainwater drainage and sewage systems (USD 9 million) and sidewalk improvement (USD 5 million).

Table 3.1.1: Contents of 38 Road Construction Project

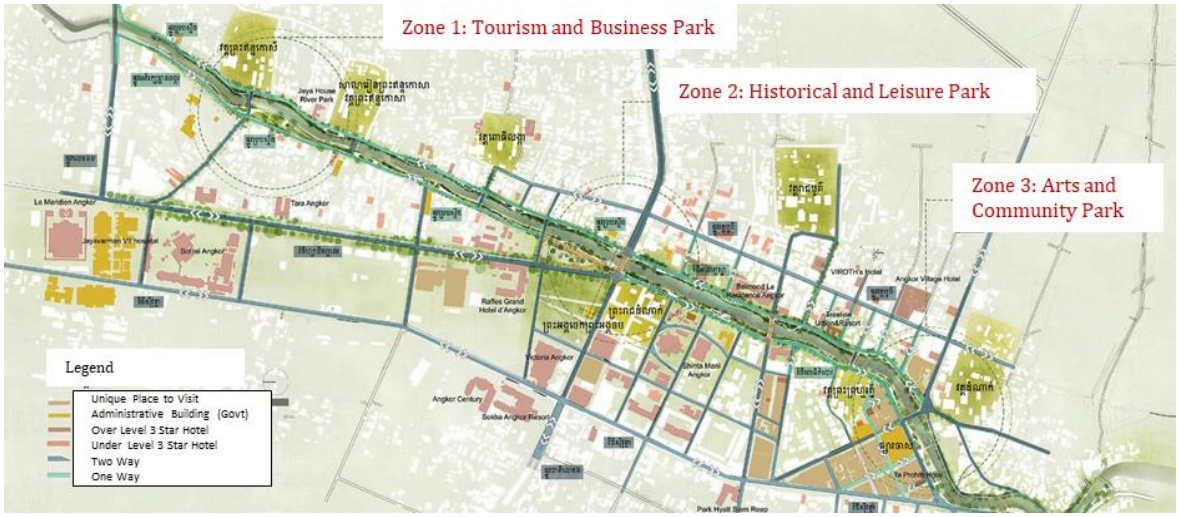
Vision	Smart and potential tourism city set by the Royal Government of Cambodia as a core national development zone and a cultural, historical, and natural tourism destination
Duration	November 2020 ~ December 2021 (13 months)
Budget	USD 150 million (National Budget)
Implementation Organization	MPWT, MLMUPC, DPWT, Army Corps of Engineers
Item	• Drainage system (stormwater) • Sewage system (wastewater) • Flood protection and drainage improvement • Sidewalks and streetlight poles as well as other aspect • Cable network • Power transmission system • Sidewalk for disability • Bicycle lane • Parking lots • Traffic sign and markers • Security camera systems

Source: MLMUPC and Khmer Times



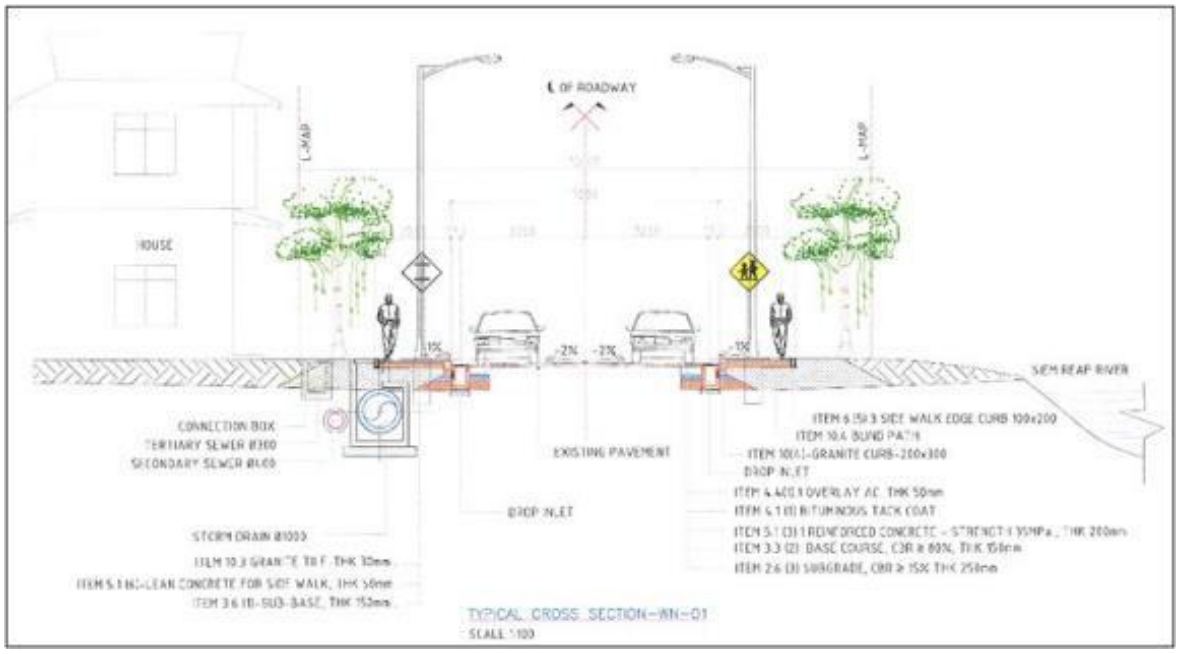
Source: MPWT

Figure 3.1.1: Mapping of 38 Road Construction Project in Siem Reap Province



Source: MPWT

Figure 3.1.2: Development Plan around Siem Reap River in 38 Road Construction Project



Source: MPWT

Figure 3.1.3: Example of Cross Section in 38 Road Construction Project (Pokambor Avenue)

Source: Nippon Koei Co., Ltd.

Figure 3.1.4: Roads after the Completion of the 38-Road Construction Project (1)

Source: Agence Kampuchea Presse

Figure 3.1.5: Roads after the Completion of the 38-Road Construction Project (2)

Below are components of the 38-Road Construction Project that especially relates to smart city.

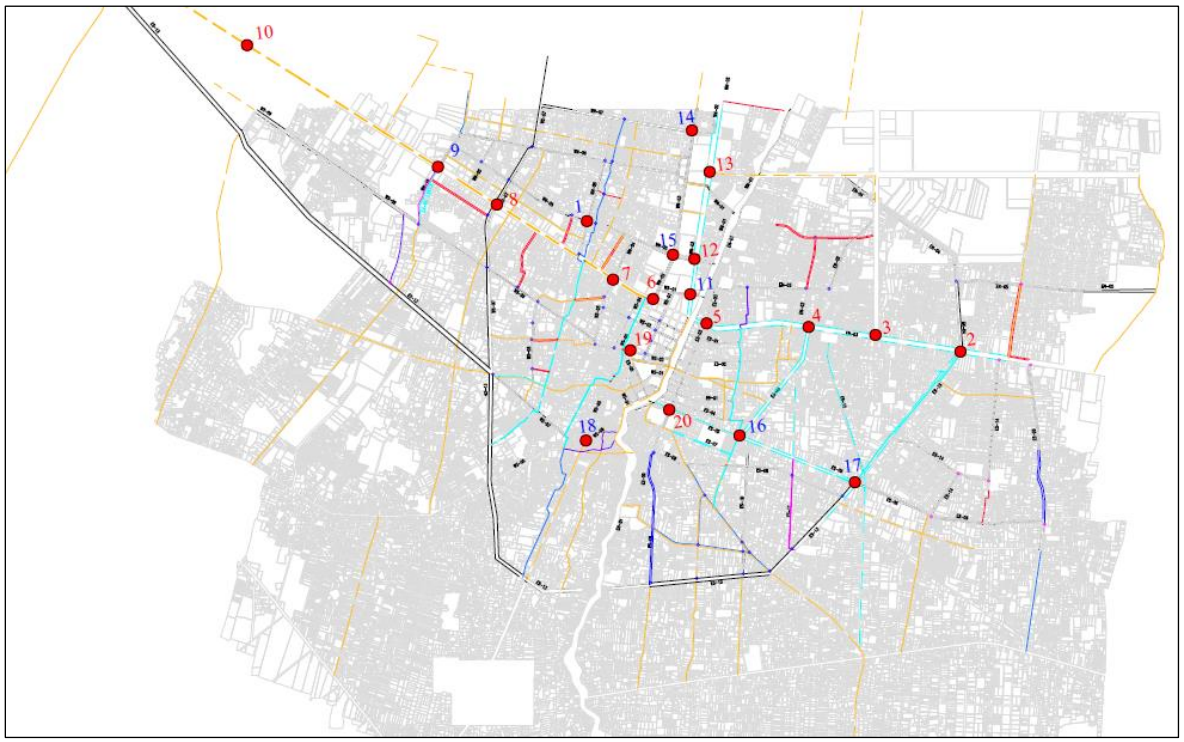
i) Traffic Signals

As part of the 38-Road Construction Project, new traffic signals were installed at 20 locations in the city. The traffic signals are manufactured by SWARCO[2] and are of the point-control type, controlled independently at each intersection, and of the fixed-cycle control type, controlled according to a predetermined display configuration, cycle length, split, and offset. The new traffic signals and their locations are shown in the figures below.

Source: Nippon Koei Co., Ltd.

Figure 3.1.6: Traffic Signals Introduced as part of the 38-Road Construction Project

[2] SWARCO is a manufacturer specialized in traffic technology, headquartered in Austria. More information of the company can be found in https://www.swarco.com/



Source: MPWT

Figure 3.1.7: Locations of the Traffic Signals Introduced as part of the 38-Road Construction Project

ii) CCTV

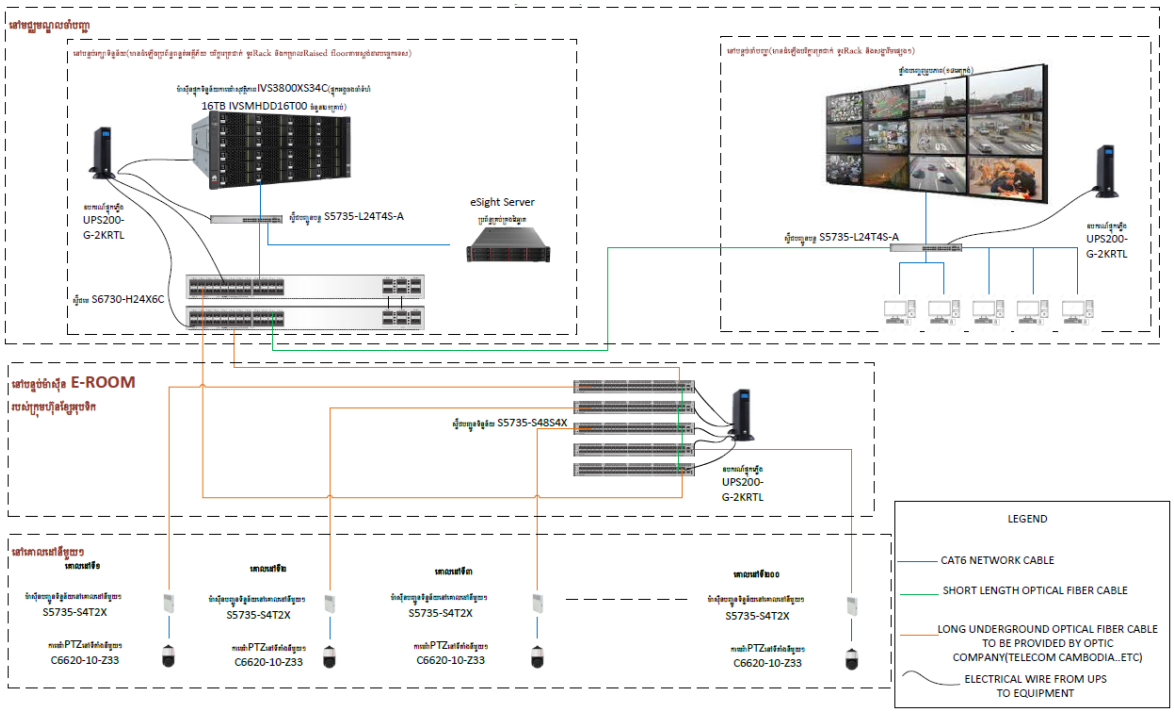
As part of the 38-Road Construction Project, Closed-Circuit Television (hereinafter referred to as "CCTV") cameras have been installed at approximately 200 locations in the city. The surveillance cameras are manufactured by HUAWEI, and the data will be sent to the central control center via an optical fiber network, where the images will be available for viewing on monitors. At the time of writing this report, the server to which the surveillance camera images are sent and the management system for the image data have not yet been established, so the images from the surveillance cameras cannot be viewed. According to an interview with the Chief Commissioner of the Provincial Police, the budget necessary for operation is insufficient, and the Provincial Administration, Provincial Police, and the Ministry of Public Works and Transportation (hereinafter referred to as "MPWT") are discussing the matter. The newly installed surveillance cameras and their locations as well as a conceptual diagram of the surveillance camera network are shown in the figures below.

Source: Nippon Koei Co., Ltd.

Figure 3.1.8: CCTVs Introduced as part of the 38-Road Construction Project

Source: MPWT

Figure 3.1.9: Locations of the CCTVs Introduced as part of the 38-Road Construction Project

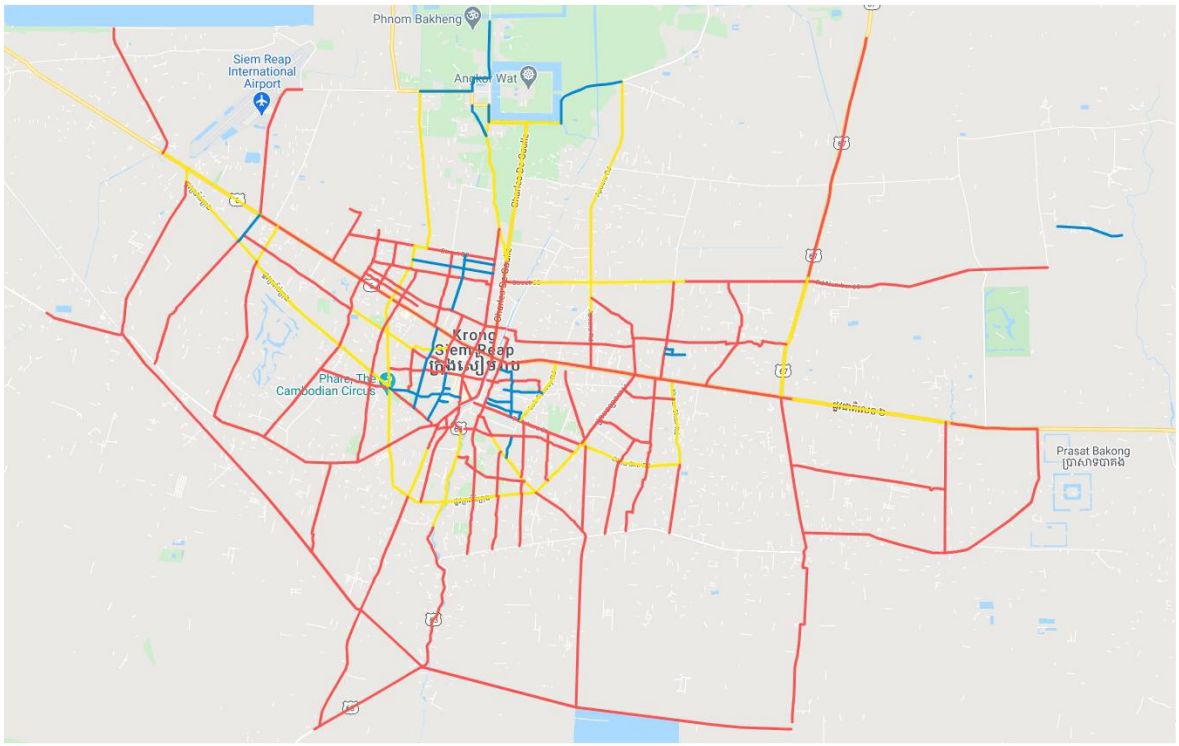


Source: MPWT

Figure 3.1.10: Network Diagram of the CCTVs Introduced as part of the 38-Road Construction Project

iii) Streetlights

As part of the 38-Road Construction Project, streetlights were installed in approximately 5,000 locations in the city. The streetlights are manufactured by Minebea-Mitsumi and are controlled centrally by Minebea (Cambodia) Co. The locations of the roads where the streetlights were installed are shown in the figure below.

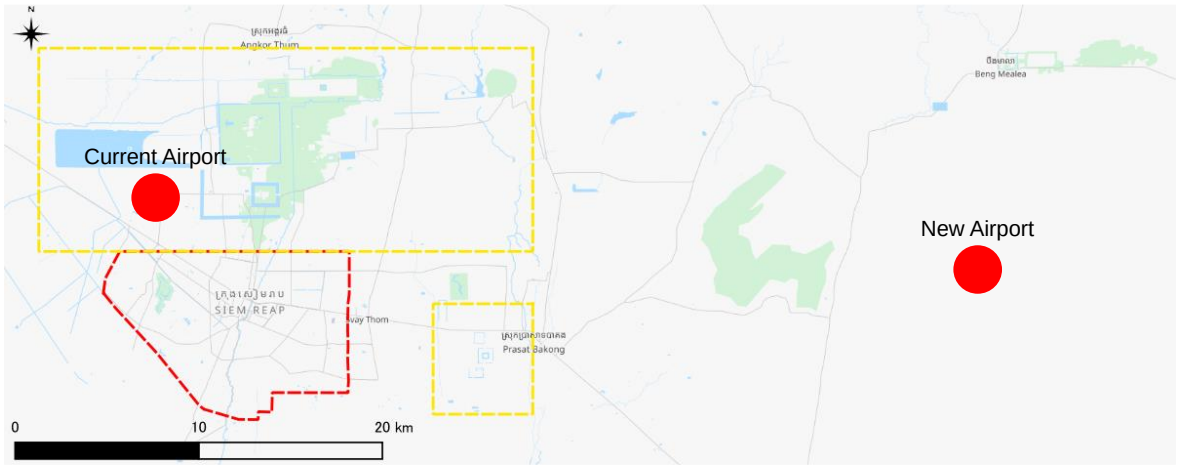


Source: Minebea (Cambodia) Co.

Figure 3.1.11: Locations of the Streetlights Introduced as part of the 38-Road Construction Project (Red and Yellow Roads)

2) New Airport Construction Project

A new airport, Siem Reap - Angkor International Airport, is currently under construction in the eastern part of Siem Reap Province. The new airport, with a total development area of approximately 760 hectares, is owned by Angkor International Airport Investment (Cambodia) Co Ltd. As of May 24, 2021, construction was 27% complete[3].



Source: Nippon Koei Co., Ltd.

Figure 3.1.12: Location of the New Airport

[3] The airport started operation on October 16, 2023.

Source: State-owned Assets Supervision and Administration Commission of the State Council of China

Figure 3.1.13: Image of the New Airport

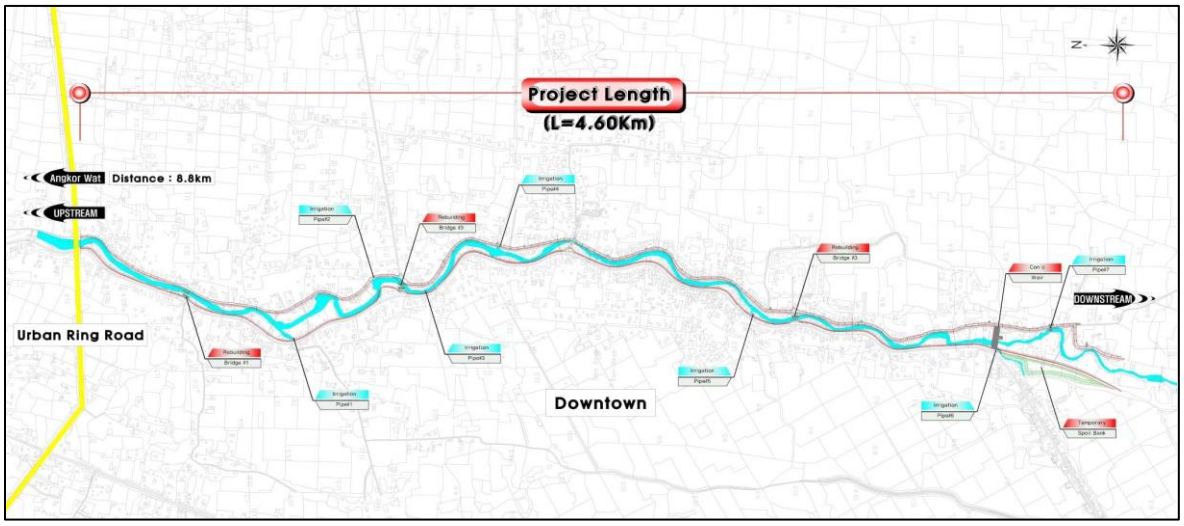
3) Improvement Project of Siem Reap River Phase 2

Since May 2022, the revetment of the Ring Road - Tonle Sap Lake section of the Siem Reap River has been underway with a loan from the Economic Development Cooperation Fund of Korea (loan amount: USD 13,303,000).

Table 3.1.2: Details of the Improvement Project of Siem Reap River Phase 2

No.	Items	Quantity
1	Embankment	L = 4,533m, W = 6.0m, 41,313m^3
2	Disposal	V = 582,918m^3
3	Revetment 1) Vegetation Mat 2) Gabion Mattress 3) Revetment Block 4) Parapet	 L = 4,592m L = 3,298m L = 424m L = 2,444m
4	Weir	1 EA (L=80m)
5	Irrigation Pipe	7 EA
6	Bridge Reconstruction Bridge Removal	3 EA (R. C. Beam) 14 EA

Source: MPWT



Source: MPWT

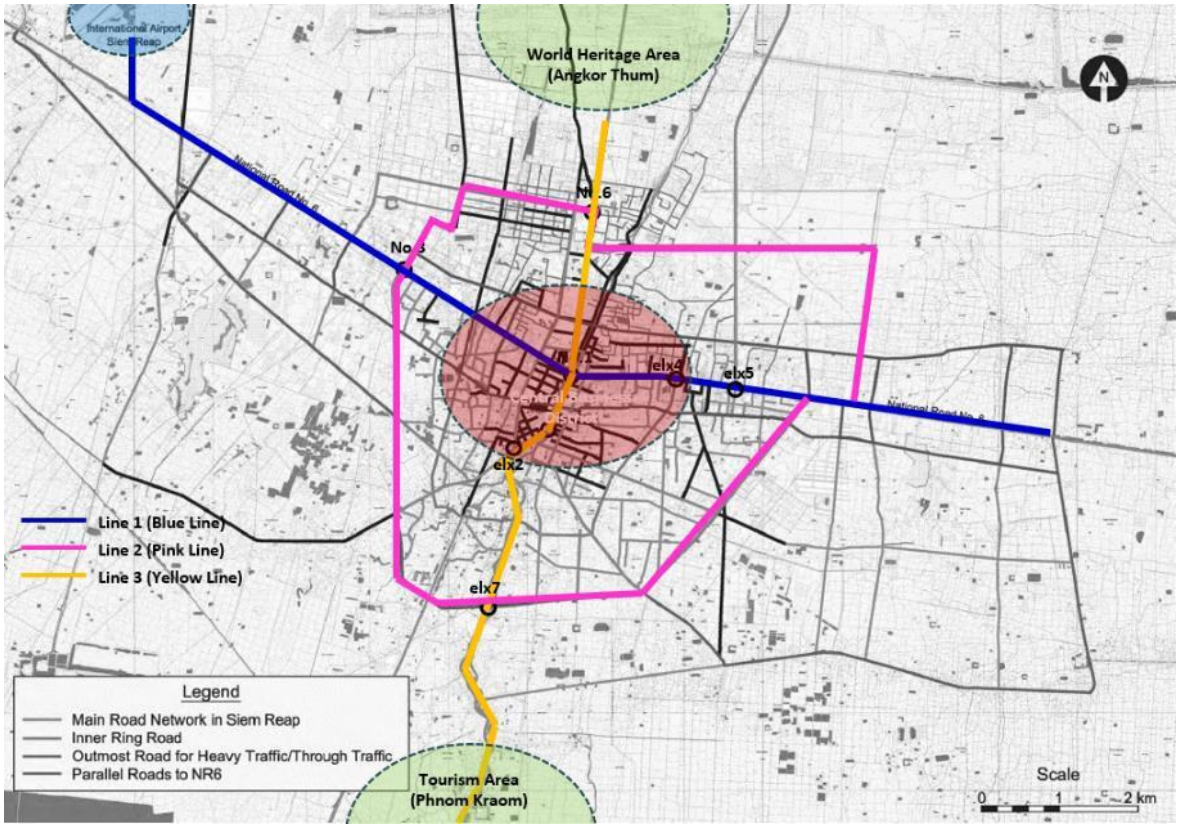
Figure 3.1.14: Locations of the Improvement Project of Siem Reap River Phase 2

Source: Nippon Koei Co., Ltd. (photo as of May 2022)

Figure 3.1.15: Construction of the Improvement Project of Siem Reap River Phase 2

4) EV Bus and EV Bike

The "Pre-Feasibility Assessment on Electric Buses in Siem Reap, Cambodia" was completed in June 2021 by the Global Green Growth Institute. There, based on the MPWT proposal, a pre-feasibility study on the introduction of Electrical Vehicles (hereinafter referred to as "EV") buses was conducted for three planned bus routes. The three planned bus routes are shown in the figure below.

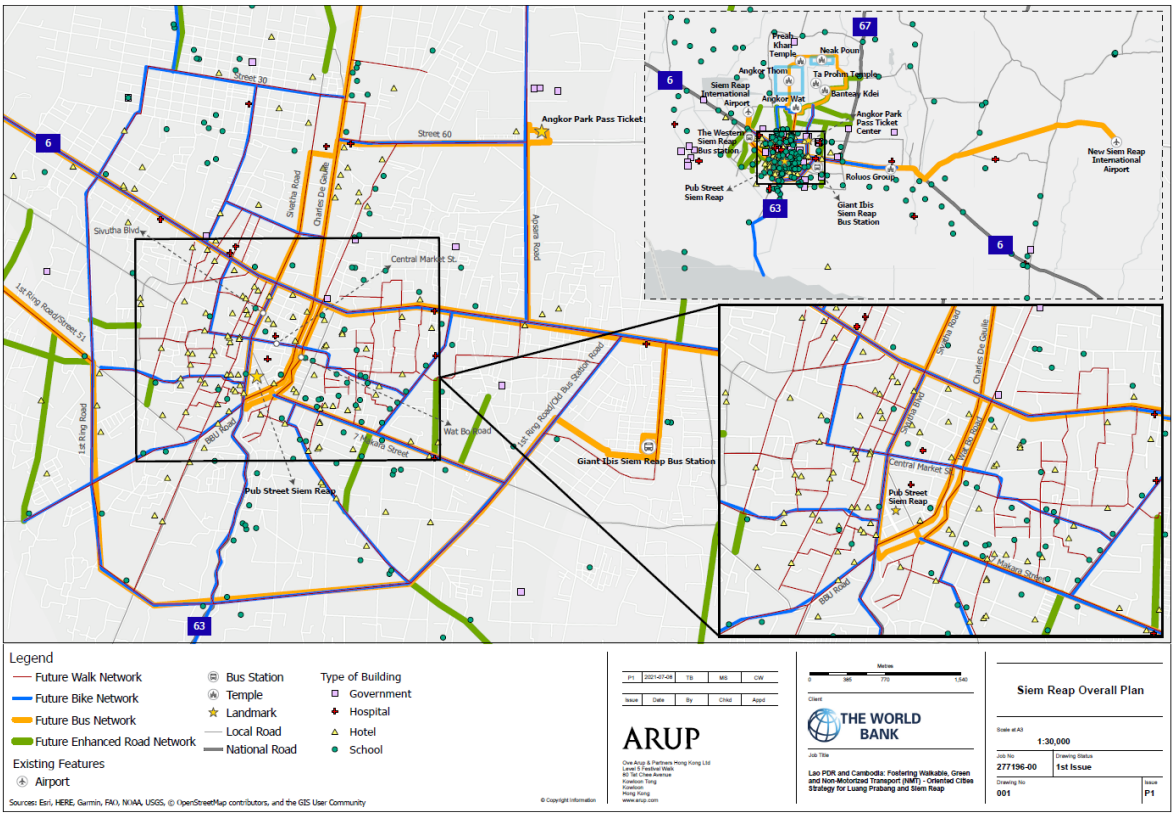


Source: The Global Green Growth Institute

Figure 3.1.16: Locations of the Planned Bus Routes

In response, the MPWT has also requested the Asian Development Bank (hereinafter referred to as "ADB") to provide feasibility studies for the EV bus project.

The World Bank has also requested the "Lao PDR and Cambodia: Fostering Walkable, Green and Non-Motorized Transport (NMT)-Oriented Cities Strategy for Luang Prabang and Siem Reap" The study proposes an "Integrated Multimodal Green Network" in Siem Reap, including EV buses, from 2020 to 2021. In addition, "Study for an Electric Bus Concept Development and Exploration of Options for Private Sector Participation in Siem Reap, Cambodia" was conducted as a follow-up study.



Source: World Bank

Figure 3.1.17: Integrated Multimodal Green Network proposed in the World Bank Project

With the support of South Korea, Very Words is introducing electric scooters in Siem Reap[4]. The company gave a presentation at ICC Angkor and held an opening ceremony for a battery station for electric scooters (POPLE STATION) on May 27, 2022. Tuk Tuk, as well as a café and a space for visitors to learn about the history of the Angkor Complex.

[4] Very Words signed a memorandum of understanding between MoE and the Global Green Growth Institute on February 7, 2025, and committed to donate 8,000 e-scooters to the Cambodian government, which will be allocated for use by public officials.

Source: Nippon Koei Co., Ltd.

Figure 3.1.18: POPLE STATION

Source: Very Words

Figure 3.1.19: Functions of POPLE STATION

Source: Very Words

Figure 3.1.20: EV Scooters and Batteries of Very Words

(2) Related Organizations

1) The Private Sector

i) Siem Reap Tourism Club

The Siem Reap Tourism Club is an industry association consisting of tourism businesses, churches, schools, and provincial and municipal government agencies in Siem Reap. The Siem Reap Tourism Club is unique in that it exists as an independent trade association at the provincial level in Siem Reap, whereas trade associations in Cambodia are generally established at the national level and often have branches in each province.

2) The Academic Sector

i) The National University of Management

The National University of Management is a university and graduate school located in Phnom Penh, with faculties in management, economics, accounting, tourism, law, and information technology (hereinafter referred to as "IT"). The university held an online workshop "Workshop on Smart City Planning Management" on January 21, 2022, which featured lectures and panel discussions on smart city development in Cambodia.

Source: The National University of Management

Figure 3.1.21: Documents of the Workshop on Smart City Planning Management

From Siem Reap, Governor Tea Seiha of Siem Reap Province gave a speech at the opening session, and Hirano, then JICA Consultant Team leader, gave a lecture on Siem Reap's smart city-related activities, including the smart city roadmap, and participated in a panel discussion. The panel discussion featured the following members.

Table 3.1.3: Panelists of the Workshop on Smart City Planning Management

Role	Name	Position
Moderator	H.E Dr. Sann Vathana	Under Secretary of State, Ministry of Education, Youth and Sport
Panelists	Mr. Kat Bun Heng	Program Manager, Habitat for Humanity Cambodia
Panelists	Mr. Kok-Chin Tay	Chairman of Smart Cities Network and Adjunct Professor at National University of Singapore
Panelists	Mr. Hirano Kuniomi	Team Leader, JICA Survey Team

Source: Nippon Koei Co., Ltd.

(3) Update of related Laws

Although the new Investment Law is scheduled to take effect in October 2022, the Sub-decree and Ministerial Decree (Prakas) associated with this law have not yet been developed, making the investment licensing procedures based on the new Investment Law difficult. There are no other updates to laws and regulations that are strongly related to this project at this time.

(4) Roadmap Approval Procedure

The Smart City Roadmap should be updated at the JCC, which is scheduled to be held about once every six months, from the viewpoint that it should be flexible enough to change its contents according to the socioeconomic conditions surrounding Siem Reap and related technological progress, while it is considered unnecessary to make the roadmap public with a written seal of approval from the provincial government and MoI.

(5) Climate Change Mitigation and Adaptation Measures

1) Cambodia Climate Change Strategic Plan 2014-2023

The Cambodia Climate Change Strategic Plan was developed in 2013 by the National Climate Change Committee, with funding from the European Union, the Swedish International Development Cooperation Agency, the Danish International Development Agency, and the United Nations Development Programme. The plan established three goals: reducing the vulnerability of people and critical systems (natural and social) to the impacts of climate change, transitioning technologies to a green development path by promoting low-carbon development and technologies, and promoting public awareness and participation in climate change response actions, and to achieve these goals, eight Strategic goals were identified as below.

Table 3.1.4: Strategic Goals of the Cambodia Climate Change Strategic Plan

Goal	Content
1	Promote climate resilience through improving food, water and energy security
2	Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts
3	Ensure climate resilience of critical ecosystems (Tonle Sap Lake, Mekong River, coastal ecosystems, highlands, etc.), biodiversity, protected areas and cultural heritage sites
4	Promote low-carbon planning and technologies to support sustainable development
5	Improve capacities, knowledge and awareness for climate change responses
6	Promote adaptive social protection and participatory approaches in reducing loss and damage due to climate change
7	Strengthen institutions and coordination frameworks for national climate change responses
8	Strengthen collaboration and active participation in regional and global climate change processes

Source: Cambodia Climate Change Strategic Plan

Although this plan covers all of Cambodia, it does not include plans for specific provinces, but rather lists policy-level objectives.

2) Long-Term Strategy for Carbon Neutrality

The Long-Term Strategy for Carbon Neutrality prepared by the Ministry of Environment of the Kingdom of Cambodia (hereinafter referred to as “MoE”) was prepared and released in December 2021. The Strategy sets 2050 as the target year and recommends climate change mitigation measures mainly in the agriculture, forestry, energy, transportation, industrial, and waste sectors in order to achieve the agreed targets in the Paris Agreement.

 Agriculture	• Less methane-intensive rice cultivars • Direct seeding practices • Alternate wetting and drying practices • Promotion of organic fertilizer and deep fertilizer technology • Feed additives for cattle • Improved fodder management • Introduction of composting technology
 Forestry and other land uses	• Reducing the deforestation rate by 50 percent in 2030 • Stopping deforestation by 2045 • Afforestation, improved forest management and forest restoration • Agroforestry and commercial tree plantation • Full implementation of the REDD+ Investment Plan by 2050
 Energy	• No new coal generation capacity beyond already committed projects • Use of natural gas as a dispatchable transition fuel • Investments in liquified natural gas (LNG) import, storage and infrastructure • Increase in solar, hydro, biomass and other renewables to 35 percent of the generation mix by 2050, of which 12 percent is from solar • Investments in grid modernization, flexibility and storage Energy efficiency measures in buildings and industry • Fuel switching to electricity for cooking • Substitution of coal in the industrial and power sector
 Transportation	• More use of public transportation – 30 percent modal share in urban areas by 2050 • Moderate penetration of electric vehicles – 70 percent for motorcycles and 40 percent for cars and urban buses by 2050 • Increased fuel efficiency for internal combustion engine vehicles • Rail for freight and passengers • CNG penetration of 80 percent for interregional buses and 80 percent for trucks until 2050
 Industrial processes and product use	• Clinker substitution in cement production • Carbon capture and storage for cement kilns • Use of recycled aggregate concrete • Increasing use of refrigerants with low global warming potential • Regular inspection of refrigeration and air-conditioning equipment and recovery of spent refrigerants
 Waste	• Reducing open burning by expanding waste collection coverage to 85 percent in 2050 • Implementing a reduce, reuse, and recycle strategy • Landfill gas management • Organic composting • Anaerobic digestion and wastewater treatment

Source: Long-Term Strategy for Carbon Neutrality

Figure 3.1.22: Summary of Key Mitigation Actions by Sector in the Long-Term Strategy for Carbon Neutrality

3) JCM Project by the Japanese Government (Introduction of High-efficiency LED Streetlights using Wireless Networks)

In 2017, 5,672 high-efficiency LED streetlights were installed by Minebea-Mitsumi Co. using the Joint Crediting Mechanism (hereinafter referred to as "JCM") and a wireless network. The streetlights are capable of dimming control through the wireless network and have reduced greenhouse gas emissions by approximately 70%.

4) JCM Project Formation Studies by the Japanese Government

From 2014 to 2016, several JCM project feasibility studies were conducted by the Ministry of Environment of the Japanese government, and greenhouse gas emission reductions using JCM in Siem Reap were discussed. Other than the conclusion of the municipal partnership agreement with Kanagawa Prefecture, there is no indication that any other projects have been realized in Siem Reap at this time.

Table 3.1.5: Contents of the JCM Studies

FY	Contents
2014	• Eco-mobility project: In Siem Reap city and Angkor site area, with the cooperation of local drivers' associations, interview and hearing surveys, vehicle fuel consumption survey, driving test and electricity cost survey of project vehicles (vehicles to be operated after the implementation of JCM project) were conducted to obtain " Data collection on driver profiles (daily driving range and distance, driver income, working days, etc.)", "Data collection on reference vehicles (vehicles operated before the JCM project implementation) (fuel consumption, driving distance, etc.)", "Data collection on project vehicles (electricity cost, driving distance per charge etc.) and "Maintenance and Management Manual for Project Vehicles" were prepared. • Mekong Culture and Ruins Park Project: The feasibility of applying Japanese low-carbon technologies and the possibility of commercializing JCM were investigated for a solar power generation system, hotel, commercial facilities, water supply and sewage facilities, and waste treatment facilities planned to be developed in the Mekong Culture and Ruins Park.
2015	• Renewable Energy Facility Installation Project: Preparation for commercialization by the private sector was conducted regarding the installation, installation, and maintenance of rooftop solar power generation systems and independent power generation projects for 5- and 4-star hotels, schools, and other public facilities in Siem Reap City. • JCM Potential Project Needs Assessment: In order to investigate the potential of "the project to introduce biomass power generation facilities by co-combustion of urban waste and rice husks," we visited urban waste accumulation sites in Siem Reap City, investigated the possibility of their reuse, and studied the rice husk aggregation potential and its aggregation The amount was investigated. • Municipal Collaboration: Kanagawa Prefecture and Siem Reap Province signed a "Memorandum of Understanding on Cooperation between Kanagawa Prefecture and Siem Reap Province to Create a Low Carbon Tourism City in Siem Reap Province" on November 5, 2015 to achieve inter-municipal collaboration.
2016	• Community solar power generation project using "roof rentals" of public high schools: Preparation for commercialization by the private sector of a rooftop solar power generation installation, installation, and maintenance project and an independent power generation project targeting public facilities such as 5- and 4-star hotels and schools in Siem Reap City. • Biomass Power Generation Project Using Low-Carbon Organic Waste and Rice Husks to Reduce Municipal Waste and Optimize Disposal: The feasibility of introducing biomass power generation facilities that separate combustible waste (organic waste) from municipal waste and use it as fuel, and mix it with rice husks was investigated.

Source: Ministry of Environment of Japan

3.2 Activity 1-2: Examination on coordination and cooperation mechanisms necessary to implement the Siem Reap Smart City Approach

This examination was done early in the project and the necessary recommendations were summarized in the Siem Reap Smart City Roadmap submitted in March 2023. The actual operation and ongoing initiatives of the cooperation mechanism are described in section 3.4, and the details presented therein were examined at that time.

(1) Proposed Industry-Academia-Government-Community Platform: Smart City Consortium

The industry-academia-government-community platform (hereinafter refer to as "Smart City Consortium") was proposed to establish to implement the Smart City Roadmap in Siem Reap Province by bringing together companies, universities/research institutes, Siem Reap Province/city government (Smart City Committee), community organizations, etc.

1) Expected Functions

Promotion/priority support for smart city-related businesses: Provide financial and technical support/cooperation depending on each role, such as utilization of subsidies and activity funds by the central government and development partners, efficiency and simplification of business approval procedures by the central government, technology and funding by businesses, and technology and know-how by universities and research institutes.

- Information sharing/matching support: Supports companies, universities/research institutes, and government agencies to introduce organizations that can provide solutions and to expand successful model projects to other regions.
- Dissemination promotion activities in Japan and overseas: Introduce the efforts of pilot projects, disseminate information such as keynote speeches by experts, and share information by e-mail and online seminars for Smart City Consortium members.
- Report: Report their activities regularly to Smart city committee of Siem Reap

2) Expected Operation

The Smart City Consortium will be built within the framework of the existing organizational structure in the short term. The TWG of Siem Reap Smart City, which is composed of government agencies, takes the lead, and the Smart City Promotion Division or temporary organizational body for the preparation of the division manages various meetings as the secretariat by recruiting members of businesses, universities, research institutes, etc., holding subcommittees, and promoting participation in existing international conferences such as ASCN meetings, Conference of Japan-Cambodia Urban Development Platform, etc.

- Individual meeting: Prior to initiating the activities of the Smart City Consortium, a forum will be set up for discussion among the parties involved on the content of the activities. The following plenary sessions and subcommittee settings will also be agreed upon at individual meetings.
- General meeting: It will be a place for understanding and consensus building among representatives of industry, academia, government, and the private sector. Decision-making shall be made by each institution and based on their respective procedures. The plenary meeting is held about once a year.

- Subcommittee meeting: To solve common problems, discuss solutions by theme and sector such as mobility, tourism, environment, security, and data management, and promote information sharing and joint projects. The subcommittee is held about once every three months, with the participation of government agencies that have jurisdiction over the sector, private businesses participating in the project, universities and research institutes, etc. Conduct technical discussions for approval of new businesses.

In the medium to long term, Special Purpose Companies (hereinafter referred to as "SPC"s) and Special Purpose Vehicles (hereinafter referred to as "SPV"s) will be established with the participation of multiple private businesses and citizen groups, and will be responsible for the operation of data platforms and area management for improving the urban environment. Part of the profits of various businesses and funds from companies and funds can be used as operation and management expenses.

(2) Monitoring and Evaluation System

The International Organization for Standardization's ISO 37151, 37153 and other Framework have been developed as indicators for evaluating cities from a smart city perspective. These are considered to be universal indicators that can be applied to any city. However, the Smart City Roadmap for Siem Reap is currently specific to some sectors, including the tourism sector. Therefore, it is preferable to monitor and evaluate the progress of this roadmap independently, while referring to these existing indicators.

The following Key Goal Indicators (hereinafter referred to as "KGI") can be considered for monitoring the implementation of the roadmap.

Table 3.2.1: Draft KGIs

Sector	Basic Policy	Key Goal Indicators
Administrative organizations	Open collaboration	Number of discussions related to Smart City Committee
Legal systems and business support	Promotion of smart business	New business permission related to smart city new project
Data management	Utilization of valuable data	Amount of utilized and disclosed data
Smart tourism	More convenient and satisfactory tourism	Number of tourists, number of repeaters, rate of tourist satisfaction
Smart mobility	More sustainable, safe, and convenient mobility systems	Number of traffic accidents, number of traffic jams, rate of EVs
Smart security	Basic security as a safe international tourist destination	Number of crimes, number of fatalities caused by fire, number of fatalities caused by natural disasters
Smart waste management	Healthy and sanitary urban environment	Turbidity of Siem Reap River, amount of solid waste

Source: Nippon Koei Co., Ltd.

The KGIs shall be monitored and evaluated approximately every five years, and shall be used as a reference when reviewing the roadmap. KGIs will also serve as reference information for the formulation of the next short-term actions.

While the KGIs are indicators to measure the degree of achievement of the basic policy, Key Performance Indicators (hereinafter referred to as "KPIs") are to measure the degree of achievement of the main actions of the priority projects listed in Chapter 8 of the Smart City Roadmap. The progress of the priority project will be monitored regularly.

3.3 Activity 1-3: Formulation and finalization of the Siem Reap Smart City Roadmap

3.3.1 Smart City Roadmap

The Siem Reap Smart City Roadmap was finalized in March 2023 after numerous discussions since the beginning of the project.

Subsequently, on 4th October 2023, SRPA published both Khmer and English versions of the Siem Reap Smart City Roadmap on the official website of SRPA[5] and also shared it widely through various media, including social media platforms.

The brief history of the publication is as followings.

- In 2018, Siem Reap was chosen as one of the members of the ASEAN Smart City Network in ASEAN summit in Singapore.
- In 2019, SRPA requested for JICA support to develop the smart city initiative in Siem Reap.
- From 2020 to the end of 2021, despite the outbreak of COVID-19, JICA and SRPA tried to conduct a Data Collection Survey and formulated the draft smart city roadmap for Siem Reap.
- From May 2022 to 2nd March 2023, there were numerous meetings and discussions among all stakeholders to revise and update the roadmap in order to make it usable and practical document and ensure consistency with the government policies.
- On the 2nd March 2023, in the 3rd JCC meeting, the Provincial Governor approved the roadmap to be an official document for Siem Reap.
- Through the necessary official process, the roadmap was published on 4th October 2023.

Although the roadmap has now been published, as the roadmap is essentially living document, the content shall be updated when necessary.

3.3.2 Siem Reap Smart City Approach

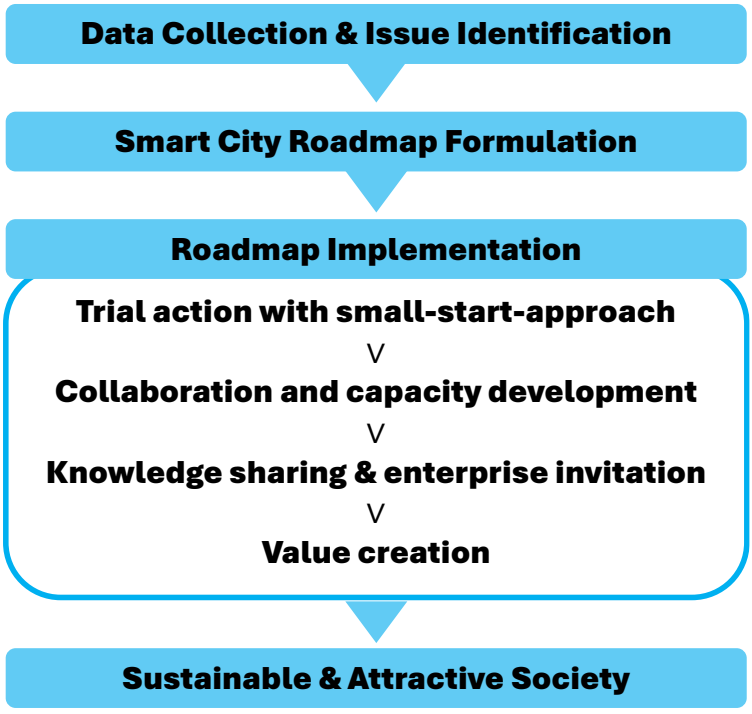
During the Project period, the definition of Siem Reap's Smart City Approach was further organized. The Siem Reap Smart City Approach is a comprehensive initiative that maximizes the region's strengths while leveraging digital technology smartly to create a sustainable and attractive society for both residents and tourists.

[5] https://siemreap.gov.kh/detail/36833

Under this approach, the key issues and priority areas for urban development are identified and analyzed first, and a roadmap is then formulated based on those findings.

When implementing measures outlined in the roadmap, a "small start" strategy is employed, beginning with the areas that have the highest feasibility. The insights and experiences gained from these small-scale implementations are shared among industry, government, academia, and communities, thereby enhancing continuous urban management capacity through capacity development. In addition, proactive dissemination of outcomes both domestically and internationally helps attract new external participants and fosters civic pride among Siem Reap residents. Through these efforts, Siem Reap is expected to gain even greater value as an international tourist destination.

By repeating this implementation cycle, Siem Reap's sustainable development will be promoted, contributing to the achievement of the Sustainable Development Goals (hereinafter referred to as "SDGs") while enhancing the well-being and quality of life for its residents and tourists.



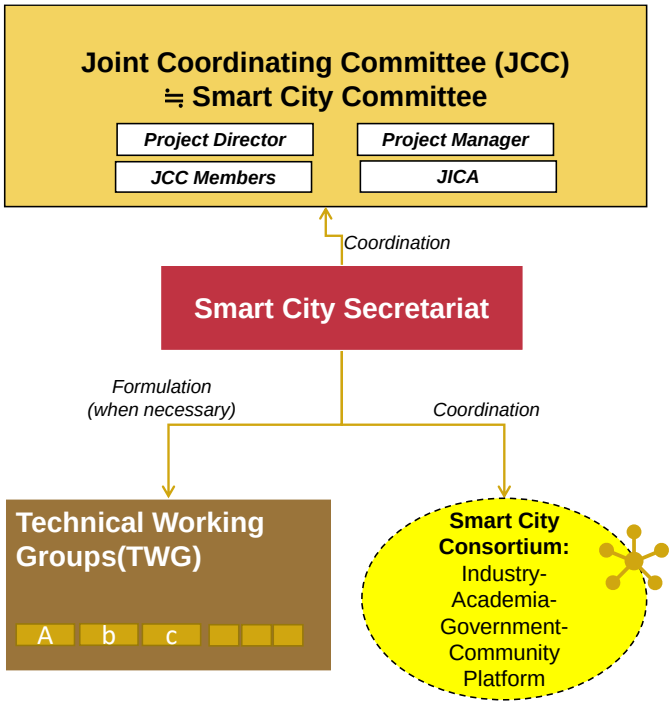
Source: JICA Long Term Expert Team

Figure 3.3.1: Diagram of Siem Reap Smart City Approach

3.4 Activity 1-4: Establishment and operation of coordination and cooperation mechanisms

3.4.1 Outline

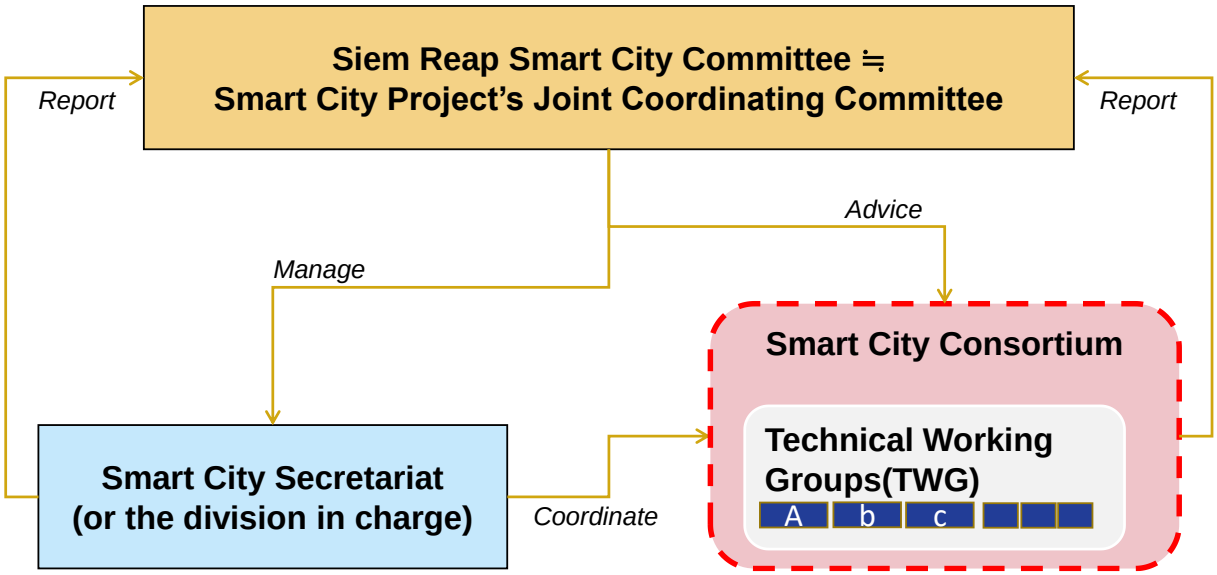
The entire concept and framework of operation of coordination and cooperation mechanisms were reviewed under Activity 1-2. A specific implementation structure, including a detailed diagram, was thereafter developed and approved at the 4th JCC in September 2023, as illustrated below.



Source: JICA Long Term Expert Team

Figure 3.4.1: Implementation Structure of the Project (approved in the 4th JCC)

During the discussion on the detailed mechanism of the coordination and cooperation , TWGs were proposed to be positioned as part of the Smart City Consortium. This updated structure was subsequently approved at the 6th JCC in September 2024.



Source: JICA Long Term Expert Team

Figure 3.4.2: Implementation Structure of the Project (approved in the 6th JCC)

The details of the Smart City Committee, the Smart City Secretariat, the Smart City Consortium, and the TWGs under the Smart City Consortium are summarized in the following subsections.

3.4.2 Siem Reap Smart City Committee

The Siem Reap Smart City Committee was established in 2019. During the Data Collection Survey, recommendations were made to enhance the organizational structure by including relevant departments that were initially excluded, such as DoT, the Provincial Police, and DPTC. In July 2022, these recommendations were adopted, leading to a restructuring of the committee. Furthermore, on 22nd July 2024, the structure was further updated following a decision by the provincial governor, resulting in the current organizational setup as of February 2025.

(1) Chairman

- Provincial Governor

(2) Vice Chairman

- Deputy Governor

(3) Members

- Director of SRPA
- Deputy Director of SRPA
- Mayor of Siem Reap Municipality
- Director of DLMUPC
- Director of DPWT

- Director of DoP
- Director of DoE
- Director of DPTC
- Director of DCFA
- Director of DoI
- Acting Director of DoT
- Director of the Planning and Investment Division of SRPA
- Director of the Public Relations and International Cooperation Division of SRPA
- Director of the Human Resource Management Division of SRPA
- Director of the Inter-sectoral Division of SRPA
- Director of the Administration Division of SRPA
- Director of the Finance Division of SRPA
- Deputy Chief of the Provincial Police
- Vice Mayor of Siem Reap City Hall
- Director of the Procurement Unit of SRPA
- Deputy Director of Water, Forestry and Infrastructure of APSARA National Authority
- Senior Architect of APSARA National Authority
- IT Support Officer of Angkor Enterprise
- IT Support Officer of Angkor Enterprise

(4) Roles and Responsibilities

- Lead collaborative discussions with development partners, the public sector, private sector, higher education institutions, research organizations, and relevant stakeholders to gather insights and strategies for achieving the vision, targets, and goals of the Siem Reap Smart City initiative.
- Facilitate partnerships between Siem Reap and other smart cities to promote knowledge exchange and cooperation.
- Oversee the study and development of the Smart City Roadmap for Siem Reap, ensuring alignment with strategic objectives.
- Coordinate, collaborate, and promote tourism development initiatives related to the Smart City project.
- Evaluate project proposals related to the Smart City initiative for inclusion in the province's five-year development plan and the three-year rolling investment program.
- Mobilize resources and support from the public sector, development partners, private sector, higher education institutions, research organizations, and citizens to ensure the successful implementation of Smart City initiatives.
- Direct and coordinate activities related to the implementation of the Smart City project.
- Report on project progress and outcomes during Provincial Council meetings.

- Monitor and evaluate the implementation of Smart City projects to ensure alignment with planned objectives.
- Seek guidance and approval from provincial councils, relevant ministries, and departments, while requesting recommendations to address challenges encountered during project implementation.
- Update the Smart City plan based on real-time conditions and emerging needs, ensuring flexibility and relevance.
- Undertake additional tasks related to the Smart City project as required by evolving circumstances.

3.4.3 Siem Reap Secretariat

The SRPA established the Smart City Secretariat in preparation for the formation of the Smart City Division or other alternative organizations. Its roles and responsibilities were updated following the provincial governor's decision on July 22, 2024, and are defined as follows.

(1) Director

- Deputy Governor

(2) Deputy Director

- Director of Planning and Investment Division
- Director of Public Relations and International Cooperation Division
- Director of Human Resource Management Division
- Director of Inter-sectoral Division
- Director of Administration Division
- Director of Procurement Unit
- Director of Finance Division

(3) Members

- Chief of Investment Office
- Chief of International Cooperation Office
- Chief of Planning Office
- Chief of Information and Documentation Office
- Chief of Protocol and Documentation
- Chief of Human Development Office
- Deputy Chief of Protocol and Documentation
- Deputy Chief of Documentation and Information Office
- Deputy Chief of International Cooperation Office
- Officer of Investment Office
- Officer of Public Order and Safety Office

- Contracted Officer of Investment Office
- Contracted Officer of Documentation Office
- Contracted Officer of Documentation Office

(4) Roles and Responsibilities

- Coordinate Smart City operations and support the activities of the Smart City Management Team.
- Develop and coordinate the annual action plan for smart city implementation and prepare corresponding budget requests.
- Promote and facilitate investment from the private sector to support smart city initiatives.
- Coordinate, collaborate, and consult with stakeholders to plan the implementation of the smart city roadmap and submit proposals for approval by the management team.
- Develop action plans for cooperation with the Japan International Cooperation Agency (JICA) and other stakeholders, seeking approval from the management team.
- Collaborate in managing the Smart City Consortium to promote comprehensive partnerships.
- Organize meetings and coordinate activities related to smart city initiatives on behalf of the management team.
- Foster collaboration with other smart cities both within Cambodia and internationally.
- Implement specific tasks outlined in the Smart City Project Roadmap.
- Monitor, evaluate, and report project implementation outcomes to the management team.
- Perform additional duties as assigned by the Smart City Committee.

3.4.4 Smart City Consortium

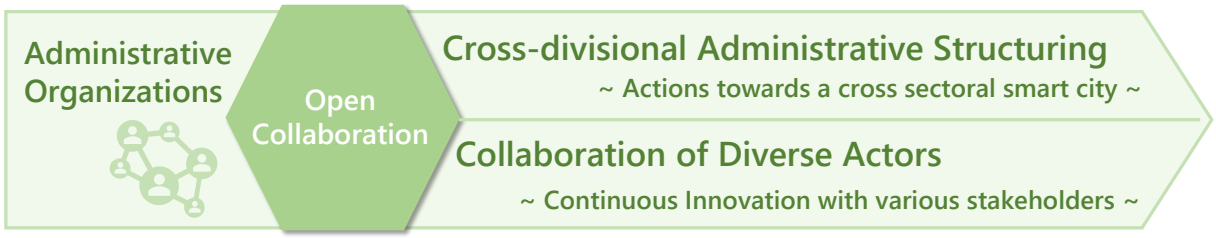
(1) Background

One of the pillars of Siem Reap Smart City Roadmap in the administrative approach namely "Administrative Organizations" aims to strengthen the administrative organization and plays the main role in the realization of the smart city and enhance the interaction among stakeholders for open innovation. This pillar is based on the identified issues as follows.

- There has been no discussion between private companies and the Smart City Committee.
- There is no fundamental basis for the public sector and the private sector to collaborate on multi-sectoral projects or projects in new disciplines.
- Academic research or academic projects with active public sector participation are nearly absence in Siem Reap.

In order to solve these problems, the Administrative Organization pillar has adopted the basic policy as "open collaboration", and the direction of action has been set as "Collaboration of Diverse actors". Under this open collaboration policy and the direction, the collaborative platform for communities,

private sector, academic, and government, the Consortium was proposed to induce the continuous innovation with various stakeholders.



Source: Siem Reap Smart City Roadmap

Figure 3.4.3: The Administrative Organizations Pillar in the Siem Reap Smart City Roadmap

The Project has implemented several pilot projects since 2022, and one of them resulted in an attempt to establish a public-private partnership system for smart cities by holding discussions between tourism organizations and the government. As a result of the project, the importance of private sector participation, information gathering on the private sector by the SRPA, and organizational platforms in promoting smart city in Siem Reap were confirmed. At the 2nd JCC meeting of the Project in October 2022, it was agreed to establish the consortium, and the methodology was agreed at the 5th JCC meetings in March 2024.

(2) Objective

The purpose of the Consortium is to promote collaboration among communities, private sector, academic, and government. Through collaboration, the consortium aims to achieve the vision of the Siem Reap Smart City Roadmap: “For Citizens and Visitors” “With Angkor Heritage, Khmer Culture and Nature”, “By Solutions Using Technologies Smartly”, “Toward More Attractive and Sustainable Society”.

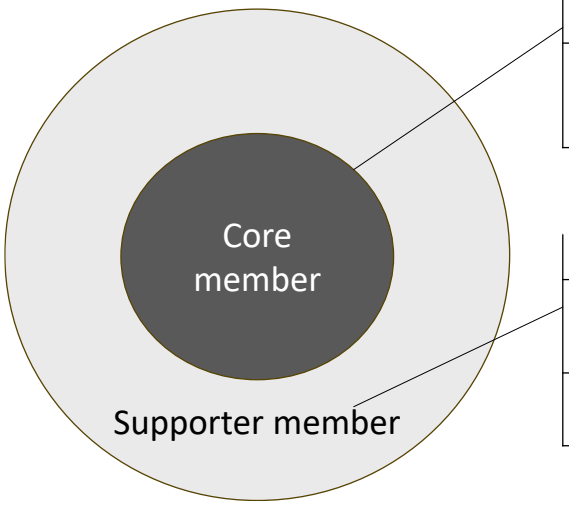
(3) Activity

The Consortium expects to implement the following activities

- Encouraging members to propose initiatives that support the vision of the Siem Reap Smart City Roadmap.
- Dissemination of information and awareness-raising related to smart city activities among stakeholders.
- Conduct other activities necessary to achieve the objectives of the consortium.

(4) Membership

Members are divided into two types as described in the figure below.



CORE Members:	
Expected member	✓ Organizations who involve in some smart city related projects/ businesses
Participation	✓ By an online application form ✓ With the mutual agreement prospective member and the SRPA

SUPPORTER Members:	
Expected member	✓ Organizations who support the vision of the Roadmap.
Participation	✓ By an online registration form ✓ No need an agreement

Source: JICA Long Term Expert Team

Figure 3.4.4: Membership Types of the Consortium

As of April 2025, 27 organizations were identified as core members, and one organization is identified as supporter members.

(5) Structure

The chairman of the Consortium, the governor of Siem Reap Province, represents the Consortium and oversees its affairs. The chairman has the authority to appoint a deputy chairman and delegate responsibilities as needed. The Consortium operates under the Siem Reap Smart City Committee, which advises on its activities. The Consortium is accountable to the Smart City Committee and supported by the Smart City Secretariat or the relevant division within the SRPA.

(6) Meetings

The General Meeting, including core and supporter members as well as invited guests, is held annually to foster collaboration and review the progress of the consortium.

The Core Member Meeting involves only core members and is held twice a year to address complex issues, make operational decisions, and ensure alignment with the Smart City Roadmap.

TWGs, co-chaired by members of the Secretariat and relevant departments, are formed as needed to focus on specific projects or research. These groups are established based on specific needs and are dissolved once their objectives are met.

(7) Kick-off Meeting (as the 1st General Meeting)

On the 3rd of July 2024, SRPA held a kick-off meeting of the Smart City Consortium, inviting private companies currently doing business in Siem Reap, as well as academic institutions and development partners who have been involved in the Smart City project so far. The kick-off meeting was held both onsite and online. Participants provided a number of positive comments on the future of the Consortium.


Source: Nippon Koei Co., Ltd.

Figure 3.4.5: Smart City Consortium Kickoff Meeting

3.4.5 Technical Working Groups Under the Consortium

Following the completion of several pilot projects and the establishment of the Smart City Consortium, the role of the TWG was redefined. Previously, the TWG functioned as a collaborative framework for the implementation of pilot projects. Moving forward, the TWG will be operated under the framework of the Consortium.

The TWG shall be established as a temporary entity with clearly defined objectives. The chair shall be appointed from among the core members, with an appropriate organization assuming the leadership role. Guest members may be invited as needed to contribute expertise. Further details regarding the TWG operation shall be discussed within the Consortium.

The Decision issued by the Governor of Siem Reap in January 2025 officially established the “Security TWG” and the “Data Utilization for Tourism Promotion TWG.”

3.5 Activity 1-5: Suggestions of legal and institutional improvements for promoting smart cities

The operation and maintenance of the Document Tracking System, that was developed as part of pilot project (4) (Government Internal Document Tracking), is conducted by SRPA from April 2024. The operation and maintenance of the Illegal Parking Monitoring System, that was implemented as part of pilot project (1) (Illegal Parking Monitoring), is conducted by SRPA from July 2024. The operation and maintenance of the Siem Reap Smart Data Platform (hereinafter referred to as “SSDaP”), that was implemented as part of pilot project (8) (Data Platform System Development), is also conducted by

SRPA from July 2024. SRPA agreed on service contracts with outsourcing companies to operate and maintain each system. The JICA Expert Team has provided technical advisory from a legal and institutional point of view, including the provision of the draft scope of works to be included in the contract documents, to SRPA.

The Smart City Consortium launched in July 2024, as mentioned in 3.4. The JICA Expert Team has drafted the Articles of Incorporation of the Smart City Consortium.

Chapter 4 Activities for Output 2

Here we list the detailed activities for Output 2.

4.1 Activity 2-1: Reflection on lessons learned from the pilot project implemented in the data collection survey

Summaries of the lessons learned from the smart parking Proof of Concept (hereinafter referred to as "PoC") of the Data Collection Survey are as below.

(1) Clarification of the Division in Charge

It is recommended to create a division within the provincial administration that is in charge of smart city policies including parking policies. In order to implement an on-street parking project, it is necessary to obtain a project permit from the provincial administration and sign a project contract. The procedures are unclear, and clarification of the procedures is necessary for active private sector cooperation in the future.

(2) Planning of relevant Plans (Parking Policy and Parking Lot Development Plan)

On-street parking on roads in the center of Siem Reap City have been managed in three categories, which are allowed parking, prohibited parking, and odd/even days. In addition, in front of large markets, parking lots for visitors are secured and operated by the market association. Although individual parking facilities are secured in the city center and markets, there is a lack of citywide policies on parking, parking maintenance, and parking enforcement, and parking policies and plans need to be formulated.

(3) Development of related Legal Systems

In Cambodia, the only relevant law on parking is the Law on Road Traffic, which stipulates the sections of roads where parking is prohibited. However, the law only specifies parking areas from the perspective of vehicular traffic, and there is no provision on policy and maintenance of on-street and off-street parking areas. In Japan and other countries, laws such as the Law on Car Parking have been developed under the basic laws such as the Law on Road Traffic to facilitate traffic in cities. It is hoped that Cambodia will enact a law on car parking soon.

In addition, in this pilot project, the use of roads as garages was found, where vehicles belonging to nearby shopkeepers and employees park for long periods of time. Using the road as a garage is a private occupation of public space, which is undesirable from the perspective of fairness in the use of public space. Therefore, it is necessary to develop not only the Law on Car Parking but also laws related to garages and mandatory parking lots which define the place where cars are to be parked.

(4) Appropriate Operation of relevant Legal Systems (such as Control and Guidance of Illegal Parking by the Traffic Police)

Although parking on the sidewalks of roads in Cambodia is prohibited under the Law on Road Traffic, the sidewalks are customarily occupied by shopkeepers and homeowners along the roads, and there is no enforcement or guidance by the traffic police.

In Siem Reap, the 38 road construction project is underway, and the sidewalks are being raised to create roads where sidewalk parking is practically not allowed. There are plans to mark the roads with parking spaces to allow on-street parking, but it is not clear how this will be implemented. When sidewalks are being built, they are being cut down to allow vehicles to enter and exit stores and residential entrances. If no guidance or enforcement is given regarding parking, sidewalks and streets may be used as parking areas.

(5) Development of Basic Infrastructure (such as Road and Communication Infrastructure) as a Precondition for Smart Cities

In order to develop smart city projects that include on-street parking, it is necessary to develop the basic infrastructure of roads, sidewalks, and communications in advance. However, the development of such basic infrastructure is not sufficient, and it is necessary to develop basic infrastructure based on the premise of smart city development (in the case of smart parking lot development, sufficient road width, sidewalks and bollards that do not allow parking, handholes and conduits for communication lines, etc.).

4.2 Activity 2-2: Formulation of the Smart City Annual Action Plan

The progress of the Action plans for each year are as follows.

- Action Plan 2023 was prepared and validated.
- Action Plan 2024 was also prepared and validated
- Action Plan 2025 was also prepared and validated
- Action Plan 2026 was prepared

These action plans are utilized for the project monitoring and formulating SRPA's budget plan to the central government.

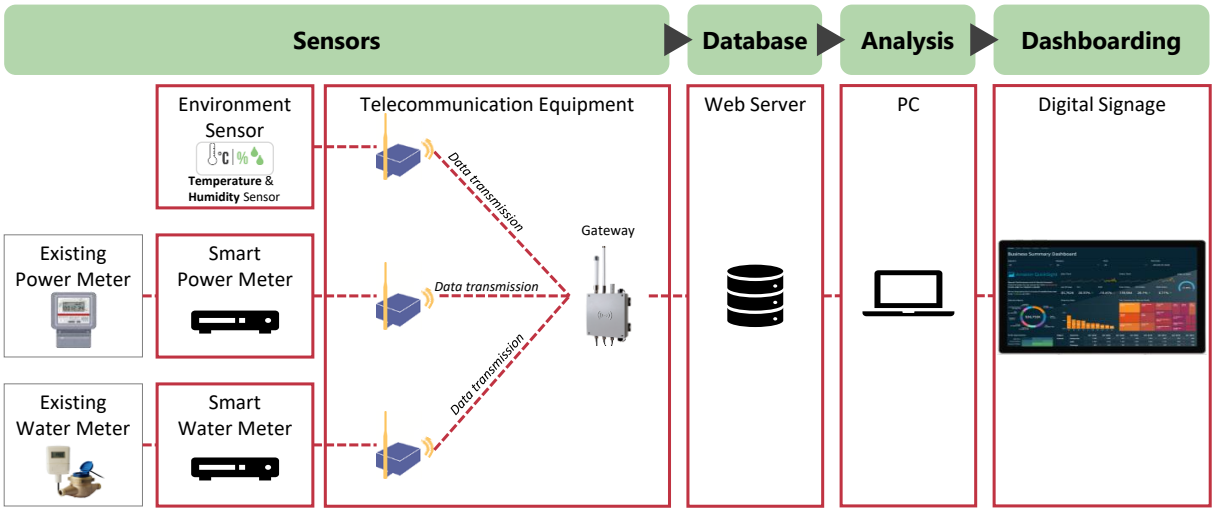
4.3 Activity 2-3: Selection of pilot projects based on the Smart City Annual Action Plan and the preparation of action plan for pilot projects

The JICA Expert Team proposed to select 1 pre-pilot project in the 2nd TWG meeting and 6 pilot projects (pilot project 1-6) during the 2nd JCC meeting. Also, the JICA Expert Team proposed to select additional 2 pilot projects (pilot project 7 and 8). All proposals were agreed in the JCC meetings. Below shows the initial action plans for each pilot project.

4.3.1 Pre-Pilot Project: Sensor Installation in Siem Reap Provincial Hall

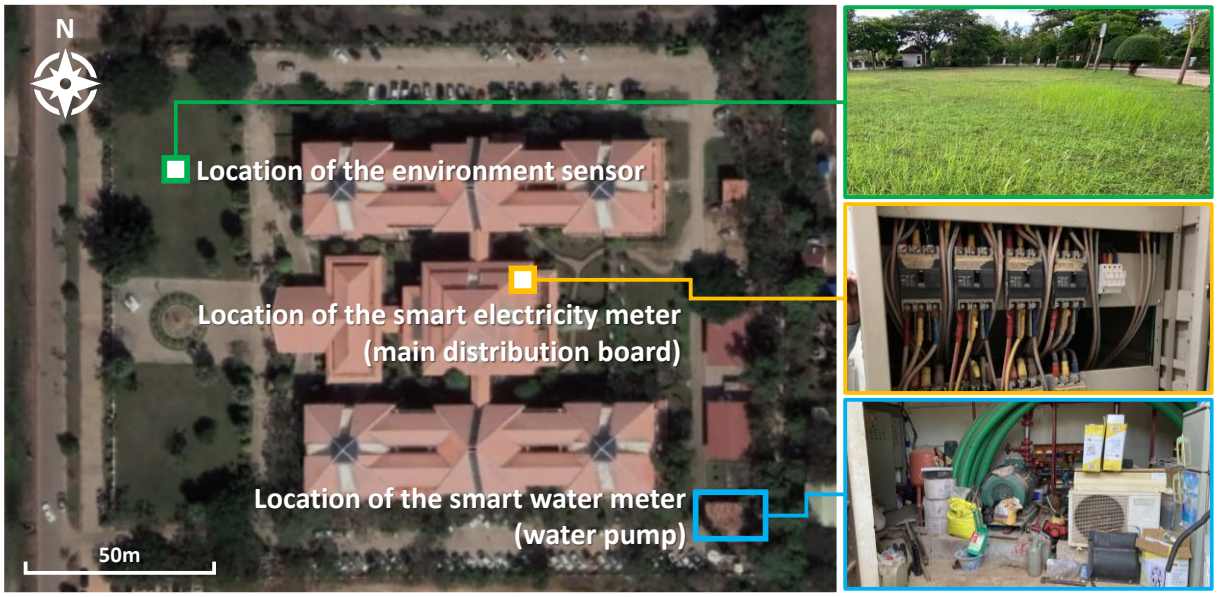
(1) Contents

- Environmental sensors, smart water meters, smart electricity meters, etc. will be introduced, and measures to visualize environmental indices, infrastructure usage, etc. will be implemented sequentially at the project office in the provincial hall building.



Source: Nippon Koei Co., Ltd.

Figure 4.3.1: Diagram of the Pre-Pilot Project



Source: Nippon Koei Co., Ltd.

Figure 4.3.2: Locations of Equipment to be Installed in the Pre-Pilot Project

(2) Roles of Key Stakeholders

- SRPA
  - ➢ Management of the trial implementation

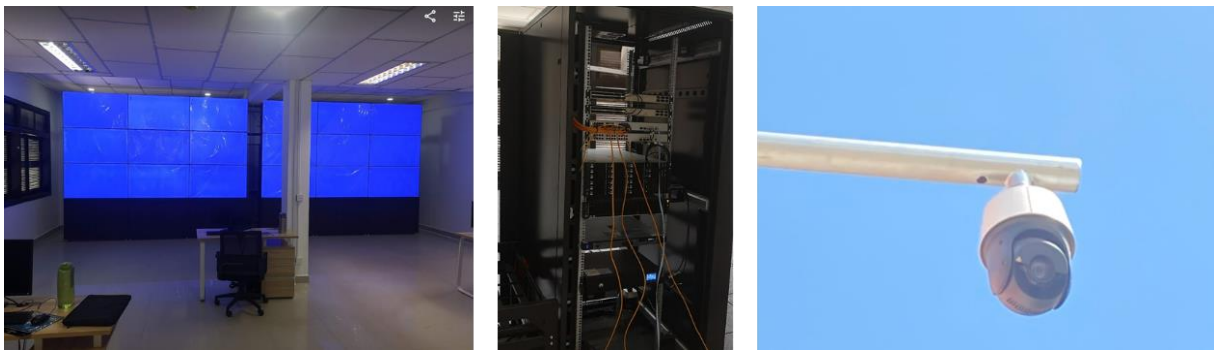
- Coordination with local organizations
- Monitoring the equipment installation
- Monitoring the data output through the dashboard

- JICA Expert Team
  - Management of the trial implementation
  - Subcontract management
  - System development to show data on the dashboard
  - Monitoring the data output through the dashboard
- Subcontractor (under the JICA Expert Team)
  - Preliminary site survey prior installation (as necessary)
  - Procurement of equipment
  - Installation of equipment
  - Operation and maintenance of the installed equipment

4.3.2 Pilot Project (1): Illegal Parking Monitoring

(1) Current Condition

- 200 CCTV cameras were installed in the 38-road construction project.
- Due to telecommunication issues, the cameras do not work for now.
- The catalogue specifications of the CCTV system are already provided by MPWT, but the actual operation has not yet been tested.
- The provincial police are keen on using CCTV cameras to detect illegal parking on walkways.



Source: Nippon Koei Co., Ltd.

Figure 4.3.3: Installed Equipment in the 38-Road Construction Project

(2) Urban Issues to be Solved

- Illegal parking on walkways is disrupting the walkability for the citizens

(3) Objective

- To monitor illegal parking on walkways for quick action by the police.

- To test an illegal parking monitoring system with the same condition as the 200 cameras, so that the 200 cameras can be quickly utilized once it is possible.

(4) Goal

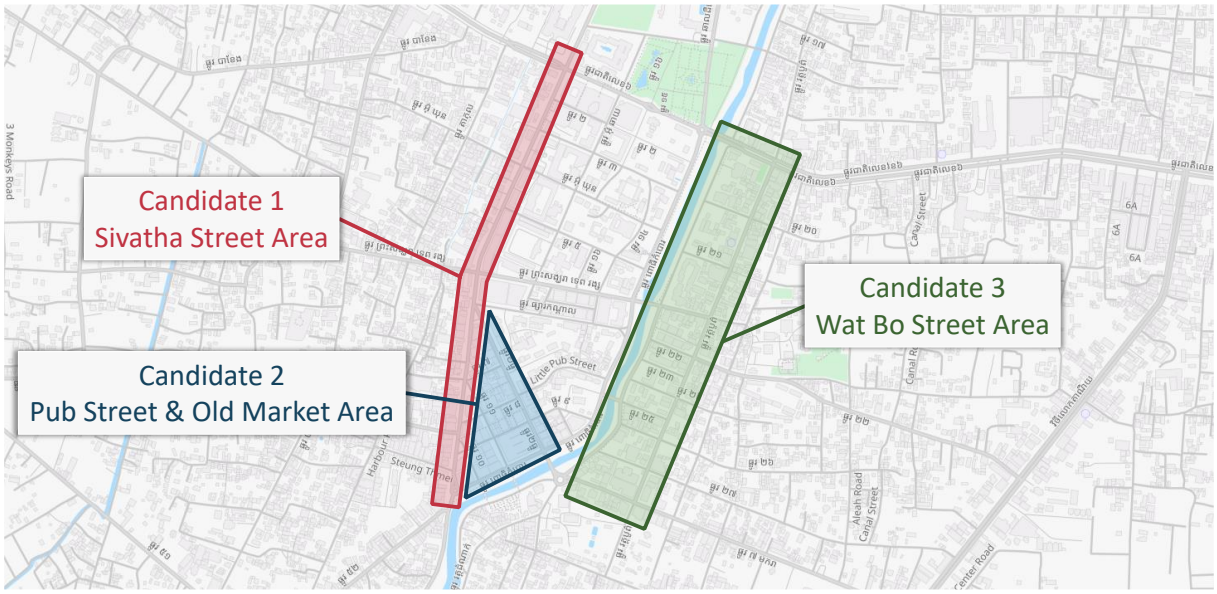
- Illegal parking is detected, reported, and managed in time
- Street safety is improved in pilot areas
- CCTV data is managed in a system

(5) Beneficiaries

- Citizens of Siem Reap (Enhanced walkability of walkways)
- Siem Reap Provincial Police (Enhanced operational efficiency)

(6) Target Area

- 4 specified areas inside the city (to be decided)



Source: Nippon Koei Co., Ltd.

Figure 4.3.4: Candidate Areas for Implementation

(7) Related Priority Project in the Smart City Roadmap

- S-01: CCTV System Introduction
- D-01: Integrated Data Collection and Analysis

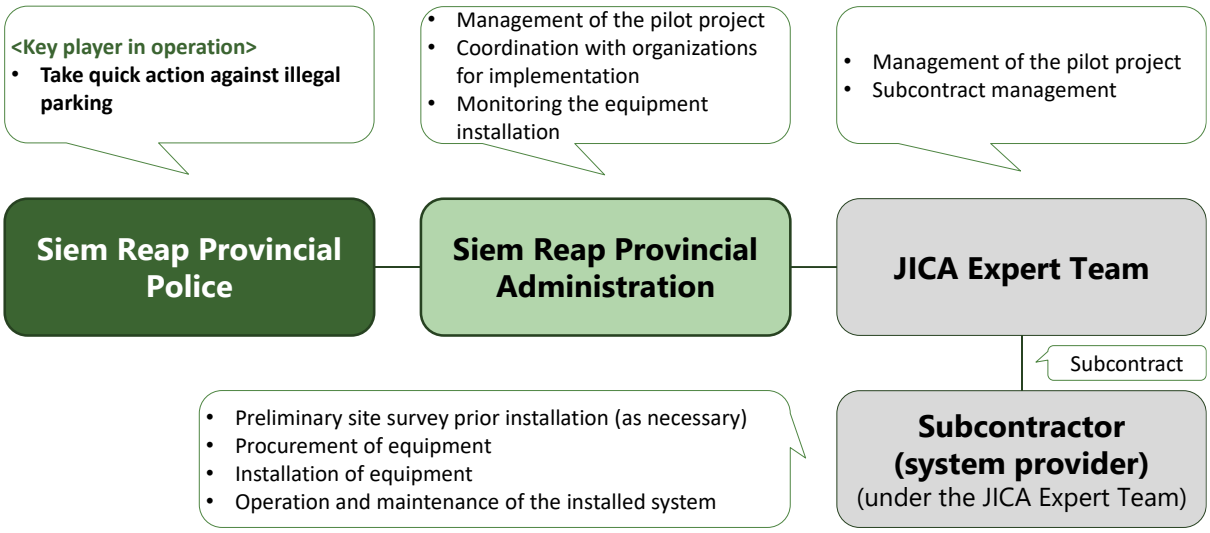
(8) Contents of the Solution

- Newly introduced 4 CCTV cameras (same specifications as the 200 cameras) shall shoot the images of walkways inside the city.

- In case there is a vehicle parked on the walkways, the system shall automatically detect the situation.
- After detection, the system shall automatically send alerts to the police in charge, so that the police can take action quickly.

(9) Roles of Key Stakeholders

- SRPA
  - Management of the pilot project
  - Coordination with organizations for implementation
  - Monitoring the equipment installation
- Siem Reap Provincial Police
  - Take action against illegal parking
- JICA Expert Team
  - Management of the pilot project
  - Subcontract management
- Subcontractor (under the JICA Expert Team)
  - Preliminary site survey prior installation (as necessary)
  - Procurement of equipment
  - Installation of equipment
  - Operation and maintenance of the installed system



Source: Nippon Koei Co., Ltd.

Figure 4.3.5: Roles of Key Stakeholders for Illegal Parking Monitoring

(10) Approximate Cost

- Capital expenditure (to be borne by JICA) : USD 15,000
  - Equipment to be installed (cameras, data servers, monitors, telecommunication equipment, etc.)

- ➢ Personnel expenses (development of the monitoring system, manual making, operation trainng, reporting, etc.)

- Operating expenditure (to be borne by JICA) : USD 15 / month / camera
  - ➢ Telecommunication fee

(11) Schedule

Source: Nippon Koei Co., Ltd.

Figure 4.3.6: Tentative Schedule for Illegal Parking Monitoring

(12) Evaluation (KPI)

- The average time taken by the police to take action to illegal parking.
- The number of illegal parking on streets of the target area

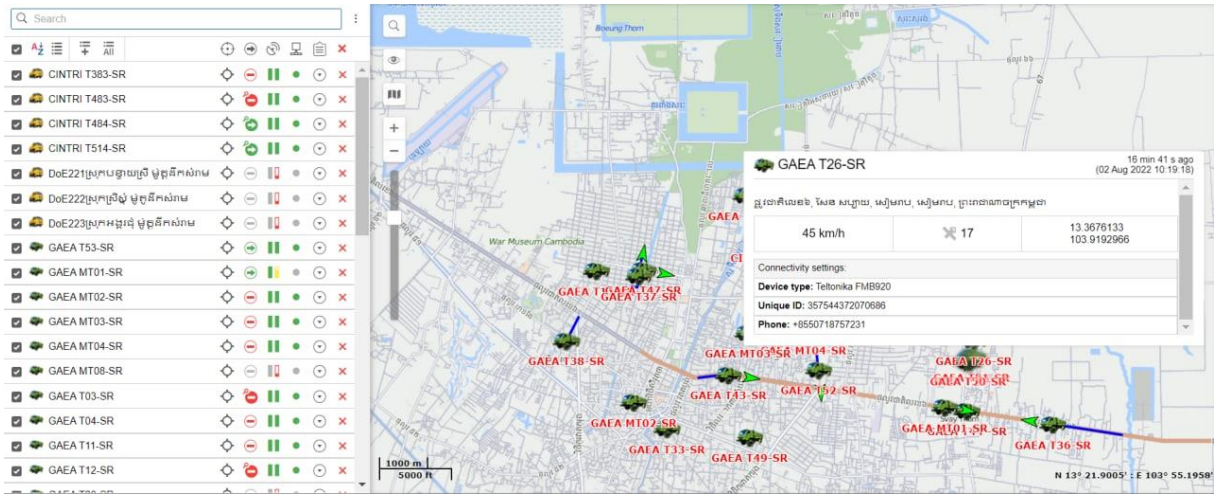
(13) Key Remarks for Implementation

- The actual performance of the pilot project depends on the detailed specifications of the CCTV installed in the 38 road construction project.

4.3.3 Pilot Project (2): Waste Collection Improvement

(1) Current Condition

- The Ministry of Environment has introduced GPS sensors to all garbage trucks in Siem Reap.
- The GPS data can be seen on the Solid Waste Management Platform.
- The Siem Reap Provincial Department of Environment can access the Solid Waste Management Platform.
- The raw data of the GPS is not provided by the Ministry of Environment for now.



Source: Nippon Koei Co., Ltd.

Figure 4.3.7: Solid Waste Management Platform

(2) Urban Issues to be Solved

- The waste collection is not controlled or monitored by the public sector in Siem Reap.
- The waste collection time is not informed to citizens, causing confusion and garbage leftover on streets.

(3) Objective

- To understand the current situation of solid waste collection.
- To improve the waste collection services inside the city, by using the GPS data of garbage trucks.

(4) Goal

- Waste collection schedule is optimized.
- Waste collection service delivery is improved.
- Waste collection data is managed in a system.
- Street landscapes and hygiene levels are improved.

(5) Beneficiaries

- Citizens and business operators of Siem Reap (better public service)
- Department of Environment (management efficiency)
- Siem Reap City Administration (management efficiency)
- Private companies collecting waste (operation efficiency)

(6) Target Area

- The whole city (not specified)

(7) Related Priority Project in the Smart City Roadmap

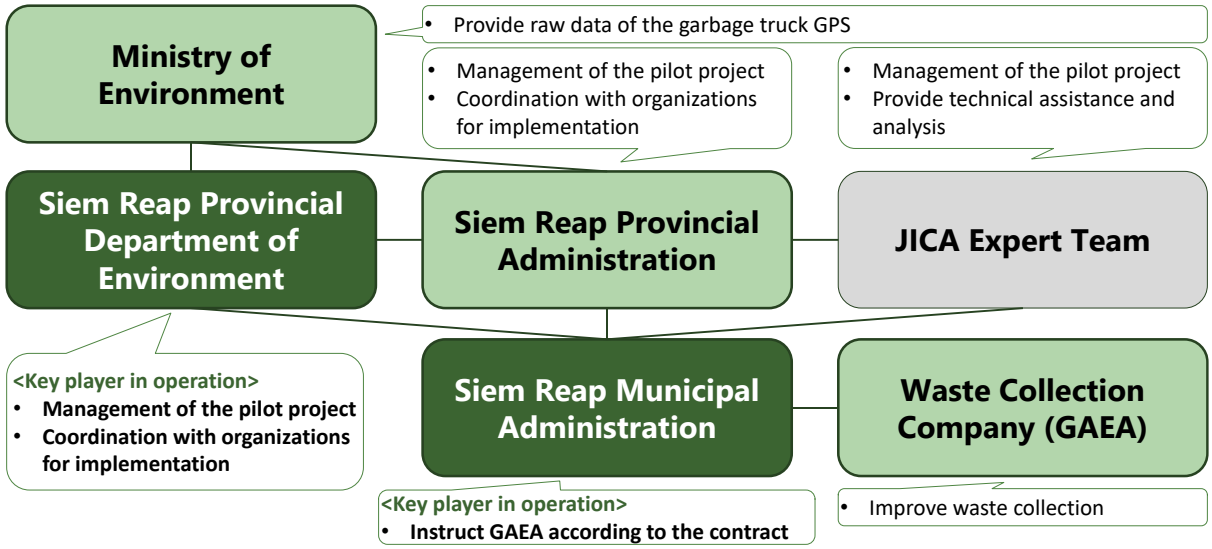
- W-01: Solid Waste Management System

(8) Contents of the Solution

- The GPS data of garbage trucks monitored by MoE shall be extracted for analysis.
- After the analysis, improved timetables for waste collection and improved manual for waste collection operation will be proposed.

(9) Roles of Key Stakeholders

- SRPA
  - Management of the pilot project
  - Coordination with organizations for implementation
- MoE
  - Provision of raw data of the garbage truck GPS
- DoE
  - Management of the pilot project
  - Coordination with organizations for implementation
- Siem Reap Municipal Administration
  - Instruct the waste collection company according to the contract
- Waste Collection Company (Global Action for Environmental Awareness (hereinafter referred to as "GAEA"))
  - Improve waste collection
- JICA Expert Team
  - Management of the pilot project
  - Provide technical assistance and analysis



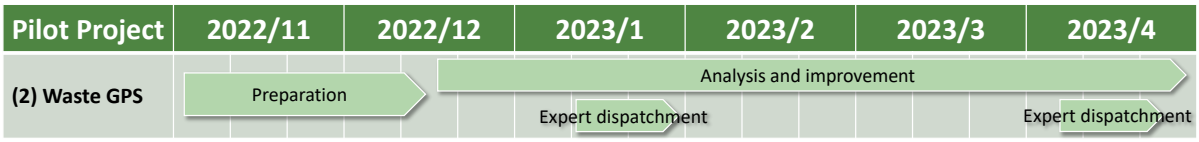
Source: Nippon Koei Co., Ltd.

Figure 4.3.8: Roles of Key Stakeholders for Waste Collection Improvement

(10) Approximate Cost

- Capital expenditure (to be borne by JICA) : USD 35,000
  - ➢ Personnel expenses (technical assistance and analysis by experts of the JICA Expert Team)

(11) Schedule



Source: Nippon Koei Co., Ltd.

Figure 4.3.9: Tentative Schedule for Waste Collection Improvement

(12) Evaluation (KPI)

- The number of timetables set for waste collection
- The total active time of garbage trucks

(13) Key Remarks for Implementation

- The technical assistance and analysis from the JICA Expert Team are available on condition that the raw data of the garbage truck GPS is provided by the Ministry of Environment.

4.3.4 Pilot Project (3): Tourism Statistics Digitalization

(1) Current Condition

- Some of the tourism data is not made by Excel (word or handwriting).

- The frequency of updating data is low (mostly once a month).
- The tourism data are not utilized for improving tourism in Siem Reap.

(2) Urban Issues to be Solved

- Due to lack of experience, the capacity of individual governmental officers to appropriately deal with data is not enough

(3) Objective

- To digitalize the process of collecting and publishing the tourism statistics and enhance the data management capacity of public officers in the tourism sector

(4) Goal

- Formulation of efficient structure for data management of high-frequency data including data collection, data storage and data analysis.
- In the future, open data of tourists (number, nationality, etc.) shall be collaborated with and utilized by tourism operators.

(5) Beneficiaries

- Siem Reap Provincial Department of Tourism
- Tourists (Better service from tourism operators)
- Tourism Operators (Increase of Tourists, allocation of the resource)
- Citizens of Siem Reap (Economic Growth)

(6) Target Area

- The whole city (not specified)

(7) Related Priority Project in the Smart City Roadmap

- D-01: Integrated Data Collection and Analysis

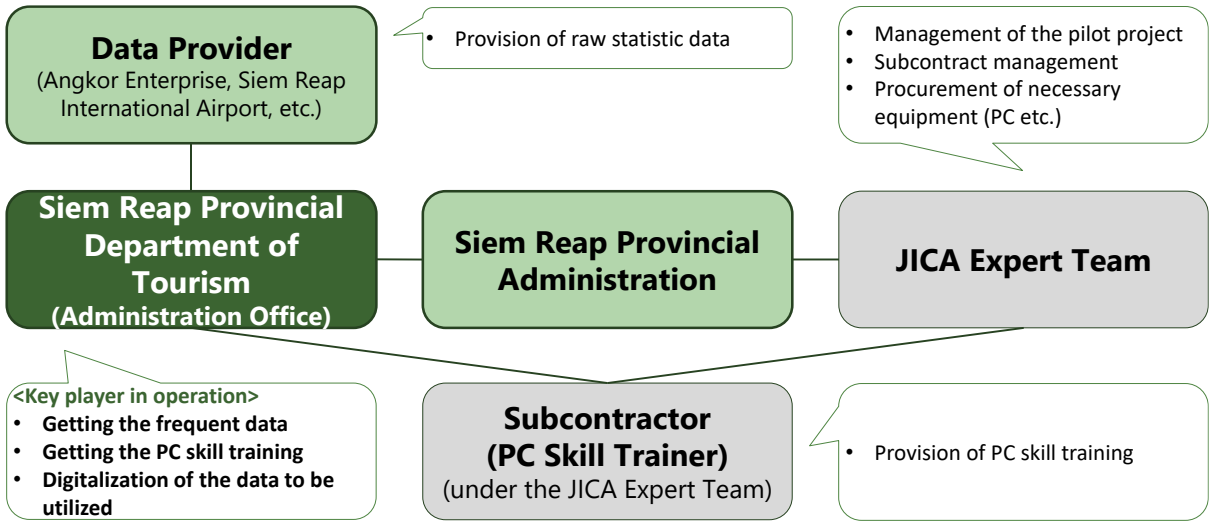
(8) Contents of the Solution

- PC skill training shall be conducted for DoT officers. In the future, the data shall be stored digitally on a cloud platform, open to the public, and shown on web GIS and dashboards.

(9) Roles of Key Stakeholders

- SRPA
  - Management of the pilot project

- DoT
  - Getting the frequent data
  - Getting PC skill training
  - Digitalization of the data to be utilized
- Data Provider (Angkor Enterprise, Siem Reap International Airport, etc.)
  - Provision of raw statistical data
- JICA Expert Team
  - Management of the pilot project
  - Subcontract management
  - Procurement of necessary equipment (PC etc.)
- Subcontractor (under the JICA Expert Team)
  - Provision of PC skill training



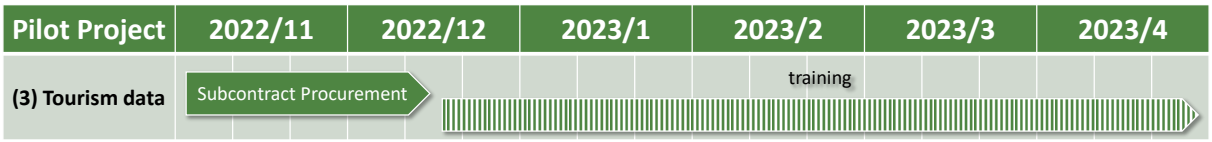
Source: Nippon Koei Co., Ltd.

Figure 4.3.10: Roles of Key Stakeholders for Tourism Statistics Digitalization

(10) Approximate Cost

- Capital expenditure (to be borne by JICA) : USD 6,000
  - New PCs to be installed
- Operating Expenditure (to be borne by JICA) : USD 1,500 / training
  - Personnel expenses for PC skill trainer

(11) Schedule



Source: Nippon Koei Co., Ltd.

Figure 4.3.11: Tentative Schedule for Tourism Statistics Digitalization

(12) Evaluation (KPI)

- Amount of digitalized data

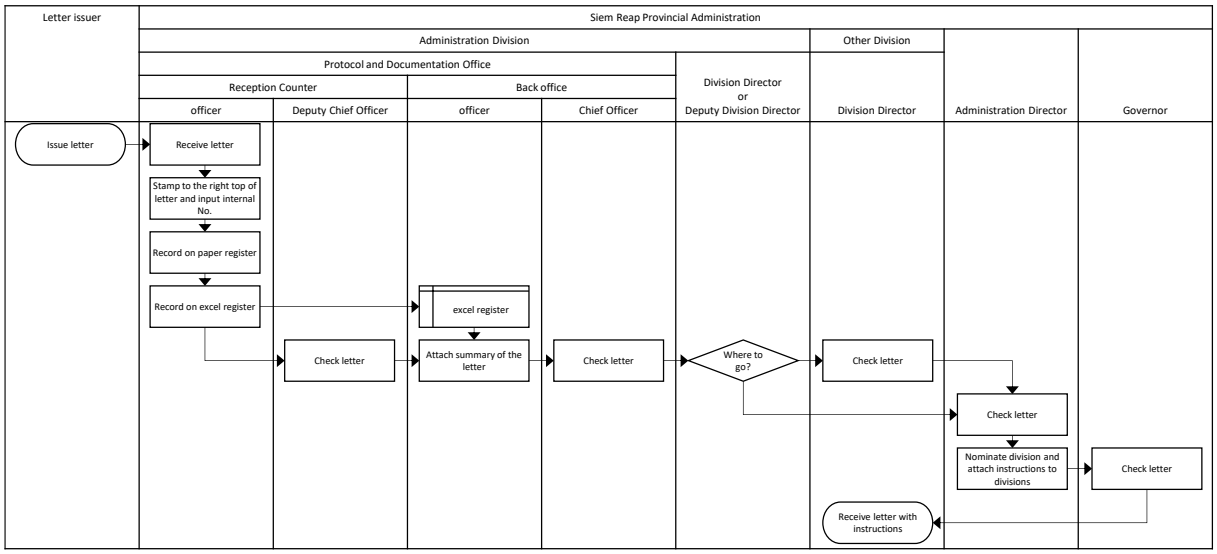
(13) Key Remarks for Implementation

- Discussion with tourism statistics data providers (Angkor Enterprise, Siem Reap International Airport, etc.) to disclose raw data (excel file) to DoT is needed.

4.3.5 Pilot Project (4): Government Internal Document Tracking

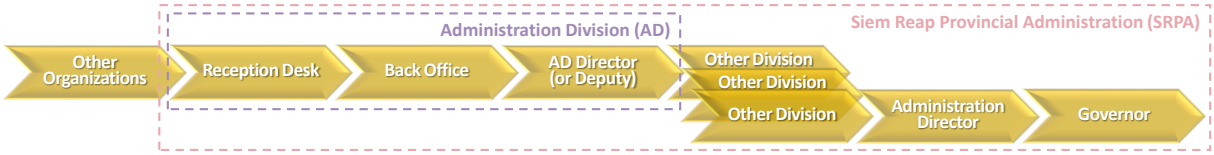
(1) Current Condition

- Letters received by SRPA from other organizations are circulated to the Governor via other divisions depending on the content.
- The process is manually recorded in the register when the Administration Division receives letters from outside and when the Administration Division passes letters to other divisions.
- The current problem is that it is unclear which Office/Officer is stopping the flow of letters during the circulation.
- There is a need for a mechanism that allows all relevant officers to easily understand the circulation status.



Source: Nippon Koei Co., Ltd.

Figure 4.3.12: Current Flow of Internal Documents (1)



Source: Nippon Koei Co., Ltd.

Figure 4.3.13: Current Flow of Internal Documents (2)

(2) Urban Issues to be Solved

- The documentation process within the public sector is unclear, causing unpredictable delays in various procedures involving the public sector

(3) Objective

- To establish a monitoring system of the internal process of document receipt in SRPA.

(4) Goal

- The internal government document processing situation is tracked and monitored.

(5) Beneficiaries

- SRPA (Better internal operation)
- Citizens and business operators of Siem Reap (Better government internal operation)

(6) Target Area

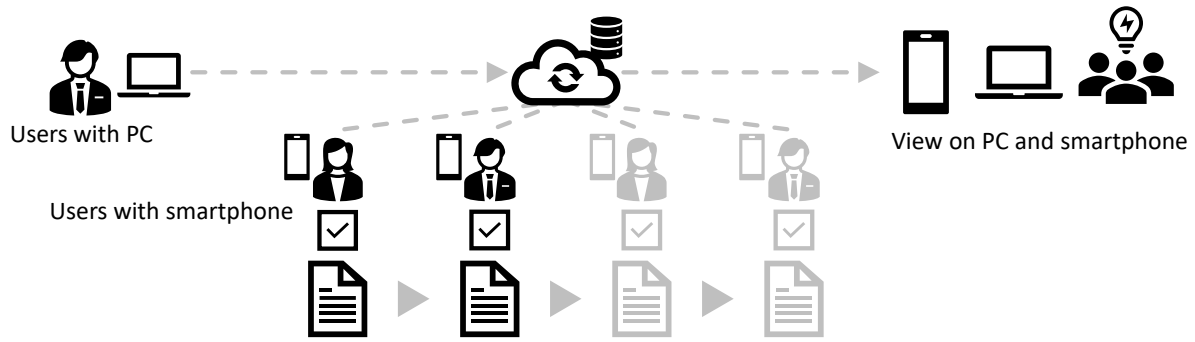
- Siem Reap Provincial Hall

(7) Related Priority Project in the Smart City Roadmap

- D-01: Integrated Data Collection and Analysis

(8) Contents of the Solution

- The features of "Document Tracking System" are as follows:
  - Protocol and Documentation Office (hereinafter referred to as "PDO") staff register letter information in the system with their PCs
  - Staff handing over the letter update the status with their smartphones
  - All relevant officers can monitor the current location of the letter from their PCs and smartphones.



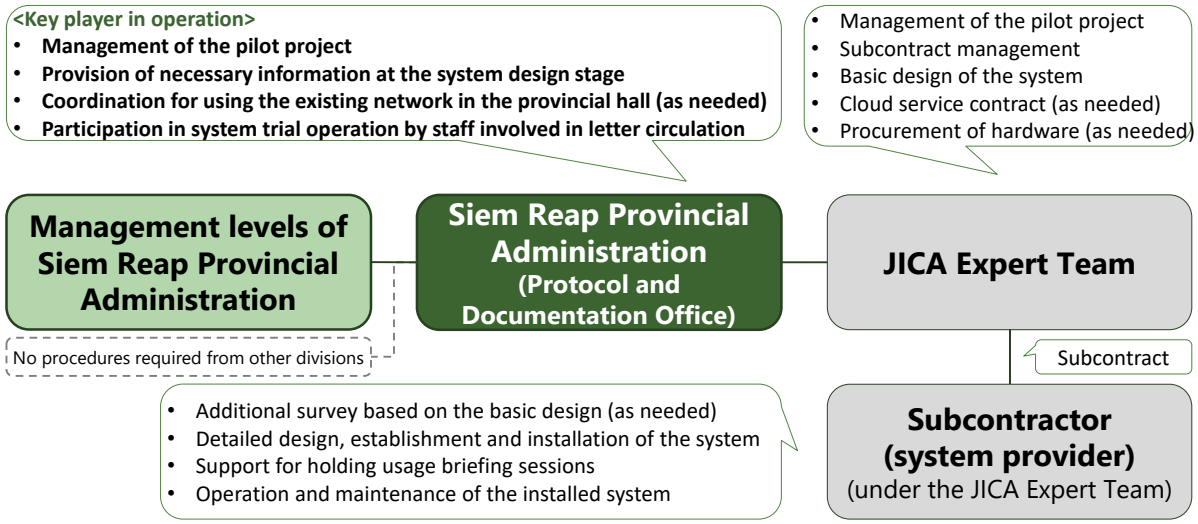
Source: Nippon Koei Co., Ltd.

Figure 4.3.14: Contents of the Document Tracking System

(9) Roles of Key Stakeholders

- SRPA (PDO)
  - Management of the pilot project
  - Provision of necessary information at the system design stage
  - Coordination for using the existing network in the provincial hall (as needed)
  - Participation in system trial operation by staff involved in letter circulation
- Management Levels of SRPA
  - Monitoring the document procedures
- JICA Expert Team
  - Management of the pilot project
  - Subcontract management
  - Basic design of the system
  - Cloud service contract (as needed)
  - Procurement of hardware (as needed)
- Subcontractor (under the JICA Expert Team)
  - Additional survey based on the basic design (as needed)

- Detailed design, establishment, and installation of the system
- Support for holding usage briefing sessions
- Operation and maintenance of the installed system



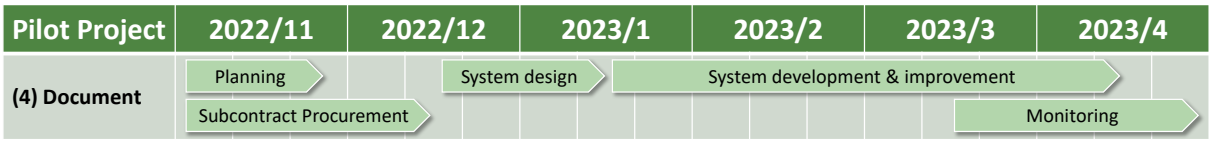
Source: Nippon Koei Co., Ltd.

Figure 4.3.15: Roles of Key Stakeholders for Government Internal Document Tracking

(10) Approximate Cost

- Capital Expenditure (to be borne by JICA) : USD 21,000
  - Subcontract for establishing a system
- Operating Expenditure (to be borne by JICA) : USD 550 / month
  - Cloud service (AWS, etc.)

(11) Schedule



Source: Nippon Koei Co., Ltd.

Figure 4.3.16: Tentative Schedule for Government Internal Document Tracking

(12) Evaluation (KPI)

- Amount of monitored documents

(13) Key Remarks for Implementation

- Cloud services are basically recommended for this pilot project from the viewpoint of time required for implementation.

- It is assumed that internet service is available at the provincial hall. The cost for telecommunication is not included above.
- The pilot project aims only for document procedures conducted by the Protocol and Documentation Office, requiring no additional operation from other divisions.

4.3.6 Pilot Project (5): Urban Environment Monitoring by Sensors

(1) Current Condition

- The urban environment is not properly monitored, and severe changes in the urban environment are not witnessed
- Telecommunication environment to support IoT equipment is not established

(2) Urban Issues to be Solved

- Insufficient infrastructure for data collection, storing and sharing

(3) Objective

- To introduce a wireless telecommunication environment for public use and test its usability by introducing sensors

(4) Goal

- A wireless telecommunication environment is established and is properly working

(5) Beneficiaries

- SRPA and Provincial Departments (Improved telecommunication environment and urban environment data acquisition)
- Citizens and private business operators (Improved telecommunication environment and urban environment data acquisition)

(6) Target Area

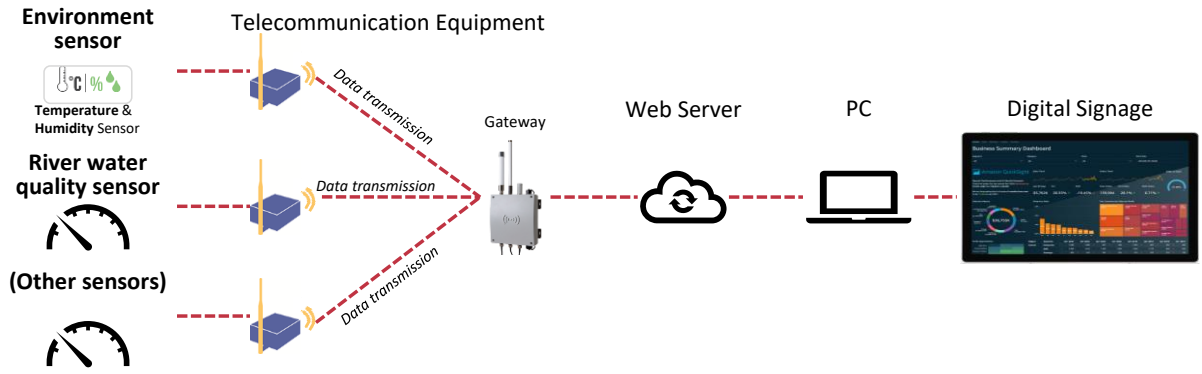
- City area

(7) Related Priority Project in the Smart City Roadmap

- D-01: Integrated Data Collection and Analysis
- W-04: Water Quality Improvement System

(8) Contents of the Solution

- The sensors shall monitor the urban and river environment, and the data shall be transmitted via wireless communication so that it can be displayed on a dashboard

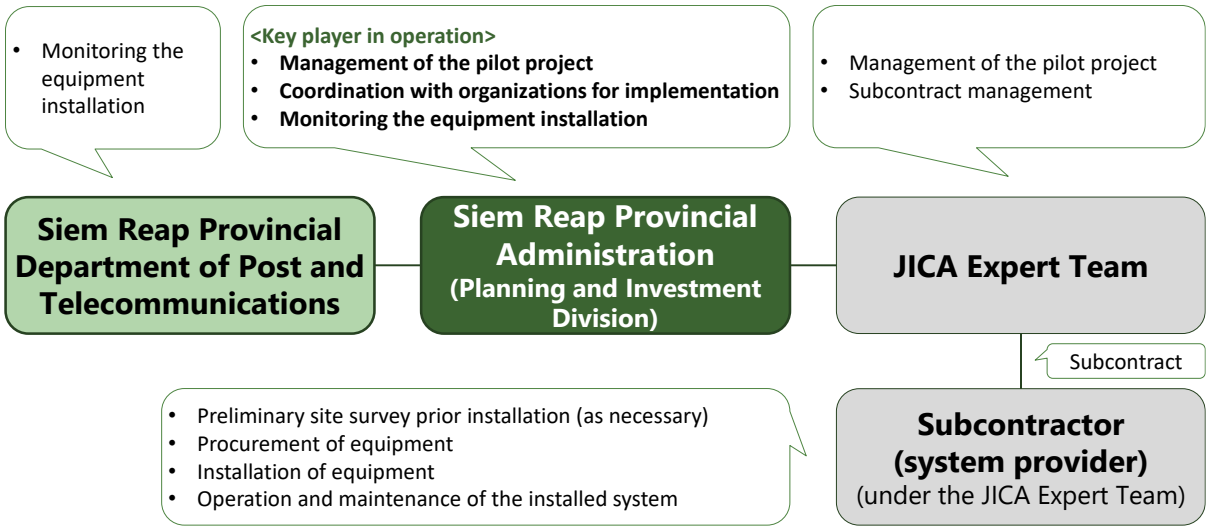


Source: Nippon Koei Co., Ltd.

Figure 4.3.17: Contents of the Urban Environment Monitoring by Sensors

(9) Roles of Key Stakeholders

- SRPA (Planning and Investment Division)
  - ➢ Management of the pilot project
  - ➢ Coordination with organizations for implementation
  - ➢ Monitoring the equipment installation
- DPTC
  - ➢ Monitoring the equipment installation
- JICA Expert Team
  - ➢ Management of the pilot project
  - ➢ Subcontract management
- Subcontractor (under the JICA Expert Team)
  - ➢ Preliminary site survey prior installation (as necessary)
  - ➢ Procurement of equipment
  - ➢ Installation of equipment
  - ➢ Operation and maintenance of the installed system



Source: Nippon Koei Co., Ltd.

Figure 4.3.18: Roles of Key Stakeholders for Urban Environment Monitoring by Sensors

(10) Approximate Cost

- Capital Expenditure (to be borne by JICA) : USD 20,000
  - ➢ Equipment to be installed (sensors, telecommunication equipment, etc.)
  - ➢ Personnel expenses (installation of the equipment, etc.)
- Operating Expenditure (to be borne by JICA) : USD 500 / month
  - ➢ Personnel expenses for maintenance

(11) Schedule

Source: Nippon Koei Co., Ltd.

Figure 4.3.19: Tentative Schedule for Urban Environment Monitoring by Sensors

(12) Evaluation (KPI)

- Amount of data obtained from the sensors
- Coverage area of the introduced telecommunication system

(13) Key Remarks for Implementation

- Public land for the installation of the sensors and telecommunication equipment is required.

4.3.7 Pilot Project (6): Public Private Tourism Collaboration

(1) Current Condition

- No regular meetings between the public and private sectors related to tourism have taken place
- There are several potential public-private-partnership projects in the tourism sector, leading to the demand for discussions between the public and the private sectors

(2) Urban Issues to be Solved

- Needs for an organizational basis for multi-stakeholder collaboration
- Needs for active promotion of private smart city business

(3) Objective

- To start discussions for cooperation between the public and private sectors

(4) Goal

- Regular discussions for cooperation between the public and private sectors are conducted

(5) Beneficiaries

- Tourism related public organizations (achieving involvement of the private sector)
- Tourism related private organizations (achieving involvement of the public sector)
- Citizens and tourists (achieving improved tourism services that stimulate the local economy)

(6) Target Area

- The whole city (not specified)

(7) Related Priority Project in the Smart City Roadmap

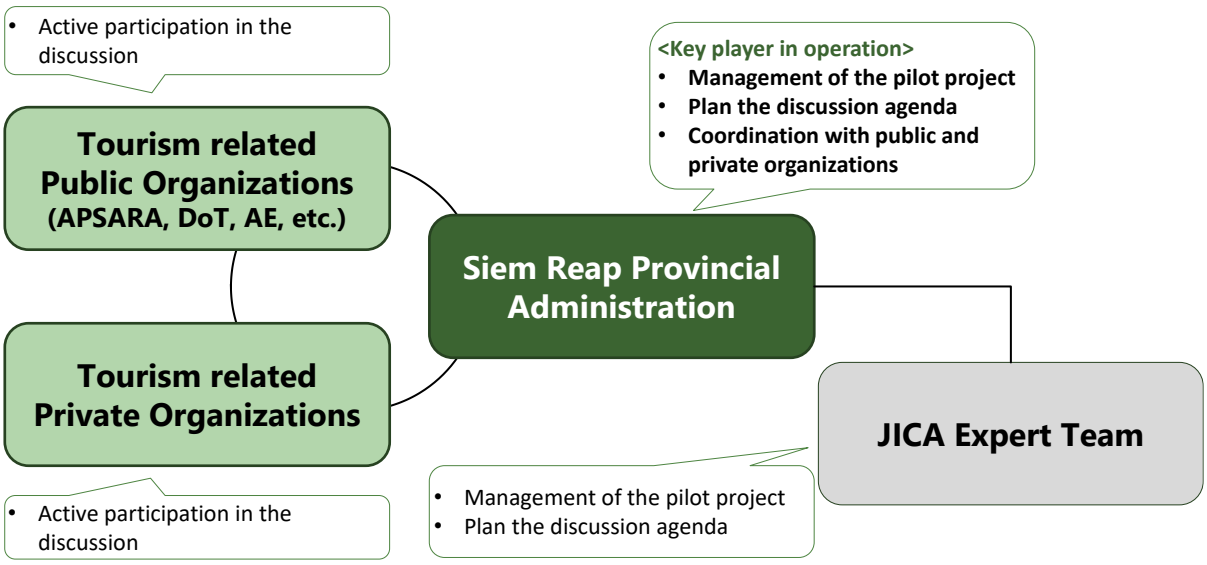
- The formulation and operation of the Private-Public-Academic-Citizen Platform

(8) Contents of the Solution

- Conduct periodical discussions between the public and private sectors
  - to conduct tourism promotion activities by smart approach (ex. AR/VR)
  - to hold tourism events with smart technologies
  - to discuss expected roles of players, system, regulations of tourism industry
  - to discuss how to establish a tourism digital platform
  - to discuss how to encourage start-up business of smart tourism

(9) Roles of Key Stakeholders

- SRPA
  - ➢ Management of the pilot project
  - ➢ Plan the discussion agenda
  - ➢ Coordination with public and private organizations
- Tourism related Public Organizations (APSARA National Authority, DoT, Angkor Enterprise, etc.)
  - ➢ Active participation in the discussion
- Tourism related Private Organizations
  - ➢ Active participation in the discussion
- JICA Expert Team
  - ➢ Management of the pilot project
  - ➢ Planning the discussion agenda



Source: Nippon Koei Co., Ltd.

Figure 4.3.20: Roles of Key Stakeholders for Public Private Tourism Collaboration

(10) Approximate Cost

- Capital Expenditure : (limited)
  - ➢ Expenditure for setting up the venue (assumed to be limited)
- Operating Expenditure : (limited)
  - ➢ Expenditure for setting up the venue (assumed to be limited)

(11) Schedule

Pilot Project	2022/11	2022/12	2023/1	2023/2	2023/3	2023/4
(6) Tourism PPP		Discussion Vol. 1		Discussion Vol. 2		Discussion Vol. 3

Source: Nippon Koei Co., Ltd.

Figure 4.3.21: Tentative Schedule for Public Private Tourism Collaboration

(12) Evaluation (KPI)

- Number of meetings held
- Number of organizations participating in the meeting

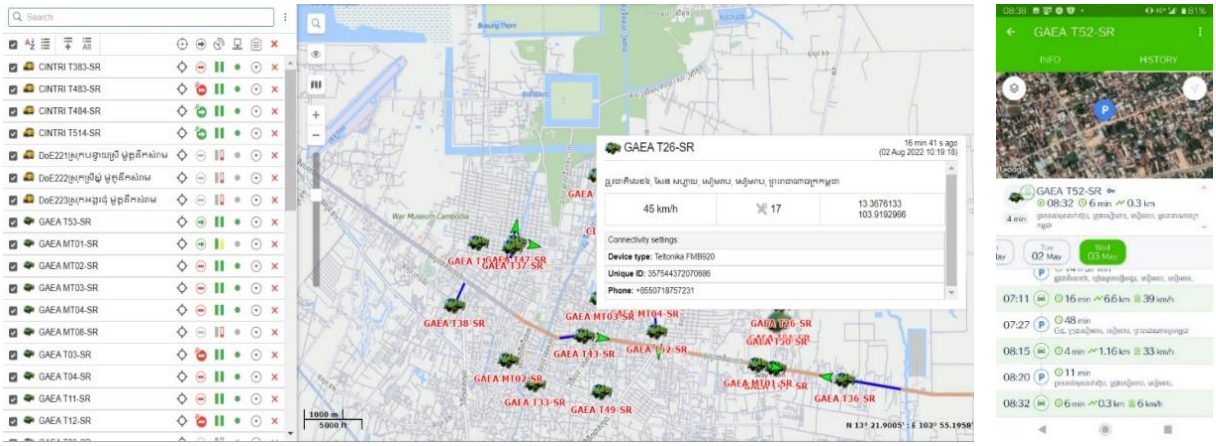
(13) Key Remarks for Implementation

- This collaboration between the public and the private is expected to expand to other sectors (mobility, security, waste management, etc.)

4.3.8 Pilot Project (7): Smart Waste Collection and Transportation

(1) Current Condition

- The Ministry of Environment has introduced GPS sensors to all garbage trucks in Siem Reap.
- The GPS data can be seen on the Solid Waste Management Platform (Luma / Samraam app).
- The Siem Reap Provincial Department of Environment can access the Solid Waste Management Platform.
- Despite employing the GPS platform, it has not been fully utilized for improving waste collection and transportation services.



Source: Nippon Koei Co., Ltd.

Figure 4.3.22: Waste Collection and Transportation Monitoring Platform (Luma/Samraam)

(2) Urban Issues to be Solved

- The waste collection and transportation is not properly controlled or monitored by the public sector in Siem Reap and highly dependent on private service providers.
- There is no clear waste collection schedule and route specified causing confusion and waste leftover on streets. Moreover, due to various kinds of bins and dispersed collection points, waste collection and transportation efficiency tends to be low.

(3) Objective

- To implement a pilot scale project in a selected commune based on the lessons learnt in the completed pilot project (1st round) thereby improving waste collection and transportation efficiency and increase the capacity of private sectors in Siem Reap.
- To examine the results of the additional pilot project (2nd round) and extract lessons to expand pilot practices to other communes by Siem Reap C/P.

(4) Goal

- Waste collection service delivery is improved.
- Waste collection data is managed systematically and utilized for waste planning.
- Street landscapes and hygiene levels are improved.

(5) Beneficiaries

- Citizens and business operators in Siem Reap (better public service)
- Department of Environment (management efficiency)
- Siem Reap City Administration (management efficiency)
- Private waste service providers (operation efficiency)

(6) Target Area

- Selected pilot site (s) in Siem Reap City (Sra Kram commune is a candidate commune to implement the additional pilot project)

(7) Related Priority Project in the Smart City Roadmap

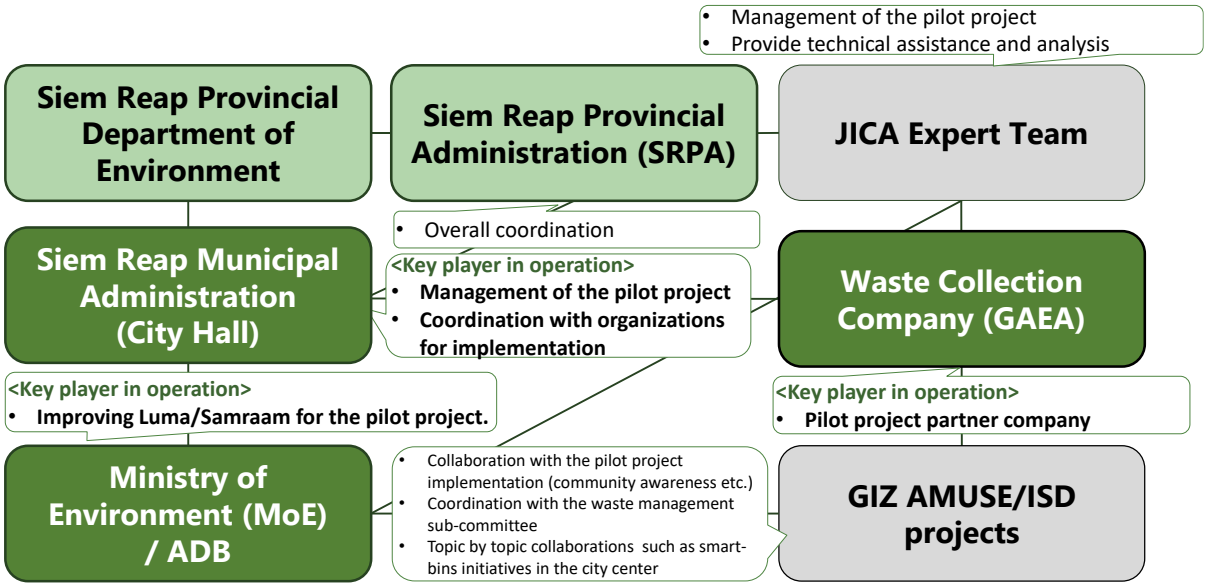
- W-01: Solid Waste Management System

(8) Contents

- Review on the completed pilot project (1st round).
- Installation of standard bins and common/accumulated waste collection points to streamline waste collection and transportation with IoT monitoring systems using Luma/Samraam.

(9) Roles of Key Stakeholders

- SRPA
  - ➢ Coordination with organizations for implementation
- MoE / ADB (Luma system developer)
  - ➢ Coordination concerned with the Luma/Samraam platform.
  - ➢ Improving the Luma/Samraam platform for the pilot project.
- DoE
  - ➢ Management of the pilot project
  - ➢ Coordination with organizations for implementation
- Siem Reap Municipal Administration
  - ➢ Management of the pilot project
  - ➢ Instruction/guidance to the waste collection company for the pilot project implementation
- Waste Collection Company (GAEA)
  - ➢ Implementation of the pilot project in cooperation with Siem Reap authorities and the JICA Expert Team
- GIZ (AMUSE/ISD projects)
  - ➢ Coordination and collaboration with the pilot project
  - ➢ Coordination with the Siem Reap Waste Management Sub-Committee
- JICA Expert Team
  - ➢ Management of the pilot project
  - ➢ Provide technical assistance and analysis



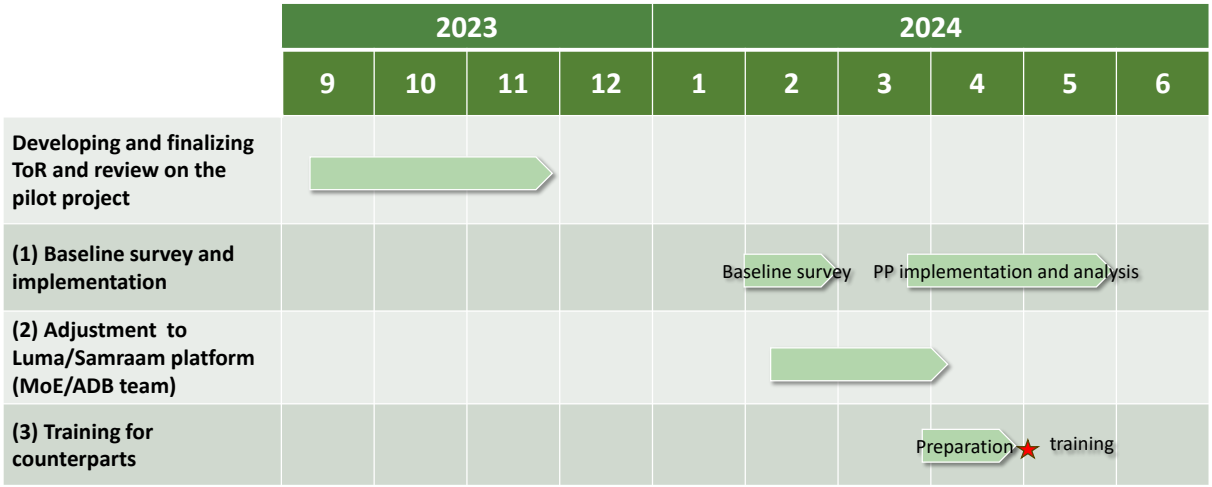
Source: Nippon Koei Co., Ltd.

Figure 4.3.23: Roles of Key Stakeholders for Smart Waste Collection and Transportation

(10) Approximate Cost

- Capital expenditure (to be borne by JICA) : USD 35,000
  - ➢ Personnel expenses (technical assistance and analysis by experts of the JICA Expert Team)

(11) Schedule



Source: Nippon Koei Co., Ltd.

Figure 4.3.24: Tentative Schedule for Smart Waste Collection and Transportation

(12) Evaluation (KPI)

- Waste collection time (total and unit time for waste loading/average driving time between collection points)
- Waste collection coverage in the selected pilot commune

(13) Key Remarks for Implementation

- The pilot project will be implemented in partnership with the German Corporation for International Cooperation (hereinafter referred to as "GIZ") AMUSE/ISD projects and MoE/ADB Luma platform development project.

4.3.9 Pilot Project (8): Data Platform System Development

(1) Current Condition

- At present, there is no comprehensive data management system that covers multiple governmental organizations, and data management operation is conducted by individual departments.
- As a custom, official documents/information/data are shared among government officers by paper or via SNS (individual accounts of Telegram, WhatsApp, etc.).

- Even numerical data such as statistical data and monitoring data are also shared by paper documents, or their scan files. Information is rarely shared in data format that can be easily utilized, such as csv.
- As for information disclosure to external organizations, usually, departments cannot decide whether they can disclose information without consultation with their line ministry. Hence, in general, information disclosure takes time.

(2) Urban Issues to be Solved

- Need for improvement of hardware and ICT circumstances:
  → Infrastructure for data storing and sharing is inefficient.
- Need for multi-sectoral data sharing and utilizing:
  → Data storage format is inefficient.
  → Experience of government officers is lacking.
- Need for open data system, data security, and regulations:
  → Decision making process for information disclosure is redundant.

(3) Objective

- To develop a smart city data platform for collecting data across sectors and sharing the accumulated data with multiple stakeholders.

(4) Goal

- The smart city data platform system operated by the SRPA is cross-sectionally established, and open to the public partly and the disclosed data can be accessed externally.

(5) Beneficiaries

- SRPA (Better data management)
- Relevant government organizations providing original data (Better data management)
- Citizens and business operators of Siem Reap (Better access to valuable data)

(6) Target Area

- The whole province

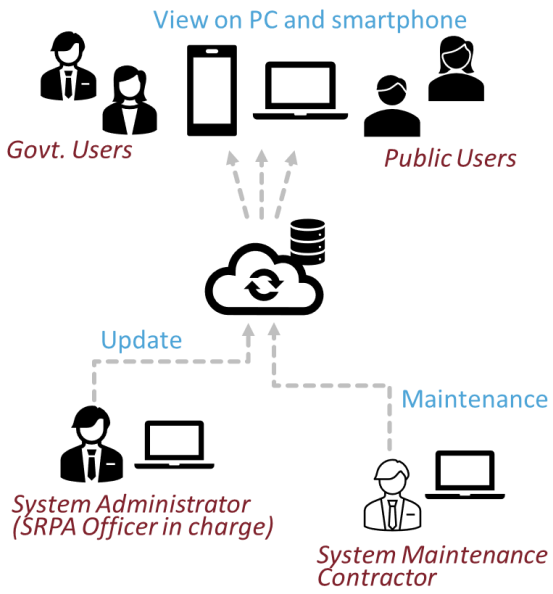
(7) Related Priority Project in the Smart City Roadmap

- D-01: Integrated Data Collection and Analysis
- D-02: Data Dissemination to Relevant Stakeholders

(8) Contents

The features of "Smart City Data Platform System" are as follows:

- Government users and public users and view information with/without login.
- System administrator updates data periodically by uploading files. System maintenance contractor supports the update works. The information items assumed at the basic design stage are several kinds of data related to i) CCTV camera, ii) waste collection, iii) the number of tourists, iv) air quality, v) meteorology, vi) population, and vii) treated water quality. Underlined items will be updated by SRPA officer.
- The system maintenance contractor performs server maintenance work on a regular basis.



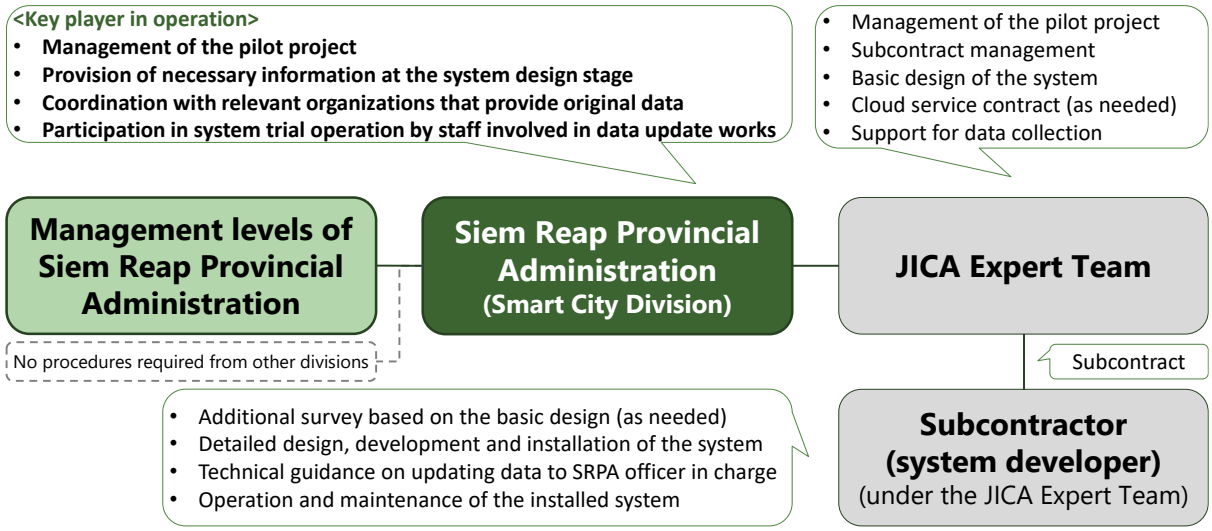
Source: Nippon Koei Co., Ltd.

Figure 4.3.25: Contents of the Smart City Data Platform System

(9) Roles of Key Stakeholders

- SRPA (Smart City Division)
  - Management of the pilot project
  - Provision of necessary information at the system design stage
  - Coordination with relevant organizations that provide original data
  - Participation in system trial operation by staff involved in data update works
- JICA Expert Team
  - Management of the pilot project
  - Subcontract management
  - Basic design of the system
  - Cloud service contract (as needed)
  - Support for data collection

- Subcontractor (under the JICA Expert Team)
  - ➢ Additional survey based on the basic design (as needed)
  - ➢ Detailed design, development and installation of the system
  - ➢ Technical guidance on updating data to SRPA officer in charge
  - ➢ Operation and maintenance of the installed system



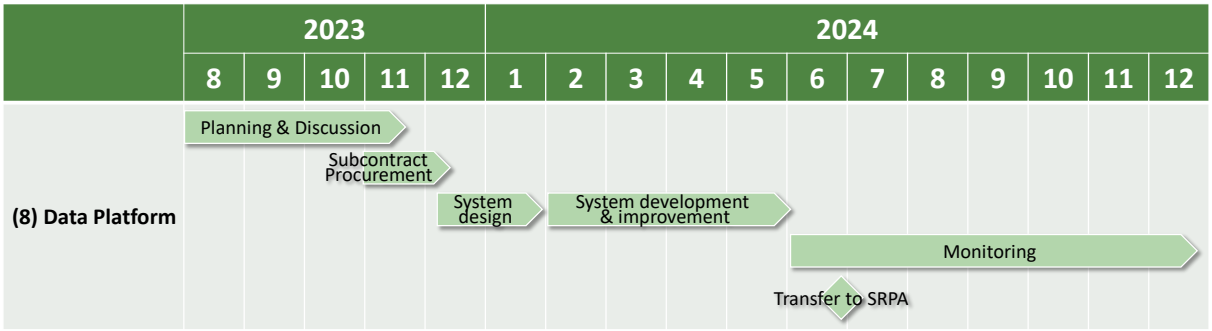
Source: Nippon Koei Co., Ltd.

Figure 4.3.26: Roles of Key Stakeholders for Smart City Data Platform System Development

(10) Approximate Cost

- Capital Expenditure (to be borne by JICA) : USD 29,000
  - ➢ Subcontract for establishing a system
- Operating Expenditure (to be borne by SRPA after July 2024): USD 1,000 / month
  - ➢ System maintenance subcontract fee (including cloud service and data update support)

(11) Schedule



Source: Nippon Koei Co., Ltd.

Figure 4.3.27: Tentative Schedule for Smart City Data Platform System Development

(12) Evaluation (KPI)

- Number of information types registered in the system
- Number of accesses to the system

(13) Key Remarks for Implementation

- Cloud services are basically used for this pilot project in accordance with the cloud first policy of the Ministry of Post and Telecommunications (hereinafter referred to as "MPTC") based on the Cambodia Digital Government Policy 2022-2035.
- It is assumed that internet service is available at the provincial hall. The cost for telecommunication is not included above.
- The operating expenditure needs to be provided by SRPA after the system is transferred from JICA to SRPA. The system transfer is expected to be completed by the end of June 2024.

4.4 Activity 2-4: Analysis on Issues-Solutions-Actors-Relationships

Below shows the initial analysis of issues-solutions-actors-relationships of each pilot project.

4.4.1 Pilot Project (1): Illegal Parking Monitoring

(1) Urban Issues to be Solved

- Illegal parking on walkways is disrupting the walkability for the citizens

(2) Contents of the Solution

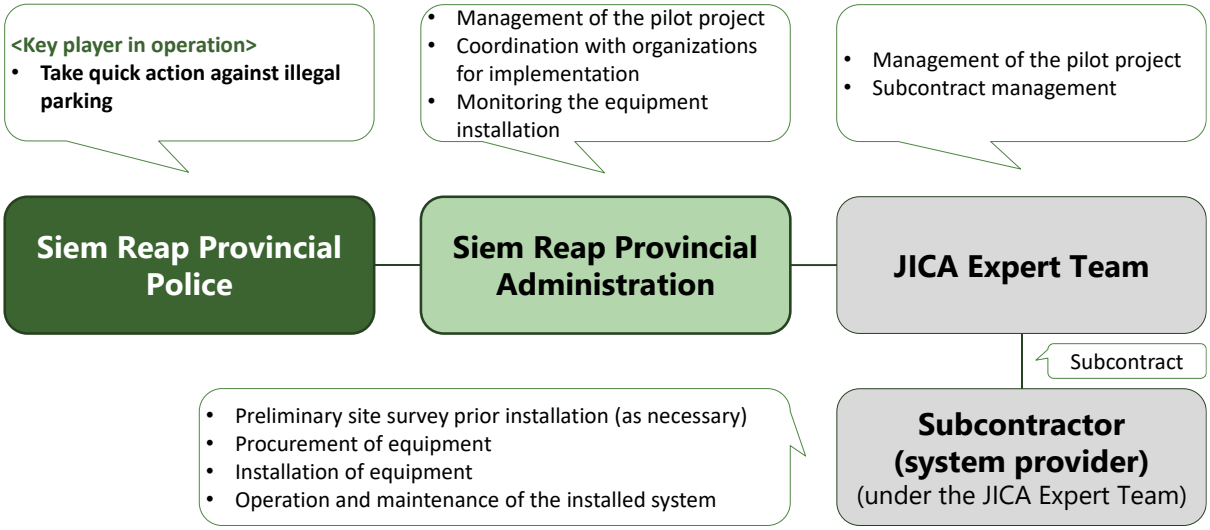
- Newly introduced 4 CCTV cameras (same specifications as the 200 cameras) shall shoot the images of walkways inside the city.
- In case there is a vehicle parked on the walkways, the system shall automatically detect the situation.
- After detection, the system shall automatically send alerts to the police in charge, so that the police can take action quickly.

(3) Roles of Key Stakeholders

- SRPA
  - Management of the pilot project
  - Coordination with organizations for implementation
  - Monitoring the equipment installation
- Siem Reap Provincial Police
  - Take action against illegal parking
- JICA Expert Team

- ➢ Management of the pilot project
- ➢ Subcontract management

- Subcontractor (under the JICA Expert Team)
  - ➢ Preliminary site survey prior installation (as necessary)
  - ➢ Procurement of equipment
  - ➢ Installation of equipment
  - ➢ Operation and maintenance of the installed system



Source: Nippon Koei Co., Ltd.

Figure 4.4.1: Roles of Key Stakeholders for Illegal Parking Monitoring

4.4.2 Pilot Project (2): Waste Collection Improvement

(1) Urban Issues to be Solved

- The waste collection is not controlled or monitored by the public sector in Siem Reap.
- The waste collection time is not informed to citizens, causing confusion and garbage leftover on streets.

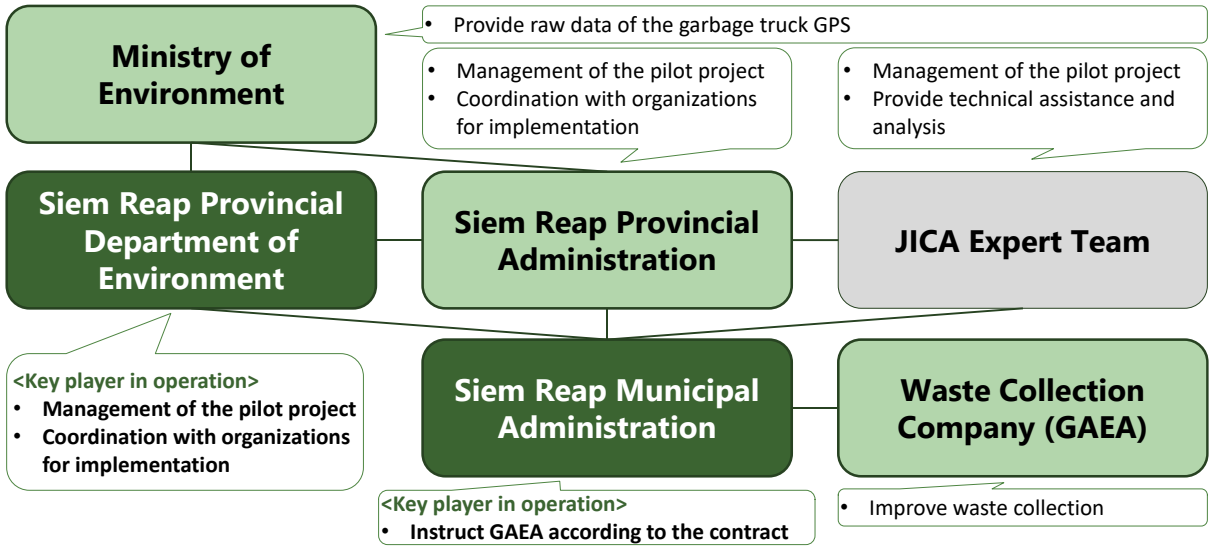
(2) Contents of the Solution

- The GPS data of garbage trucks monitored by MoE shall be extracted for analysis.
- After the analysis, improved timetables for waste collection and improved manual for waste collection operation will be proposed.

(3) Roles of Key Stakeholders

- SRPA
  - ➢ Management of the pilot project
  - ➢ Coordination with organizations for implementation

- MoE
  - Provision of raw data of the garbage truck GPS
- DoE
  - Management of the pilot project
  - Coordination with organizations for implementation
- Siem Reap Municipal Administration
  - Instruct the waste collection company according to the contract
- Waste Collection Company (GAEA)
  - Improve waste collection
- JICA Expert Team
  - Management of the pilot project
  - Provide technical assistance and analysis



Source: Nippon Koei Co., Ltd.

Figure 4.4.2: Roles of Key Stakeholders for Waste Collection Improvement

4.4.3 Pilot Project (3): Tourism Statistics Digitalization

(1) Urban Issues to be Solved

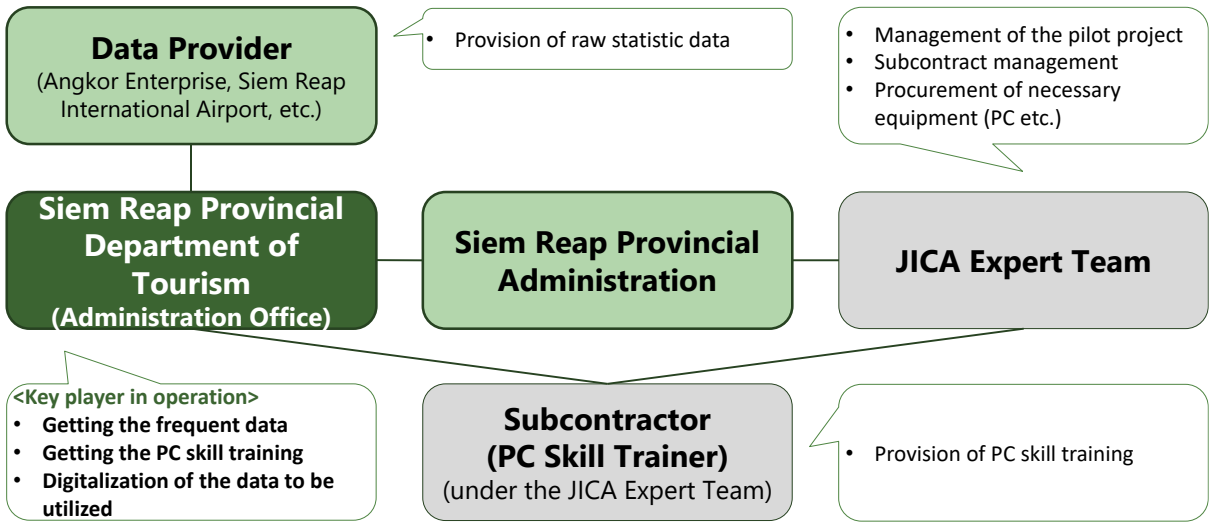
- Due to lack of experience, the capacity of individual governmental officers to appropriately deal with data is not enough

(2) Contents of the Solution

- PC skill training shall be conducted for DoT officers. In the future, the data shall be stored digitally on a cloud platform, open to the public, and shown on web GIS and dashboards.

(3) Roles of Key Stakeholders

- SRPA
  - ➢ Management of the pilot project
- DoT
  - ➢ Getting the frequent data
  - ➢ Getting PC skill training
  - ➢ Digitalization of the data to be utilized
- Data Provider (Angkor Enterprise, Siem Reap International Airport, etc.)
  - ➢ Provision of raw statistical data
- JICA Expert Team
  - ➢ Management of the pilot project
  - ➢ Subcontract management
  - ➢ Procurement of necessary equipment (PC etc.)
- Subcontractor (under the JICA Expert Team)
  - ➢ Provision of PC skill training



Source: Nippon Koei Co., Ltd.

Figure 4.4.3: Roles of Key Stakeholders for Tourism Statistics Digitalization

4.4.4 Pilot Project (4): Government Internal Document Tracking

(1) Urban Issues to be Solved

- The documentation process within the public sector is unclear, causing unpredictable delays in various procedures involving the public sector

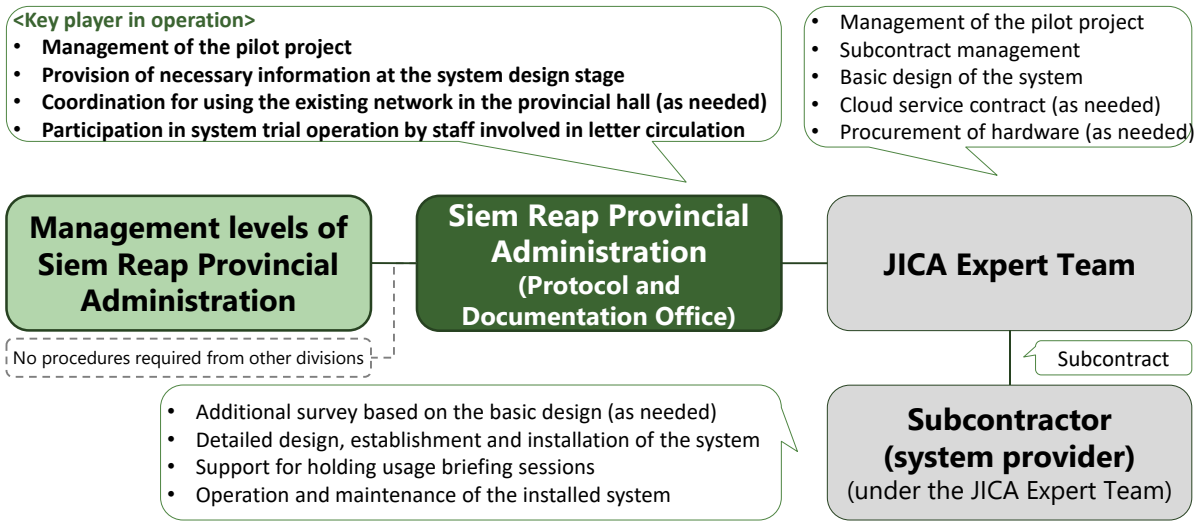
(2) Contents of the Solution

- The features of “Document Tracking System” are as follows:

- Protocol and Documentation Office staff register letter information in the system with their PCs
- Staff handing over the letter update the status with their smartphones
- All relevant officers can monitor the current location of the letter from their PCs and smartphones.

(3) Roles of Key Stakeholders

- SRPA (Protocol and Documentation Office)
  - Management of the pilot project
  - Provision of necessary information at the system design stage
  - Coordination for using the existing network in the provincial hall (as needed)
  - Participation in system trial operation by staff involved in letter circulation
- Management Levels of SRPA
  - Monitoring the document procedures
- JICA Expert Team
  - Management of the pilot project
  - Subcontract management
  - Basic design of the system
  - Cloud service contract (as needed)
  - Procurement of hardware (as needed)
- Subcontractor (under the JICA Expert Team)
  - Additional survey based on the basic design (as needed)
  - Detailed design, establishment, and installation of the system
  - Support for holding usage briefing sessions
  - Operation and maintenance of the installed system



Source: Nippon Koei Co., Ltd.

Figure 4.4.4: Roles of Key Stakeholders for Government Internal Document Tracking

4.4.5 Pilot Project (5): Urban Environment Monitoring by Sensors

(1) Urban Issues to be Solved

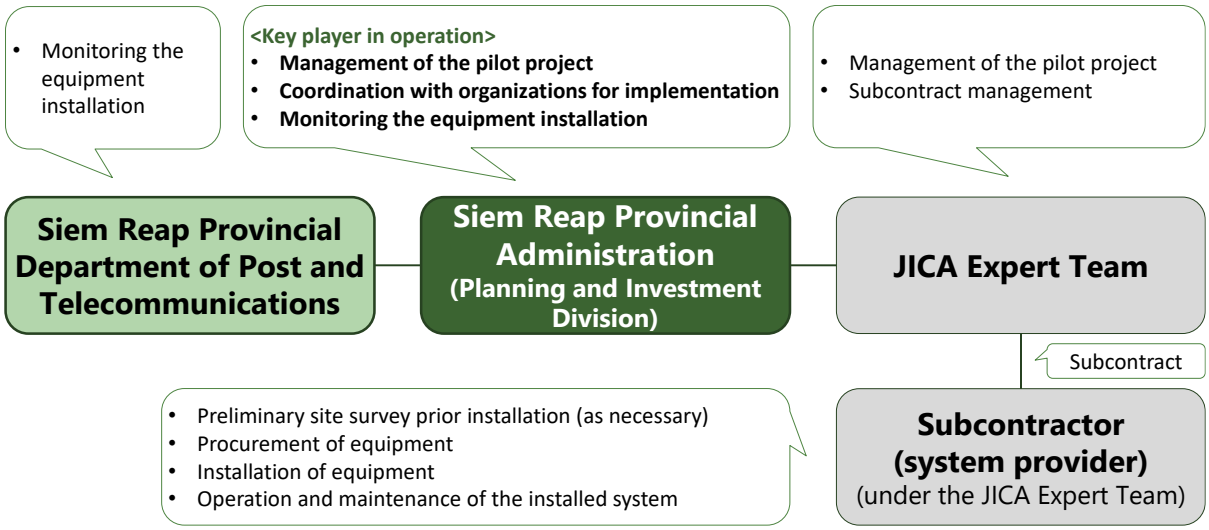
- Insufficient infrastructure for data collection, storing and sharing

(2) Contents of the Solution

- The sensors shall monitor the urban and river environment, and the data shall be transmitted via LoRaWAN so that it can be displayed on a dashboard

(3) Roles of Key Stakeholders

- SRPA (Planning and Investment Division)
  - ➢ Management of the pilot project
  - ➢ Coordination with organizations for implementation
  - ➢ Monitoring the equipment installation
- DPTC
  - ➢ Monitoring the equipment installation
- JICA Expert Team
  - ➢ Management of the pilot project
  - ➢ Subcontract management
- Subcontractor (under the JICA Expert Team)
  - ➢ Preliminary site survey prior installation (as necessary)
  - ➢ Procurement of equipment
  - ➢ Installation of equipment
  - ➢ Operation and maintenance of the installed system



Source: Nippon Koei Co., Ltd.

Figure 4.4.5: Roles of Key Stakeholders for Urban Environment Monitoring by Sensors

4.4.6 Pilot Project (6): Public Private Tourism Collaboration

(1) Urban Issues to be Solved

- Needs for an organizational basis for multi-stakeholder collaboration
- Needs for active promotion of private smart city business

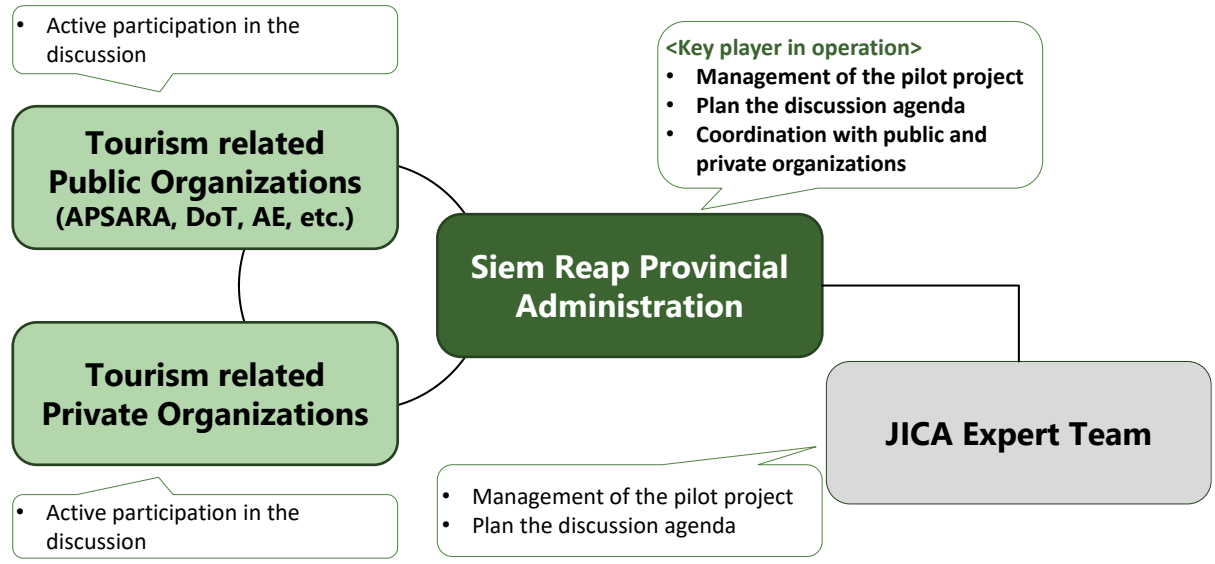
(2) Contents of the Solution

- Conduct periodical discussions between the public and private sectors
  - ➢ to conduct tourism promotion activities by smart approach (ex. AR/VR)
  - ➢ to hold tourism events with smart technologies
  - ➢ to discuss expected roles of players, system, regulations of tourism industry
  - ➢ to discuss how to establish a tourism digital platform
  - ➢ to discuss how to encourage start-up business of smart tourism

(3) Roles of Key Stakeholders

- SRPA
  - ➢ Management of the pilot project
  - ➢ Plan the discussion agenda
  - ➢ Coordination with public and private organizations
- Tourism related Public Organizations (APSARA National Authority, DoT, Angkor Enterprise, etc.)
  - ➢ Active participation in the discussion
- Tourism related Private Organizations
  - ➢ Active participation in the discussion
- JICA Expert Team

- Management of the pilot project
- Planning the discussion agenda



Source: Nippon Koei Co., Ltd.

Figure 4.4.6: Roles of Key Stakeholders for Public Private Tourism Collaboration

4.4.7 Pilot Project (7): Smart Waste Collection and Transportation

(1) Urban Issues to be Solved

- The waste collection and transportation is not properly controlled or monitored by the public sector in Siem Reap and highly dependent on private service providers.
- There is no clear waste collection schedule and route specified causing confusion and waste leftover on streets. Moreover, due to various kinds of bins and dispersed collection points, waste collection and transportation efficiency tends to be low.

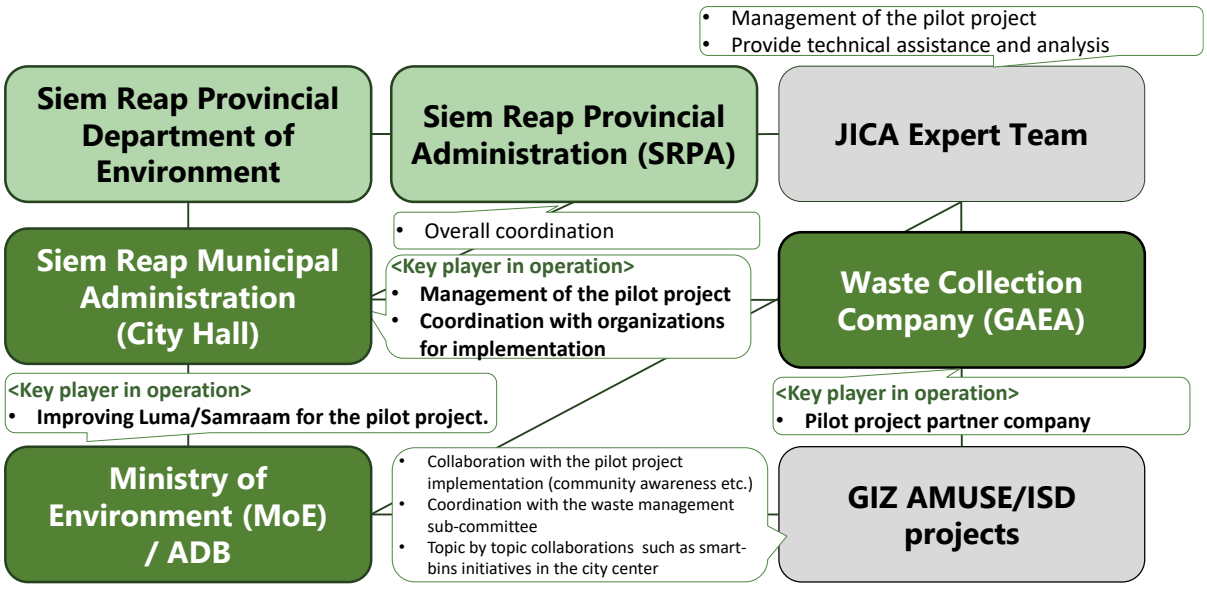
(2) Contents of the Solution

- Review on the completed pilot project (1st round).
- Installation of standard bins and common/accumulated waste collection points to streamline waste collection and transportation with IoT monitoring systems using Luma/Samraam systems.

(3) Roles of Key Stakeholders

- SRPA
  - Coordination with organizations for implementation
- MoE / ADB (Luma system developer)
  - Coordination concerned with the Luma/Samraam platform.
  - Improving the Luma/Samraam platform for the pilot project.

- DoE
  - ➢ Management of the pilot project
  - ➢ Coordination with organizations for implementation
- Siem Reap Municipal Administration
  - ➢ Management of the pilot project
  - ➢ Instruction/guidance to the waste collection company for the pilot project implementation
- Waste Collection Company (GAEA)
  - ➢ Implementation of the pilot project in cooperation with Siem Reap authorities and the JICA Expert Team
- GIZ (AMUSE/ISD projects)
  - ➢ Coordination and collaboration with the pilot project
  - ➢ Coordination with the Siem Reap Waste Management Sub-Committee
- JICA Expert Team
  - ➢ Management of the pilot project
  - ➢ Provide technical assistance and analysis



Source: Nippon Koei Co., Ltd.

Figure 4.4.7: Roles of Key Stakeholders for Smart Waste Collection and Transportation

4.4.8 Pilot Project (8): Data Platform System Development

(1) Urban Issues to be Solved

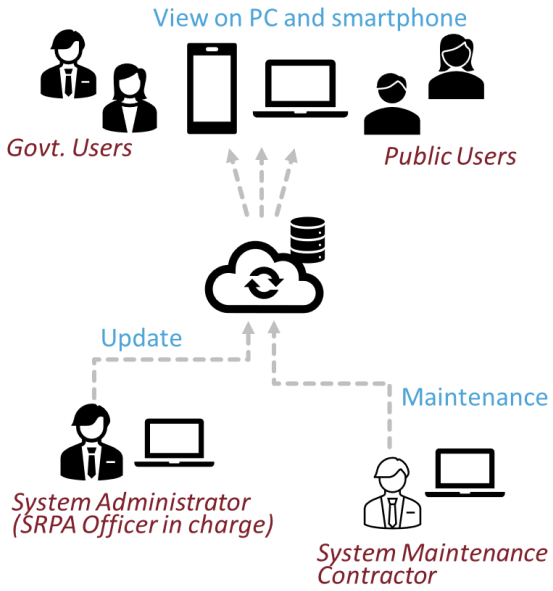
- Need for improvement of hardware and ICT circumstances:
  → Infrastructure for data storing and sharing is inefficient.

- Need for multi-sectoral data sharing and utilizing:
  → Data storage format is inefficient.
  → Experience of government officers is lacking.
- Need for open data system, data security, and regulations:
  → Decision making process for information disclosure is redundant.

(2) Contents of the Solution

The features of "Smart City Data Platform System" are as follows:

- Government users and public users and view information with/without login.
- System administrator updates data periodically by uploading files. System maintenance contractor supports the update works. The information items assumed at the basic design stage are several kinds of data related to i) CCTV camera, ii) waste collection, iii) the number of tourists, iv) air quality, v) meteorology, vi) population, and vii) treated water quality. Underlined items will be updated by SRPA officer.
- The system maintenance contractor performs server maintenance work on a regular basis.



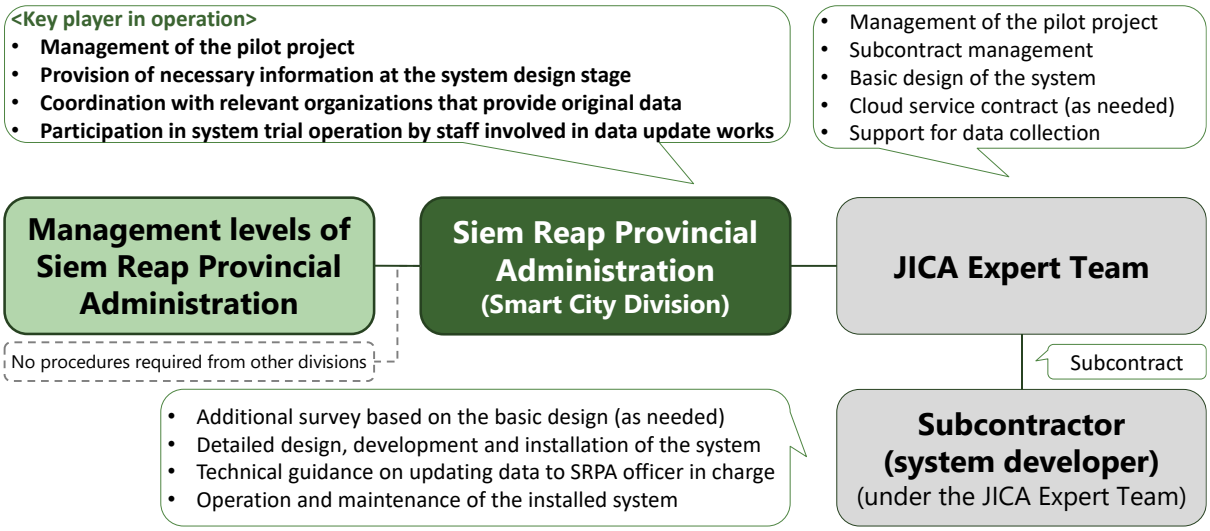
Source: Nippon Koei Co., Ltd.

Figure 4.4.8: Contents of the Smart City Data Platform System

(3) Roles of Key Stakeholders

- SRPA (Smart City Division)
  - Management of the pilot project
  - Provision of necessary information at the system design stage
  - Coordination with relevant organizations that provide original data
  - Participation in system trial operation by staff involved in data update works

- JICA Expert Team
  - Management of the pilot project
  - Subcontract management
  - Basic design of the system
  - Cloud service contract (as needed)
  - Support for data collection
- Subcontractor (under the JICA Expert Team)
  - Additional survey based on the basic design (as needed)
  - Detailed design, development and installation of the system
  - Technical guidance on updating data to SRPA officer in charge
  - Operation and maintenance of the installed system

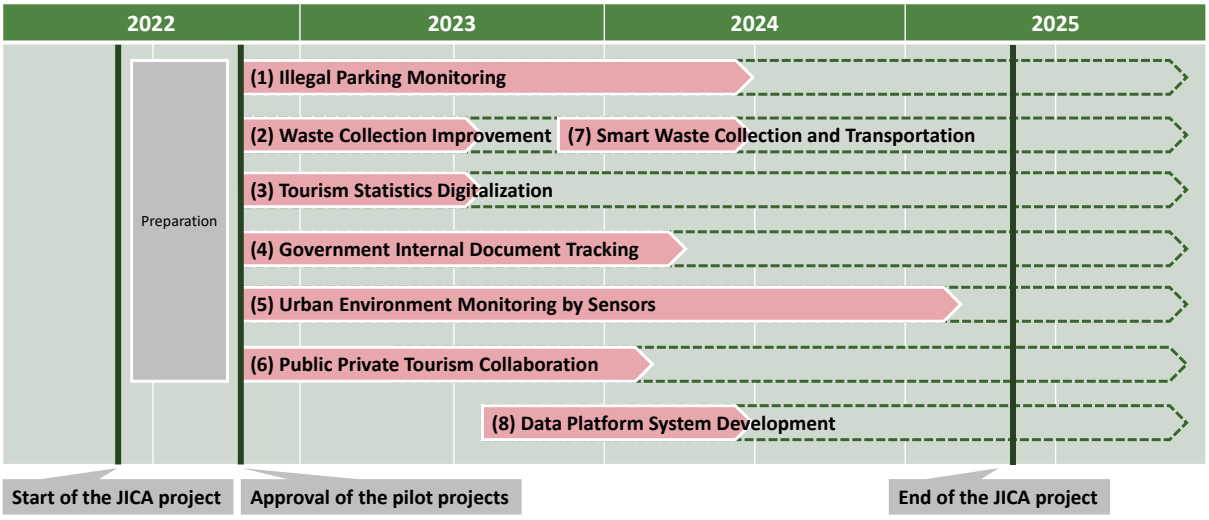


Source: Nippon Koei Co., Ltd.

Figure 4.4.9: Roles of Key Stakeholders for Smart City Data Platform System Development

4.5 Activity 2-5: Implementation of pilot projects

Below shows the overall progress of the pilot projects.



Source: Nippon Koei Co., Ltd.

Figure 4.5.1: Overall Schedule and Progress of the Pilot Projects

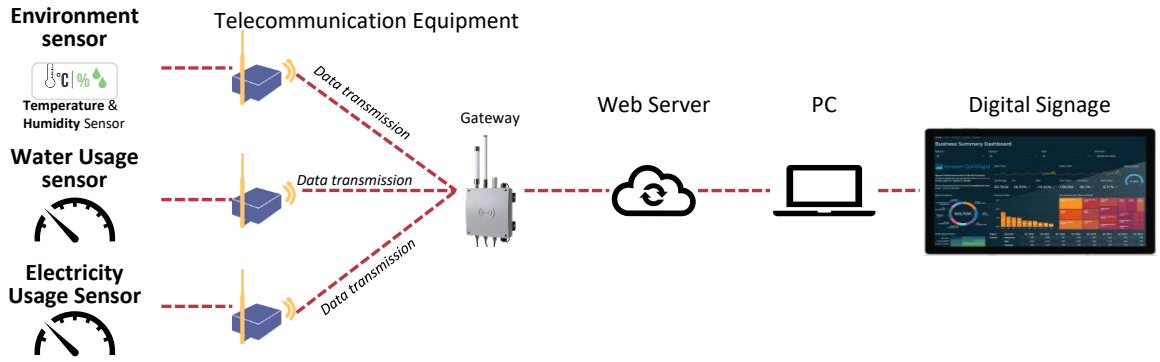
In this section, the outline of each pilot project and the progress since the beginning of the Project.

4.5.1 Pre-Pilot Project: Sensor Installation in Siem Reap Provincial Hall

(1) Outline

1) Background and Objectives

The objective of the pre-pilot project was to introduce a wireless telecommunication environment for public use and test its usability by introducing sensors. The sensors shall monitor the environment, and the data shall be transmitted via wireless communication, so that it can be displayed on a dashboard. This pre-pilot was conducted as a test to understand the possibilities and difficulties of data transmission and management in the country of Cambodia.



Source: Nippon Koei Co., Ltd.

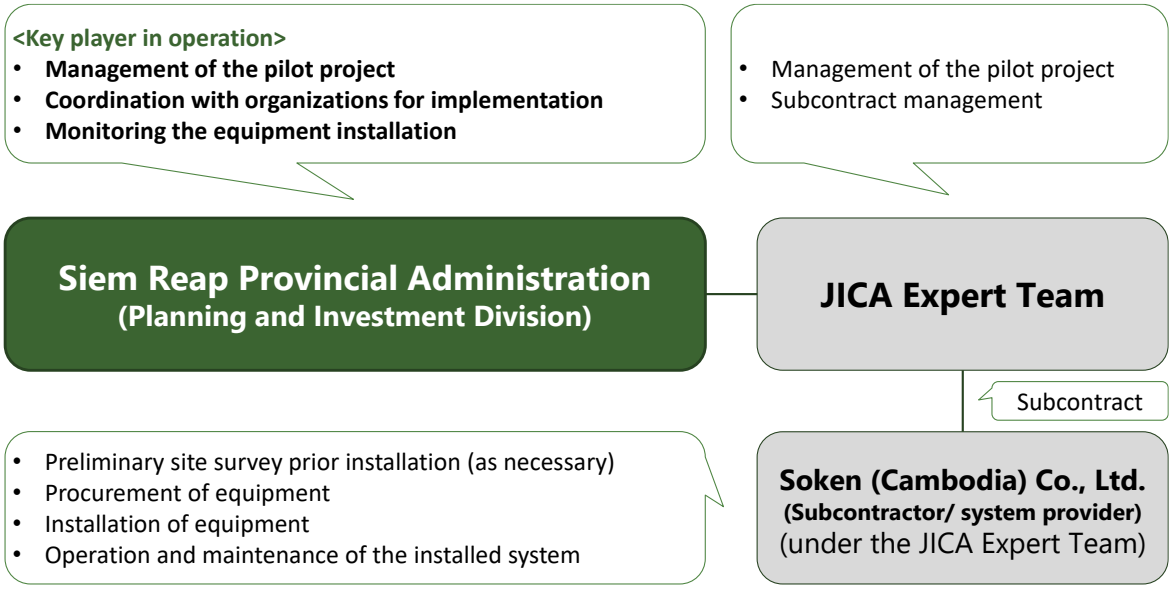
Figure 4.5.2: Diagram of the Pre-Pilot Project

2) Scope of Works

The scope of the works is divided into the procurement of equipment, installation of equipment, transmission of data from the equipment, and the display of the data to the platform. The procured equipment is environment sensor, smart water sensor, smart electricity meter, telecommunication equipment, PC, and digital signage.

3) Implementation Structure and Inputs

The implementation structure of this pilot project is shown below. According to a Quality and Cost-Based Selection (hereinafter referred to as "QCBS"), Soken (Cambodia) Co., Ltd. was selected as the subcontractor for this pilot project. The cost excluding personnel expenses of the JICA Expert Team was roughly around USD 15,000.



Source: Nippon Koei Co., Ltd.

Figure 4.5.3: Implementation Structure of Pre-Pilot Project

4) Work Schedule

Below shows the work schedule of this pilot project.

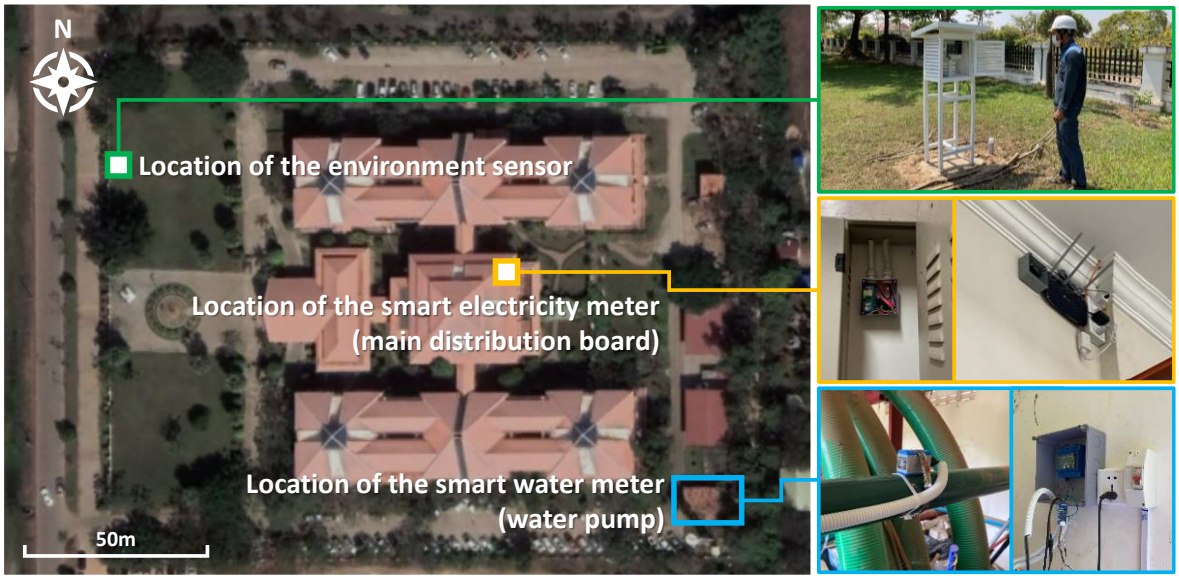
Source: Nippon Koei Co., Ltd.

Figure 4.5.4: Locations of Installed Equipment for the Pre-Pilot Project

(2) Activities and Outputs

1) Conducted Activities

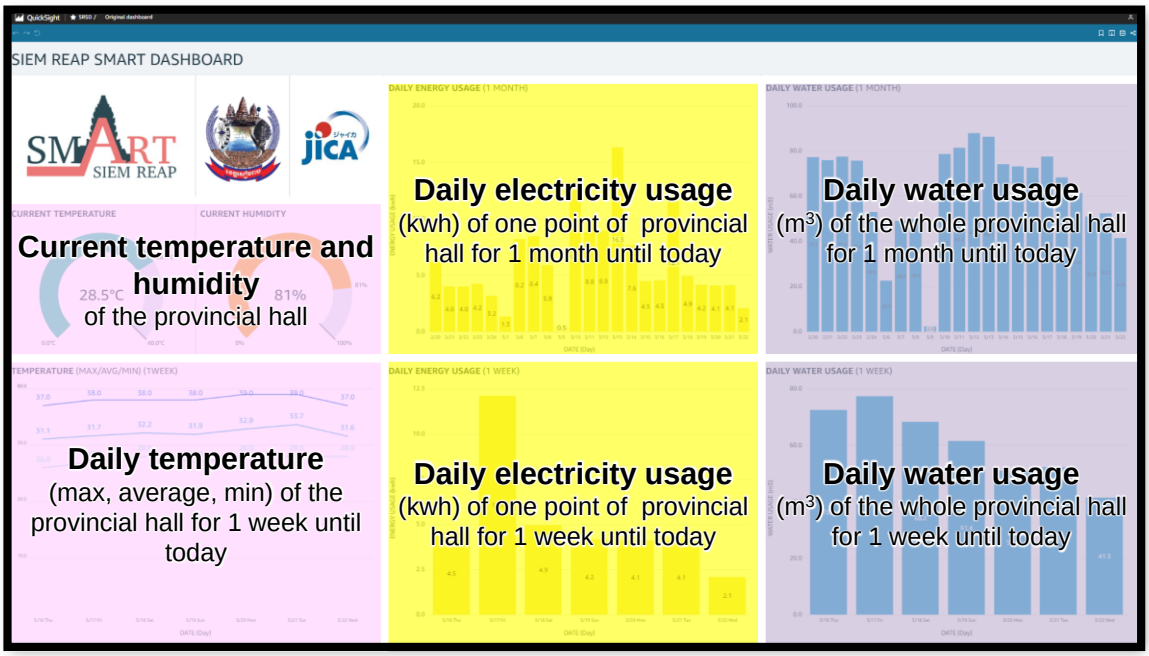
As shown in the diagram below, the environment sensor, electricity sensor, the water sensor, and the telecommunication equipment were installed in Siem Reap Provincial Hall.



Source: Nippon Koei Co., Ltd.

Figure 4.5.5: Locations of Installed Equipment for the Pre-Pilot Project

The SIEM REAP SMART DASHBOARD has been created as a part of the "Pre-Pilot Project" to monitor environment (temperature/humidity), water usage, and electricity usage inside the Provincial Hall. The wireless data transmission from the IoT sensor devices is tested out and succeeded in general. The dashboard was displayed in the entrance of the provincial hall.



Source: Nippon Koei Co., Ltd.

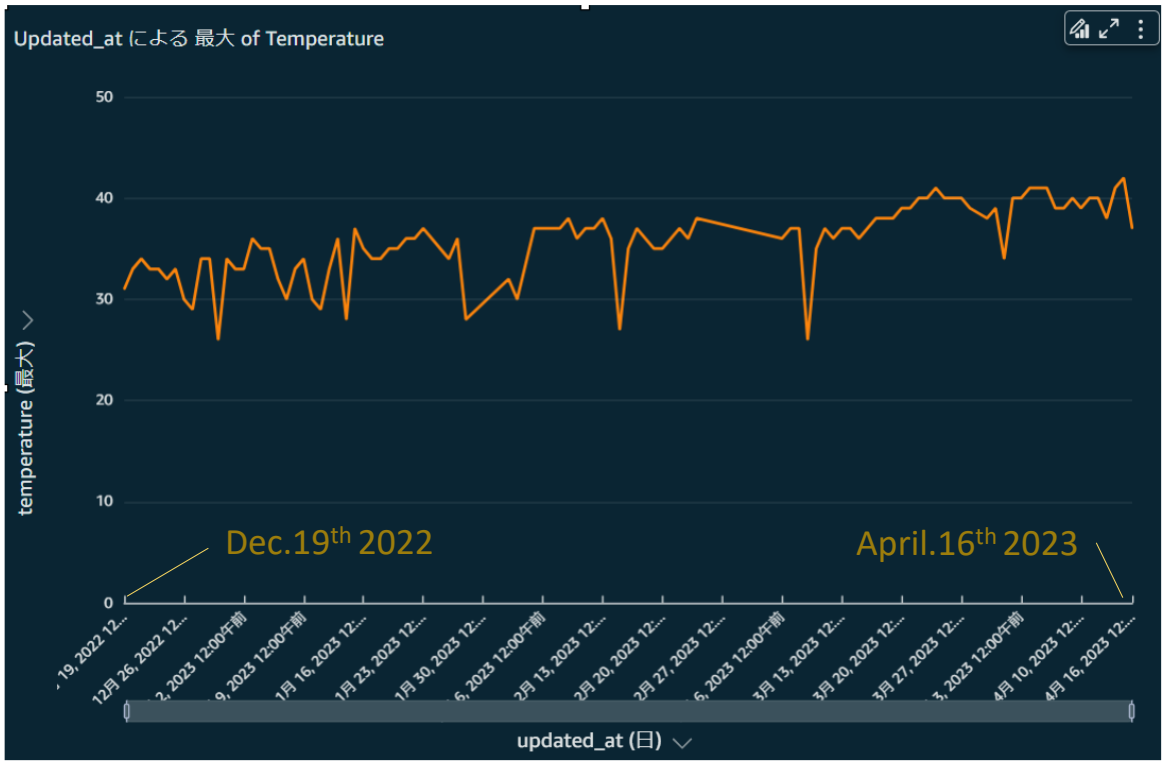
Figure 4.5.6: Contents Displayed in the Siem Reap smart Dashboard

2) Key Outputs and Achievements

The meters and telecommunication were installed, and the smart dashboard has been created. The officers and the visitors were able to monitor the environmental data, electricity usage, and water usage displayed on the monitor in the entrance of the Siem Reap Provincial Hall.

Source: Nippon Koei Co., Ltd.

Figure 4.5.7: Dashboard Displayed at the Entrance of the Provincial Hall



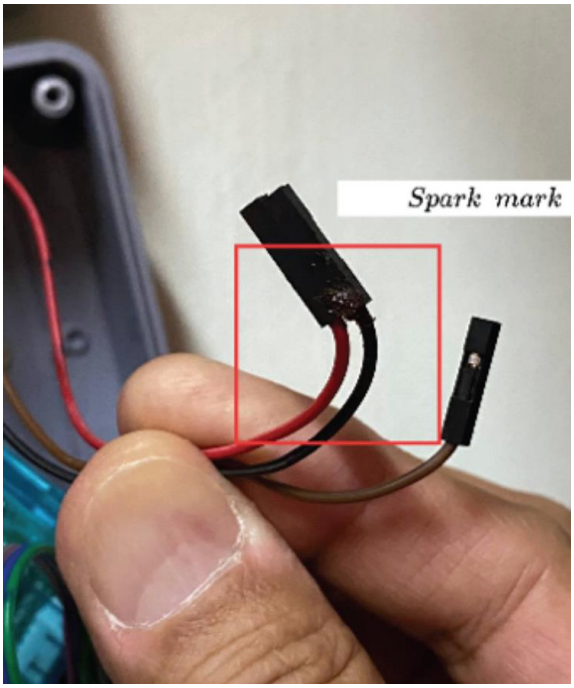
Source: Nippon Koei Co., Ltd.

Figure 4.5.8: Data Transmission Record

3) Lessons Learnt and Way Forward

The data monitoring and showing on the data platform was successfully conducted from December 19th 2022 to April 16th 2023. However, the data transmission had interference after April 16th 2023 and there were several challenges found.

As for the hardware, every connection between the main microcontroller and sensor was using a wire jumper. This type of connection is not stable in long term use. The custom Poly Chlorinated Biphenyl shield should be used to provide a solid connection. The location of LoRa-gateway was not optimized due to many blockages part. The LoRa-gateway should be installed in an open space area. There was spark mark on the wire jumper that connects between microcontroller and energy meter. This mark represents burning caused by high current and voltage.



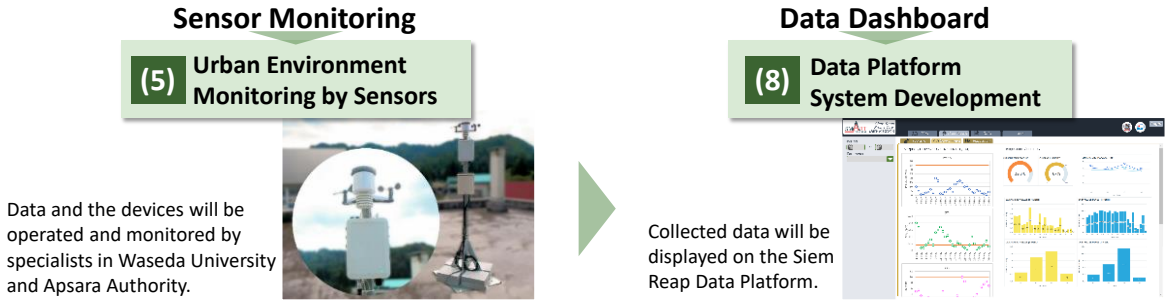
Source: Nippon Koei Co., Ltd.

Figure 4.5.9: Spark Mark found on the Wire Jumper

As for the firmware, the flow value display in the flow meter and flow value that show on microcontroller is different because of the microcontroller firmware. Firmware that has correct interpretation of flow data needs to be implemented.

As for the Amazon Web Services (hereinafter referred to as "AWS") platform, the data inflow stopped, and the reasons have not been clearly identified. A potential problem could be a malfunction in the network server which is provided by the sub-contractor.

The pre-pilot project demonstrated difficulties in monitoring urban environment in closed premises such as the Siem Reap Provincial Hall. There were also problems with unstable current. However, Re-procurement of the hardware and restructure of the platform system would require additional costs. The lessons learnt in this pre-pilot project shall be utilized in other pilot projects.



Source: Nippon Koei Co., Ltd.

Figure 4.5.10: Lessons Learnt from the Pre-Pilot Project that are utilized in Other Pilot Projects

The progress and the lessons learnt of the pre-pilot project was reported in the 16th TWG meeting in January 2024 by the JICA Expert Team, and SRPA acknowledged the reported progress and the lessons learned.

4.5.2 Pilot Project (1): Illegal Parking Monitoring

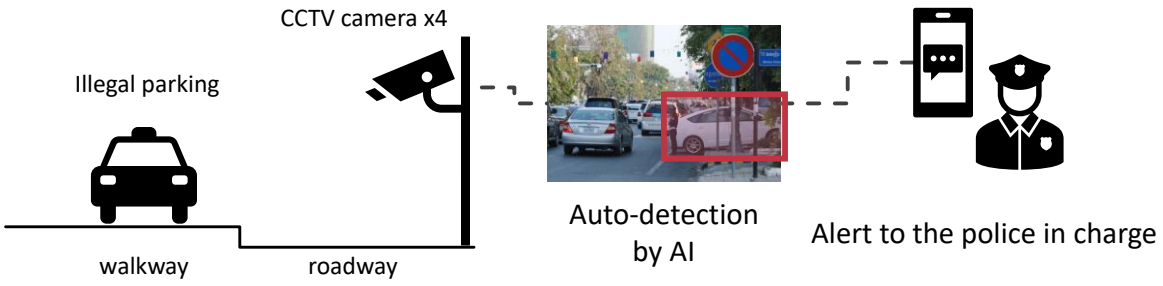
(1) Outline

1) Background and Objectives

As of the date of the 2nd JCC meeting, 200 CCTV cameras were installed in the 38-road construction project. However, due to telecommunication issues, the cameras did not work. The catalogue specifications of the CCTV system are already provided by MPWT, but the actual operation has not yet been tested. The provincial police were keen on using CCTV cameras to detect illegal parking on walkways. The objective of this pilot project was to test an illegal parking monitoring system with the same condition as the 200 cameras, so that the 200 cameras can be quickly utilized once it is possible, and to monitor illegal parking on walkways for quick action by the police.

2) Scope of Works

Newly introduced 4 CCTV cameras (same specifications as the 200 cameras) shall shoot the images of walkways inside the city. In case there is a vehicle parked on the walkways, the system shall automatically detect the situation. After detection, the system shall automatically send alerts to the police in charge, so that the police can take quick action. The scope of works includes planning, design, and implementation of the system, as well as the operation and maintenance.

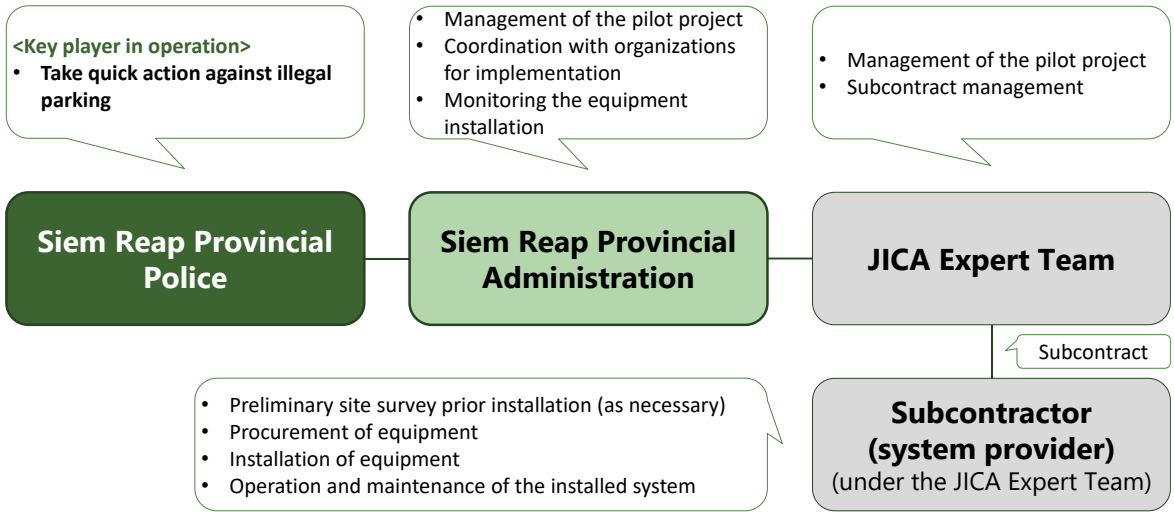


Source: Nippon Koei Co., Ltd.

Figure 4.5.11: Conceptual Scheme of Pilot Project (1)

3) Implementation Structure and Inputs

The implementation structure of this pilot project is shown below. According to a QCBS, Forval (Cambodia) Co., Ltd. was selected as the subcontractor for this pilot project. The cost excluding personnel expenses of the JICA Expert Team was roughly around USD 50,000.

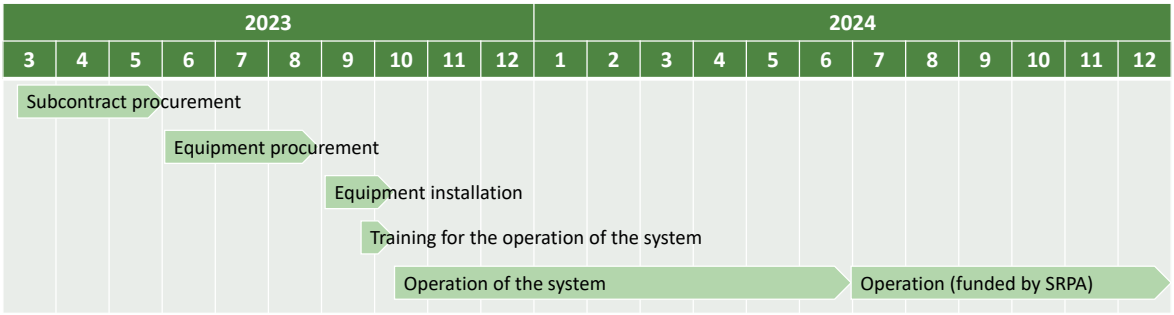


Source: Nippon Koei Co., Ltd.

Figure 4.5.12: Implementation Structure of Pilot Project (1)

4) Work Schedule

Below shows the work schedule of this pilot project.



Source: Nippon Koei Co., Ltd.

Figure 4.5.13: Implementation Schedule of Pilot Project (1)

5) Related Information

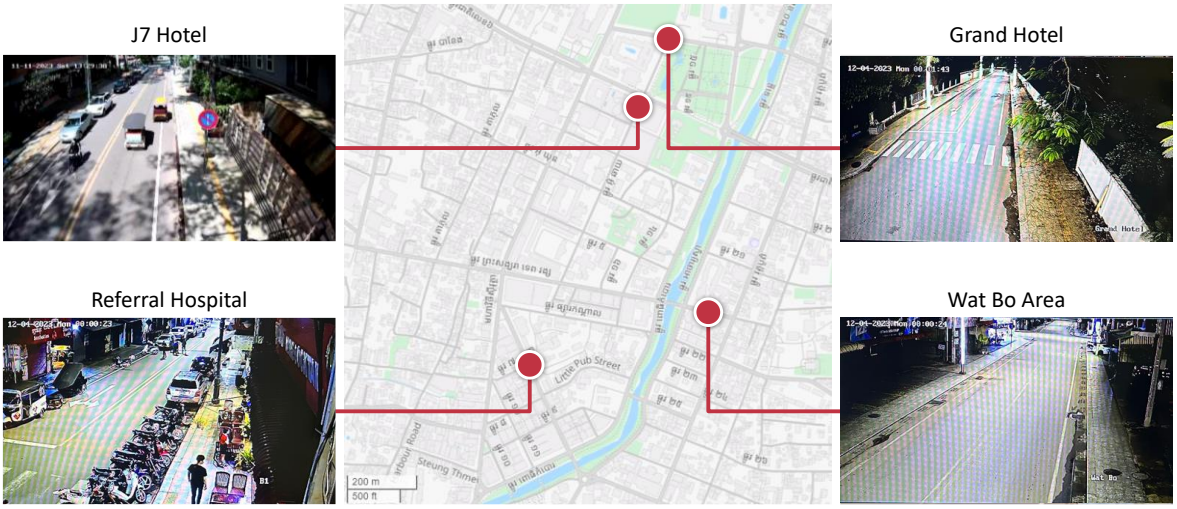
As of the date of submission of this report, the 200 CCTV cameras introduced in Siem Reap in 2021 are not yet under use. One of the reasons for this unavailability of use is said to be the telecommunication cost of the image of the CCTV cameras being too expensive to be borne by SRPA. Discussions between the subcontractor of this pilot project (Forval (Cambodia) Co., Ltd.) on ways to minimize the operational cost of the 200 CCTV cameras is ongoing.

(2) Activities and Outputs

1) Conducted Activities

i) Identification of the Installment Location and Finalization of the System Design

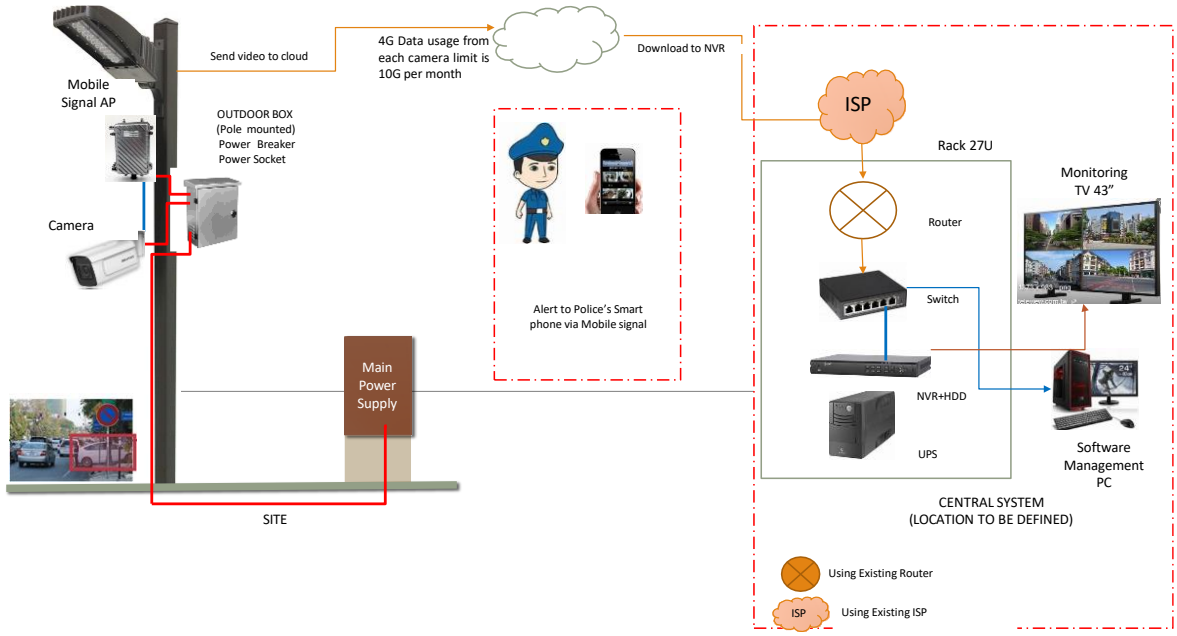
The location of the 4 CCTV cameras to be installed was identified as below.



Source: Nippon Koei Co., Ltd.

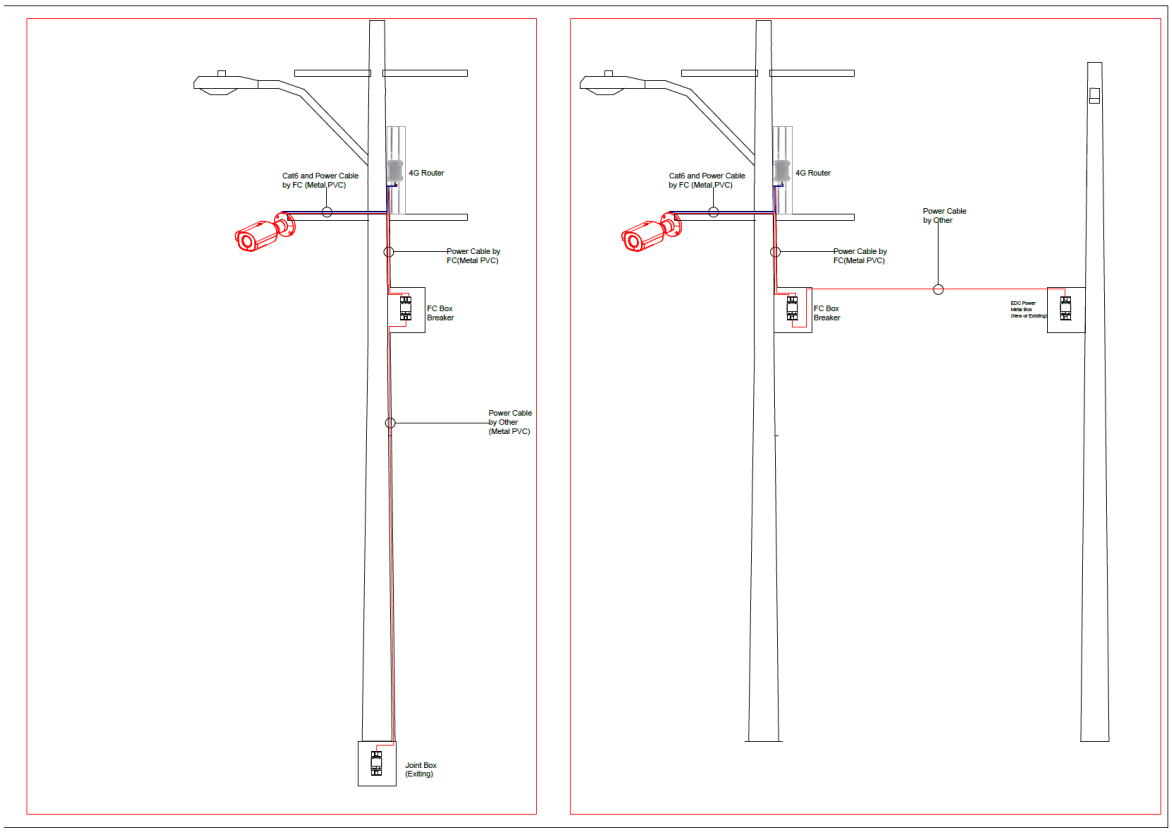
Figure 4.5.14: Location of the 4 CCTV Cameras to be Installed

The design of the system and equipment to be installed was finalized.



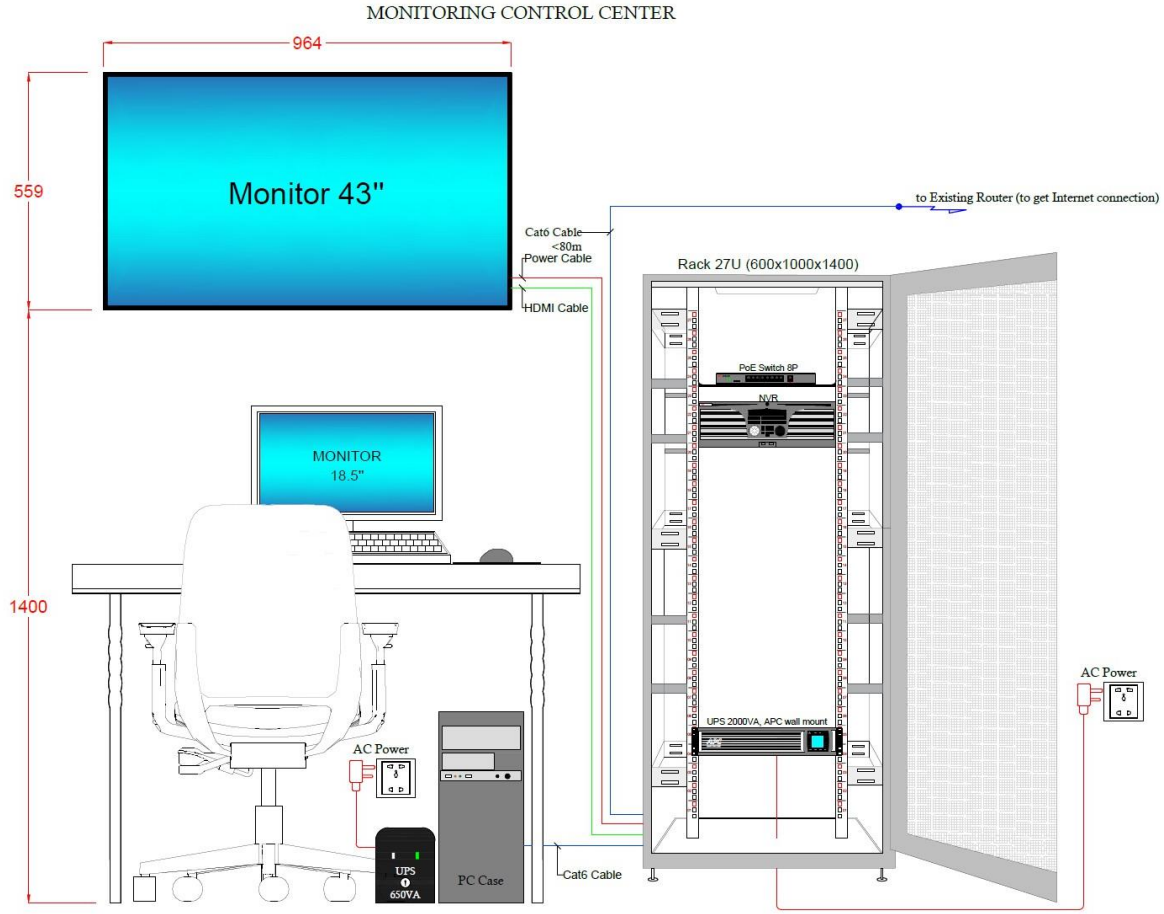
Source: Forval (Cambodia) Co., Ltd.

Figure 4.5.15: Conceptual Diagram of the Overall System



Source: Forval (Cambodia) Co., Ltd.

Figure 4.5.16: Design of the Onsite System



Source: Forval (Cambodia) Co., Ltd.

Figure 4.5.17: Design of the Central System

ii) Purchase of Equipment and Installation Works

Purchase of the equipment and installation works were conducted by the subcontractor and was completed on 16th October 2023. The site inspection for the installation was conducted on 17th October 2023.

Source: Nippon Koei Co., Ltd.

Figure 4.5.18: Installation Works

iii) Trainings to related Officials

Trainings to SRPA officers and the provincial police officers were conducted on 18th October 2023. Additional training sessions were conducted as necessary on occasions of regular maintenance report meetings. Operation manuals were made and distributed to necessary officers.

Source: Nippon Koei Co., Ltd.

Figure 4.5.19: Training Session to related Officers

Source: Forval (Cambodia) Co., Ltd.

Figure 4.5.20: Operation Manuals

iv) Regular Maintenance Works

Regular maintenance works by the subcontractor were conducted in December 2023, March 2024, and May 2024. After each regular maintenance work, the subcontractor reported the results to SRPA.

Source: Nippon Koei Co., Ltd.

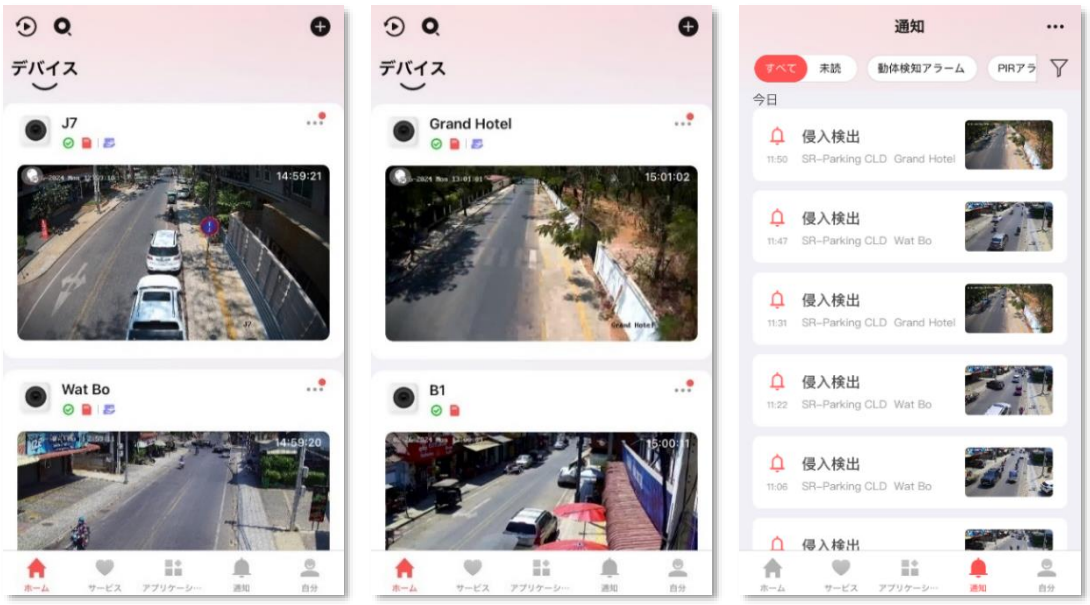
Figure 4.5.21: Regular Maintenance Works

2) Key Outputs and Achievements

Through the implementation of this pilot project, the following key outputs have been achieved:

a) System and Functionality Output

A monitoring system of illegal parking was successfully introduced in Siem Reap. The video shot from the 4 CCTV cameras has been regularly used by the provincial police to detect illegal parking remotely. As for actual situation, several police officers monitor the situation via the system and provide instructions to other officers by Telegram. The police use the system every day, 8 hours per day.



Source: Nippon Koei Co., Ltd.

Figure 4.5.22: App Screen of the Illegal Parking Monitoring

b) Capacity Strengthening Output

Through various sessions of training, the officers of SRPA and the provincial police have understood the basic functions and the way of using the installed system.

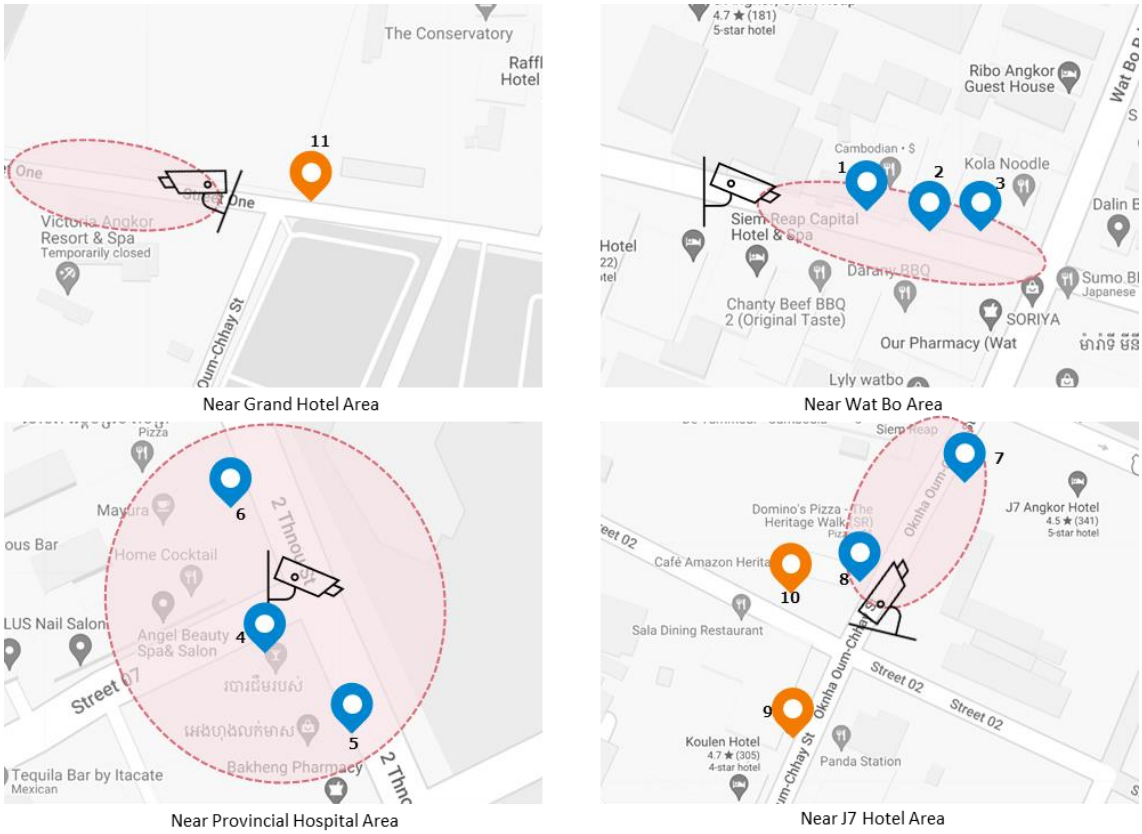
It was confirmed that all police officers involved in this pilot project utilize this application at a high frequency in the survey. (15 out of 16 responded with a 4 out of 4 and 1 responded with a 3.) Also, the two IT staffs in SRPA had approximately 90% correct answers on the comprehension test of their tasks in December 2024, but both had 100% correct answers in February 2025. This is due to the fact that after the December 2024 test, the JICA Expert Team prepared a checklist for them to record the actions they should take for this pilot project, and they recorded their actions at least twice a week from December 2024 to February 2025, which we recognize as having increased their understanding of the task.

c) Urban Issues Solution Output

Police officers report that the number of illegal parking incidents has decreased from 60 to 30 per day before and after the system was installed in the video captured area. When the police actually confirm an illegal parking incident, they go to the site and give cautions against illegal parking for approximately 50% of the total cases.

Also, a satisfaction survey of police officers on the system indicated that all police staff involved in this pilot project were highly satisfied with the system (15 of 16 responded with a 4 out of 4, 1 with a 3 out of 4). Especially, the deputy chief of the police commented that this system is highly effective, and he would like to expand this system to the entire Siem Reap area in the future.

The survey for citizens indicates that more than 80% of residents and businesses in the area (blue pin) noted a decrease in illegal parking. Also, 3 businesses (orange pin) outside the CCTV area noted no negative impact on the surrounding area.



Source: Nippon Koei Co., Ltd.

Figure 4.5.23: CCTV Installation Area and Interviewees

By applying the knowledge gained from this pilot project to the operation of the 200 CCTV cameras already installed, it will be possible to quickly crack down on illegal parking and provide a safe and comfortable street space, contributing to the solution of urban issue No. 12 “Needs for

comfort against traffic congestion and on-street parking", stipulated in the Siem Reap Smart City Roadmap.

3) Lessons Learnt and Way Forward

i) Limitation of the Detection Function

The specifications of the 4 CCTV cameras that were introduced in this pilot project were chosen on the condition that those specifications are similar to the specifications of the 200 CCTV cameras that were already installed in Siem Reap, to ensure expandability of the lessons learnt through this pilot project to the operation of the 200 CCTV cameras. Therefore, some functions of the cameras were not sufficient enough to fully meet the demands of the provincial police. Especially for the detection function, since the function within the camera detects any intrusions for a preset amount of time (threshold) for any preset detection area and is not specified for vehicle detection or illegal parking detection. The function did not eliminate object intrusion unrelated to illegal parking, but this is because the functions and specifications of the 4 CCTV cameras were limited not to exceed the 200 CCTV cameras.

ii) Usage of the Video Data by the Provincial Police

Despite the limitations of the illegal parking detection function, the provincial police reports that the system is used regularly to remotely detect illegal parking by using the video images shown in the app screen. This shows the effectiveness of the CCTV camera images themselves without any autodetection functions for the current illegal parking detection operation inside Siem Reap Provincial Police.

iii) Future Operation and Maintenance of the Installed System

The operation and maintenance of the installed system of this pilot project were conducted by JICA Expert Team and Forval (Cambodia) Co., Ltd. until June 2024. From July 2024, the operation and maintenance are conducted by SRPA and Forval (Cambodia) Co., Ltd., and the JICA Expert Team is supporting the operation and maintenance, under a contract agreement between SRPA and Forval (Cambodia) Co., Ltd. from July 2024 to December 2024. The operation and maintenance is expected to continue by the same structure from 2025 onwards. As of the end of August 2024, the contract document between SRPA and Forval (Cambodia) Co., Ltd. for the operation and maintenance is generally agreed, but is not yet signed by the representative of SRPA.

iv) Expandability to the Already Installed 200 CCTV Cameras

As mentioned earlier, the specifications of the installed systems were carefully considered so that it is similar and does not exceed the specifications and functions of the already installed 200 CCTV

cameras, so that the lessons learned through this pilot project can be used for the future operation of the 200 CCTV cameras. As of the date of submission of this report, the 200 CCTV cameras are still not operated. The subcontractor of this pilot project, Forval (Cambodia) Co., Ltd., is currently having discussions with SRPA on possible solutions to start the operation of the already installed 200 CCTV cameras. The JICA Expert Team hopes for the operation of the 200 CCTV cameras using the lessons learnt from this pilot project.

4.5.3 Pilot Project (2): Waste Collection Improvement Survey and Pilot Project (7): Smart Waste Collection and Transportation

(1) Outline

1) Background and Objectives

The objectives of the pilot projects are to improve the waste collection and transportation services in the selected communes in Siem Reap city using a smart city approach. In this regard, a series of pilot projects was implemented that included Pilot Project (2): Waste Collection Improvement Survey and Pilot Project (7): Smart Waste Collection and Transportation, that aimed at examining issues associated with the present waste collection and transportation in the city and provide solutions to address them employing web and mobile applications.

According to the Tourism Development Master Plan Siem Reap 2021-2035, waste generation in Siem Reap City is estimated at 376 ton/day (2020) and per capita generation is estimated approx.0.66kg/day (2020) in which more than a half of waste (54%) is assumed to be organic and can be decomposed (Pheakdey, et. al., 2022[6]). This number is expected to increase up to 729 tons/day by 2035 following the recovery of the local economy driven mainly by the tourism sector after the COVID-19 pandemic and population growth. Despite the increase in waste generation, the capacity of waste management in Siem Reap city is not sufficient to accommodate waste in an appropriate and effective manner. There have been numerous issues associated with waste generation, collection and transportation, treatment and final disposal in multiple dimensions in the city and the pilot projects put an emphasis on optimizing waste collection and transportation following the request made by SRPA and the Siem Reap City Hall. The summary of each pilot project and activities are presented in Table 4.5.1.

[6] Pheakdey, D.V.; Quan, N.V.; Khanh, T.D.; Xuan, T.D. Challenges and Priorities of Municipal Solid Waste Management in Cambodia. Int. J. Environ. Res. Public Health 2022, 19, 8458. https://doi.org/10.3390/ijerph19148458

Table 4.5.1: Summary of Pilot Projects and Activities

Pilot Project	Objective	Activity
Pilot Project (2): Waste Collection Improvement Survey	To increase efficiency and optimize waste collection and transportation systems for using available dataset and primary data collected by surveys. To draw lessons and develop "a To Do List" for succeeding the pilot project by the C/P.	a) Time and motion survey (T&M survey) to understand the status of waste collection and transportation b) Examination and analysis of GPS tracking data for monitoring waste collection trucks
Pilot Project (7): Smart Waste Collection and Transportation	To improve the waste collection and transportation services in the selected commune (Sla Kram).	a) Upgrade the existing waste collection points in Sla Kram commune using bins system. b) Develop "a waste app" for various applications including alert/notification, public awareness, and waste collection monitoring.

Source: Nippon Koei Co., Ltd.

Bins set up besides the old market

Waste collection by private company

Private recycler's workshop

Final disposal site operated by private company

Source: Nippon Koei Co., Ltd.

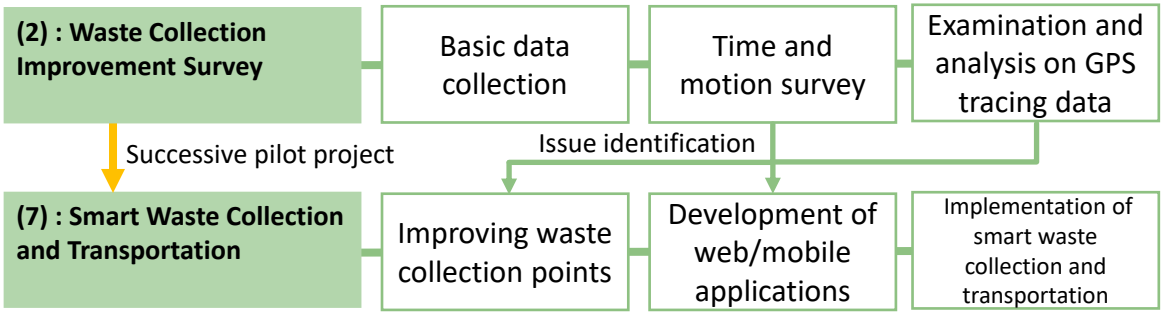
Figure 4.5.24: Current Situation of Waste Management in Siem Reap City

2) Scope of Works

The scope of works for (2): Waste Collection Improvement Survey and Pilot Project (7): Smart Waste Collection and Transportation were set as follows.

Pilot Project (2): Waste Collection Improvement Survey started with identifying the bottlenecks that hinder the efficient waste collection operation by employing a time and motion survey (hereinafter referred to as "T&M survey") and the examination and analysis on the Global Positioning System (hereinafter referred as "GPS") tracking system (Luma/Samraam system) installed at the waste collection trucks by MoE.

Pilot Project (7): Smart Waste Collection and Transportation was a successive pilot project and designed and implemented aiming at solving the operational and technical bottlenecks identified by the Pilot Project (2). This pilot project focused mainly on installing uniform waste bins and the development and application of web and mobile applications in monitoring the status of waste collection to prompt timely and regular waste collection and provides communication channel among services providers and users. Figure 4.5.25 shows the outline of Pilot Project (2) and Pilot project (7) and the methodologies employed for implementation.



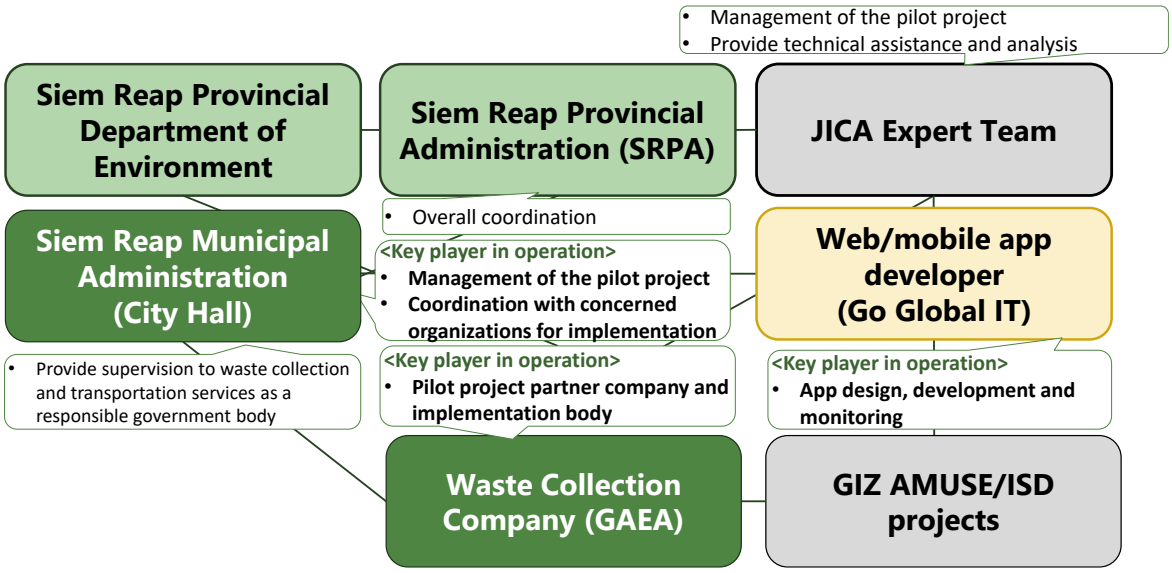
Source: Nippon Koei Co., Ltd.

Figure 4.5.25: Outline of the Pilot Project (2) and (7)

3) Implementation Structure and Inputs

The pilot projects were implemented by SRPA and Siem Reap City Hall, the authority responsible for waste management in Siem Reap city while involving a variety of government, public and non-public stakeholders. The implementation structure for Pilot Project (7): Smart Waste Collection and Transportation is illustrated in Figure 4.5.26.

Both pilot projects (2) and (7) were led primarily by SRPA, the Siem Reap City Hall, and a private waste service provider for implementation with technical support by the JICA Expert Team. Other key players involved in Pilot Project (7) included a private web developer, Go Global IT, for app development and monitoring. Also, based on the Memorandum of Understanding (hereinafter referred to as "MOU") made by the JICA Expert Team and GIZ , the ASEAN Municipal Solid Waste Management Enhancement Project (hereinafter referred to as "AMUSE") cooperated in this pilot project for joint coordination with the relevant parties.

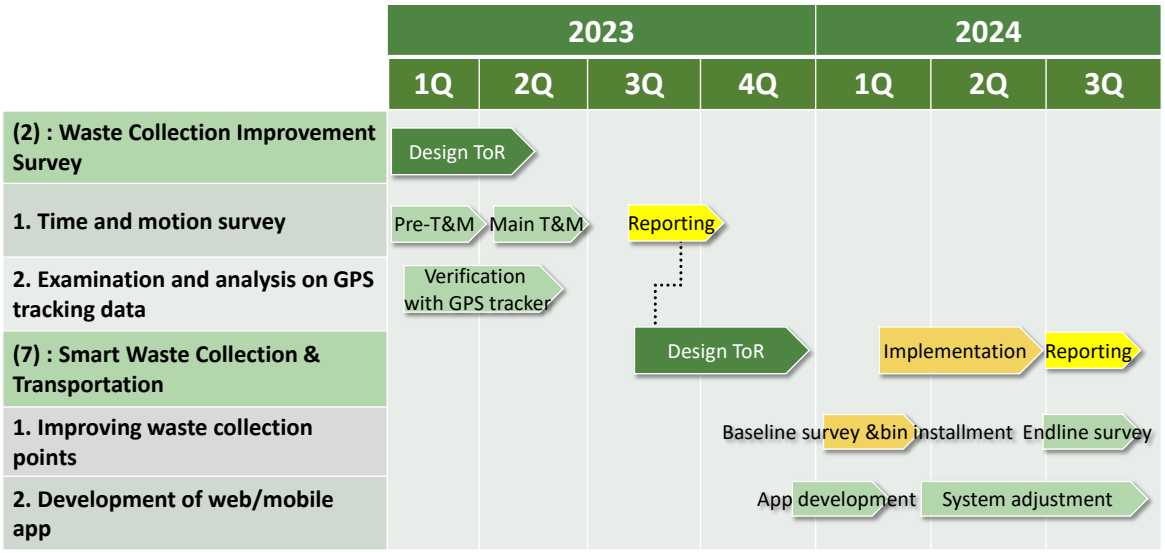


Source: Nippon Koei Co., Ltd.

Figure 4.5.26: Implementation Structure of Pilot Project (7)

4) Work Schedule

Figure 4.5.27 presents the work schedule of Pilot Project (2) and (7).



Source: Nippon Koei Co., Ltd.

Figure 4.5.27: Work Schedule of Pilot Project (2) and (7)

5) Related Information

The pilot projects were conducted engaging numerous actors in the solid waste management sector that include the Samraam platform project initiated by MoE financed by ADB, the Project for Improved Service Delivery for Citizens in Cambodia (hereinafter referred to as "ISD") by GIZ. The JICA Exprt Team cooperated closely with those stakeholders and development partners throughout the pilot project implementation to avoid the duplication of efforts and to create synergy.

Table 4.5.2: Related Projects and Stakeholders

Project	Description	Interaction with Pilot (2) and (7)
Cambodian Solid Waste Management Platform (Samraam platform)	The MoE initiated project to develop a platform (web/mobile) to manage wase collection using GPS.	Pilot (2) examined and verified the accuracy of the Samraam platform and suggested recommendations for improvement.
Improved Service Delivery for Citizens in Cambodia (ISD)	The GIZ project focuses on improving public services including waste and wastewater management.	Pilot (2) and Pilot (7) made a project-based memorandum of agreement with GIZ and performed related activities.
ASEAN Municipal Solid Waste Management Enhancement (AMUSE)	The GIZ regional project to improve the capacity of waste management across the ASEAN	Pilot (2) and Pilot (7) made a project-based memorandum of agreement with GIZ and performed related activities.

Source: Nippon Koei Co., Ltd.

Discussion with MoE, Cambodia

Signing of JICA-GIZ project-based MoU

Source: JICA Long Term Expert Team

Figure 4.5.28: Collaboration with Stakeholders

(2) Activities and Outputs

1) Conducted Activities

Pilot project (2) and Pilot project (7) were conducted consecutively aiming at optimizing the present waste collection and transportation services in Siem Reap city.

i) Pilot project (2): Waste Collection Improvement Survey

Pilot project (2) performed the following activities.

a) Basic data collection to understand the current situation on waste collection and transportation systems

The JICA Expert Team conducted a review on legislation pertaining to solid waste management. The review included Sub-Decree on Urban Solid Waste Management, No. 113 (2015), Solid Waste Management Action Plan for Siem Reap City (Draft) that are considered crucial in designing the pilot project.

b) Identification of survey locations (two communes) and time and motion survey to obtain baseline data and the state of collection and transportation services by the service provider

The JICA Expert Team held discussions with SRPA and the Siem Reap City Hall to determine two locations for the proposed T&M survey. Sla Kram and Krabei Riel communes were determined as the survey sites given location, demographic, and geographic features, and the existing waste collection services. The T&M survey was conducted in both communes to obtain baseline data for assessment.

c) Examination, analysis, and interpretation of GPS tracking data to verify the GPS tracking system employed by the service provider

In order to verify the GPS sensors installed on the waste colelction trucks and justify gaps, the JICA Expert Team employed GPS loggers to record collection route in the course of the T&M and made a comparison with the data recorded by the GPS sensors attached to the waste collection trucks. The recoorded routes and the number of waste collection points were extrated for annalysis which observed the inaccuracy in waste collection points and technical limitations of the GPS sensors.

Compactor truck for collection

Recording during the T&M survey

Survey in Sla Kram commune

Survey in Krabei Riel commune

Source: Nippon Koei Co., Ltd.

Figure 4.5.29: Activities Conducted in Pilot Project (2)

ii) Pilot Project (7): Smart Waste Collection and Transportation

Based on the findings in the Pilot project (2), Pilot project (7) performed the following activities.

a) Installation of uniform waste bins for improving waste collection points

The JICA Expert Team initiated the installation of uniform waste bins at the selected eleven households in improving the efficiency of waste collection and environmental sanitation in Sla Kram commune, a pilot commune. The uniform bins were procured with the support of SRPA, and they were provided to the household owners committed to be a part of the pilot implementation.

b) Development and introduction of web/mobile applications

Since Pilot project (2) suggested the needs of improving the capacity of monitoring waste collection and transportation services, the JICA Expert Team designed and developed web/mobile applications in consultation with the concerned authorities including SRPA, the Siem Reap City Hall and an app developer. The apps were developed with the functions to visualize and monitor the operation of waste collection services in real time with the communication tool to bridge between the local governments, service providers, and users.

c) Implementation of smart waste collection employing the introduced uniform bins and the developed web/mobile application (one commune)

The JICA Expert Team conducted the pilot-scale implementation on smart waste collection and transportation with the web/mobile applications involving key stakeholders in the Sla Kram commune. The smart waste collection and transportation was pilot tested for a period of one month at the Wat Polanka street.

In the implementation, the service provider conducted waste collection twice a week from June to July 2024 with the involvement of the eleven households provided with the uniform waste bins connected to the developed applications for monitoring.


Visit to the commune representative of Sla Kram


Pilot project launching meeting


App instruction to a commune citizen


Smart waste collection using app

Source: Nippon Koei Co., Ltd.

Figure 4.5.30: Activities Conducted in Pilot Project (7)

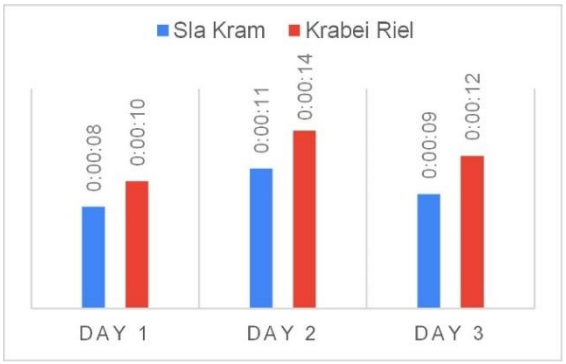
2) Key Outputs and Achievements

i) Pilot project (2): Waste collection improvement survey

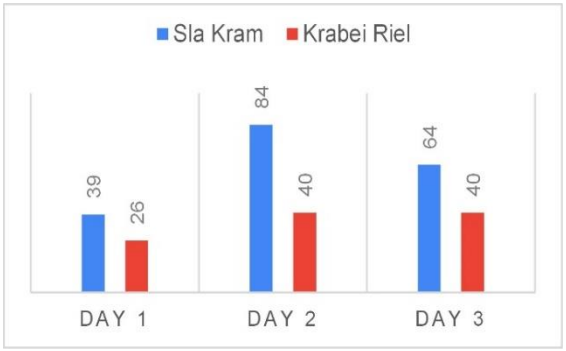
The key outputs and the achievements made in Pilot project (2) include the followings:

- The T&M survey was conducted to see the difference in waste collection efficiency between Sla Kram commune (urban) and Krabei Riel commune (rural). The higher waste collection efficiency was observed in Sla Kram commune as the density of waste collection points is much higher than that of Krabei Riel commune.
- The survey also saw that the total operation time is hugely influenced by the number of collection points (but not the number of bags). Minimizing no of waste collection points can contribute to more efficient operation. The survey also presented that the number of waste collection points defers depending on collection routes and collection day, indicating combining waste collection points with reasonable route setting can lead to efficient operation as illustrated in Figure 4.5.31.

- Verification was made comparing the Luma/Samramm GPS data with the data obtained using the GPS loggers, showing inconsistency in waste collection points (due to technical limitations of the Luma systems) and fairy good consistency in collection routes as shown in Figure 4.5.32.
- While the Luma/Samraam system demonstrated good accuracy in location, the compared result presented that the system was not able to record accurate waste collection points where actual waste collection was performed in the survey showing technical limitations of the system.



Unit time/loading time (median)



Number of collection points/route

Source: Nippon Koei Co., Ltd.

Figure 4.5.31: Summary Result of T&M Survey in Sla Kram and Krabei Riel Communes

Collection Route in Sla Kram

Collection Route in Krabei Riel

Source: Nippon Koei Co., Ltd.

Figure 4.5.32: Overlaying Image of Sla Kram and Krabei Riel Commune Collection Route

ii) Pilot project (7) Smart waste collection and transportation

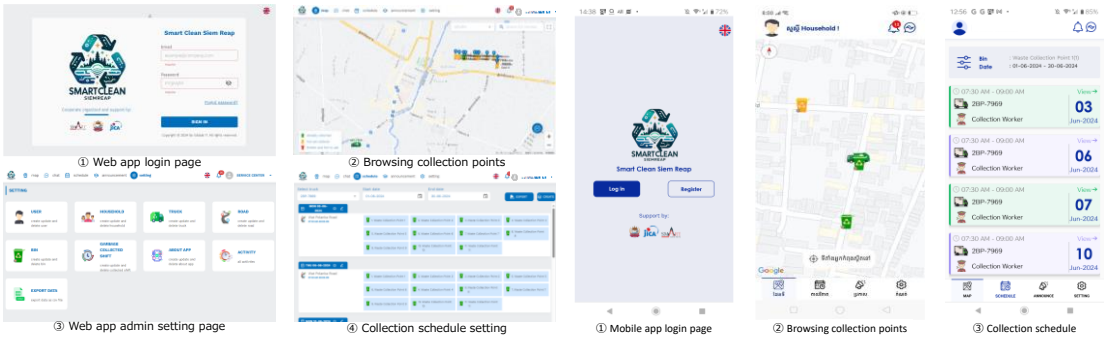
Through the implementation of this pilot project (7), the following key outputs have been achieved:

a) System and Functionality Output

Smart waste collection employs uniform waste bins, and a web/mobile application was developed and implemented eight times during June and July 2024.

The uniform waste bins (240L) were installed to the 11 selected households located along the Wat Polanka street in Sla Kram commune as a pilot test. The qualitative results include the minimization of work burden of waste collection workers as well as improved environmental sanitation at the points of installation.

The web and mobile applications were developed and named "Smart Clean Siem Reap Application". The developed applications were published and became available on Google Play Store (Android) as well as Apple App Store (iOS) with the purpose of managing waste collection. The images of interfaces of the developed applications are shown in Figure 4.5.33. Government / collection company / resident communication channels were established through the app (including notification function, collection calendar).



Collection Route in Sla Kram　　Collection Route in Krabei Riel

Source: Nippon Koei Co., Ltd.

Figure 4.5.33: Web/mobile Application Interface

b) Capacity Strengthening Output

Drivers in charge of the pilot area gave the highest rating (responded with a 5 out of 5) for their understanding of the system.

c) Urban Issues Solution Output

The pilot implementation observed that the introduction of uniform waste bins along with the use of the developed applications can contribute to minimize the average of 5 seconds/point at the selected households, showing the potential of optimizing waste collection services in terms of efficiency as illustrated in Figure 4.5.34. It also should be highlighted that the involved key players including the service providers and the selected household owners played their assigned roles properly, demonstrating positive attitude toward the pilot project as presented in Figure 4.5.35. In the feedback survey, all citizens were satisfied with the system overall and on the chat system of app, there were no complaints. For example, some citizens commented "The bin helps prevent animals and people from tearing waste bag" while the other commented "I can know in advance when the waste collector come, and they come to collect regularly". Also, the chief of

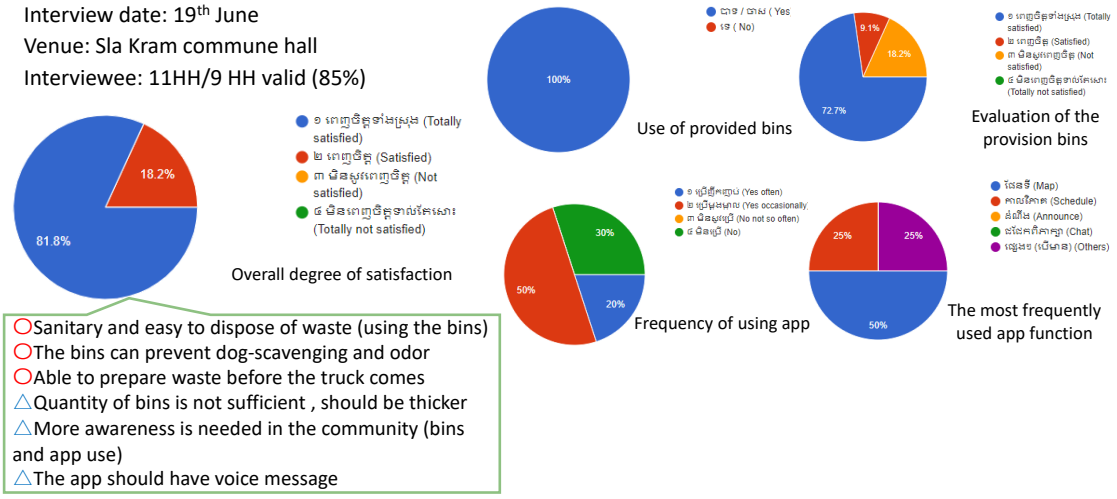
the Commune of the pilot area (Sra Kram) commented that the effect has been very positive, and he hopes to expand the system to the whole commune.

In the survey, a total of five key stakeholders (GAEA, SRPA, and Sra Kram Commune) gave the highest rating (responded with a 5 out of 5) for the effectiveness and its implementation in other areas.

	#of targeted HH	Unit time /point	Remarks
Trial	11	0:00:46	Day 1 (trial)
Endline 1st	11	0:00:53	Day 2
Endline 2nd	11	0:0041	Day 4 manual bin status change only
Endline ave	11	0:00:41 (ave: 3 days)	Day1 ,Day 2, and Day 4 *Reference value obtained in limited survey settings. *No of collection points and bags also decreased per collection

Source: Nippon Koei Co., Ltd.

Figure 4.5.34: Summary of Results of Smart Waste Collection (Recorded at 11 households for 3 days)



Source: Nippon Koei Co., Ltd.

Figure 4.5.35: Summary of Users' Feedback on the Pilot Project in Sla Kram Commune

3) Lessons Learnt and Way Forward

The lessons learnt in Pilot project (2) and (7) are presented as follows.

- As the waste management sector involves a variety of players ranging from national and local governments to civil society, coordination and engagement of those stakeholders are critical in leading the launched waste collection and transportation systems.

- Despite limited interventions, the pilot implementation initiated in Pilot project (7) minimized loading time (average 5 sec/point at 11 households), regular collection, and user-convenience by the developed applications, suggesting a wide-scale implementation could lead to further improvement.
- Pilot project (2) suggested the technical limitations of the Luma/Samraam system, hindering the service provider from effective operation. Although the developed web/mobile applications resolved the problems in terms of providing the accurate location of waste collection points and the status of operation, the system will need to be constantly adjusted in meeting the service provider's needs to make it further practical.
- Pilot project (2) and (7) aimed at improving the capacity of solid waste collection of Siem Reap local authorities. Given a major part of waste management operation is outsourced to the private service provider, the responsible local authority, the Siem Reap City Hall, has limited control. The City Hall under the instruction by SRPA, however, initiated a series of meetings with the service providers and the local community, guided the pilot implementation in the selected commune, and constantly monitored waste collection utilizing the applications developed, that demonstrates the potential of strengthening government leadership in the solid waste management sector further.

The challenges and the direction for improvement are suggested in Table 4.5.3.

Table 4.5.3: Challenges and Direction for Improvement

Challenge	Direction for improvement
System improvement and sustainability of the system (bins/app)	• The developed applications should be further tailored to the service provider's needs to ensure the sustainability of the systems. • The app functions should be constantly updated by the developer under the supervision of the Siem Reap local authorities.
Expansion of smart waste collection coverage and maintenance	• As Pilot project (7) suggested, a wide-scale implementation could contribute to improvement in waste collection operation and user's convenience. Resource mobilization and government leadership would be necessary.
Continuous engagement of citizens	• The system could only work when individuals in local communities use the developed applications in a correct manner. Regular awareness and community awareness would be a critical pillar to make a wide-scale implementation possible.

Source: Nippon Koei Co., Ltd.

4.5.4 Pilot Project (3): Tourism Statistics Digitalization

(1) Outline

1) Background and Objectives

Due to lack of experience, the capacity of individual governmental officers to appropriately deal with data is not enough. This pilot project aims to digitalize the process of collecting and publishing tourism statistics and enhance the data management capacity of public officers in the tourism sector.

2) Scope of Works

The pilot project consists of a series of training programs of IT skills to DoT officers, including a 2-day onsite training in Phnom Penh provided by the Cambodia Academy of Digital Technology (hereinafter referred to as "CADT"). The onsite training consists of the following.

- Pre-training test
- Word processing training
  - Create complex text.
  - Text format, paragraph, and advance table.
  - Prepare document format by using font style and paragraph.
  - Automatic advance mail merge function.
- Spreadsheet training
  - Working on spreadsheets and saving files.
  - Input data into the cell and create tables.
  - Select, sort, copy, move and delete data.
  - Create mathematic formula and logic using standard excel.
  - Create formula and find errors.
  - Select correct charts for workflows.
- Post-training test

Table 4.5.4: Contents of the Word Processing Training

No.	Lesson	Topic	Goal
1	Time-saving tips	• Create the document using the template. • Autosave • Tell me function • Bullets and numbering list • Line and box • Autocorrect • Auto text and quick parts • Text alignments • Influence the use of a mouse and keyboard	To provide ease, importance, and pro tips to the students so they can perform the task faster, more effortlessly, and timesaving.
2	Use the right tools for the correct problems	• Insert font in the document • Download and install the font • Font setting • Default page setting • Picture and shape • Smart art • Page orientation	To study tips for using the correct tools to solve the problem.
3	Problem solving skill	• Mail merge • Indentation • Tab stop • Diverse page number • Page setting • Table of content	To provide valuable tips to solve the common issue effectively.

Source: CADT

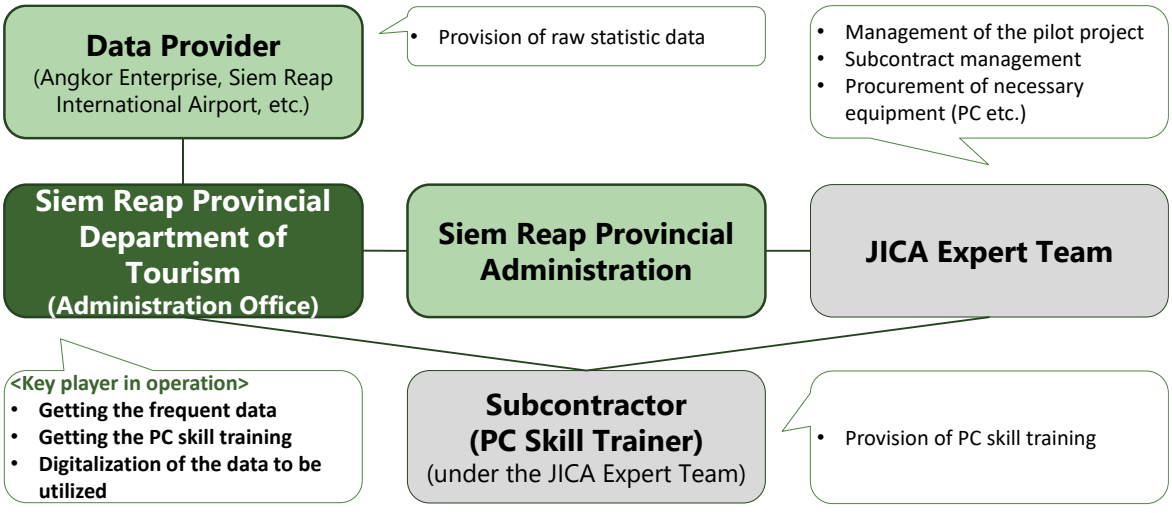
Table 4.5.5: Contents of the Spreadsheet Training

No.	Lesson	Topic	Goal
1	Table	• Understanding mouse pointer • Border and background • Data formatting • Freeze pane • Printing • Conditional formatting	To understand the structure of the table, and to know how to create a proper table, easy to understand.
2	Function	• Foundation of using formula • Cell reference • Function	To provide students with a solid foundation in using a function such as mathematics, statistic, and finance so that they can solve complicated calculations.
3	Data analysis	• Auto table • Sorting data • Filtering data • Data validation • Pivot table	To study important keys in data analysis such as filtering, extract, summary, and explanation to make a more understandable analysis.
4	Chart	• Benefit of chart • Chart element • Chart usage	To understand how to use each chart for the right objective. It is an essential element for creating an effective and engaging presentation.

Source: CADT

3) Implementation Structure and Inputs

The implementation structure of this pilot project is shown below. CADT was selected as the subcontractor. The cost excluding personnel expenses of the JICA Expert Team was roughly around USD 4,000.



Source: Nippon Koei Co., Ltd.

Figure 4.5.36: Implementation Structure of Pilot Project (3)

4) Work Schedule

The 2-day onsite training program was conducted from 11th to 12th May 2023. The outputs using the knowledge earned in this training were presented in the 4th JCC meeting in September 2023.

(2) Activities and Outputs

1) Conducted Activities

i) Training in Phnom Penh

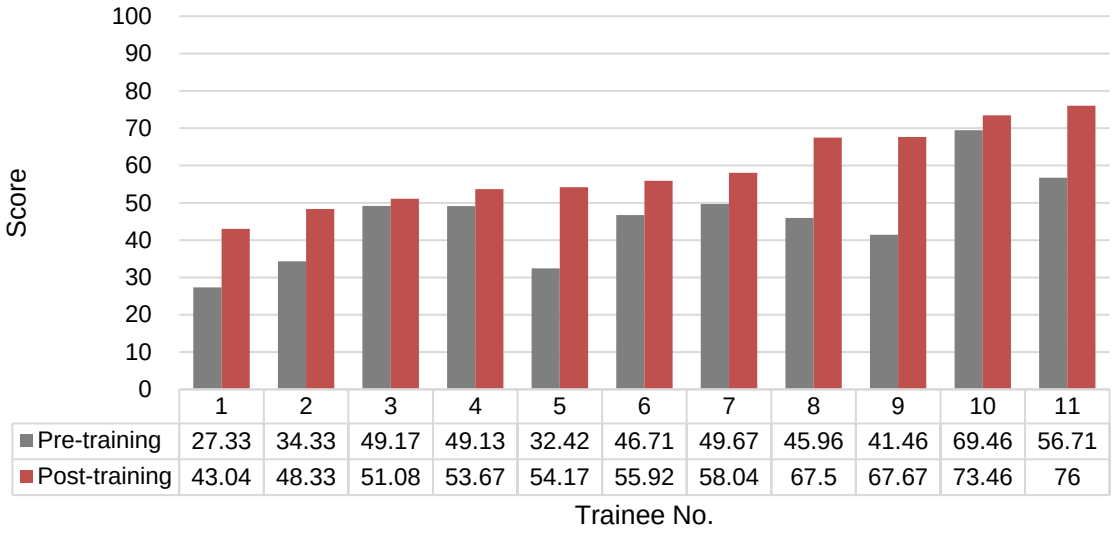
As mentioned previously, a 2-day onsite training program was conducted from 11th to 12th May 2023 to 11 DoT officers. The conducted curriculum is shown in 4.5.4(1)2).

Source: CADT

Figure 4.5.37: Training in Phnom Penh

ii) Pre- and Post-Training Tests

Tests were conducted to trainees before and after the training. As shown in the figure below, all participants showed improvement in their scores after training.



	1	2	3	4	5	6	7	8	9	10	11
Pre-training	27.33	34.33	49.17	49.13	32.42	46.71	49.67	45.96	41.46	69.46	56.71
Post-training	43.04	48.33	51.08	53.67	54.17	55.92	58.04	67.5	67.67	73.46	76

Source: Nippon Koei Co., Ltd.

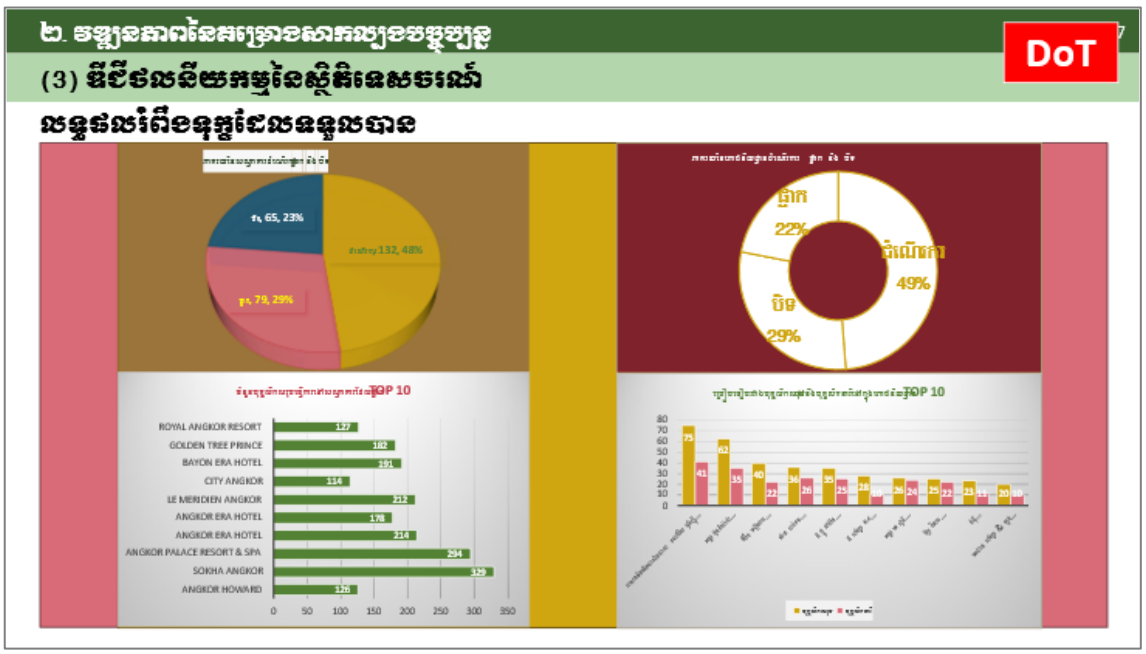
Figure 4.5.38: Pre- and Post-Training Test Scores

2) Key Outputs and Achievements

Through the implementation of this pilot project, the following key outputs have been achieved:

a) System and Functionality Output

The outputs using the knowledge earned in this training were presented in the 4th JCC meeting in September 2023, and the digitalization of tourism statistics progressed.



Source: DoT

Figure 4.5.39: Presentation in the 4th JCC Meeting by Officers of DoT

b) Capacity Strengthening Output

As seen in the pre- and post-training test results, officers of DoT have improved their score by an average of 60% on digitalization of tourism statistics.

c) Urban Issues Solution Output

Through activities in pilot project (8), tourism statistics was open to public and citizens and businesses can now access tourism information. It contributes to the solution of urban issue No. 9 "Needs to strengthen promotion as a tourist city", stipulated in the Siem Reap Smart City Roadmap.

3) Lessons Learnt and Way Forward

Since IT skills of SRPA officers and provincial department officers are still limited, similar training programs are expected to be conducted in the future to enhance their skills.

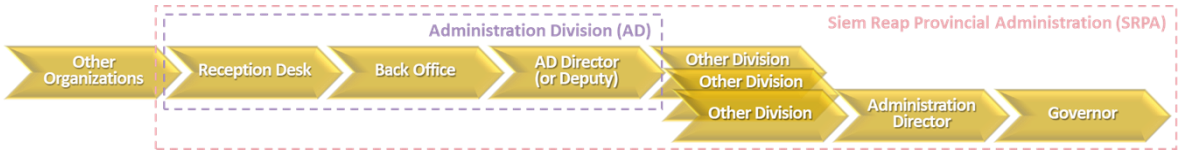
As part of pilot project (8) "Data Platform System Development", DoT officers collaborated with the subcontractor of pilot project (8) to input tourism related data to SSDaP.

4.5.5 Pilot Project (4): Government Internal Document Management

(1) Outline

1) Background and Objectives

As presented in Figure 4.5.40, letters received by SRPA from other organizations are circulated to the Governor via other divisions depending on the content. The circulation process is manually recorded in the register when the Administration Division (hereinafter referred to as "AD") receives letters from outside and when AD passes letters to other divisions.



Source: Nippon Koei Co., Ltd.

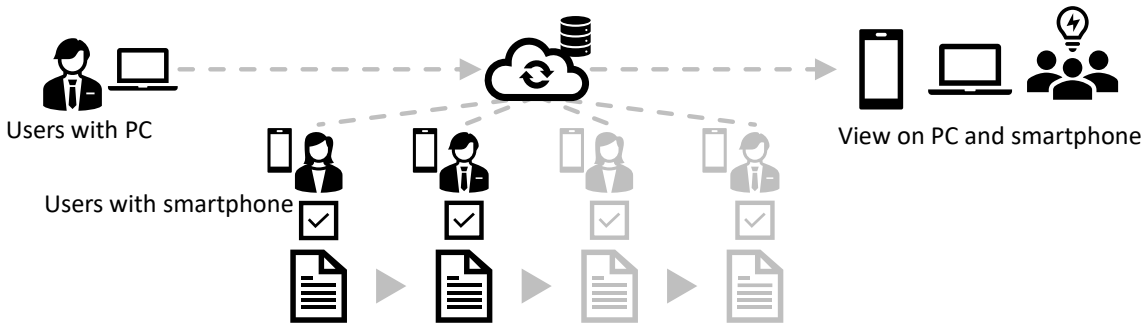
Figure 4.5.40: Basic Flow of Government Internal Document

The current problem is that it is unclear which office/officer is stopping the flow of letters during the circulation. There is a need for a mechanism that allows all relevant officers to easily grasp the circulation status.

The objective of the Government Internal Document Management Pilot Project is to establish a monitoring mechanism of the internal process of document circulation in SRPA through developing

a "Document Tracking System" (hereinafter referred to as "DTS"). The features of the system are as follows:

- Staff at PDO under AD register letter information in the system with their PCs.
- Staff handing over the letter update the status with their smartphones.
- All relevant officers can monitor the current location of the letter from their PCs and smartphones.



Source: Nippon Koei Co., Ltd.

Figure 4.5.41: Outline of the Document Tracking System

2) Scope of Works

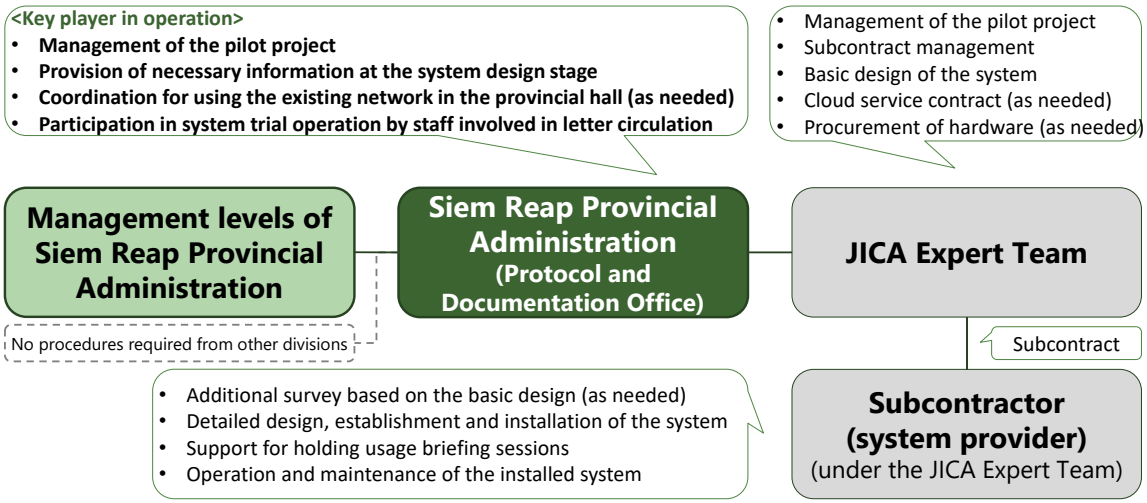
The scope of works covers the following items:

- Preparation of the basic design
- Additional survey based on the basic design
- Detailed design, development, and installation of the system
- Explanation in usage briefing sessions
- Operation and maintenance of the installed system

The system development work was sublet to a subcontractor. Thus, the above-mentioned first item and the other items were performed by the JICA Expert Team and the subcontractor, respectively.

3) Implementation Structure and Inputs

The outline of the roles of implementation players of this pilot project is shown below. After a QCBS process by the JICA Expert Team, Beniten Co., Ltd. was selected as the subcontractor of this pilot project. The subcontractor's scope of works is as described in item 2) above.



Source: Nippon Koei Co., Ltd.

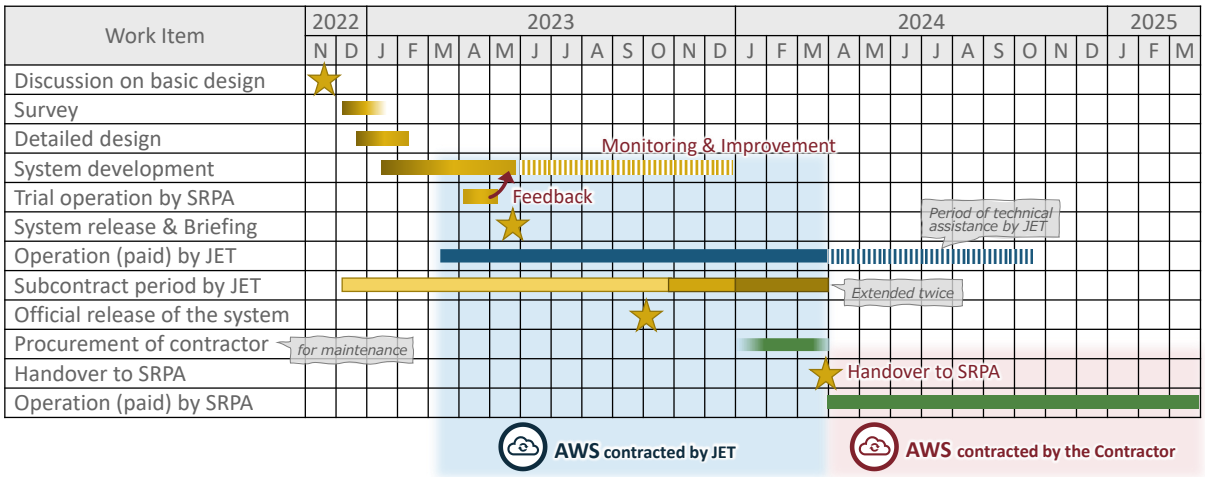
Figure 4.5.42: Outline of the Roles of the Implementation Players of the Government Internal Document Management Pilot Project

At the 2nd JCC meeting where this pilot project was agreed upon, the approximate costs were presented as follows. The subcontractor was procured for the scope of works envisaged in item 2) at approximately the amounts below.

- Capital expenditure: USD 21,000 (subcontract for establishing a system)
- Operating expenditure: USD 550/month (including cloud service fee)

4) Work Schedule

The work schedule for this pilot project is presented below. The subcontract period commenced in December 2022 and continued until March 2024, with two extensions based on SRPA's request. The system was eventually handed over to SRPA and began operation in April 2024, at SRPA's budget.



Source: Nippon Koei Co., Ltd.

Figure 4.5.43: Work Schedule of the Government Internal Document Management Pilot Project

5) Related Information

One issue related to the use of private cloud services is outlined in this section separately from the main activities. Ultimately, a private cloud service was adopted with the agreement of all parties involved. However, the various steps and challenges leading to this decision are detailed in Table 4.5.6.

Table 4.5.6: The Decision-Making Process for Adopting Cloud Servers

Month	Decision	Detailed Communications between MPTC, SRPA and the JICA Expert Team
Oct to Dec 2022	Tentative decision: Cloud	• The JICA Expert Team proposed selecting cloud servers and JCC members agreed to that. • After a comparative study, the detailed design was prepared based on the assumption that cloud servers would be used.
Mar 2023	Changed from Cloud to On-premises	• When requesting the use of national domain (gov.kh), MPTC notified SRPA and the JICA Expert Team to store data in Cambodia in accordance with Sub-decree. • Besides, MPTC offered to use MPTC's data center in Phnom Penh. • SRPA and the JICA Expert Team decided to change to the on-premises method.
May 2023	Changed from On-premises to Cloud	• The JICA Expert Team purchased two on-premises servers. • After that, MPTC allowed SRPA and the JICA Expert Team to use cloud services in view of their digital government policy.
Jun 2023	Changed from Cloud to On-premises	• Despite the MPTC's permission, SRPA and the JICA Expert Team agreed to on-premises method considering the already-procured servers and difficulties in cloud service contract. • SRPA and the JICA Expert Team applied for the use of MPTC's data center. However, MPTC refused it. Instead, MPTC recommended installing the servers in SRPA.
Jul 2023	Changed from On-premises to Cloud	• The JICA Expert Team surveyed the SRPA's server room, but could not recommend installing servers in SRPA from the viewpoints of issues related physical security, etc. • Instead, the JICA Expert Team suggested a cloud-included maintenance contract. SRPA agreed to this method and officially decided to use cloud servers for DTS.
Jun 2024	(use of on-premises servers)	• The JICA Expert Team decided to install the already-procured servers in SRPA and use them as backup servers for the DTS and the data platform system (pilot project No.8). • The two physical servers were installed in SRPA's CCTV control room.

Source: Nippon Koei Co., Ltd.

Currently, MPTC is developing a "Government Cloud" based on the "Cambodia Digital Government Policy 2022-2035". In the future, it is desirable to transfer the systems from the private cloud service server to the government cloud server.

(2) Activities and Outputs

1) Conducted Activities

i) Preparation and Discussion of the Basic Design

The draft basic design of the document tracking system was prepared by the JICA Expert Team in August 2022. Discussions were held twice to hear requests and feedback from SRPA on the draft basic design as follows. Through these discussions, the basic design was updated and finally used as the procurement document for selecting the subcontractor. Officers from AD, including PDO officers who will be the main users of the system, participated in the discussions.

a) Meeting on the Draft Basic Design on 29th August 2022

Main points of discussion are summarized below:

- AD should be responsible for user management of the system.
- Requests for system function include: displaying a detailed page for each document, creating summary reports for monitoring & evaluation, sending alerts when documents are stuck for several days, automatically updating offline inputs when communication resumes, displaying responses such as "done" to indicate completion of processing, key ward search for document titles, and registering receipt by document recipients. However, both sides agreed that not everything could be reflected due to the pilot project's schedule and budget constraints.
- From the explanation of the advantages and disadvantages of cloud and on-premises servers, it seems that cloud is more suitable for this system, but ultimately it is necessary to confirm with the SRPA upper management.

Source: Nippon Koei Co., Ltd.

Figure 4.5.44: Meeting on the Draft Basic Design (29th August 2022)

b) Meeting on the Updated Draft Basic Design on 18th November 2022

Main points of discussion are summarized below:

- SRPA made additional requests; to set CRUD (Create, Read, Update, Delete); and to limit the documents that can be viewed by each division and position to avoid a situation where all users can view all documents.
- It was agreed that the system will be transferred to SRPA, including the source code, with the possibility of SRPA outsourcing to another contractor in mind.
- Once a subcontractor is decided, the JICA Expert Team will introduce them to SRPA. An initial survey will be conducted prior to detailed design. The Director will be the contact person.
- The domain to be used will be "gov.kh". This will be applied for through the MPTC and can be obtained in around one month. SRPA will proceed with the procedures.

Source: Nippon Koei Co., Ltd.

Figure 4.5.45: Meeting on the Updated Draft Basic Design (18th November 2022)

ii) Additional Survey based on the Basic Design

Prior to the detailed design of the system, additional surveys were conducted to clarify the system development environment as well as the details of requests from SRPA.

a) Meeting with SRPA on 15th December 2022

Main points of discussion are summarized below:

- As for new account creation, there is no self-signup. AD can manage users in their division (create, update, delete). When creating a user, they will select a role for that user.
- The following features, which were not clearly mentioned in the basic design, will be included: update profile, change password, and two step authentication using email.
- In terms of the user roles, user account that can register a new document, update document status, pass the document, and receive the document, should be determined by AD based on the roles selected when creating a user account.
- A recording function for both incoming and outgoing to prevent a user passing document without receiver receives the document.

b) Comparative Study between Cloud and On-premises

When the basic design was prepared, cloud services were basically recommended for this pilot project from the viewpoint of time required for implementation. To finalize the selection of servers, a comparative study was conducted as presented in Table 4.5.7.

Table 4.5.7: Comparative Study between Cloud and On-premises

Viewpoint	Cloud Server	On-premises Server
Advantage	• Low development cost • Low maintenance cost • Easy to deploy application • Easy to scale up • Very high stability	• Data is stored inside Cambodia. • Servers is physically under our control.

Viewpoint	Cloud Server	On-premises Server
Disadvantage	• Data is stored in a data center outside Cambodia. * Location of the cloud service's data center is unknown.	• High development cost • High operation cost • Require IT support team to maintain the servers 24/7. • Scaling is not easy.

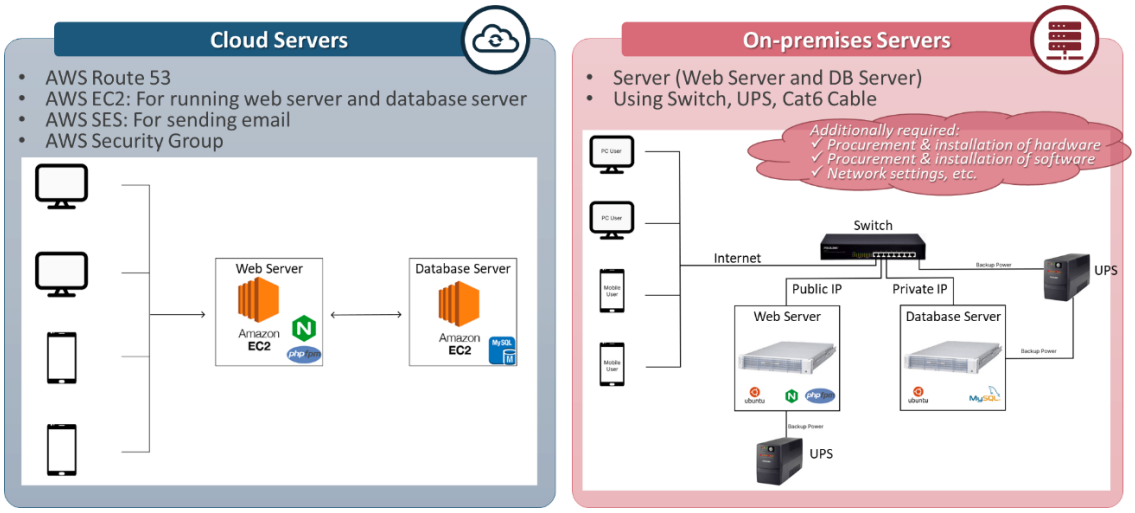
Source: Nippon Koei Co., Ltd.

Based on the above study, it was confirmed that cloud servers are more suitable than on-premises servers for this pilot project. However, before cloud servers were selected finally, further discussions were conducted as described in the clause "(1)5) Related Information".

iii) Detailed Design, Development, and Installation of the System

a) Detailed Design of the System

From the above considerations, a detailed design was prepared by the subcontractor and compiled into the design documents, which are part of the outputs of subcontract works. Regarding the system configuration, both a cloud server case and an on-premises server case were considered as presented in Figure 4.5.46. In the end, the system configuration on the left side was adopted.



Source: Nippon Koei Co., Ltd.

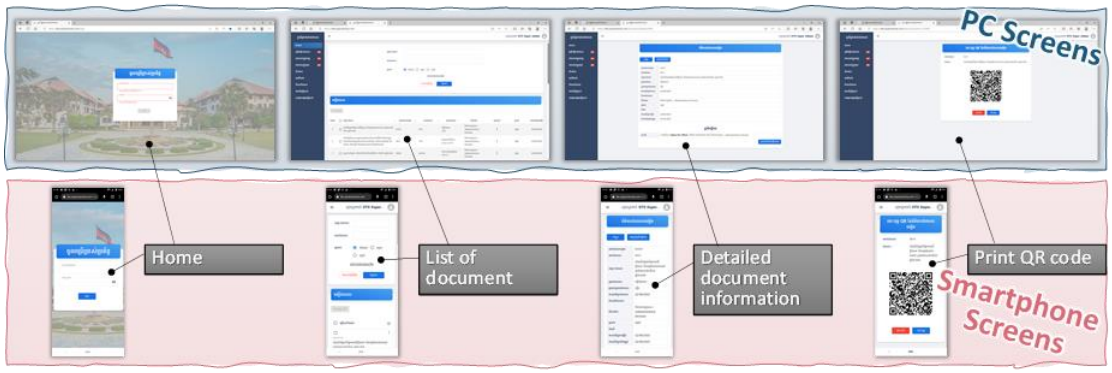
Figure 4.5.46: System Configuration Considered for Both Cases

b) Development of the System

The initial version of the document tracking system was developed in end-February 2023 based on the above-mentioned detailed design. Following the development, the subcontractor performed the system tests including integration tests and comprehensive tests in the development environment by using computers (Windows and Mac) and smartphones. The total number of test items was 279. All the test items were finally passed.

c) Installation of the System

The system developed as described above was installed on the cloud server in mid-March 2023. AWS was selected as a cloud service after a comprehensive evaluation of its functionality, cost, market share, adoption experiences, ease of development, available regions, etc.



Source: Nippon Koei Co., Ltd.

Figure 4.5.47: Image of the Screens of the Document Tracking System

d) Preparation of Relevant Documents

The following documents were prepared in relation to the system development.

Table 4.5.8: Documents Prepared for Document Tracking System Development

Work Outputs	Document Name	Version
1. Detailed design report	Siem Reap-DTS-Screen-And-Functional-Design-v1.1.0.docx	1.1.0
	Siem Reap-DTS-Database-Structure-v1.0.0.docx	1.0.0
	Siem Reap-DTS-Website and Server components-v1.2.0.docx	1.2.0
2. System test result report	Siemreap_dts_Testcase20230405.xlsx	1.0.0
3. System operation manual	Siem Reap-DTS-User-Manual-English-v1.1.0.docx	1.1.0
	Siem Reap-DTS-User-Manual-Khmer-v1.1.0.docx	1.1.0
4. System installation manual	Siem Reap-DTS- Installation Manual-v1.1.0.docx	1.1.0
5. Periodic maintenance manual	Siem Reap-DTS-Periodic maintenance manual-v1.1.0.docx	1.1.0

Source: Nippon Koei Co., Ltd.

iv) Explanation in Usage Briefing Sessions

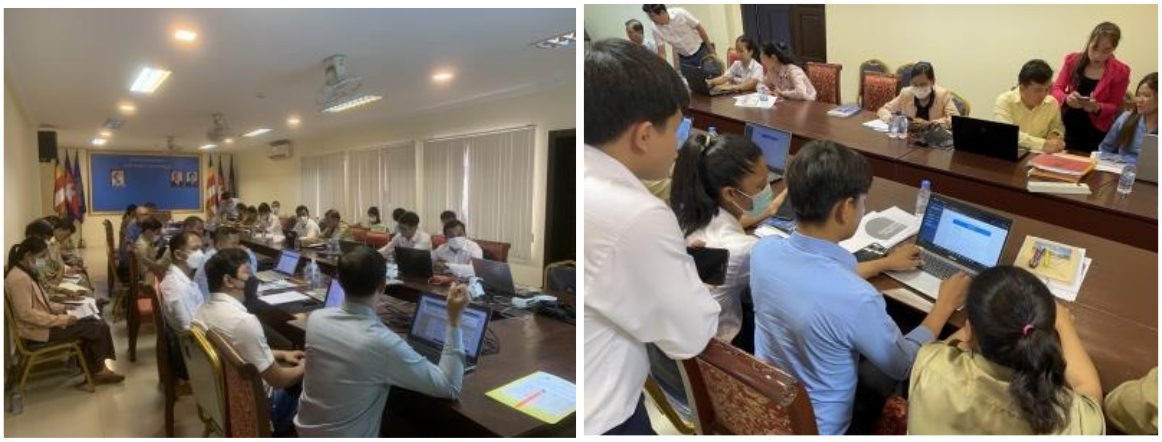
When the system was launched, system usage briefing sessions were held for expected users of SRPA. Initially, only one session was planned, but in response to requests from SRPA, the sessions were held three times, as summarized in Table 4.5.9 below.

Table 4.5.9: Briefing Sessions Held for System Usage

Date & Time	Method	Major Purposes
7th April 2023, 14:30-16:30	Zoom meeting	To explain the purposes of the document tracking system and how to use the trial version of the system prior to trail operation to be conducted in April 2023
26th April 2023, 8:30-10:00	Zoom meeting	To explain the system overview to the SRPA executives and discuss the operation and maintenance plan after the handover
15th May 2023, 8:30-16:30	Face to face meeting	To introduce the developed system and to conduct system operation exercise for the expected users at a practical level

Source: Nippon Koei Co., Ltd.

System improvements were made based on feedback received from SRPA through the briefing sessions as well as actual use during the trial operation period.



Source: Nippon Koei Co., Ltd.

Figure 4.5.48: Briefing Session of Document Tracking System Usage (15th May 2023)

v) Operation and Maintenance of the Installed System

The document tracking system was officially released on 1st October 2023 based on the SRPA's official notification by the Governor dated 11th July 2023.

The operation and maintenance work during the pilot project period continued by the JICA Expert Team and the subcontractor until the system was transferred to SRPA on 1st April 2024. The operation and maintenance work included ensuring daily system operations, performing periodic maintenance, and responding to inquiries from system users.

vi) System Improvement

In November 2023, SRPA raised nine challenges faced during the usage of DTS. After discussion, SRPA and the JICA Expert Team agreed that the status of four challenges are solved immediately, the status of three challenges are to be improved by additional system development, and two challenges are to be further discussed in SRPA or to be solved in the future. For the three challenges that were deemed to require improvement - displaying character limit, QR code printing function, and report creation function - system improvements were made by February 2024.

vii) System Transfer from the JICA Expert Team to SRPA

The operation and maintenance of the Document Tracking System was handed over from the JICA Expert Team to SRPA on 1st April 2024. Prior to the timing of the handover, SRPA procured a maintenance contractor. The JICA Expert Team provided technical assistance of the procurement process of the maintenance contractor, including providing a draft scope of works of the maintenance contractor as follows.

2) Key Outputs and Achievements

Through the implementation of this pilot project, the following key outputs have been achieved:

a) System and Functionality Output

The key output related to system and functionality is to develop and deploy the system. This has been achieved as DTS was developed and officially launched within SRPA. Approximately 100 SRPA staff have registered as users, with 80 to 100 documents being registered daily.

b) Capacity Strengthening Output

The key output related to capacity strengthening is the understanding of how to use the system by the staff responsible, and this has been achieved. All 5 PDO officers demonstrated at least a 3 out of 4 level of understanding for each document viewing, new document registration, and status update. The daily registration of new documents and the regular updates of the status of circulating documents are observed in the system, and this demonstrates that the staff users have a sufficient understanding of how to use the system.

c) Urban Issues Solution Output

The key output related to addressing urban challenges is the improvement observed before and after the system's implementation. These improvements have been confirmed through interviews within SRPA's three divisions, showing positive impacts in the five areas as presented in Table 4.5.10 below.

Table 4.5.10: Improvements Before and After DTS Implementation

Improvement Area	Before Implementation	After Implementation
1. Accelerated Approval Processes	The PDO staff and approvers handled documents sequentially as they arrived, without knowing when and what documents were scheduled.	The PDO staff can now efficiently manage approval requests by bundling them, as they have visibility on the number of documents arriving within the day. As for the impressions of PDO staffs, approval process time has reduced by 50%~75% after the system implementation. Approvers can also prioritize their schedules based on the importance of the documents, leading to a faster approval process.
2. Quick Access to Document Information	Document information was searched through paper-based lists (handwritten) held by each division, sometimes taking more than one business day.	Information can now be accessed via a web-based system, with searches in the DTS taking just a few minutes.
3. Quick Verification of Document Location	Verifying the location required consulting paper-based lists to identify the responsible division and then contacting the person in charge individually, taking 1-2 business days.	Location verification can now be completed within minutes through the system.
4. Elimination of Document Loss	Temporary loss of documents occurred about five times per year.	No document loss has been reported since the implementation of DTS.

Improvement Area	Before Implementation	After Implementation
5. Improved Information Security in Document Management	Paper-based lists and Google Spreadsheets were used.	DTS was designed with security measures such as access control and data backup protocols in mind.

Source: Nippon Koei Co., Ltd.

3) Lessons Learnt and Way Forward

Lessons learnt are summarized as follows:

- System transfers often occur at the end of a project, making it difficult to monitor proper operations afterward. In this case, by transferring the system to SRPA during the project, we were able to observe and ensure that SRPA successfully initiated operations on their own.
- During development, we conducted a trial operation to gather feedback for system improvements, but few suggestions were received. After the system was transferred to SRPA and daily operations began, improvement requests emerged. To gather meaningful feedback from users unfamiliar with the system usage, it's essential for them to engage with it hands-on and use it extensively.

Challenges and recommendations for the future are outlined below:

- The current system is only being used by a limited number of divisions. For maximum impact, it is desirable for all divisions within SRPA to utilize the system.
- As the user base expands and the range of documents handled increases, requests for functional enhancements may arise. Additionally, incorporating new technologies could further advance the system. It's important to regularly review the need for system improvements, secure appropriate budgets, and continuously work towards making the system more user-friendly.
- For the first year after the transfer, the JICA Expert Team’s support ensured smooth maintenance services. Moving forward, SRPA needs to ensure smooth budgeting processes to secure funds and then efficiently procure and renew maintenance contracts annually.

4.5.6 Pilot Project (5): Environment Monitoring

(1) Outline

1) Background and Objectives

The air quality of Siem Reap was not continuously monitored, and the potential harm to human health and the conditions of the Angkor ruins were not assessed. The pilot project aims to introduce continuous air quality monitoring in Angkor Heritage site, for the public sector and the academic sector to assess the situation.

2) Scope of Works

In this pilot project, a continuous air quality monitoring sensor is installed in Siem Reap. The data is to be transmitted to various databases and dashboards, including SSDaP.

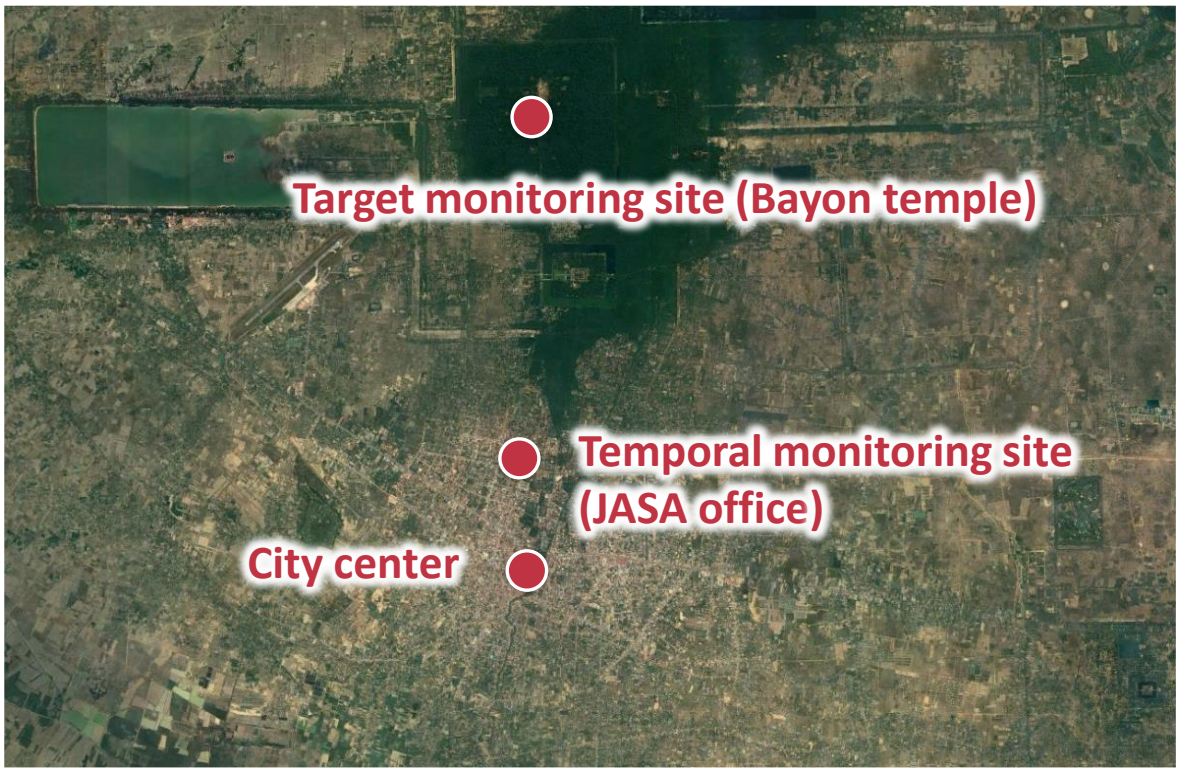
The sensor is "GBiot", manufactured by Green Blue Corporation. The sensor is to be run by electricity supplied by solar generators.

Table 4.5.11: Specifications of GBiot

Items	Specifications
Power Requirements	100/200VAC (for overseas use), 12VDC (for solar operation)
Power Consumption	7W ~ 10W (stationary state)
Data Communication	Wi-Fi (2.4GHz 802.11 b/g/n) (LPWA as an option)
Data Frequency	1 minute
Preferred Installation Environment	Temperature: 0 ~ 40℃, humidity: 15 ~ 90%
Measurement Range of SO_2	0 ~ 1000ppb
Measurement Range of CO	0 ~ 20ppm
Measurement Range of O_3	0 ~ 500ppb
Measurement Range of PM	0 ~ 500μg/m^2
Measurement Range of NO_2	0 ~ 250ppb
Weather Sensor	Temperature, humidity, pressure, wind direction, wind speed, rainfall, solar radiation, etc.
Sensor Endurance	1 ~ 3 years (depending on the type of sensor and frequency of use)

Source: Nippon Koei Co., Ltd. based on information from Green Blue Corporation

The equipment is to be installed near Bayon temple, but subject to preliminary installation in other areas of Siem Reap.

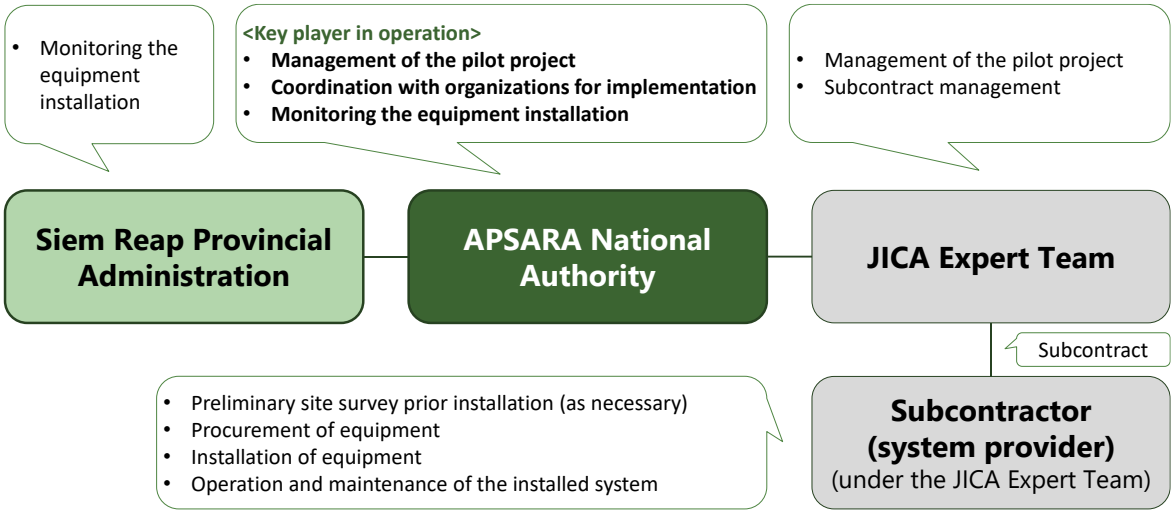


Source: Nippon Koei Co., Ltd. (aerial photography from Google Earth)

Figure 4.5.49: Installation Location of GBiot-FH3

3) Implementation Structure and Inputs

The implementation structure of this pilot project is shown below. Waseda University was selected as the subcontractor. The cost excluding personnel expenses of the JICA Expert Team was roughly around USD 15,000.

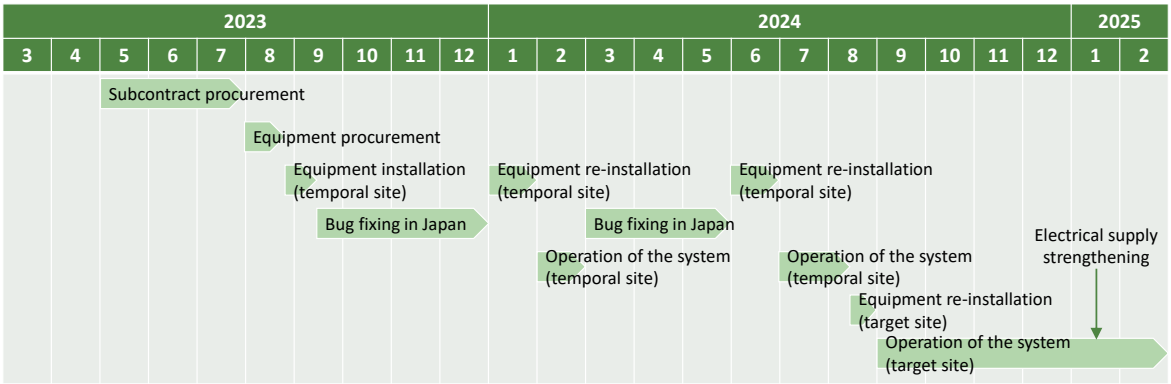


Source: Nippon Koei Co., Ltd.

Figure 4.5.50: Implementation Structure of Pilot Project (5)

4) Work Schedule

Below shows the work schedule of this pilot project.



Source: Nippon Koei Co., Ltd.

Figure 4.5.51: Implementation Schedule of Pilot Project (5)

5) Related Information

Waseda University has been continuously supporting the preservation and conservation of the Angkor ruins since 1994, dispatching members of the "Japanese Government Team for Safeguarding Angkor" (hereinafter referred to as "JSA") and "JSA and APSARA Safeguarding Angkor" (hereinafter referred to as "JASA").

(2) Activities and Outputs

1) Conducted Activities

i) Preliminary Installation and Bug Fixing

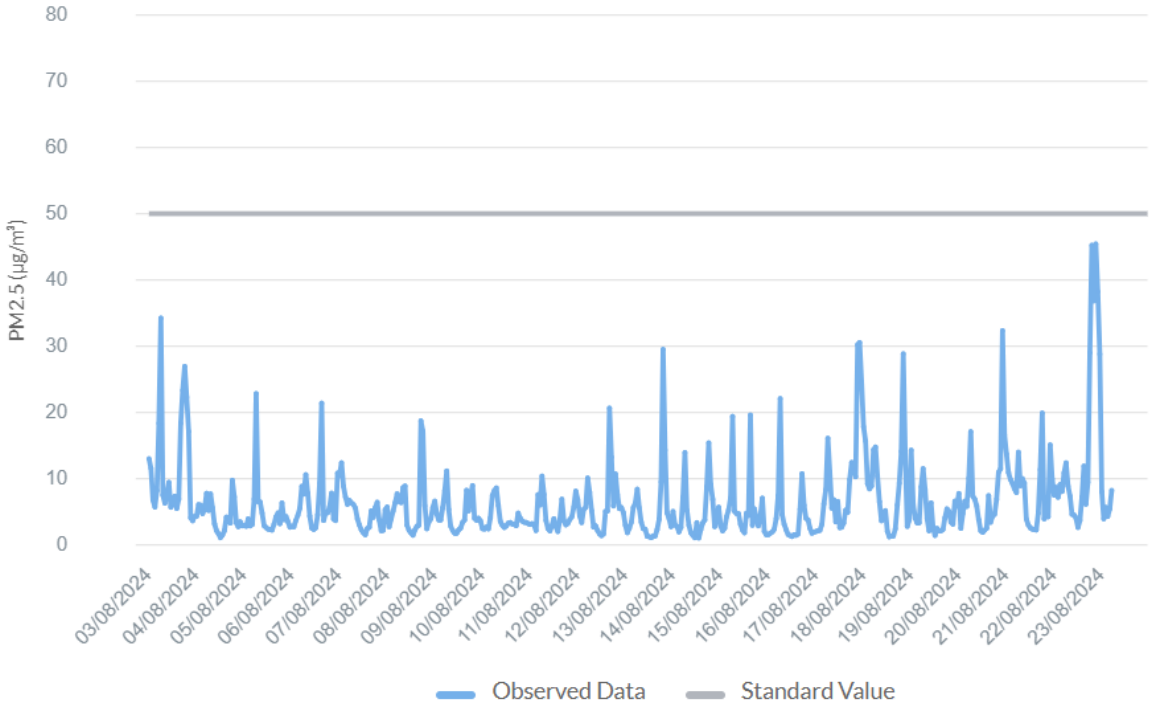
The initial preliminary installation was conducted in August 2023 at the roof of JASA office in Siem Reap. However, several problems were found during the preliminary installation period, including but not limited to the following:

- Telecommunication between the sensor and the server
- Power transmission from the battery to the sensor
- Data bugs due to lack of memory in the microcomputer built in the sensor
- Bugs on the internal clock of the microcomputer built in the sensor

Therefore, the subcontractor brought back the sensor several times to Japan, and the manufacturer of the sensor conducted bug fixing and the proof of concept of fixed features.

Source: Nippon Koei Co., Ltd.

Figure 4.5.52: Installation Works in the Preliminary Installation Site

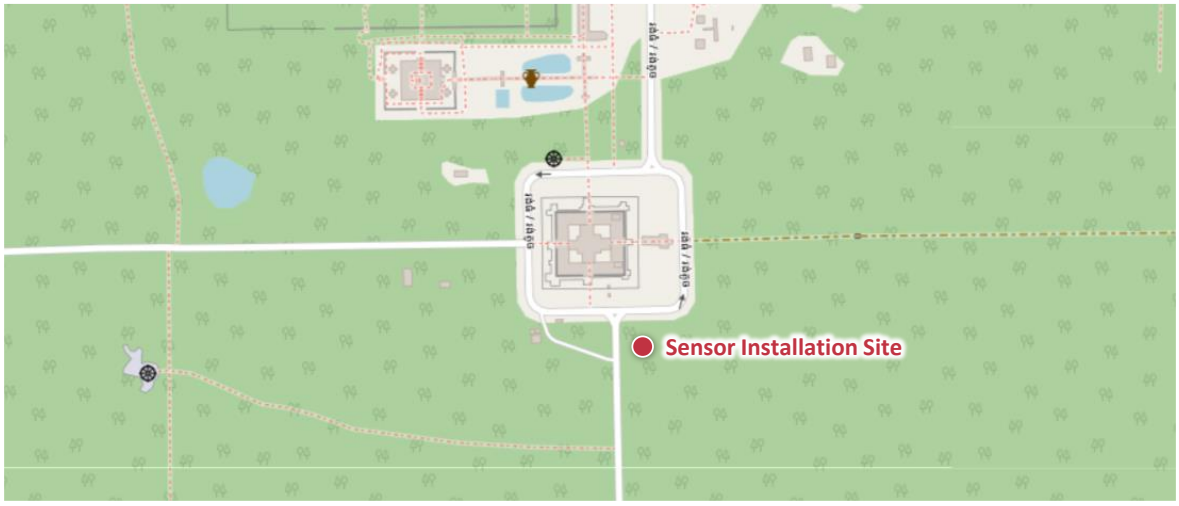


Source: Nippon Koei Co., Ltd.

Figure 4.5.53: PM2.5 Monitoring Results during the Preliminary Installation

ii) Installation at Bayon Site

After confirming the stable monitoring status in the preliminary installation condition, in August 2024, the subcontractor moved the sensor to the monitoring site (near Bayon temple).



Source: Nippon Koei Co., Ltd.

Figure 4.5.54: Detailed Location of the Installation Site

Source: Nippon Koei Co., Ltd.

Figure 4.5.55: Installation Works in the Installation Site (August 2024)

Source: Nippon Koei Co., Ltd.

Figure 4.5.56: Installed Sensor (August 2024)

iii) Electricity Supply Strengthening Works

After the installation in August 2024, the electricity supply to the sensor became unstable. Therefore, in January 2025, works to strengthen the electricity supply to the sensor was conducted.

Source: Nippon Koei Co., Ltd.

Figure 4.5.57: Electricity Supply Strengthening Works in the Installation Site (January 2025)

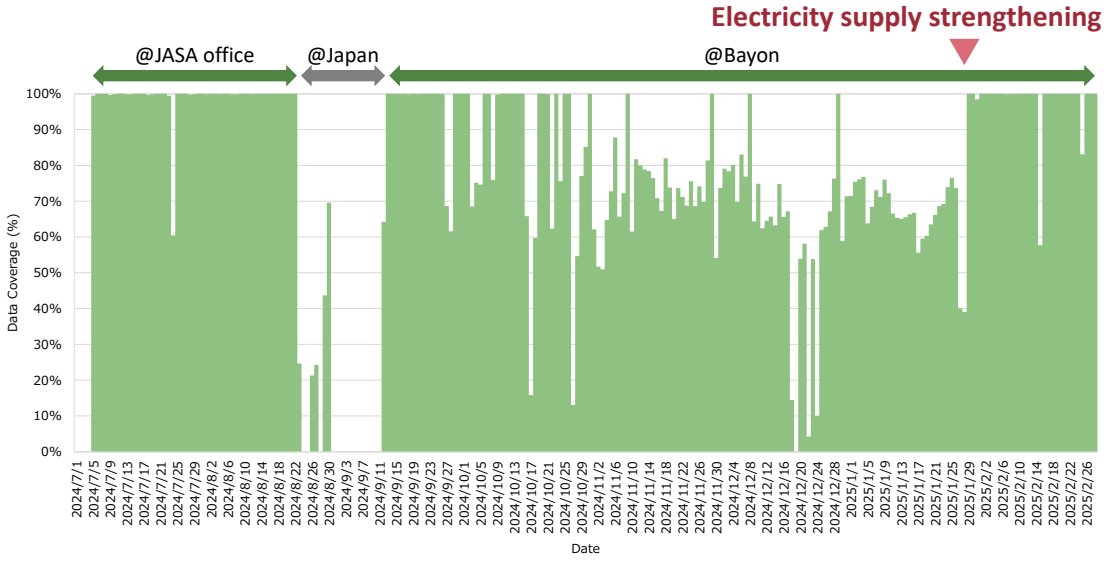
Source: Nippon Koei Co., Ltd.

Figure 4.5.58: Installed Sensor (January 2025)

2) Key Outputs and Achievements

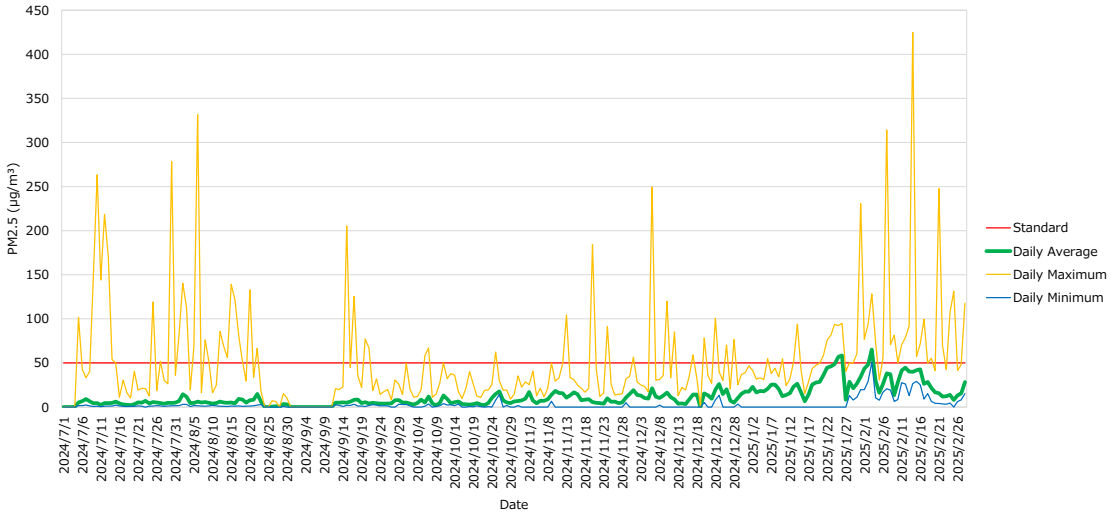
a) System and Functionality Output

The installation of the sensor to the Bayon site is completed, and the system to monitor the urban environment is established. Below shows the data coverage ratio per day and the observation result of PM 2.5, O_3, and NO_2.



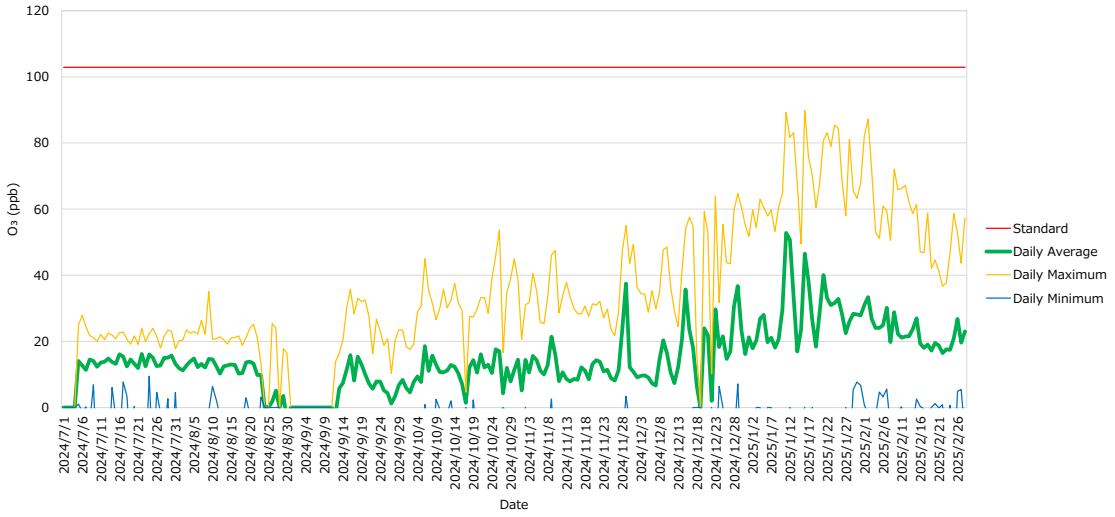
Source: Nippon Koei Co., Ltd.

Figure 4.5.59: Data Coverage Ratio (July 2024 ~ February 2025)



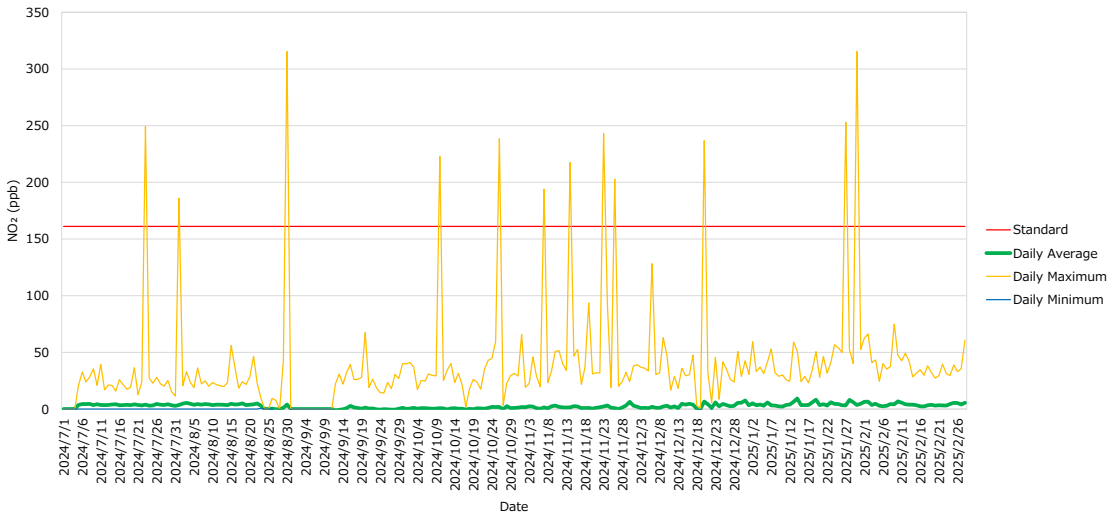
Source: Nippon Koei Co., Ltd.

Figure 4.5.60: PM 2.5 Observation Result (July 2024 ~ February 2025)



Source: Nippon Koei Co., Ltd.

Figure 4.5.61: O_3 Observation Result (July 2024 ~ February 2025)



Source: Nippon Koei Co., Ltd.

Figure 4.5.62: NO_2 Observation Result (July 2024 ~ February 2025)

Data coverage was relatively stable in July and August, when the sensor was installed in the temporary installation site, with the electricity supplied via sockets of JASA office. The data coverage became unstable from September, after moving the sensor to the target installation site, due to the lack of electricity supply from the solar panel and batteries. After the electricity supply strengthening work in late January, the data coverage became stable again.

The daily average of observed concentration for PM 2.5, O3, and NO2 is consistently below the national standard set by the Ministry of Environment, except for PM 2.5 in late January, when the inflation of the observed concentration was significantly high not only in Siem Reap buy throughout the Indochine Peninsula.

b) Capacity Strengthening Output

The basic functions of the system are understood by officers of APSARA National Authority, through joint initiatives to implement the system. It was confirmed that Deputy Director of Department of Water, Forestry, and Infrastructure Management of APSARA National Authority who involved in this pilot project understand the system well (responded with a 4 out of 5 in the survey).

c) Urban Issues Solution Output

Through this pilot project, the basis for addressing environmental issues with a quantitative analysis is established through a joint initiative of the public sector (APSARA National Authority) and the academic sector (Waseda University), contributing to the solution of urban issue No. 18 “Needs for enforcement of the public initiative” in the environmental sector, stipulated in the Siem Reap Smart City Roadmap.

Also, Deputy Director of Department of Water, Forestry, and Infrastructure Management of APSARA National Authority described the highest response, 5 out of 5, to the following topics: "Satisfaction about the current system", "Usefulness of the system", and "To what extent do you anticipate the system being installed in other areas".

3) Lessons Learnt and Way Forward

During the implementation of the sensor in Siem Reap, many technical problems were found, all of which were not found during previous installment of the same type of sensor in other countries, such as Japan, Vietnam, and Myanmar. These problems are seen to be particular to the environment in Cambodia. As a lesson learnt in this pilot project, it can be said that even if a certain system has experience of successful installation in similar environments in neighboring countries, problems unique to the Cambodian environment may happen, so schedules taking this risk in account is necessary when implementing systems that has not been implemented in Cambodia in the past.

4.5.7 Pilot Project (6): Public Private Tourism Collaboration

(1) Outline

1) Background and Objectives

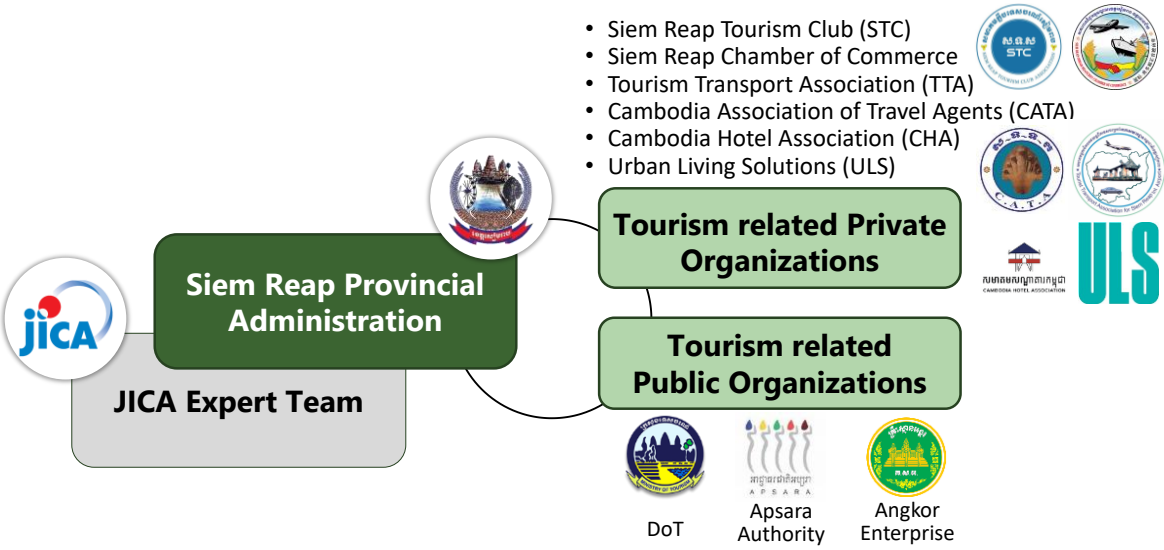
Discussion platforms for activities which require cooperation between the public and the private sectors were not developed, causing little collaboration between the public and private sectors. The pilot project aimed to establish occasions for discussions for cooperation between the public and private sectors in tourism sector for collaboration.

2) Scope of Works

In this pilot project, an opportunity for the public sector related to tourism and the private sector related to tourism to have discussions to share their views on tourism development in Siem Reap was organized.

3) Implementation Structure and Inputs

The implementation structure of this pilot project is shown below.



Source: Nippon Koei Co., Ltd.

Figure 4.5.63: Implementation Structure of Pilot Project (6)

4) Work Schedule

The meeting for the public-private tourism collaboration in Siem Reap was held on 7th March 2023.

(2) Activities and Outputs

1) Conducted Activities

Below shows the outline of the meeting held on 7th March 2023.

Table 4.5.12: Information of the Public-Private Tourism Collaboration Meeting

Date/Time	7th March, 2023 9:00 ~ 11:00
Venue	Meeting Room in Siem Reap Provincial Hall
Chairperson	Deputy Governor (H.E. Mr. Yun Linne)
Attendees	Private sector: 10 participants • Tourist Transportation Association of Siem Reap International Airport • Siem Reap Tourism Club • Cambodian Association of Travel Agents • Siem Reap Provincial Chamber of Commerce • Sofitel • Urban Living Solutions Public sector: 12 participants • SRPA • APSARA National Authority • DoT • Angkor Enterprise • JICA Expert Team
Discussion Points	• Introduction of smart city roadmap by SRPA (including key points in the tourism sector) • Introduction of activities by private sector related to smart tourism • Discussion for future collaboration

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd., SRPA

Figure 4.5.64: The Public-Private Tourism Collaboration Meeting

2) Key Outputs and Achievements

a) System and Functionality Output

A channel for future collaboration between the public and private in the tourism sector was established.

b) Capacity Strengthening Output

The importance of public-private collaboration is understood by SRPA, which led to the initiatives to establish the Consortium.

c) Urban Issues Solution Output

Based on the knowledge gained through this pilot project, an industry-academia-government collaboration system (the Consortium) was established, leading to industry-academia-government collaboration in solving urban issues, contributing to the solution of urban issue No. 3 “Needs for an organizational basis for multi-stakeholder collaboration”, stipulated in the Siem Reap Smart City Roadmap.

3) Lessons Learnt and Way Forward

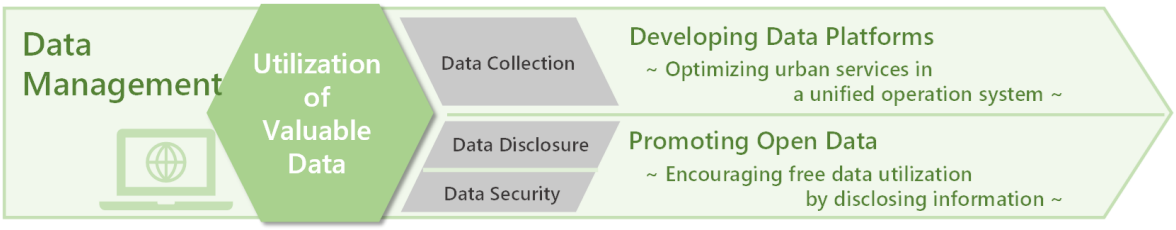
The channel for discussion between the public and private sectors was utilized in the formulation of the Consortium. The platform of discussion was successfully inherited by the Consortium.

4.5.8 Pilot Project (8): Data Platform System Development

(1) Outline

1) Background and Objectives

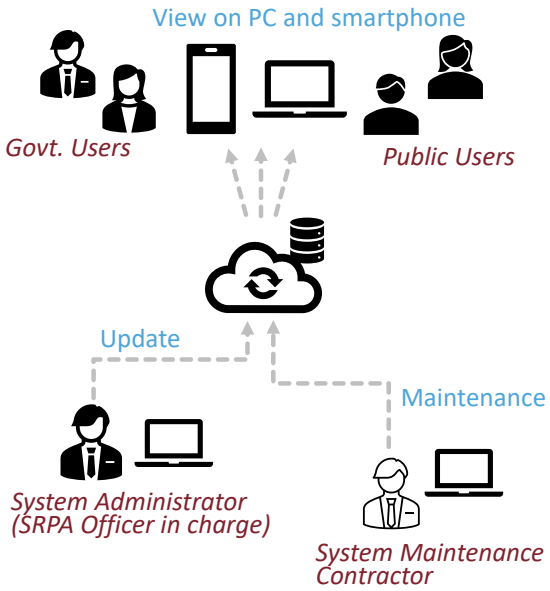
In the Siem Reap Smart City Roadmap, the basic approach for data management was set as "utilization of valuable data". The two main directions of measures presented by the roadmap were "developing data platforms" and "promoting open data" as shown in Figure 4.5.65 below.



Source: Siem Reap Smart City Roadmap

Figure 4.5.65: Basic Approach for Data Management in SRSC-Roadmap

The objective of the Data Platform System Development Pilot Project is to collect data across sectors and to share the accumulated data with multiple stakeholders. The features of the system are summarized in Figure 4.5.66 below. Public users and government users view information with or without login. Public users and government users shall be able to access different types of data. The system administrator update data periodically by uploading files. System maintenance contractor supports the update work.



Source: Nippon Koei Co., Ltd.

Figure 4.5.66: Outline of the Siem Reap Smart City Data Platform System

2) Scope of Works

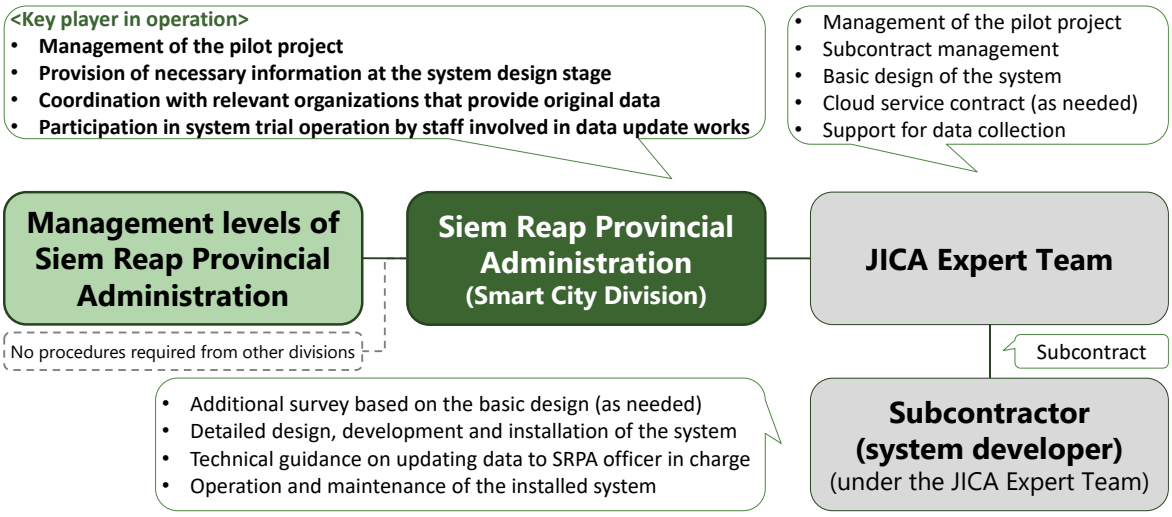
The scope of works covers the following items:

- Preparation of the basic design
- Preparatory works including review of the basic design
- Detailed design, development, and installation of the system
- Explanation in usage briefing sessions
- Operation and maintenance of the installed system

The system development work was sublet to a subcontractor. Thus, the above-mentioned first item and the other items were performed by the JICA Expert Team and the subcontractor, respectively.

3) Implementation Structure and Inputs

The outline of the roles of implementation players of this pilot project is shown below. After a QCBS process by the JICA Expert Team, Beniten Co., Ltd. was selected as the subcontractor of this pilot project. The subcontractor's scope of works is as described in item 2) above.



Source: Nippon Koei Co., Ltd.

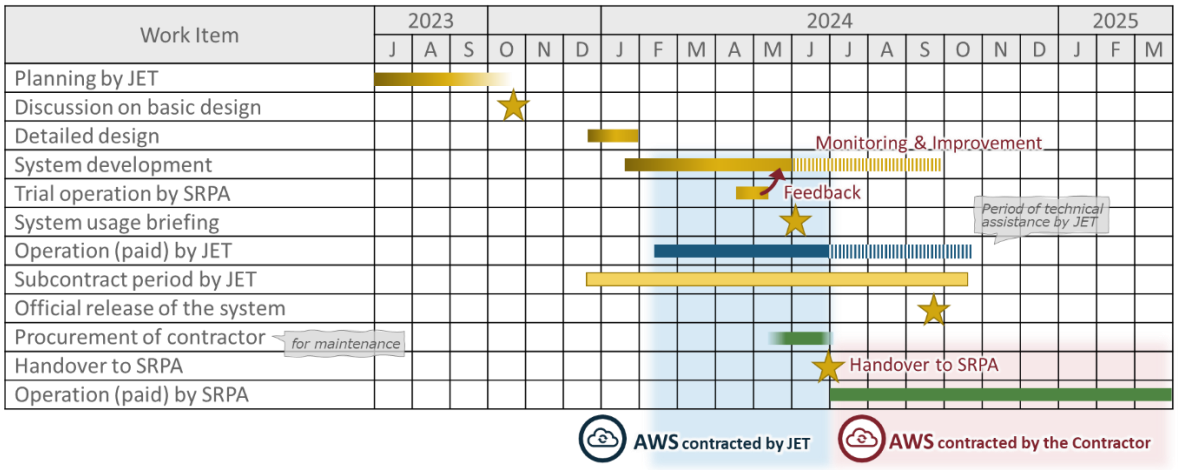
Figure 4.5.67: Outline of the Roles of the Implementation Players of the Data Platform System Development Pilot Project

At the 4th JCC meeting where this pilot project was agreed upon, the approximate costs were presented as follows. The subcontractor was procured for the scope of works envisaged in item 2) at approximately the amounts below.

- Capital expenditure: USD 29,000 (subcontract for establishing a system)
- Operating expenditure: USD 1,000/month (including cloud service fee and data update support)

4) Work Schedule

The work schedule for this pilot project is presented below. The subcontract period commenced in December 2023 and continued until October 2024. Although the JICA Expert Team and the subcontractor continued system improvements until September 2024, the system was officially handed over to SRPA in July 2024 and began operations under SRPA's budget. This early transfer aimed to foster SRPA's ownership of the system and allowed monitoring of whether SRPA could smoothly initiate operations during the project's implementation.



Source: Nippon Koei Co., Ltd.

Figure 4.5.68: Work Schedule of the Data Platform System Development Pilot Project

5) Related Information

In the graph display for air quality monitoring, it was decided to show the environmental standards. However, there were some concerns regarding the evaluation of these standards, as outlined below. To address these issues, explanatory notes were added alongside the graph to help users interpret the data appropriately:

- SSDaP automatically receives data at 1-minute intervals and displays it without any outlier removal or correction processing, which means that there may occasionally be abnormal values included.
- When determining compliance with environmental standards, it is necessary to evaluate the 24-hour average or 1-hour average for each parameter. However, SSDaP monitors air quality data at 1-minute intervals and displays the graph using this minute-level data, which does not fully align with the proper evaluation rules for environmental standards.
- Since the units of the monitored results differ from those of the environmental standards, a conversion was made assuming constant temperature and pressure values, and the converted data is displayed in the graph for comparison.

(2) Activities and Outputs

1) Conducted Activities

i) Preparation and Discussion of the Basic Design

The draft basic design of the Siem Reap Smart City Data Platform system was prepared by the JICA Expert Team in October 2023. A TWG for this pilot project was formed, including DoT and DPWT providing the original data, DPTC specializing in information and communication technology, and relevant divisions within SRPA. The TWG held a meeting on 19th October 2023 to discuss the basic design. Through the discussions, the basic design was updated and finally used as the procurement document for selecting the subcontractor.

The key points discussed in the above TWG meeting are summarized below:

- Considering the system transfer to SRPA, it is believed that there is a shortage of IT personnel within SRPA. A technology transfer covering operation & maintenance will be required.
- For internal reporting, it would be beneficial for admin users to be able to monitor system usage, such as accessing the system, frequently viewed screens, and data download.
- The official name of the system will be “Siem Reap Smart City Data Platform”, with the nickname “SSDaP”, pronounced “Esdap”.
- The system should allow data viewing on smartphones, with the expectation that detailed data viewing and downloading will primarily be done on PCs.
- The types of data to be handled by the system were agreed upon as proposed by the JICA Expert Team.
- The CCTV images will not be disclosed on the system, but their locations can be disclosed.
- Some items within the treated water quality data are sensitive, and further consideration will be needed to determine whether those items can be disclosed.

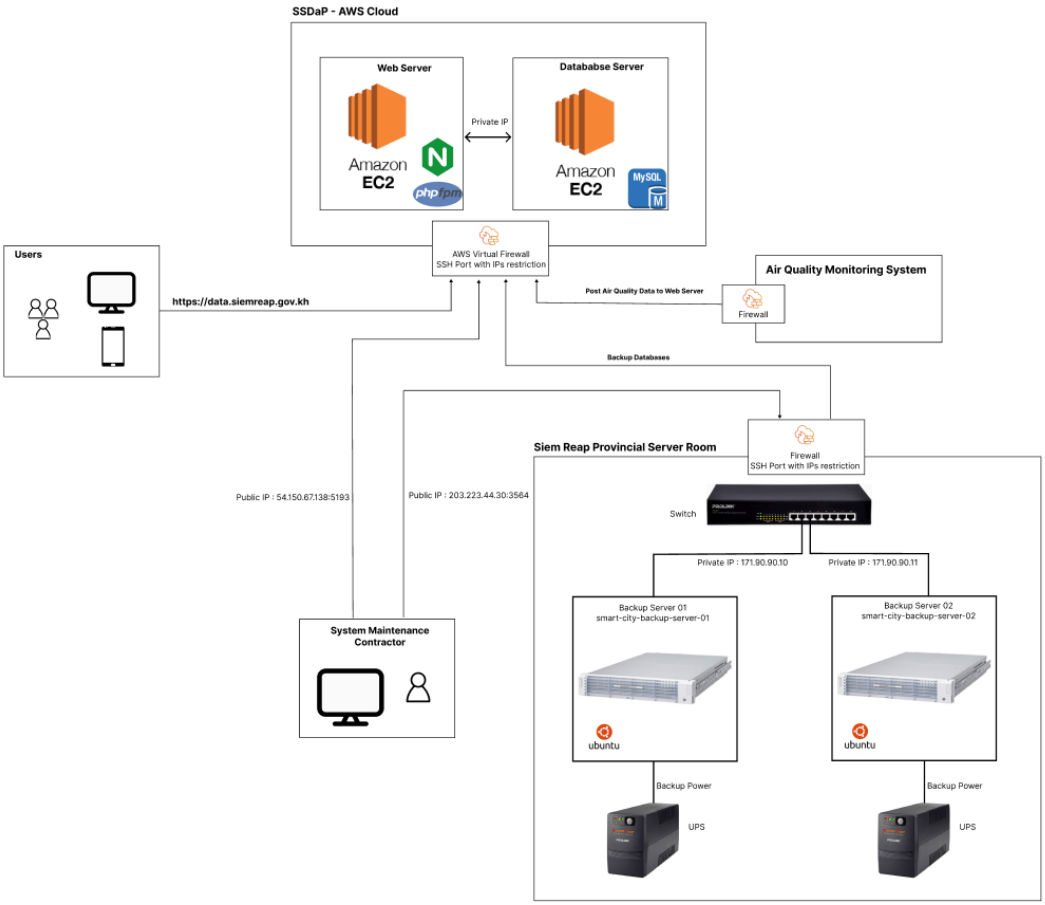
Source: Nippon Koei Co., Ltd.

Figure 4.5.69: Meeting on the Draft Basic Design (19th October 2023)

ii) Detailed Design, Development, and Installation of the System

a) Detailed Design of the System

From the above considerations, a detailed design was prepared by the subcontractor and compiled into the design documents, which are part of the outputs of subcontract works. The system configuration was considered as shown in Figure 4.5.70.



Source: Siem Reap Smart City Data Platform Detailed Design Report

Figure 4.5.70: System Configuration for SSDaP

b) Development of the System

The initial version of SSDaP was developed in early-April 2024 based on the above-mentioned detailed design. Following the development, the subcontractor performed the system tests including integration tests and comprehensive tests in the development environment by using computers (Windows and Mac) and smartphones. The total number of test items was 466. All the test items were finally passed.

c) Installation of the System

The system developed as described above was installed on the cloud server in mid-April 2024. AWS was selected as a cloud service, following the example of document tracking systems.

d) Preparation of Relevant Documents

As of September 2024, the following documents have been prepared in relation to the system development. They were finalized by the end of October 2024.

Table 4.5.13: Documents Prepared for SSDaP

Work Outputs	Document Name	Version
1. Detailed design report	1. SSDaP - Detailed design report-v1.0.0.docx	1.0.0
	1. SSDaP - Detailed design report - Functional_Design-v1.0.0.docx	1.0.0
	1. SSDaP - Detailed design report - Database_Structure-v1.0.0.docx	1.0.0
2. On-premise server installation report	2. SSDaP - On-premise server installation report-v1.0.1.docx	1.0.1
3. System test result report	3. SSDaP - System Test Result Report.xlsx	---
4. System operation manual	4. SSDaP - System operation manual English-v1.0.0.docx	1.0.0
	4. SSDaP - System operation manual Khmer-v1.0.0.docx	1.0.0
5. System installation manual	5. SSDaP - System installation manual-v1.0.0.docx	1.0.0
6. Periodic maintenance manual	6. SSDaP - Periodic maintenance manual-v1.0.1.docx	1.0.1

Source: Nippon Koei Co., Ltd.

iii) Explanation in Usage Briefing Sessions

After the system was internally released to TWG members, a system usage briefing session was held on 4th June 2024. During the session, Beniten staff provided explanations on various topics using the above system operation manual, including how to navigate each content area, how DoT and DPWT staff can upload data, how SRPA staff can manage user registration and so forth.

Source: Nippon Koei Co., Ltd.

Figure 4.5.71: Briefing Session of SSDaP Usage (4th June 2024)

iv) System Transfer from the JICA Expert Team to SRPA

As described in the clause "(1)4) Work Schedule", operation of the system was handed over to SRPA on 1st July 2024, before the pilot project was completed. Prior to the timing of the handover, SRPA

procured a maintenance contractor. The JICA Expert Team provided technical assistance for the procurement process of the maintenance contractor.

The JICA Expert Team also supported SRPA's operation so that the system operation would start smoothly after the handover. In particular, the JICA Expert Team encouraged SRPA to coordinate with DoT and DPWT when data updates were not being made appropriately. In addition, the JICA Expert Team provided advice on when to obtain support from the maintenance contractor.

v) Operation and Maintenance of the Installed System

Since the contract with the subcontractor for maintenance started on 1st July 2024, the operation and maintenance works were transferred to SRPA from 1st July. The operation and maintenance work included ensuring daily system operations, performing periodic maintenance, responding to inquiries from system users, and data update support.

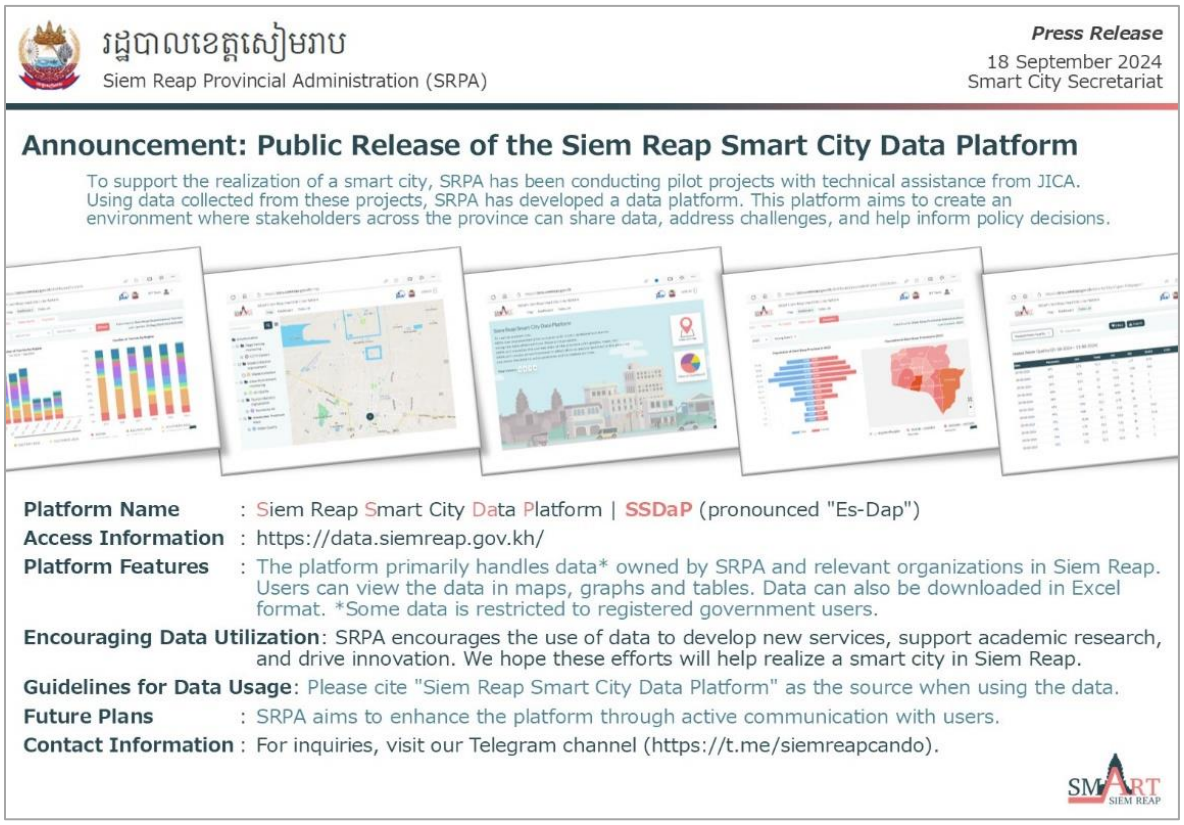
vi) System Improvement

After the system handover, new data started to be registered, and issues that had not been apparent during the testing phase surfaced. Additionally, as the system was operated, the need for system improvements, such as adding new features and improving screen displays, became evident. Therefore, before the public release, system improvements were implemented. The main improvements are as follows:

- Addition of a new "Role" menu: This feature allows system administrators to set user permissions for the publication or restriction of each piece of information.
- Changes in data processing and display: For the air quality monitoring data, which is received on a minute-by-minute basis, we modified the data processing and display methods, taking into account the limitations of observation accuracy.
- Addition of an inquiry form function: Prior to the release to the public, a simple inquiry form or contact information was added so that public users can contact us regarding system malfunction reports, data provision, data usage, etc.

vii) Public Release Announcement

SSDaP was officially launched to the public on 18th September 2024. In conjunction with the release, the press release document shown below was posted on the SRPA official website and the project's Facebook page.



Source: Nippon Koei Co., Ltd.

Figure 4.5.72: Press Release Document for the Public Release of SSDaP

2) Key Outputs and Achievements

Through the implementation of this pilot project, the following key outputs have been achieved:

a) System and Functionality Output

The key output related to system and functionality is to develop and deploy the system. This has been achieved as SSDaP was developed and officially launched within SRPA. By February 2025, there were approximately 2,500 accesses and around 450 data entries.

b) Capacity Strengthening Output

The key output related to capacity strengthening is the understanding of how to use the system by the staff responsible, and this has been achieved. It has been confirmed in the system that the staffs from the relevant departments regularly register data and approve new user applications, which shows that the staffs responsible have good understanding of how to use the system's administration site.

Especially, the two IT staffs in SRPA had approximately 50% and 60% correct answers on the comprehension test of their tasks in December 2024, but both had over 90% correct answers in February 2025. This is due to the fact that after the December 2024 test, the JICA Expert Team

prepared a checklist for them to record the actions they should take for each data update in SSDaP, and they recorded their actions at least twice a week from December 2024 to February 2025, which is recognized as causing increase in their understanding of tasks.

c) Urban Issues Solution Output

The key output related to addressing urban challenges is the improvement observed before and after the system's implementation. These improvements have been confirmed through the following aspects:

- **Data Management Output**: The key output related to data management is that data previously held by different departments has been managed in a more accessible format. This has been confirmed in the system by ensuring that the information is managed in map, graph, and list formats. According to a questionnaire survey conducted by the JICA Expert Team to 30 people, including officials of SRPA and members of the Smart City Consortium, more than 90% of the respondents answered that the visibility and design of the site is average or higher.
- **Data Utilization Output**: The key output related to data utilization is that the published data has been actively used by users. This has been verified by monitoring system access counts, data views, and the number of data downloads on the administration user page. According to the questionnaire survey conducted by the JICA Expert Team, more than 50% of respondents consider touristic information to be the most useful among the content currently displayed on SSDaP.

3) Lessons Learnt and Way Forward

Lessons learnt are summarized as follows:

- During the system development phase, we used test data to check graph displays, but many issues only became apparent once actual data was registered. As a result, system improvements were required. Going forward, it would be more effective to discuss display requirements using real data as much as possible, especially when adding new data items.
- SSDaP has mechanisms to regularly add new data, both automatically and manually. However, delays in data uploads on the data providers' side or sensor troubles on the observer's side can prevent timely data updates, as we observed during the pilot phase. Moving forward, SRPA, the operational body, will need to coordinate with relevant bodies to ensure a system is in place for proper and timely data updates.

Challenges and recommendations for the future are outlined below:

- To gather feedback from general users, a comment posting feature was added to SSDaP. However, no significant comments were received during the project period. This may indicate a lack of system utilization promotion and user engagement. Moving forward, it could be beneficial to widely disseminate information about the system's usage and benefits through websites and social media, and to use pop-up notifications and email notifications within the system to encourage feedback.
- A data platform serves as an infrastructure for distributing various data. However, there may be demands from those unfamiliar with its core function to provide “services” using the data. It is important to focus on the data platform’s main role and ensure that such service-related features are developed outside the data platform, in alignment with its original purpose.
- The phase of simply uploading existing data has been completed with this pilot project. According to a questionnaire survey conducted by the JICA Expert Team, the contents listed below were raised by respondents as additional contents that they wish to have in the data platform.
  - Tourist concentration areas: Heatmaps or location-based data showing where tourists are most active.
  - Tourist arrival statistics: Data on the number of tourists arriving by plane and other means of transport at the airport.
  - Investment zones: Highlighted areas with high investment potential for businesses and infrastructure projects.
  - Live traffic data: Real-time congestion levels and road condition
  - Emergency services map: Locations of police stations, fire stations, and public emergency buttons.
  - Incident reports and response times: Data on emergency response efficiency in different areas.
  - Air quality and noise levels: Real-time environmental monitoring data.
  - Waste treatment and management: Information on waste collection points in other areas and processing facilities.

  However, future system expansions should focus on adding data items with data utilization in mind. It will be important to review the potential users and how they will utilize the data when selecting new data items. Additionally, selecting and categorizing items in relation to the smart city roadmap will be crucial to ensure alignment with smart city goals.
- During the pilot project, system improvements were relatively minor and were implemented by amending the contract with the original subcontractor. However, future system expansions may require more significant modifications, necessitating the competitive procurement of a new contractor. In such cases, care must be taken to ensure that no other contractor makes modifications to the system during the term of the ongoing maintenance contract.

While the above way forward discusses future enhancements, the following outlines four major strategies for the effective utilization of the current SSDaP by SRPA after the project completion:

- **Centralized Information Management**: By centrally managing various data, it becomes easier to share the latest information among stakeholders. This can save time spent searching for data and improve operational efficiency. For example, population data and land use data are essential for various development projects and administrative management. Previously, these data were provided upon request. In the future, by registering the latest data on SSDaP, this process can be significantly shortened.
- **Viewing Areas and Facilities**: SSDaP allows for the display of area and point information on a map, along with their attribute information. By spatially understanding registered public facility information (including schools, health centers, post offices, etc.) and infrastructure information (including main roads, drainage, etc.), it is expected to contribute to the planning and updating of future spatial plans. Additionally, if evacuation facilities are added in the future, it can also be useful for disaster response and evacuation planning.
- **Environmental Management Measures**: Monitoring to understand the current situation is essential when implementing environmental management measures. SSDaP monitors treated water quality and air quality, and publishes the observation data in graphs and numerical values. SRPA is required to utilize this information on SSDaP and collaborate with relevant departments to discuss the necessity and direction of measures as needed. In addition to the current monitoring items, it is desirable to expand the scope of monitoring to include river and lake water quality, soil, noise, and vibration.
- **Creation of Easy-to-Understand Materials**: In discussions among relevant organizations, public briefings, and external presentations, displaying explanatory materials with maps and graphs can provide intuitive and visually understandable information. From this perspective, it is also desirable to consider adding items to SSDaP, such as information that is frequently needed for explanations.

Chapter 5 Activities for Output 3

Here we list the detailed activities for Output 3.

5.1 Activity 3-1: Support to draft the ToR, roles and responsibilities for the Smart City office within Siem Reap Province Office

The discussion was held in accordance with the development of the roadmap. Following the start of the project, it was recognized that establishing the smart city office or division requires a national approach. In response, project experts engaged in discussions with MoI, which have been ongoing since August 2022.

While awaiting national-level decisions, the SRPA took proactive steps to facilitate the establishment of the Smart City Division by forming the "Smart City Secretariat", comprising several departments within the SRPA starting in June 2023. Since its establishment, the Secretariat has remained actively engaged, with substantial activities, such as managing pilot projects and preparing action plans, being continuously carried out by the Deputy Governor, division directors, and responsible personnel as of February 2025. The role is stipulated by Decision of the Provincial Governor as described in 3.4.

5.1.1 Proposed ToR of Smart City Division in the Siem Reap Smart City Roadmap

The following is the proposed Terms of Reference (ToR) for the Smart City Division, as outlined in the Smart City Roadmap. This has been specified at the division level rather than as an office, based on the results of discussions within the Project.

- Assessment of projects based on the criteria for smart projects, such as compliance with roadmaps, SDGs, partnership of public, private and academic sector, technical and financial support, necessity of PoC, etc.
- Consultation with private sectors
- Consolidation of necessary administrative procedure
- Selection of PoC (pilot projects) and support for implementation
- Data sharing with private companies (excluding sensitive information)
- Coordination with private companies to utilize the data for public purposes
- Business matching among relevant sectors (domestic and international)
- Coordination and applying for budgets for smart city related activities

5.2 Activity 3-2: Monitoring and analysis of pilot projects by Smart City related organizations

The monitoring of the implementation of the pilot projects and the analysis for the improvement of the operation of the pilot projects were conducted by smart city related organizations. The activities for this include periodic monitoring of the operating status of the systems and TWG meetings. Below shows the list of TWGs related to pilot projects during the Project implementation.

Table 5.2.1: TWG Meetings related to the Monitoring and Analysis of Pilot Projects

Date	Contents
21st July, 2022	• Discussions on the 1st round of pilot projects
23rd August, 2022	• Proposals of the 1st round of pilot projects
21st October, 2022	• Detailed proposals of the 1st round of pilot projects
6th February, 2023	• Report of the progress of the pilot projects
21st February, 2023	• Report of the progress of the pilot projects
31st March, 2023	• Discussions on the illegal parking monitoring pilot project
16th May, 2023	• Discussions on the urban environment monitoring pilot project
24th August, 2023	• Discussions on the illegal parking monitoring pilot project
7th September, 2023	• Discussions on the illegal parking monitoring pilot project
14th September, 2023	• Discussions on the illegal parking monitoring pilot project
19th October, 2023	• Discussions on the data platform system development pilot project
16th November, 2023	• Discussions on the illegal parking monitoring pilot project and the document tracking system pilot project
27th December, 2023	• Discussions on the solid waste collection pilot project
26th January, 2024	• Discussions on the overall progress of the pilot projects
20th February, 2024	• Discussions on the solid waste collection pilot project
28th March, 2024	• Discussions on the solid waste collection pilot project
10th May, 2024	• Discussions on the illegal parking monitoring pilot project
20th May, 2024	• Discussions on the data platform system development pilot project
28th May, 2024	• Discussions on the solid waste collection pilot project
3rd June, 2024	• Discussions on the solid waste collection pilot project
17th June, 2024	• Discussions on the solid waste collection pilot project
20th June, 2024	• Discussions on the illegal parking monitoring pilot project
10th September, 2024	• Discussions on the illegal parking monitoring pilot project
26th November, 2024	• Discussions on the data platform system development pilot project

Source: Nippon Koei Co., Ltd.

5.3 Activity 3-3: Drafting the Smart City Annual Action Plan for the following year based on the monitoring and analysis

The 2024 Action Plan, under review by the Smart City Secretariat since August 2023, is based on the previous year's Action Plan and monitoring indicators. The Action Plan for 2025 was then developed using the experience of Action Plan 2024. The Action Plan 2026 was drafted in February 2025 based on the analysis of the results from the previous year.

Chapter 6 Activities for Output 4

Here we list the detailed activities for Output 4.

6.1 Activity 4-1: Implementation of capacity assessment (organizations, individuals, infrastructure) and consideration of capacity development program

6.1.1 Overview of Capacity Development and Capacity Assessment

(1) Concept

In principle, JICA's Technical Cooperation supports human resource development, research and development, technology dissemination and the development of institutional frameworks essential for the development of economies and societies in the recipient country. To uphold this philosophy, the project is required to conduct capacity development which is thought of as the process whereby the capabilities for handling issues of the recipient country are developed at individual, organizational, and societal levels in a holistic manner.

To prepare a capacity development program, a capacity assessment, which will diagnose the current situation and change process from various perspectives, will be conducted.

According to the Smart City Reference Architecture White Paper, the functions of the implementation body are summarized as below. The project will refer to this framework as appropriate for Siem Reap.

Table 6.1.1: Main Functions implementation body (Example)

Main Function	Description
Smart City overall management & strategy formulation	• Formulate and manage the overall strategy of Smart City, and perform overall management to realize Smart City according to the strategy
Organization operation & management	• Supervise stakeholders, establish and manage primary promoters to make the whole Smart City function smoothly.
Rules setting & management	• Establish and manage rules and guidelines necessary for the promotion of Smart City
Business development & management (Financial management)	• Develop services through experience design for each field of business conducted in Smart City in the region, and manage services provided and managed by each service provider. * Subcommittee, etc. for each business field may also be assumed. • Build and manage business model with the aim of sustainable management of the whole smart city and manage all the financial matters which may arise.
Marketing & public relations	• Manage public relations for the country and other communities as well as residents, tourists, and business operators, and work as a point-of-contract for information collaboration.
Digital Platform operation & management	• Develop and operate digital systems including Digital Platform, and determine and manage the application programming interface (hereinafter referred to as "API") of services, federations to other communities, etc.
Asset and data management & operation	• Manage assets in the region, acquire and store data from residents, public administration, service providers, etc., analyze them, and promote their utilization by the whole Smart City.
Security	• Ensure security of the whole digital systems including from Digital Platform to services and assets.

Source: SIP Cross-ministerial Strategic Innovation Promotion Program

(2) Methodology of the Capacity Assessment

In a smart city, technologies should be leveraged smartly to solve urban issues. Consequently, government officials will require a variety of competencies (skills and equipment) to handle these technologies, in society, in organizations, and in individuals. Since it is practically impossible to introduce those skills and equipment all at once, it is necessary to first assess the basic conditions such as the number of officers who can handle the computers and the like.

Therefore, the capacity assessment at this stage will begin with a review of the basic conditions. At the same time, other capacity development needs have been identified through dialogue and interviews with provincial administrations and other counterparts.

6.1.2 Capacity Assessment for Basic Condition

Capacity assessment for basic conditions has been done as follows.

(1) Objectives

- To assess basic conditions for the counterparts

(2) Target

- Project counterparts (selected officials)

(3) Method and Date

- Questionnaire dated 26 October 2022

(4) Result Summary

- A total of 17 departments/ provincial divisions answered a questionnaire with the valid information of 479 officers.
- The number of devices available for use is about 0.5 per person.
- Officers have basic PC skills rating 85%
- Of the 12 organizations that responded, 6 currently have IT staff and 10 will have IT staff in the future.
- IT training is required for approximately half of the officers.

6.1.3 Direction of the Capacity Development Program

Based on the result of the capacity assessment for fundamental condition as well as the dialogue and interviews with provincial administrations and other counterparts, the capacity development program was structured as below.

- On the Job Training
  - This is training provided to relevant Siem Reap Province personnel during project implementation. Projects mobilize experts, consultants, technicians, and other personnel to teach relevant government officials how to use specific tasks and equipment. In some cases, learning is integrated into daily work tasks.
- Training in Japan for smart city
  - This training focuses on the development of smart city technologies and initiatives and their implementation. Japan is well-known for its technology and urban planning, and training in Japan could provide valuable insights and knowledge for the participants working in this field.
- IT training by IT passport framework
  - The IT Passport Framework is a certification system for IT skills and knowledge in Japan. IT training according to this framework provides a systematic program covering a variety of IT topics.
- Basic IT training in line with pilot projects
  - The training is designed to support a pilot project for the introduction of new technologies and processes.

6.2 Activity 4-2: Public relations and branding

The public relations and branding policies were discussed, and the results were added to “Chapter 7 Implementing Measures” of the Smart City Roadmap.

6.2.1 Public relations and branding measures in the Smart City Roadmap

(1) Objective

For the promotion of smart cities, awareness of smart city initiatives among a wide range of stakeholders and incorporation of diverse opinions are important. There is a need to harmonize the smart city roadmap with the movements of central government ministries and agencies and development partners. In addition, the method of publicizing the smart city initiatives should include a branding perspective that can improve the image of Siem Reap through the use of smart city, and should not be limited to simply providing information. Strategic approaches to external communication and interaction methods will be important. The definition of “public relations” here is to promote understanding and empathy and build relationships with citizens, private companies, and government agencies through the smart city, while “branding” aims to improve Siem Reap's regional image and enhance the city's value through the smart city initiatives. The objectives of the PR and branding strategy shall be set as follows.

- I. Roadmap dissemination:
  - Publicize the importance of the smart city roadmap and increase the feasibility of smart city implementation (build momentum)

- II. Knowledge sharing:
  - To increase the presence of Siem Reap as a smart city and to attract knowledge that contributes to the Siem Reap smart city initiative.
- III. Attraction of companies:
  - To attract private companies to Siem Reap in order to improve the quality of products and services.
- IV. Enhancement of the regional image:
  - To enhance the regional image of Siem Reap for citizens and tourists by utilizing the smart city.

(2) Implementation Structure

The Smart City Division and the International Exchange and Public Relations Division are expected to play a key role in public relations activities related to smart cities. On the other hand, since it will take time to establish the Smart City Division, the International Exchange and Public Relations Division, the Intersectoral Division, and the Investment Planning Division will cooperate in implementing measures until the Smart City Division is established.

6.2.2 Press Tour

The SRPA welcomed the Official Development Assistance (hereinafter referred to as "ODA") Press Tour in the participation of various mass media companies in the morning of 5th October 2023.

Source: JICA Long Term Expert Team

Figure 6.2.1: Press Tour

6.2.3 Participation in the 5th Japan-ASEAN Smart City Meeting

The "5th Japan-ASEAN Smart City Network High-Level Meeting" was held on October 26 and 27, 2023 at the International Conference Center in Tsukuba City, Ibaraki Prefecture, by the Ministry of Land, Infrastructure, Transport and Tourism of Japan (hereinafter referred to as "MLIT"), inviting ASEAN countries, related ministries, and related local governments in Japan. Deputy Governor of Siem Reap Province, Director of Inter-sectoral division, and Chief Advisor for the Project participated the meeting. From the Cambodian government, public officials from MoI, Phnom Penh Capital, and Battambang Province had also participated the meeting.

6.2.4 Attendance of Thai smart city Expo

The Project participated in Thailand Smart City Expo 2023, which was held at Queen Sirikit International Conference Center in Bangkok on November 22nd and 23rd, 2023.

At the panel discussion on "Enhancing ASEAN Cities through Global Partnerships" held on the second day, the chief advisor of the JICA Siem Reap smart city project took the stage as a panelist with United Nations Industrial Development Organization (hereinafter referred to as "UNIDO") and United States Trade and Development Agency and shared advice on how to utilize the knowledge of the project in the ASEAN region.

Source: JICA Long Term Expert Team

Figure 6.2.2: Thai Expo

6.2.5 The Series of Environmental Awareness Raising Workshop in collaboration with GIZ

On 17th, 20th and 21st November 2023, JICA Project Team participated in a series of workshops to raise environmental awareness among residents, students, and local authorities. The workshop is organized by the city administration, GIZ, other local authorities, a waste collection company and JICA Project Team. The 3-day workshops were held in 5 locations with a total of 466 participants.

The aim of the workshop is to raise environmental awareness of people in Siem Reap. In each session, the environmental awareness video produced by JICA was shown as an introduction. After that, a member of JICA Project Team presented a brief summary of our Smart City Project in Siem Reap and related activity of waste management. After the presentation of JICA Smart City Project. GIZ then gave a presentation on the impact of plastic waste on the environment and shared their knowledge with the participants. Afterwards, the participants watched a video to deepen their understanding of how they can contribute to urban environmental protection. The concept of the 4Rs (Refuse, Reduce, Reuse, Recycle) to reduce waste was also introduced. These presentations and short videos were shown using the projector from Seiko Epson Corporation Ltd., which is cooperating with the project.

6.2.6 Asia-Africa Knowledge Sharing Seminar for Smart Cities

JICA organized an Asia-Africa Knowledge Sharing Seminar from 28 February to 1 March 2024 as a forum for sharing case studies of Asian / African cities and examples of initiatives for smart cities.

The seminar took place in Côte d'Ivoire and was attended by participants from 10 countries: Uganda, Zambia, Nigeria, Côte d'Ivoire, Senegal, Laos, Cambodia, Tanzania, Kenya and Rwanda. The deputy governor of Siem Reap Province (the Project Manager) and the expert participated on behalf of the Project.

The objectives of the seminar were as follows:

- To exchange the knowledge and the issues that each country is facing regarding smart city initiatives to deepen the understanding of what they should aim for, and identify the necessary organizational and government support
- To exchange the urban issues prevalent in each country to foster a more profound discourse on the effectiveness of smart cities as a means of solving urban issues in each country.

For this purpose, presentations and panel discussions were held on to introduce urban planning and smart city approaches in participant countries. The project manager, deputy governor of Siem Reap, made a presentation and was also served as a panelist in a discussion session. As a result, we were able to share Siem Reap's knowledge with participant countries and learn from their case studies.

At the end of the seminar, participants pledged to share and learn from each other's experiences, as well as to maintain and develop the network of participating countries and organizations, in addition to confirming the importance of the conference.

Source: JICA Long Term Expert Team

Figure 6.2.3: Asia-Africa Knowledge Sharing Seminar for Smart Cities

6.2.7 Project Introduction to the JCI ASPAC Participants

The Junior Chamber International Asia Pacific (hereinafter referred to as "JCI ASPAC") Cambodia Angkor Conference was held at a hotel in Siem Reap from June 6th to June 9th, 2024, gathering approximately 5,000 members of Junior Chambers of Commerce from various countries in the Asia-Pacific region. At the request of one of the participating groups, the Kanto District Council of the Japan Junior Chamber of Commerce, the Siem Reap Smart City Project introduced the project activities to 46 members interested in Siem Reap Smart City initiative on June 7th, 2024.

Source: JICA Long Term Expert Team

Figure 6.2.4: Project Introduction for the Junior Chambers of Commerce

6.2.8 Cambodia-Japan Smart City Networking Workshop

On August 9th, 2024, the Ministry of Land Management, Urban Planning and Construction of the Kingdom of Cambodia (hereinafter referred to as "MLMUPC"), MLIT, Japan Aerospace Exploration Agency (hereinafter referred to as "JAXA") and JICA held a networking workshop to promote international cooperation on smart cities between Japan and Cambodia in the MLMUPC's main conference room.

The project team introduced the activities and engaged in networking with representatives from Japanese companies who participated in the workshop, as well as relevant Cambodian government organizations, including the MLMUPC, and provincial government officials who attended the symposium.

Source: JICA Long Term Expert Team

Figure 6.2.5: Introduction on Cambodia-Japan Smart City Networking Workshop

6.2.9 Speech at the SCALe Info Day

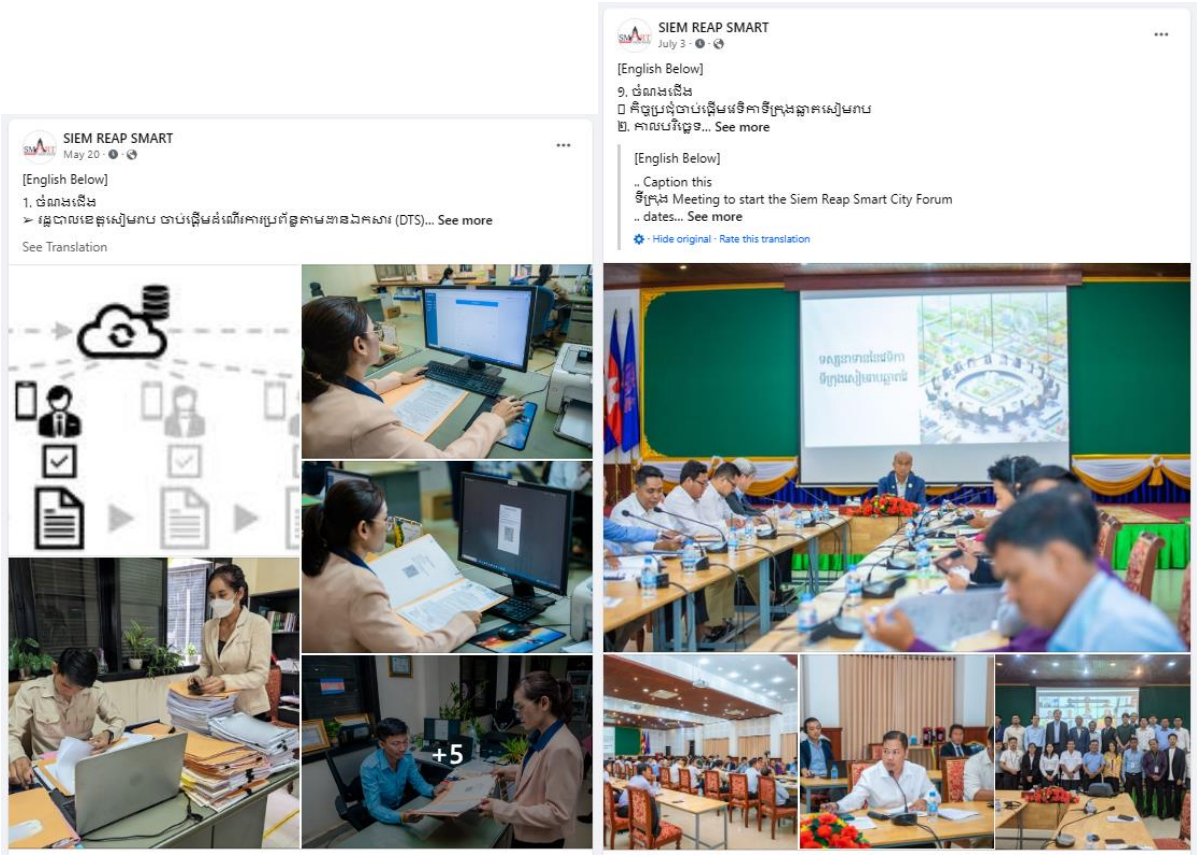
Smart City ASEAN Learning Network (hereinafter referred to as "SCALe") is funded by the European Union is a 3-year project from July 2023 involving 9 ASEAN higher education institutes, including the National University of Management (hereinafter referred to as "NUM") in Phnom Penh. The SCALe Info Day held on 28th August 2024 aimed to attract trainees to participate in smart city related micro-courses to be developed and integrated into existing curriculum by higher education institutions of Asia. The JICA Expert Team was invited as a guest speaker to introduce the Project's activities and lessons learned from the implementation of the Project. Active discussions were held between the participants, including faculty members, alumni, and students at NUM.

Source: National University of Management

Figure 6.2.6: SCALe Info Day

6.2.10 Facebook Promotion

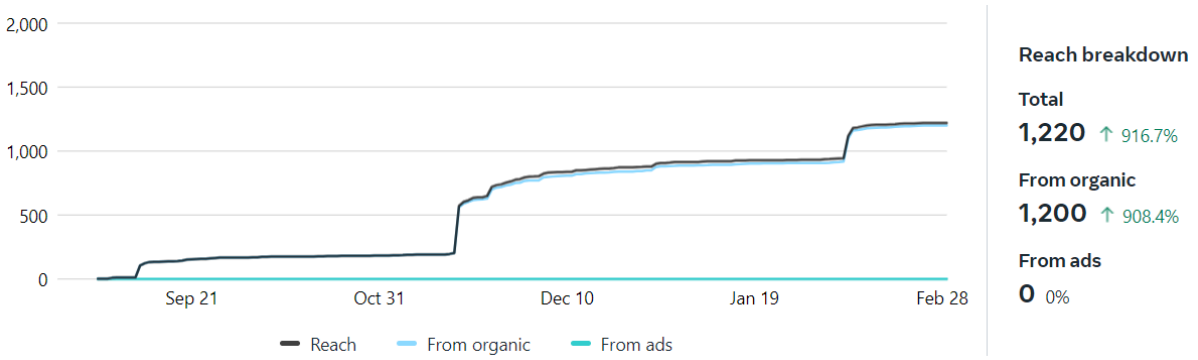
Together with the SRPA, the JICA Expert Team launched a Facebook page to promote smart city related activities in Siem Reap.



Source: Nippon Koei Co., Ltd.

Figure 6.2.7: Examples of Facebook Posts

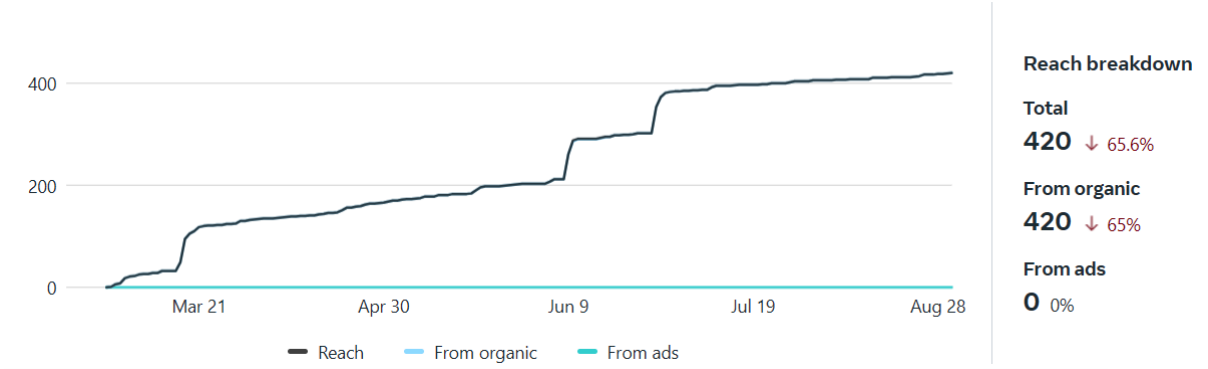
Below shows the statistics of the Facebook page and posts[7].



Source: Nippon Koei Co., Ltd.

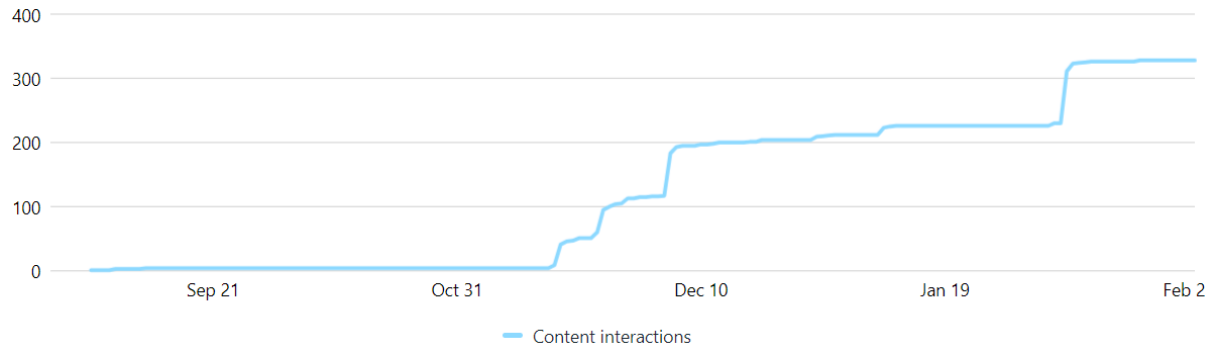
Figure 6.2.8: Reaches of the Facebook Page (September 2023 ~ February 2024)

[7] Since the reform of the dashboard of the insight of Facebook pages in October 2024, Meta only allows Facebook page owners to track insights for the past 28 days only. Therefore, as of the date of submission of this report, it is impossible to track the insights for more than 28 days. Figure 6.2.8 to Figure 6.2.13 are insight information that are shown in previous progress reports of the Project.



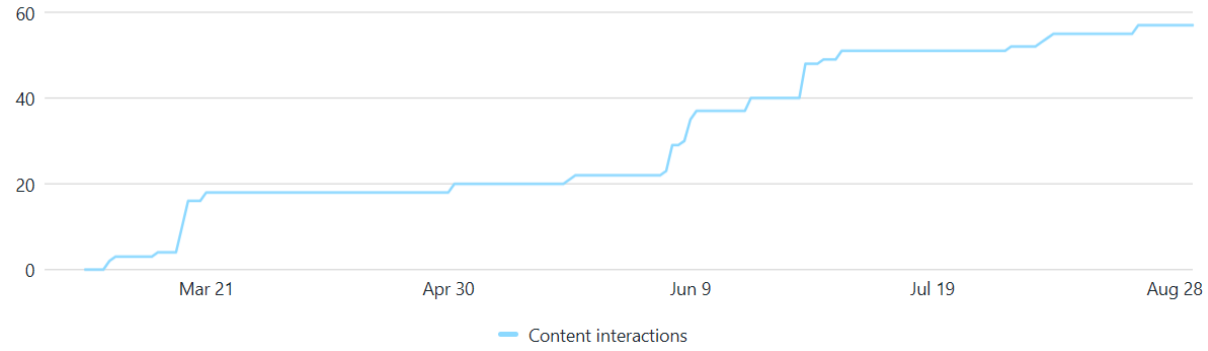
Source: Nippon Koei Co., Ltd.

Figure 6.2.9: Reaches of the Facebook Page (March 2024 ~ August 2024)



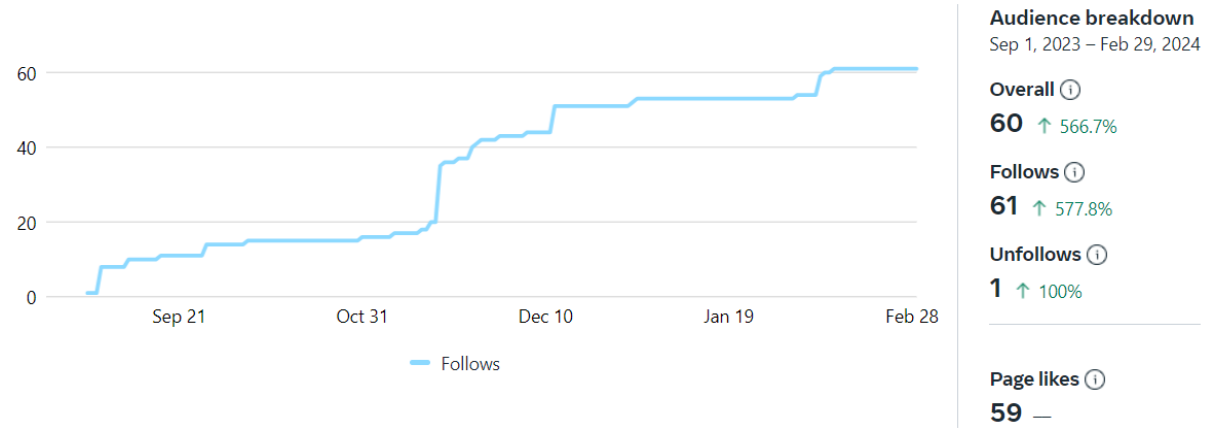
Source: Nippon Koei Co., Ltd.

Figure 6.2.10: Content Interactions of the Facebook Page (September 2023 ~ February 2024)



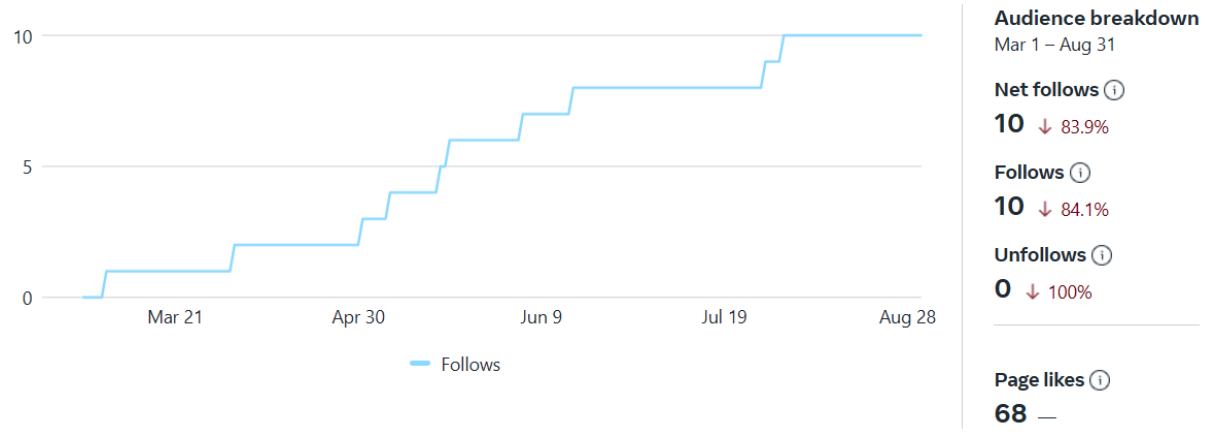
Source: Nippon Koei Co., Ltd.

Figure 6.2.11: Recent Content Interactions of the Facebook Page (March 2024 ~ August 2024)



Source: Nippon Koei Co., Ltd.

Figure 6.2.12: Audiences of the Facebook Page (September 2023 ~ February 2024)



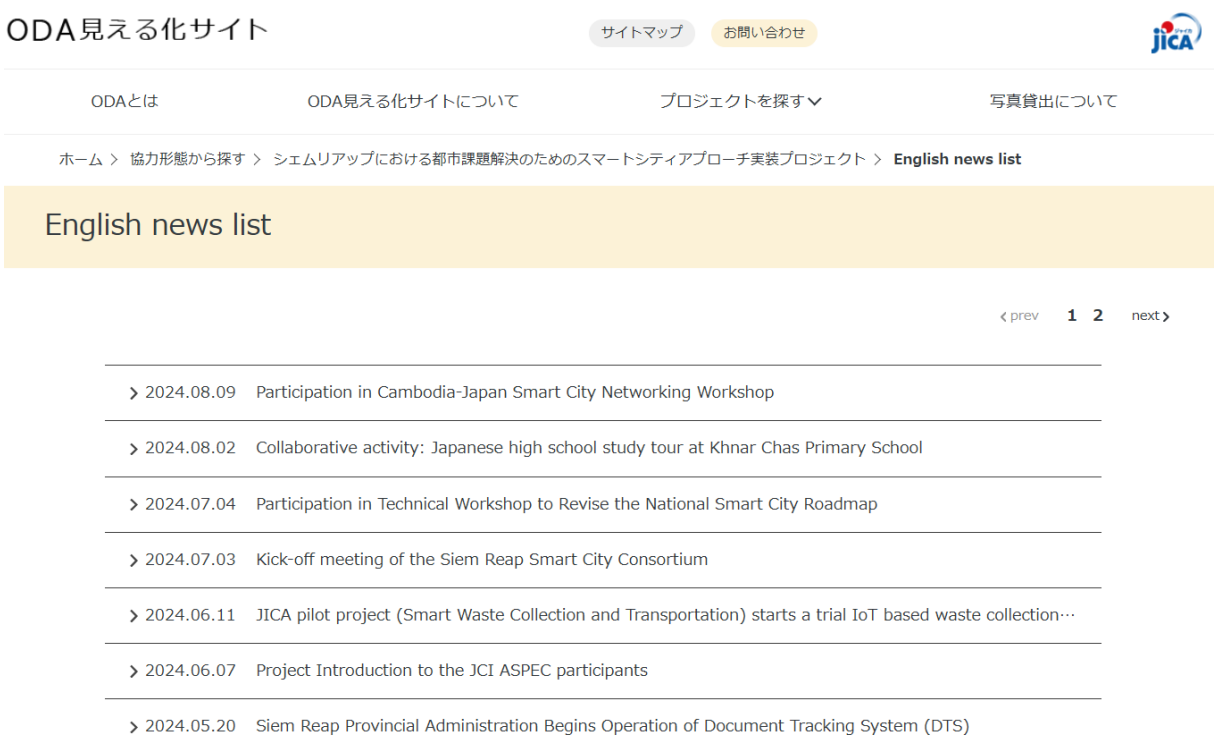
Source: Nippon Koei Co., Ltd.

Figure 6.2.13: Audiences of the Facebook Page (March 2024 ~ August 2024)

6.2.11 JICA ODA Visualization Site

The “ODA Visualization Site” was launched in October 2010 to provide various information on Japan’s ODA projects, including photos and videos, to a wider audience in an easier-to-understand format, The site has been created in cooperation with the Ministry of Foreign Affairs of Japan and JICA. Activities of the Project are summarized on this website. The below link is the homepage of the project and project activities are in the “project news”.

https://www.jica.go.jp/oda/project/201903200/index.html



Source: JICA

Figure 6.2.14: List of the Project's Newsletters

6.2.12 Other Promotion Measures

The events associated with the project have been highlighted by the media, including SRPA's official media, television broadcasts and newspapers.

6.3 Activity 4-3: Promotion for city-to-city collaborations

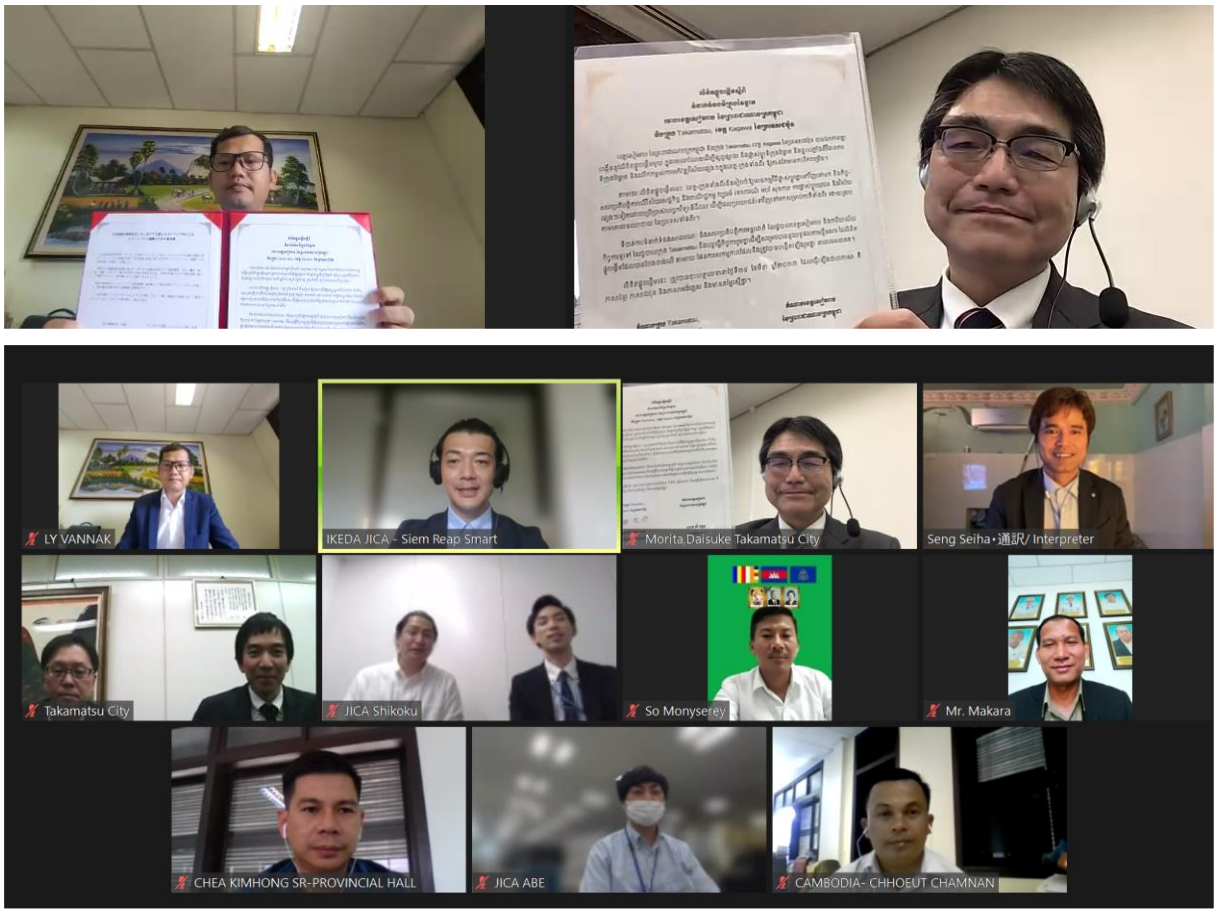
6.3.1 From Collaboration with Takamatsu City, Japan

The intent of the city-to-city exchange was confirmed at the first JCC in May 2022. Then Takamatsu City was selected as candidate city for city collaboration in 2nd JCC in October 2022. The reasons for selecting Takamatsu City are as follows.

- Takamatsu city is attracting strong attention as a smart city with the city digital platform.
- The digital platform could serve as a reference for Siem Reap.
- The G7 Summit City Ministerial Meeting will be held in Takamatsu next year, and Cambodia also holds international conferences, including ASEAN
- Cooperation between the two cities will help to create an image of Cambodia as a center of smart city.

On March 24, 2023, SRPA and Takamatsu City, Kagawa Prefecture created a "Letter of Intent on Smart City Relations" and held an online signing ceremony. The letter of intent was created to contribute to

the promotion and exchange of smart city activities, reflection of smart city measures, and enhancement of development of both cities. At the signing ceremony, the letter of intent was signed between Mr. Daisuke Morita, Director General of Takamatsu City General Affairs Bureau, and Mr. Ly Vannak, Administration Director of Siem Reap Province. Siem Reap Province and Takamatsu City expressed their willingness to broaden cooperation in the future, taking this signing as an opportunity.



Source: JICA Long Term Expert Team

Figure 6.3.1: Signing Ceremony of the Letter of Intent

On the 6th of February 2024, a signing ceremony was held in Siem Reap Province and Takamatsu City for a MOU for collaboration on smart cities. The signing ceremony was conducted in a hybrid format, combining online and local participants.

The signing of Siem Reap Province was held at Provincial Hall and attended by more than 20 representatives, including the provincial governor. From Takamatsu City Hall side, the mayor and members of the General Affairs Bureau engaged in smart city promotion participated. In addition, Director and Counsellor of the Consular office of Japan in Siem Reap, the Senior Vice President and representatives from Urban and Regional Development Group of JICA Headquarters, Chief Representative and Representative from JICA Cambodia Office and Representatives from JICA Shikoku also participated by online.

It is hoped that the conclusion of the MOU will further strengthen the relationship between Takamatsu and Siem Reap and lead to beneficial developments in the future.

Source: JICA Long Term Expert Team

Figure 6.3.2: Signing Ceremony of the MoU

In the 2nd general meeting of Smart City Consortium, conducted in October 2024, Takamatsu City made a presentation as an invited guest of the meeting.

6.3.2 Collaboration with Preah Sihanouk Province

On 29th January 2024, 34 delegates from Preah Sihanouk Province came to visit Siem Reap and learn from Siem Reap Smart City implementation. The study visit for Siem Reap and Preah Sihanouk Province was organized to exchange experiences in the sector. The visit included a workshop to share experiences and knowledge on smart cities and a site visit.

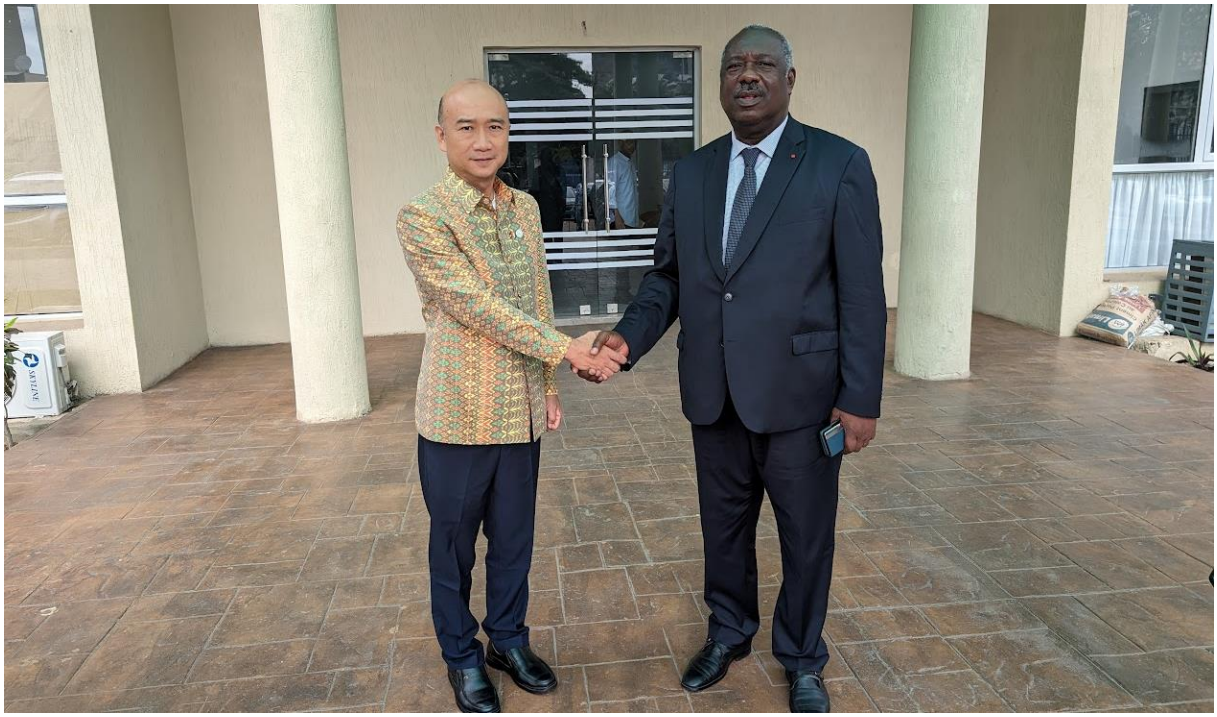
At the end of the event at the provincial hall, the Deputy Governor of Preah Sihanouk Province showed much interest in the smart city project of Siem Reap, and the Deputy Governor of Siem Reap gave a friendly closing remark which he welcomes any future collaboration with Preah Sihanouk Province no matter how big or small that will be.

Source: JICA Long Term Expert Team

Figure 6.3.3: Siem Reap Presents the Roadmap to the Delegation of Preah Sihanouk

6.3.3 Collaboration with Abidjan City, Côte d'Ivoire

The Deputy Governor of Siem Reap paid a courtesy visit to the Deputy Governor of Abidjan on 1st March 2024 while attending a seminar organized by JICA in Côte d'Ivoire. During the courtesy visit, Siem Reap Province expressed its desire to explore possibilities for cooperation, which was welcomed by Abidjan. Both parties agreed to further define areas of potential cooperation in the future.



Source: JICA Long Term Expert Team

Figure 6.3.4: Courtesy Visit to the Deputy Governor of Abidjan in front of the Abidjan City Hall

6.4 Activity 4-4: Implementation of capacity development programs

6.4.1 Outlines

Based on the results of the capacity assessment conducted by the 2nd JCC meeting, the capacity development program is summarized as on the job training, training in Japan, IT training and training courses utilizing the pilot project.

- On the Job Training:
  - This is training provided to relevant Siem Reap Province personnel during project implementation. Projects mobilize experts, consultants, technicians, and other personnel to teach relevant government officials how to use specific tasks and equipment. In some cases, learning is integrated into daily work tasks.
- Training in Japan for smart city
  - This training focuses on the development of smart city technologies and initiatives and their implementation. Japan is well-known for its technology and urban planning, and training in Japan could provide valuable insights and knowledge for the participants working in this field.
- IT training by IT passport framework
  - The IT Passport Framework is a certification system for IT skills and knowledge in Japan. IT training according to this framework provides a systematic program covering a variety of IT topics.
- Basic IT training in line with pilot projects

- The training will be designed to support a pilot project for the introduction of new technologies and processes.

6.4.2 Training in Japan

As part of the Project, a training in Japan was conducted as follows.

(1) Objective

- To understand Japan's smart city initiatives and their lessons learned, and will organize necessary actions to be taken by individuals or their organizations to promote smart cities in Siem Reap and Cambodia.
- To network between Siem Reap Province and the lecturers, such as local governments, companies, universities, and organizations.

(2) Training Period

- Management level: May 20, 2023 (Sat.) (Departure from Cambodia) ~ May 28, 2023 (Sun.) (Departure from Japan)
- Technical level: May 20, 2023 (Sat.) (Departure from Cambodia) ~ May 31, 2023 (Wed.) (Departure from Japan)

(3) Participants

Below is the list of the participants in the training.

Table 6.4.1: Participant List of the Training in Japan

	Name	Position	Level
1	H.E. Sor Vorin	Deputy Director General of the General Department Secretary of Administration, Ministry of Interior	Management
2	H.E. Yun Linne	Siem Reap Provincial Deputy Governor	Management
3	Mr. Ly Vannak	Administration Director, SRPA	Management
4	Mr. Tip Piseth	Director of Planning and Investment Division, SRPA	Management
5	Mr. Oeng Sophorn	Director of Inter-sectoral Division, SRPA	Management
6	Mr. Bith Chankhan	Deputy Director of the Department in charge of Municipal, District, Commune and Sangkat Affairs, Ministry of Interior	Technical
7	Mr. Thoeurt Soviet	Deputy Director of Inter-sectoral Division, SRPA	Technical
8	Mr. Khon Chanvuthy	Deputy Chief of Office of Development and Construction Management Office, SRPA	Technical
9	Mr. Chhoeurt Chamnan	Officer of Investment Office, SRPA	Technical
10	Mr. Mao Ousa	Officer of Information Office, SRPA	Technical
11	Mr. Ngon Sotheadara	Senior architect of the department of water, forest and infrastructure, APSARA National Authority	Technical
12	Mr. Lam Sokhak	Administration Director, Siem Reap Municipal Administration	Technical

Source: Nippon Koei Co., Ltd.

(4) Curriculum

Below is the curriculum of the training.

Table 6.4.2: Training Curriculum of the Training in Japan

Date			Content	Accommodation	Means of Transport
0	May 20th	Sat	Departure from Cambodia	-	Air
1	May 21st	Sun	Arrival to Japan	Tokyo	Bus
2	May 22nd	Mon	Briefing of the training Lecture from JICA Lecture from the Cabinet office of Japan Site visit to Daimaruyu area	Tokyo	Bus
3	May 23rd	Tue	Site visit to Haneda Innovation City Travel from Tokyo to Takamatsu Courtesy call to Takamatsu City	Takamatsu	Bus / Air
4	May 24th	Wed	Lecture and site visit to Takamatsu City and Kagawa University	Takamatsu	Bus
5	May 25th	Thu	Lecture and site visit to Kamikatsu Town	Kamikatsu	Bus
6	May 26th	Fri	Lecture and site visit to Kakogawa City	Amagasaki	Bus
7	May 27th	Sat	Site visit to Himejijo Castle	Amagasaki	Bus
8	May 28th	Sun	(Management level) Travel from Japan to Cambodia (Technical level) Travel from Kansai to Tokyo	Tokyo	Management level: Bus / Air Technical level: Train
Only technical level from below					
9	May 29th	Mon	Lecture and site visit to Kashiwanoha	Tokyo	Train
10	May 30th	Tue	Action plan presentation and wrap-up of the training	Tokyo	-
11	May 31st	Wed	Travel from Tokyo to Cambodia	-	Bus / Air

Source: Nippon Koei Co., Ltd.

Source: Nippon Koei Co., Ltd.

Figure 6.4.1: Training in Japan (1)

Source: Nippon Koei Co., Ltd.

Figure 6.4.2: Training in Japan (2)

6.4.3 Knowledge Co-Creation Program (Group and Region Focus)

(1) Course Overview

The Knowledge Co-Creation Program (Group and Region Focus) titled “Methodology and Approaches to Realize Smart City” has been organized and implemented by JICA Yokohama. Since the fall of 2022, JICA Yokohama has conducted this program three times, with Cambodia participating in all instances. The program aims to provide participants with insights into Japan’s smart city experiences through

fieldwork and case studies, enhancing their understanding of technology utilization and stakeholder coordination.

(2) Training Period

- The year of 2022: 2nd September 2022 (Fri.) (Arrival in Japan) ~ 15th September 2022 (Thu.) (Departure from Japan)
- The year of 2023: 22nd September 2023 (Fri.) (Arrival in Japan) ~ 5th October 2023 (Thu.) (Departure from Japan)
- The year of 2024: 29th August 2024 (Thu.) (Arrival in Japan) ~ 13th September 2024 (Fri.) (Departure from Japan)

(3) Objectives and Outcomes

The objective of this course is to develop an understanding of methodologies and approaches for applying smart technologies to address urban challenges, as well as for coordinating stakeholders based on Japanese experiences. Participants will also explore potential actions to implement these solutions.

The outcome is set as follows:

- To understand examples of policies and projects of smart city concept, technologies, and smart approaches (policy making based on data and application of smart technologies) to solve urban issues.
- To consider smart approaches to solve urban issues of the participant's countries.
- To prepare actions to be taken in order to solve urban issues in the participant's countries.

(4) List of Participants

The following is a list of the participants. In addition to SRPA, the implementing agency, participants also included representatives from the Siem Reap Municipality, relevant departments of the Siem Reap Province, and central government related to the Smart City.

Table 6.4.3: List of Participants of the Knowledge Co-Creation Program (Group and Region Focus)

	Name	Position (at the time of the training program)	Year in training program
1	Mr. Tip Piseth	Director of Planning and Investment Division, SRPA	2022
2	Mr. Oeng Sophorn	Director of Inter-sectoral Division, SRPA	2022
3	Ms. Lim Phallika	Deputy Mayor, Siem Reap Municipality	2022
4	Mr. Meas Piseth	Officer, PR & International Cooperation Division, SRPA	2022
5	Ms. Pol Chanreasey	Officer, General Department of Administration, MoI	2023
6	Mr. Hoem Tola	Senior ICT Technical Official, Department of ICT for Rural, MPTC	2023
7	Mr. Tan Kimang	Office Head, Technical Office, DPWT	2023
8	Mr. Soeung Sitha	Chief of Clean City Bureau, DoT	2023
9	Mr. Khuoch Vearythla	Director of Administration Division, SRPA	2024
10	Mr. Rem Sophal	Chief of Capacity Development Office, Human Resource Management Division, SRPA	2024

	Name	Position (at the time of the training program)	Year in training program
11	Mr. Moan Phanit	Senior Hydraulic Engineer, in charge of Irrigation and infrastructure office, Water Forestry and Infrastructure Management , APSARA National Authority	2024
12	Mr. Lim Chhayly	Senior Software Engineer, Digital Government Transformation, Digital Government Committee	2024
13	Mr. Bith Chankhan	Deputy director of the municipality, district, commune, and Sangkat administrative affairs, General Department of Administration, MoI	2024

Source: JICA Long-term Expert Team

(5) Contents

To prepare an Inception Report on urban issues, Smart City related activities and level of understanding of administrative officers and citizens in the participant's countries and cities

Through this 1-2 week program, the participants understood the Japanese technologies and approaches on Smart City through lectures, fieldworks and case studies through the following contents, thus consider the realization of Smart Cities in the participant's countries and cities.

- Smart city concept and advantages of Smart City in Japan
- Technologies to realize Smart City (including fieldwork)
- Approaches, implementation structure, and roadmap to consider Smart City (including fieldwork and case studies)
- Consensus building and coordination among stakeholders (including fieldwork, case studies)
- Preparation of action plans (strategies to apply and to promote smart city approaches, proposal of actions to be taken)

6.4.4 IT Training by IT Passport Framework

The IT Training has been done under the following conditions

(1) About the Course

This course is based on the IT Passport textbook developed in Japan as government certification. The online course method of this textbook for Khmer speakers was developed by the JICA grassroots project in collaboration with CADT.

The IT Passport textbook is divided into three main sections: Strategy, Management and Technology. The strategy part contains Corporate and Legal Affairs, Business Strategy and System Strategy. The management part contains technology for development, project management and service management. The technology part contains Basic Theory, Algorithm and Programming, Computer Systems and Technological Elements.

(2) Qualification of Participants

- Have basic knowledge of information technology (computer).
- Study time: 5: 30pm - 8:40pm (meet with the lecturers once or twice a week online).
- Before meeting with lecturers, participants have to do self-learning. Self-learning is watching video lessons in the learning system and do quiz.
- The course duration is 8 weeks.

(3) Outline of the Training

1) Duration

- January 30 to March 22, 2023

2) Participants

- Number of registered participants: 106 participants, including 19 females and 87 males
- Breakdown of registered participants by affiliation
- The number of participants who have taken the final examination, have attended at least six lectures (50%), and have received certificates: 75 participants
- Breakdown of participants receiving certificates by affiliation

(4) Result of Examination

Mock exams 1 and 2 were conducted the following day at the end lecture. There were Khmer and English tests for participants to choose. The average score of Mock exam 1 is 27.78 (Khmer), 31.53 (English), Mock exam 2 is 30.25 (Khmer), 43.70 (English). This average score is comparable to other courses in Phnom Penh and Battambang. Average score of Phnom Penh is 36 (English) and average score of Battambang is 37 (English). The questions of Mock exam 1 and 2 were extracted from previous Information Technology Engineers Examinations (hereinafter referred to as "ITEEs"). It can be concluded that participant could have checked previous ITEE.

Final examination: The average score of Final 1 is 31.33 (Khmer), 36.97 (English). The top score is 79 which is very high compared to other training programs.

(5) Course End Survey

Questionnaires were taken during the course, at the midpoint and at the end of the course. Evaluations of the course were basically good, with the following feedback

- It is good knowledge to apply daily work.
- Use for business.

- After gaining this new knowledge, I will share it with my colleagues and students. Also, I will request my department's director to modernize my place's IT system for convenience and faster. For example, developing a method of entering data via computer or phone and eliminating handwritten interviews. Drawing using technology, not by hand as before, etc.
- I will share it with my friends and colleagues and apply it in my current job.

(6) Course Schedule

Below shows the course schedule.

Attachment 1

Training Schedule of Basic Course (using IT Passport textbook)
Siem Reap (OLC#9) From January 30 to March 22, 2023

Week 1	January 30, Monday	Tuesday	February 1, Wednesday	Thursday	Friday
05:30-07:00 PM	***Chapter 1: Corporate and Legal Affairs (1)*** *E-Learning (watch video)* *Sub-unit 1111 - 1116 (6 videos)*	***Chapter 1: Corporate and Legal Affairs (2)*** *E-Learning (watch video)* *Sub-unit 1121 - 1133 (6 videos)*	***Chapter 1: Corporate and Legal Affairs (3)*** *E-Learning (watch video)* *Sub-unit 1211 - 1232 (5 videos)*	***Chapter 1: Corporate and Legal Affairs (4)*** *E-Learning (watch video)* *Sub-unit 1241 - 1271 (5 videos)*	***Chapter 1: Corporate and Legal Affairs*** ***Lecture name:*** ***VAM Piseth***
07:00-07:10 PM					Refreshment Break
07:10-08:40PM	*English Textbook* *Chapter 1* *1-1 Corporate Activities* *1-1-1 Management and organization* *(Page: 17 - 30)* *Additional document: Quiz C11*	*English Textbook* *Chapter 1* *1-1-2 OR and IE* *1-1-3 Accounting and Financial Affairs* *(Page: 30 - 45)* *Additional document: Quiz C12*	*English Textbook* *Chapter 1* *1-2 Legal Affairs (1-2-1, 1-2-2, 1-2-3)* *(Page: 46 - 55)* *Additional document: Quiz C13*	*English Textbook* *Chapter 1* *1-2 Legal Affairs (1-2-4, 1-2-5, 1-2-6, 1-2-7)* *(Page: 56 - 62)* *Additional document: Quiz C14*	***Chapter 1: Corporate and Legal Affairs*** ***Lecture name:*** ***DOEURN Ey***

Week 2	February 6, Monday	Tuesday	Wednesday	Thursday	Friday
05:30-07:00 PM	***Chapter 2: Business Strategy (1)*** *E-Learning (watch video)* *Sub-unit 2111 - 2114 (4 videos)*	**Chapter 2: Business Strategy (2)** *E-Learning (watch video)* *Sub-unit 2121 - 2151 (6 videos)*	**Chapter 2: Business Strategy (3)** *E-Learning (watch video)* *Sub-unit 2211 - 2341 (7 videos)*	***Chapter 2: Business Strategy*** ***Lecture name:*** ***Dr. Heng Sopheap***	**Chapter 3: System Strategy (1)** *E-Learning (watch video)* *Sub-unit 3111 - 3132 (6 videos)*
07:00-07:10 PM				Refreshment Break	
07:10-08:40PM	*English Textbook* *Chapter 2* *2-1 Business Strategy Management (2-1-1)* *(Page: 67 - 73)* *Additional document: Quiz C21*	*English Textbook* *Chapter 2* *2-1 Business Strategy Management (2-1-2, 2-1-3, 2-1-4, 2-1-5)* *(Page: 74 - 81)* *Additional document: Quiz C22*	*English Textbook* *Chapter 2* *2-2 Technological Strategy Management* *2-3 Business Industry* *(Page: 82 - 93)* *Additional document: Quiz C23*	***Chapter 2: Business Strategy*** ***Lecture name:*** ***Dr. Heng Sopheap***	*English Textbook* *Chapter 3* *3-1 System Strategy* *(Page: 97 - 106)* *Additional document: Quiz C31*

Week 3	February 13, Monday	Tuesday	Wednesday	Thursday	Friday
05:30-07:00 PM	**Chapter 3: System Strategy (2)** *E-Learning (watch video)* *Sub-unit 3211 - 3232 (4 videos)*	***Chapter 3: System Strategy*** ***Lecture name:*** ***Thach Bunroeurn***	**Chapter 4: Development Technology (1)** *E-Learning (watch video)* *Sub-unit 4111 - 4117 (7 videos)*	**Chapter 4: Development Technology (2)** *E-Learning (watch video)* *Sub-unit 4121 - 4212 (3 videos)*	***Chapter 4: Development Technology*** ***Lecture name:*** ***Thach Bunroeurn***
07:00-07:10 PM		Refreshment Break			Refreshment Break
07:10-08:40PM	*English Textbook* *Chapter 3* *3-2 System Planning* *(Page: 107 - 114)* *Additional document: Quiz C32*	***Chapter 3: System Strategy*** ***Lecture name:*** ***Thach Bunroeurn***	*English Textbook* *Chapter 4* *4-1 System Development Technology* *(Page: 123 - 137)* *Additional document: Quiz C41*	*English Textbook* *Chapter 4* *4-2 Software Development Management Techniques* *(Page: 137 - 141)* *Additional document: Quiz C42*	***Chapter 4: Development Technology*** ***Lecture name:*** ***Thach Bunroeurn***

Attachment 1

Week 4	February 20, Monday	Tuesday	Wednesday	Thursday	Friday
05:30-07:00 PM	***Chapter 5: Project Management (1)*** *E-Learning (watch video)* *Sub-unit 5111 - 5122 (3 videos)*	***Chapter 5: Project Management (2)*** *E-Learning (watch video)* *Sub-unit 5123 - 5125 (3 videos)*	***Chapter 5: Project Management*** ***Lecture name:*** ***Po Bunnika***	***Chapter 6: Service Management*** *E-Learning (watch video)* *Sub-unit 6111 - 6222 (7 videos)*	***Chapter 6: Service Management*** ***Lecture name:*** ***Po Bunnika***
07:00-07:10 PM			Refreshment Break		Refreshment Break
07:10-08:40PM	*English Textbook* *Chapter 5* *5-1 Project Management* *(Page: 145 - 154)* *Additional document: Quiz C51*	*English Textbook* *Chapter 5* *5-1 Project Management* *(Page: 154 - 158)* *Additional document: Quiz C52*	***Chapter 5: Project Management*** ***Lecture name:*** ***Po Bunnika***	*English Textbook* *Chapter 6* *6-1 Service Management* *6-2 System Audit* *(Page: 163 - 174)* *Additional document: Quiz C61*	***Chapter 6: Service Management*** ***Lecture name:*** ***Po Bunnika***

Week 5	February 27, Monday	Tuesday	March 1, Wednesday	Thursday	Friday
05:30-07:00 PM	***Chapter 7: Basic Theory (1)*** *E-Learning (watch video)* *Sub-unit 7111 - 7132 (7 videos)*	***Chapter 7: Basic Theory (2)*** *E-Learning (watch video)* *Sub-unit 7211 - 7241 (7 videos)*	***Chapter 7: Basic Theory*** ***Lecture name:*** ***LY Kimleng***	***Chapter 8: Computer System (1)*** *E-Learning (watch video)* *Sub-unit 8111 - 8132 (6 videos)*	***Chapter 8: Computer System (2)*** *E-Learning (watch video)* *Sub-unit 8211 - 8223 (5 videos)*
07:00-07:10 PM			Refreshment Break		
07:10-08:40PM	*English Textbook* *Chapter 7* *7-1 Basic Theory* *(Page: 181 - 196)* *Additional document: Quiz C71*	*English Textbook* *Chapter 7* *7-2 Algorithm and Programming* *(Page: 197 - 211)* *Additional document: Quiz C72*	***Chapter 7: Basic Theory*** ***Lecture name:*** ***LY Kimleng***	*English Textbook* *Chapter 8* *8-1 Computer Component* *(Page: 215 - 225)* *Additional document: Quiz C81*	*English Textbook* *Chapter 8* *8-2 System Component* *(Page: 226 - 233)* *Additional document: Quiz C82*

Week 6	March 6, Monday	Tuesday	March 8, Wednesday	Thursday	Friday
05:30-07:00 PM	***Chapter 8: Computer System (3)*** *E-Learning (watch video)* *Sub-unit 8311 - 8412 (7 videos)*	***Chapter 8: Computer System*** ***Lecture name:*** ***Lay Leangsros, CADT***	***ទិវាសិទ្ធិនារី*** *Women's Day*	***Chapter 9: Technology Element (1)*** *E-Learning (watch video)* *Sub-unit 9111 - 9221 (5 videos)*	***Chapter 9: Technology Element (2)*** *E-Learning (watch video)* *Sub-unit 9311 - 9342 (7 videos)*
07:00-07:10 PM		Refreshment Break			
07:10-08:40PM	*English Textbook* *Chapter 8* *8-3 Software* *8-4 Hardware* *(Page: 234 - 246)* *Additional document: Quiz C83*	***Chapter 8: Computer System*** ***Lecture name:*** ***Lay Leangsros, CADT***		*English Textbook* *Chapter 9* *9-1 Human Interfaces* *9-2 Multimedia* *(Page: 251 - 261)* *Additional document: Quiz C91*	*English Textbook* *Chapter 9* *9-3 Database* *(Page: 262 - 276)* *Additional document: Quiz C92*

Attachment 1

Week 7	March 13, Monday	Tuesday	Wednesday	Thurday	Friday
05:30-07:00 PM	Chapter 9: Technology Element (3) E-Learning (watch video) Sub-unit 9411 - 9433 (8 videos)	Chapter 9: Technology Element (4) E-Learning (watch video) Sub-unit 9511 - 9535 (8 videos)	Chapter 9: Technology Element (1) Lecture name: Lay Leangsros, CADT	Chapter 9: Technology Element (2) Lecture name: Lay Leangsros, CADT	Mock Exam 1 6:00 PM - 8:00 PM
07:00-07:10 PM			Refreshment Break	Refreshment Break	
07:10-08:40PM	English Textbook Chapter 9 9-4 Network (Page: 277 - 293) Additional document: Quiz C93	English Textbook Chapter 9 9-5 Security (Page: 294 - 310) Additional document: Quiz C94	Chapter 9: Technology Element Lecture name: Lay Leangsros, CADT	Chapter 9: Technology Element Lecture name: Lay Leangsros, CADT	

Week 8	March 20, Monday	Tuesday	Wednesday	Thurday	Friday
05:30-07:00 PM	Answer Guide of Mock Exam 1 6:00 PM - 8:00 PM Lay Leangsros, CADT	Mock Exam 2 6:00 PM - 8:00 PM	Answer Guide of Mock Exam 2 6:00 PM - 8:00 PM Lay Leangsros, CADT		
07:00-07:10 PM					
07:10-08:40PM					

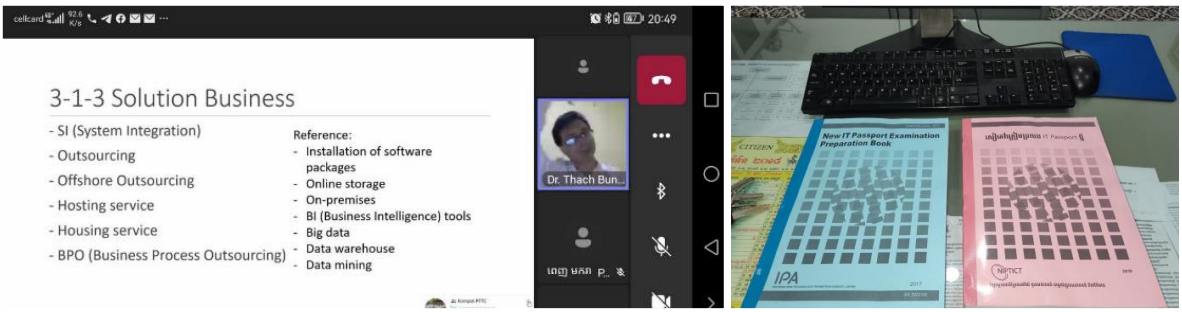
1. ចំណាំ៖ ការបើកវគ្គ និងការពន្យល់អំពីវគ្គសិក្សា ធ្វើឡើងនៅថ្ងៃទី២០ ខែមករា ឆ្នាំ២០២៣។
   (Note: Course opening and explanation is on January 20, 2023.)
2. ចំណាំ៖ ការប្រលងបញ្ចប់វគ្គ នឹងប្រព្រឹត្តិទៅ រយៈពេល ២ សប្តាហ៍ក្រោយបញ្ចប់វគ្គត្រូវនឹងថ្ងៃទី៣០ ខែមីនា ឆ្នាំ ២០២៣។
   (Note: The final exam will be held for 2 weeks after the end of the course. It will be on March 30, 2023.)

Source: CADT

Figure 6.4.3: Course Schedule

(7) Official Exam

The top five highest-scoring students in the course took the official ITEE administered by the Information Technology Professional Examination Council on April 23, 2023, in Ho Chi Minh City. The result was one successful candidate. The other examinees were close to a passing score, and further study is expected in the future.



Source: JICA Long Term Expert Team

Figure 6.4.4: Image of the Online Training

6.4.5 Capacity Development for Pilot Project Expansion

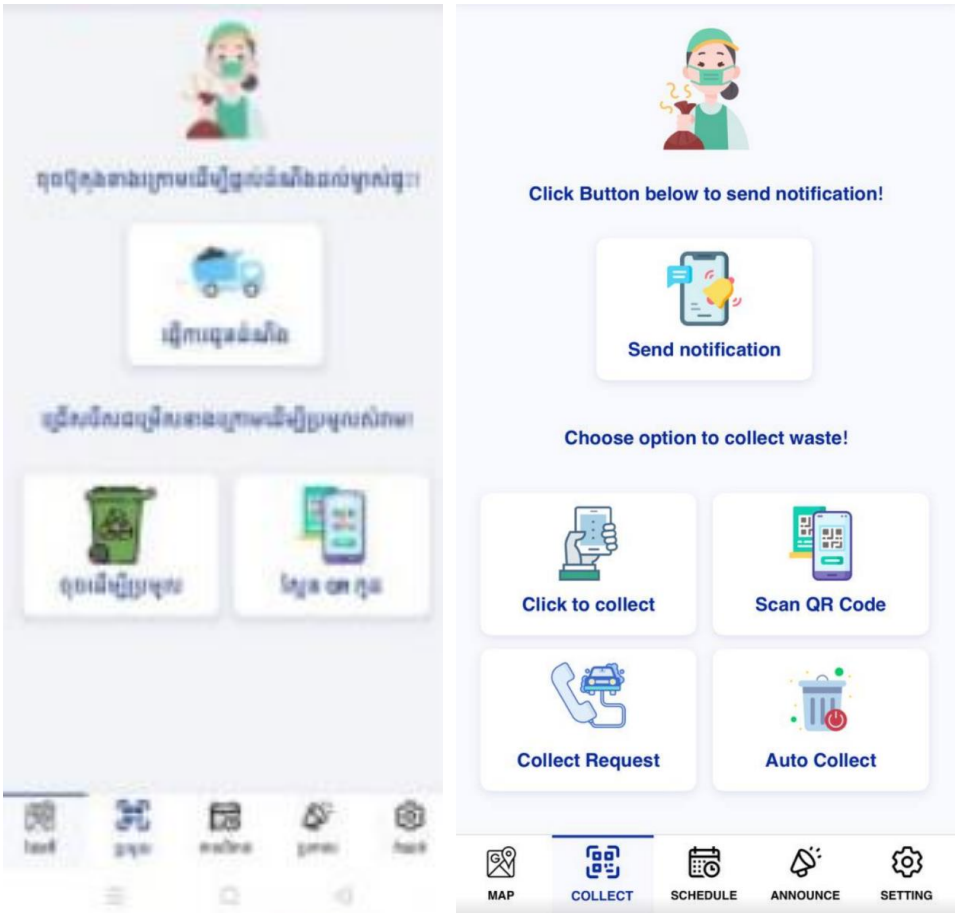
Pilot projects suitable for handover were transferred to SRPA, with their securing the necessary governmental budget. The Project provided support for contract arrangements between the pilot project contractors and SRPA. Additionally, follow-up was conducted after the handover to address desirable enhancements identified through the implementation of the pilot projects.

This follow-up aimed at enabling counterparts to independently manage system expansions and improvements. To achieve this, the project engaged counterparts in the expansion planning process, including requirements definition and stakeholder coordination, and utilized project funds to implement the system enhancements.

(1) Expansion of Smart Clean Siem Reap Application (developed in Pilot Project (7))

To enhance the functionality and user experience of the waste collection application, several key features were added and upgraded. The expanded features are detailed below.

- Service Area Integration: The app was updated to include all work shifts in the Sla Kram and Sala Kamreuk communes within the “Schedule,” “Setting-Road,” and “Map” functions, reflecting the service provider's collection schedule. Bin installation locations were visualized, with specific focus on the Wat Bo area in the Sala Kamreuk commune.
- Automated Bin Status and Notifications: The app was further automated to reflect real-time status changes of bins and issue notifications at the start and end of each waste collection.
- Route-Based Notifications: The app was modified to ensure users receive notifications only for their registered waste collection routes.
- Truck Inventory Management: A truck inventory list was added within the "Setting" function, enabling the service provider to manage waste collection vehicles.
- On-Demand Collection: An “on-demand collection” function was introduced, allowing users to request waste collection services as needed, integrated with the messaging feature for direct communication.
- Personalized Notifications: Users can now register their specific area such as communes or streets, during the initial setup, enabling personalized notifications based on their designated waste collection route.
- Flexible User Settings: The app allows users to update their registered area or route at any time via the “Settings” function, ensuring adaptability for users who relocate or wish to change their preferred collection route.



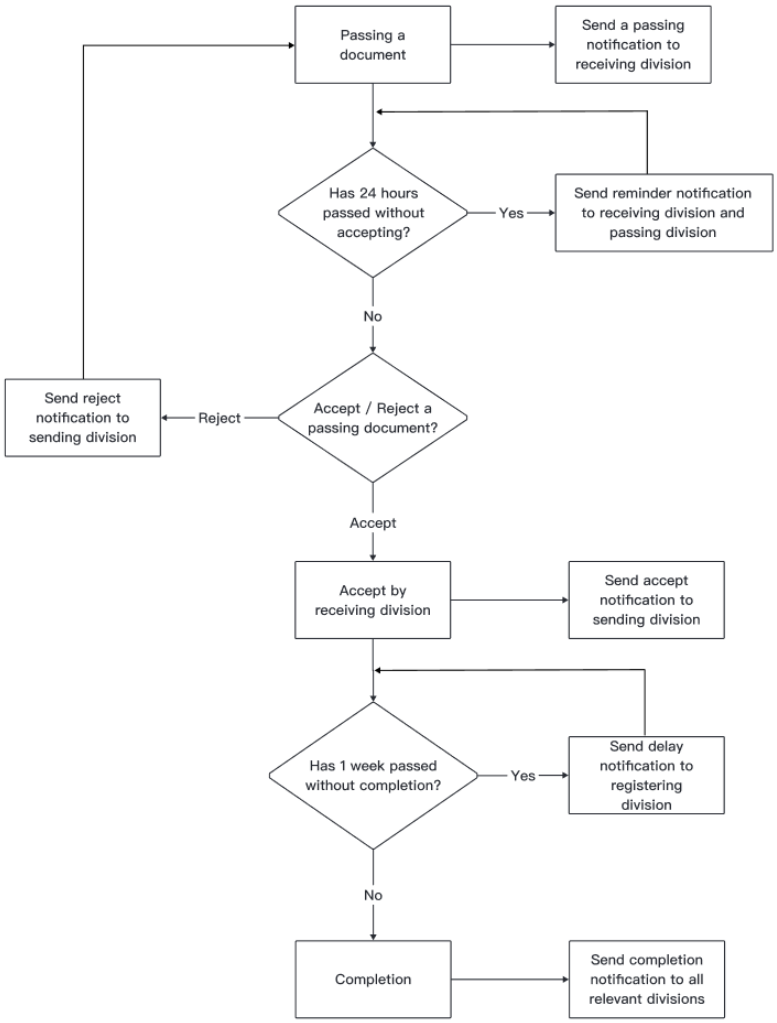
Note: Left: Before system expansion / Right: After system expansion
Source: JICA Long Term Expert Team

Figure 6.4.5: Expansion of Smart Clean Siem Reap Application

(2) Expansion of DTS (developed in Pilot Project (4))

To enhance administrative efficiency and transparency within the SRPA, DTS has been expanded based on lessons learned from the initial pilot project. This expansion addresses operational challenges and improves system usability, as outlined below.

- Advanced Alert System: A real-time notification system has been introduced, ensuring timely alerts for document receipt, circulation, and pending actions.
- Enhanced Search Functionality: Robust search capabilities now allow users to quickly locate documents using various search parameters, improving accessibility and workflow efficiency.
- Customizable Reporting Tools: A comprehensive reporting system has been integrated, enabling the generation of tailored reports that provide actionable insights for management and operational decision-making.



Source: JICA Long Term Expert Team

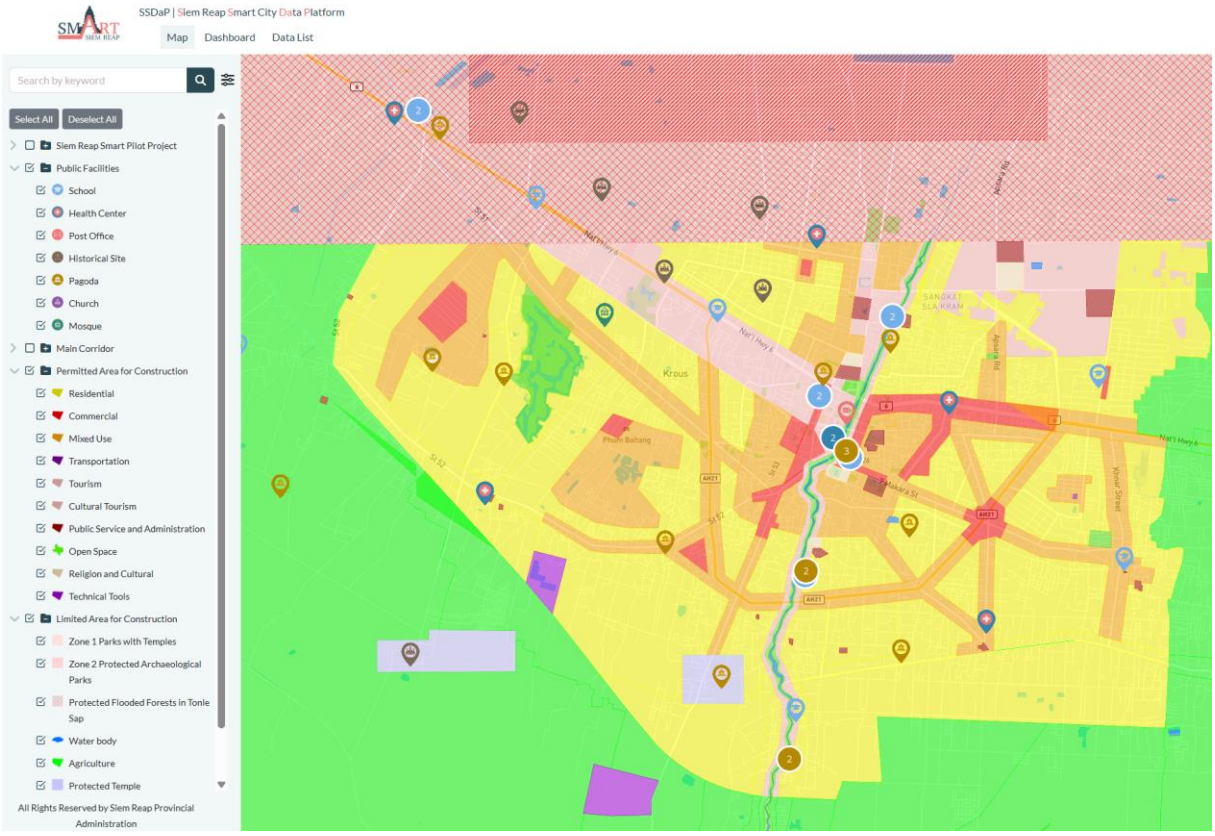
Figure 6.4.6: Expansion of DTS (Flowchart of the Notification System)

(3) Expansion of Siem Reap Data Platform (developed in Pilot Project (8))

To enhance the functionality and user experience of SSDaP, several key features were added and upgraded. The expanded features are detailed below.

- Geospatial Data Expansion: SSDaP includes additional geospatial datasets, such as administrative boundaries, zoning of APSARA National Authority, and land-use classifications. These datasets provide a more comprehensive view of Siem Reap's urban landscape, supporting better decision-making for urban planning and development.
- Addition of Public Facility Location Data: Public facility location data, including hospitals, schools, and religious sites, have been integrated into the platform. These datasets are aligned with defined data specifications and are presented with interactive icons, search functions, and filtering options for user convenience.

- Enhanced Security Measures: To strengthen data privacy and security, an automated ID image deletion function was implemented. This ensures that ID images are promptly removed upon registration approval.



Source: JICA Long Term Expert Team

Figure 6.4.7: Expansion of Siem Reap Data Platform (Added the Geospatial Data)

6.4.6 Promotion of the Siem Reap Smart City Consortium

To activate the Siem Reap Smart City Consortium, two key initiatives were conducted: the Implementation of the Students' PoC Competition and the Smart City Model Projects by the core member.

Both initiatives were aligned with the broader goals of the Siem Reap Smart City Consortium to foster collaboration, drive innovation, and enhance smart city development through practical and impactful projects. As these initiatives progress, their outcomes will be assessed to refine and strengthen the Consortium's future activities.

(1) Implementation of the Students' PoC Competition

1) Objective

The competition sought to promote the Smart City Consortium by encouraging students to develop practical, innovative smart city solutions and by sharing lessons learned from their PoC implementations. Furthermore, the competition aimed to increase public awareness of the Consortium's activities and foster deeper collaboration between academia, government, and industry. This initiative was expected to not only generate fresh, practical ideas but also strengthen engagement within the Smart City Consortium by fostering cooperation among students, government agencies, and private sector members.

2) Result of the Selection

Two student teams, namely "Tourism Foresight" and "Pedestrian Safety" were selected for contract negotiation on this matter. Both are from Institute of Technology of Cambodia.

3) Outline of the PoC

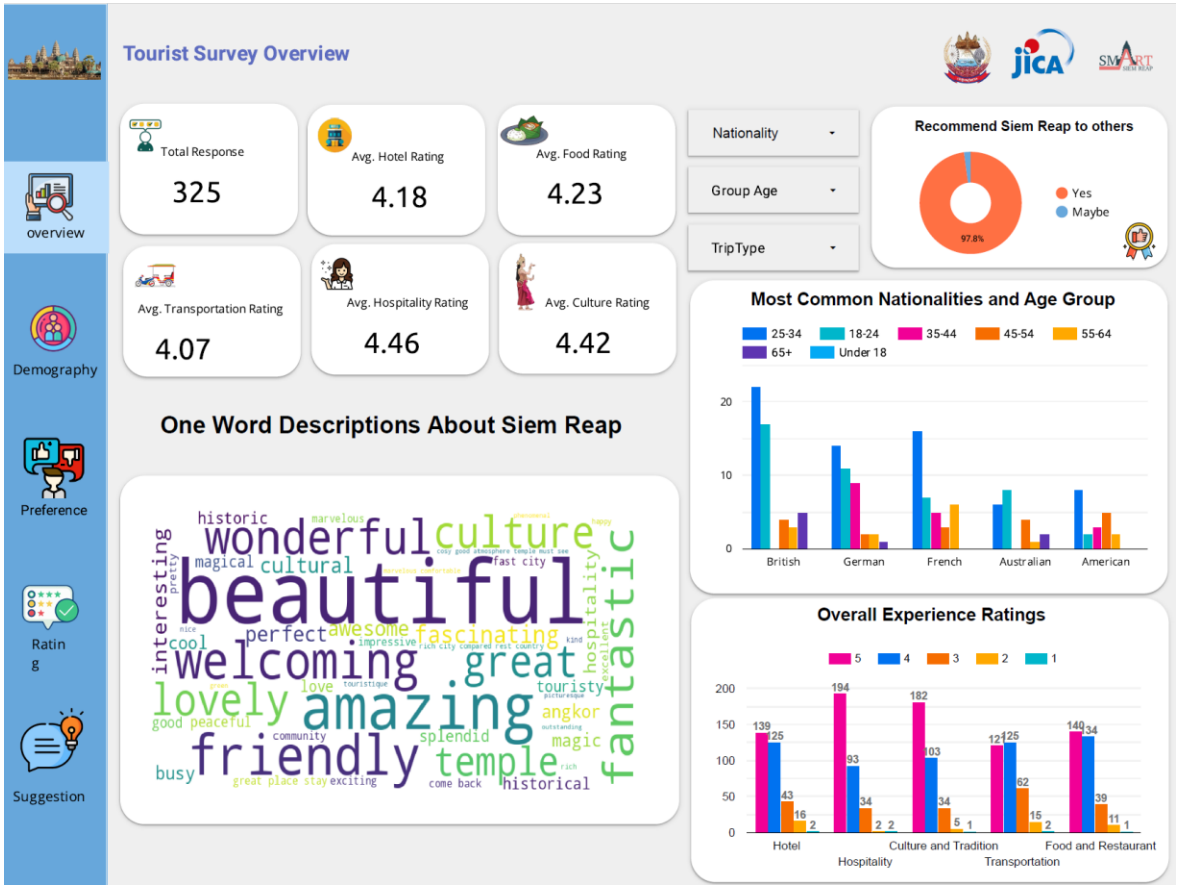
i) Tourism Foresight

The Tourism Foresight team's PoC aimed to enhance the tourism experience in Siem Reap by leveraging data science and smart technology. While the approach successfully demonstrated feasibility, it was limited by sample sizes, language barriers, and social media platform restrictions, making certain insights more preliminary. The project analyzed tourist feedback from social media platforms and online review sites using Natural Language Processing (hereinafter referred to as "NLP") and Large Language Models (hereinafter referred to as "LLMs"), while also collecting real-time feedback through a QR code-based survey system. In particular, data from websites (ex., TripAdvisor, Booking.com) was more structured, whereas social media content required extensive cleaning due to noise and inconsistent formats. Insights were visualized on interactive dashboards. The initiative functions as a PoC to provide a comprehensive understanding of tourist satisfaction, preferences, and areas for improvement, ultimately contributing to smarter and more responsive tourism management in Siem Reap.

The achievements are as follows:

- Analyzed thousands of online reviews using NLP and LLMs
- Developed a functional QR code-based feedback collection system
- Collected 325 tourist survey responses from key sites in Siem Reap via QR code
- Created interactive dashboards to visualize findings for stakeholders
- Demonstrated the feasibility but also the scalability requirements of smart tourism analytics in Cambodia

- Identified key satisfaction drivers: cultural experiences, hospitality, and local food
- Highlighted areas for improvement: transportation pricing, enhanced road infrastructure, and consistent accommodation quality
- Identified 97.8% of respondents would recommend Siem Reap, indicating a high level of tourist satisfaction.



Source: Tourism Foresight

Figure 6.4.8: Interactive Dashboards Created by the Students' PoC

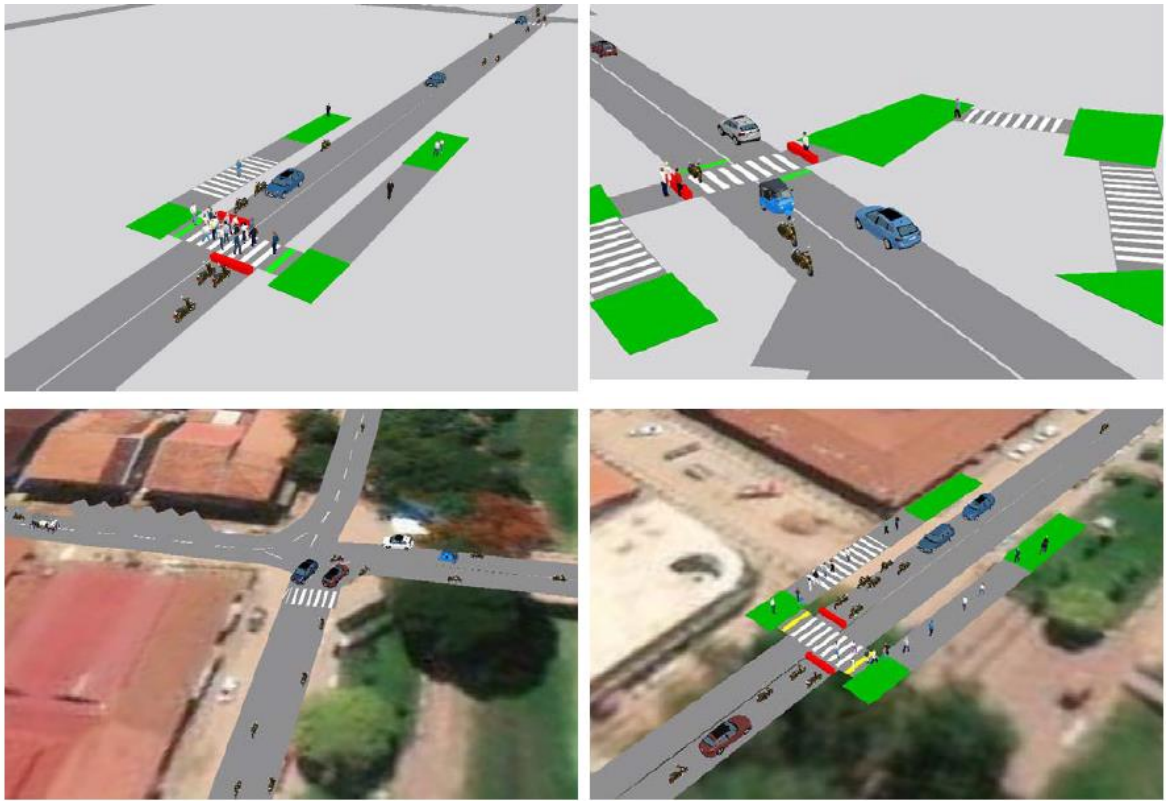
ii) Pedestrian Safety

The Pedestrian Safety team conducted a research-based PoC to address pedestrian safety challenges in the Pub Street and Night Market area of Siem Reap. The project aimed to assess public perception of pedestrian safety and evaluate the potential effectiveness of installing pedestrian traffic signals or establishing pedestrian-only zones. Through detailed surveys, site observations, traffic and pedestrian data collection, and simulations, the team proposed evidence-based recommendations to improve walkability, safety, and accessibility in the city's most tourist-concentrated areas.

The achievements are as follows:

- Conducted 179 face-to-face interviews with residents, tourists, and local business owners

- Analyzed public support for pedestrian signals (90%+) and evening-only pedestrian zones (around 68%)
- Collected traffic and pedestrian counts at key intersections over two days (weekday vs. weekend)
- Identified major pedestrian conflict points tied to illegal parking and narrow sidewalks
- Developed and tested traffic simulation models for pedestrian signals vs. pedestrian-only zones, maintaining an acceptable level of service
- Found strong support for clear crosswalks and signage to ensure safer pedestrian crossings
- Proposed complementary policy measures: off-street parking, one-way traffic system, improved on-street parking and information, tuk-tuk and bus stations, and designated zones for residents and tourist vehicles.



Source: JICA Long Term Expert Team

Figure 6.4.9: Traffic Simulation Created by the Students' PoC

(2) Smart City Model Projects by Core Members

1) Objective

The Smart City Model Project aimed to develop replicable solutions for urban challenges by integrating smart technologies, ensuring measurable benefits for Siem Reap residents and tourists, and paving the way for larger-scale implementations.

2) Result of the Selection

Two core members, namely Smart Axiata Company Limited and FORVAL (Cambodia) Co., Ltd. from the Consortium were selected.

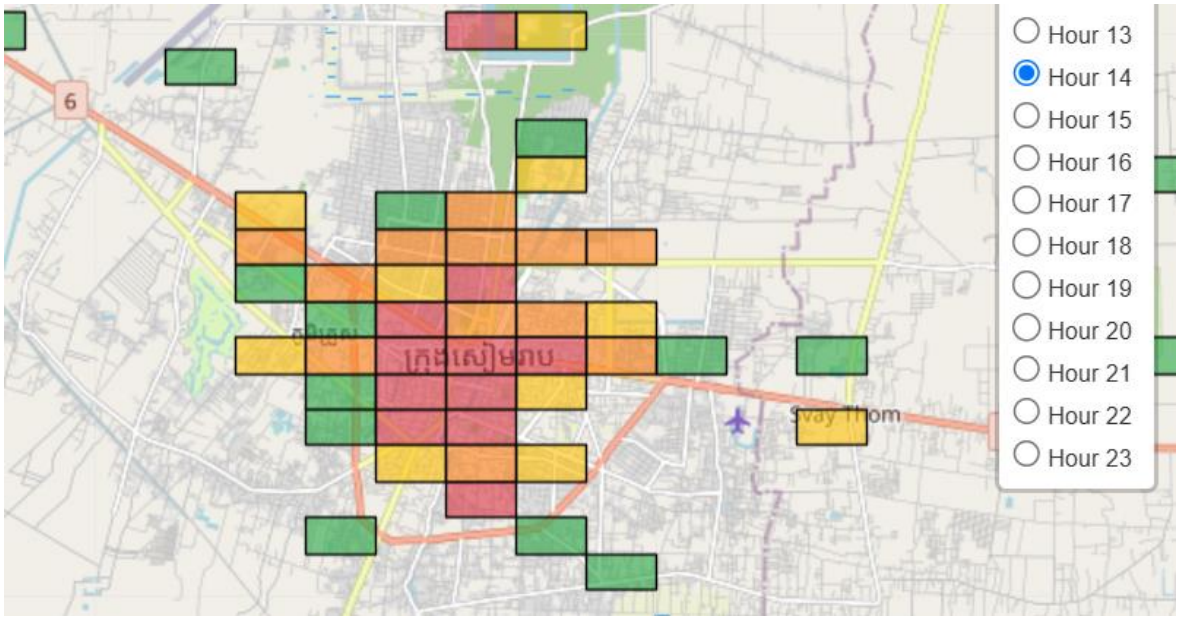
3) Outline of the Model Projects

i) Smart Axiata Company Limited

Smart Axiata Company Limited conducted a data-driven PoC using mobile network data to generate valuable insights into the behavior of foreign tourists visiting Siem Reap. The objective was to support evidence-based tourism development and smart city planning by analyzing tourist flows, popular destinations, and travel patterns. The analysis covered approximately 91,000 foreign visitors to Cambodia in October 2024, with a focus on the 30,000 who visited Siem Reap. Key outputs include country of origin analysis, length of stay, popular intra-provincial movement patterns, and hotspot detection by time and day.

The achievements are as follows:

- Identified that 33% of all foreign tourists who uses Smart Axiata's service to Cambodia in October 2024 visited Siem Reap.
- Determined top countries of origin: China, USA, Korea, Hong Kong, Australia, UK, Thailand, Japan, Germany, and Netherlands.
- Found average stay in Siem Reap was 3 days; Siem Reap was commonly the first or last stop of the trip.
- Mapped most visited areas inside Siem Reap using geolocation data (ex., Angkor Wat, Pub Street, Bayon).
- Visualized tourist movement across four times of day (morning, noon, evening, night).
- Detected weekday versus weekend hotspots using Geohash grid-based analysis.
- Delivered interactive movement and hotspot maps for policy planning and campaign targeting.



Source: Smart Axiata Company Limited

Figure 6.4.10: Example of the Interactive Hotspot Map

ii) FORVAL (Cambodia) Co., Ltd

FORVAL (Cambodia) Co., Ltd aimed to enhance safety and public trust in Siem Reap by installing a user-friendly emergency alert system in the Pub Street area. The system enables the public to report crimes, accidents, or other emergencies directly to the police through a single push of a button. Once activated, the system transmits the caller's location, video, and audio to the 24-hour police control center. This model project tested the feasibility of such a system, trained relevant stakeholders, and laid the groundwork for potential city-wide expansion.

The achievements are as follows:

- Installed a Panic Alarm Station with camera, intercom, and emergency button at a strategic location in Pub Street.
- Enabled real-time communication between the caller and police control center through video and audio.
- Successfully completed system design, procurement, and installation within the period.
- Conducted training sessions for SRPA, the provincial police, and technical staffs.
- Created operation manuals in both English and Khmer.
- Launched public outreach using PR video, posters, digital screens, and social media.
- Launched the system to collect feedback via QR code-linked surveys to improve system awareness and usability.
- Established a clear roadmap for future expansion and integration with police response systems.

Source: JICA Long Term Expert Team

Figure 6.4.11: PR Material for the Emergency Button

6.5 Activity 4-5: Recommendations on National Smart City Policy / Guideline

The project has been in discussions with the MoI, beginning with attendance at the National Smart City Roadmap workshop in August 2022. Below are major activities by the JICA Expert Team since.

- In February 2023, the project provided advice to the National Smart city roadmap.
- In April 2023, reported to the Director General of the Ministry of Interior on the current situation in Siem Reap Province.
- In August 2023, the project experts participated in a taskforce for smart city roadmap, namely Smart City Taskforce, composing MoI, GIZ, the United Nations Office for Project Services (hereinafter

referred to as "UNOPS"), the United Nations Human Settlements Programme (hereinafter referred to as "UN-Habitat").

- The taskforce has organized an orientation workshop on smart city development in Kampot on December 5 and 6, 2023 and in Siem Reap on December 12 and 13, 2023. The details of the workshop are as follows.
  - This series of the workshop aimed at establishment an institutional framework for smart cities policy throughout Cambodia. The events are planned by the Task Force Smart City Cambodia, headed by the Ministry of Interior of Cambodia, with the participation of experts from UNOPS, UN Habitat, GIZ, and the JICA Smart City Project.
  - This workshop was attended primarily by government officials responsible for smart cities. There were 87 participants from 12 provinces/cities in Kampot and 78 participants from 16 provinces/cities in Siem Reap.
  - On the first day of the workshop in Siem Reap, the representatives briefly described their organization's activities and expressed their feelings about smart city development. Then, a GIZ consultant explained the concept of smart city in detail and demonstrated many case studies from around the world. In the afternoon of the first day, the participants were asked to participate in group discussions where they had to choose some important topics and discuss problems and solutions.
  - On the second day, representatives from each group presented the contents of their group discussions. In many groups, environmental issues (especially waste management) seemed to be of high interest. This was followed by an overview of smart city development in Siem Reap by a smart city expert from JICA. At the end of the workshop, a representative from the Ministry of Interior spoke about the prospects for smart cities at the national level.
- Attendance on the reflection workshop on Smart City Development in Cambodia (30 April 2024)
- Attendance of meeting of the National Smart City Taskforce, consisting of MoI, GIZ, UNOPS, UN-Habitat, and JICA (8th May 2024)
- Discussion on technical cooperation and data driven smart city (21st May 2024)
- Participation in Technical Workshop to Revise the National Smart City Roadmap (July 4 and July 5, 2024)
  - This is organized by MoI. Approximately 30 representatives from Siem Reap Province, Phnom Penh Capital City, Battambang Province, and Preah Sihanouk Province attended the event.
  - During the workshop, specific discussions were held to revise the current version of the National Smart City Roadmap to make it more resilient, more sustainable, and more conducive to the SDGs for each city.
  - At the request of MoI, the JICA Expert Team presented the process of developing the Siem Reap Smart City Roadmap and points to consider in implementing smart city-related projects, sharing specific examples and lessons learned. Participants also responded that Siem Reap's smart city case study can be a useful reference for other cities.

- Discussion about the Urban Issues in the National Smart City Roadmap and its Indicators (8th August 2024)
- Comments on the Draft Revised National Smart City Roadmap (16th August 2024)

Source: JICA Long Term Expert Team

Figure 6.5.1: The Orientation Workshop on Smart City Development

Source: JICA Long Term Expert Team

Figure 6.5.2: Workshop on Revise the National Smart City Roadmap

In addition, the above mentioned the Knowledge Co-Creation Program (Group and Region Focus) namely "Methodology and Approaches to Realize Smart City" invited the officials from MoI and MPTC through the project, which benefit for both national and local authorities in terms of smart city development.

6.6 Activity 4-6: Recommendations on Data Management (Organizations, infrastructure, management)

6.6.1 Current Issues in Data Management

The studies on the current data management practices were conducted through the implementation of the pilot project (8) "Data Platform System Development". The identified challenges for enhancing data management capabilities at the provincial level are summarized below:

(1) Human Resource Development

- Data management and IT are crucial for effective data utilization. Although efforts have been made to enhance IT personnel during the project period, further enhancement remains essential to ensure sustainable operations.
- Following the transfer of systems developed during the project, there is a need to procure contractors for system maintenance and improvements. SRPA should be able to appropriately prepare technical specifications for such procurement.
- System development includes cost management. When developing a system using a development partner's budget, there is a tendency to think of fulfilling all requests. However, it is important to carefully consider priorities and cost-effectiveness when deciding what to implement.

(2) IT Infrastructure:

- The utilization of the Government Cloud, currently being developed by MPTC, is recommended for future system operations.
- Adequate power backup, generator systems, and air-conditioning facilities in the server room (currently the control room) are necessary for the simultaneous use of on-premises servers.
- Using cloud services would eliminate the need for hardware maintenance within the SRPA building. However, flexibility should be considered when concluding cloud service contracts.
- The systems developed in the pilot projects require only a small amount of server capacity, as they mostly deal with text-based data. However, when handling image data in the future, the required server storage will increase dramatically. This should be taken into account when expanding the data scope for the platform.

(3) Data Quality Management

- It is advisable to evaluate missing data and abnormal values before releasing data. Missing data can be treated as information if it is defined as "missing", so it should not be left blank.
- A standardized evaluation methodology for data quality across various data types needs to be established by the respective organizations.
- As a system-side quality management, implementation of validation checks (character types, digit counts, formats, etc.) and display in graph format aid in identifying data anomalies are needed.

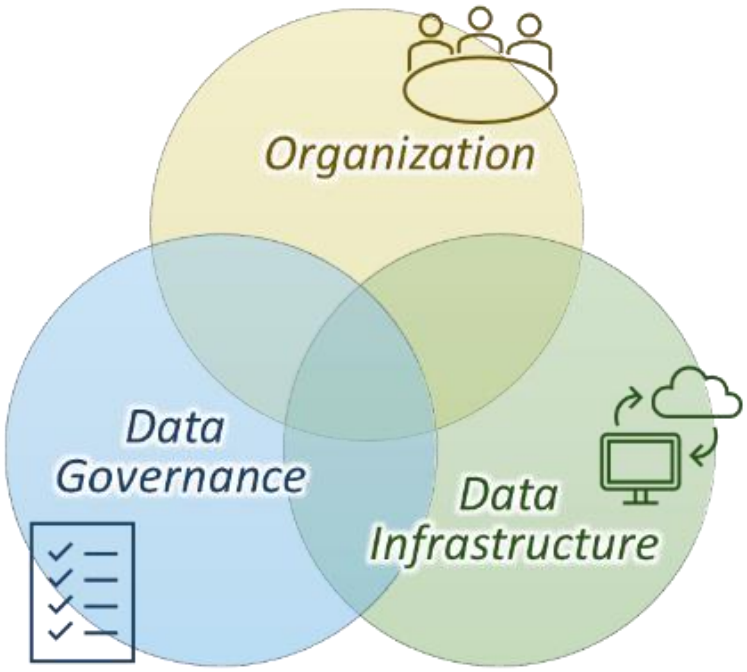
(4) Data Utilization

- As the next step after data accumulation and publication, efforts should be made to promote data utilization. This includes presenting potential use cases tailored to specific user groups, such as academic institutions for environmental monitoring data and tourism businesses for tourism-related data.

- In the future, it is desirable to expand the scope of data utilization by linking with other relevant systems, enabling both the acquisition and provision of data.

6.6.2 Recommendations for Data Management

Building on the Smart City Roadmap finalized in 2023 and considering the lessons learned from the pilot project conducted in 2023–2024 for the development of SSDaP, recommendations for improving data management are provided. These recommendations aim to enhance the overall approach to data management by focusing on three key aspects: organization, data infrastructure and data governance, as shown in Figure 6.6.1.



Source: Nippon Koei Co., Ltd.

Figure 6.6.1: Three Aspects of Data Management

(1) Recommendations for Organization

1) Investment in IT Human Resources Development

- Developing personnel with IT skills plays a crucial role in managing and operating data within smart city-related systems.
- In the short term, outsourcing system operations and maintenance to contractors could be effective, while technology transfer over time may help internalize these tasks in the long term.

2) Securing Sustainable Funding

- To ensure the stable operations and maintenance of systems, it is important to allocate planned budgets within the provincial framework.

3) Strengthening Interdepartmental Coordination

- Advancing data development and utilization may benefit from SRPA's collaboration with provincial departments under a unified framework. This might involve setting up data-sharing protocols and holding regular coordination meetings.

(2) Recommendations for Data Governance

1) Establishing ICT-Related Policies

- Provincial-level information security policies aligned with national guidelines, such as MPTC policies, would provide a solid foundation.
- Developing system operation guidelines, including standardized manuals, could help clarify responsibilities and procedures for system operators, such as handling system failures.

2) Developing Data Management Rules

- Defining standards for data collection, storage, sharing, and deletion could enhance governance, with regular audits ensuring compliance with these standards.
- Departments responsible for specific data sectors might establish data quality standards, while provincial guidelines provide the overall framework.

(3) Recommendations for Data Infrastructure

1) Cloud Infrastructure Utilization and Transition

- The current use of private cloud services can be continued; however, transitioning to MPTC's government cloud is recommended once it becomes available in 2026.
- Future system designs that emphasize flexibility and cloud compatibility, including standardized APIs, could facilitate this transition.

2) Enhancing Network Infrastructure

- Collaborating with MPTC on national network infrastructure initiatives could enhance infrastructure utilization at the provincial level.
- Strengthening network connectivity among provincial departments, potentially with supplementary infrastructure at the provincial level, could also be considered.

3) Establishing Data Backup Systems

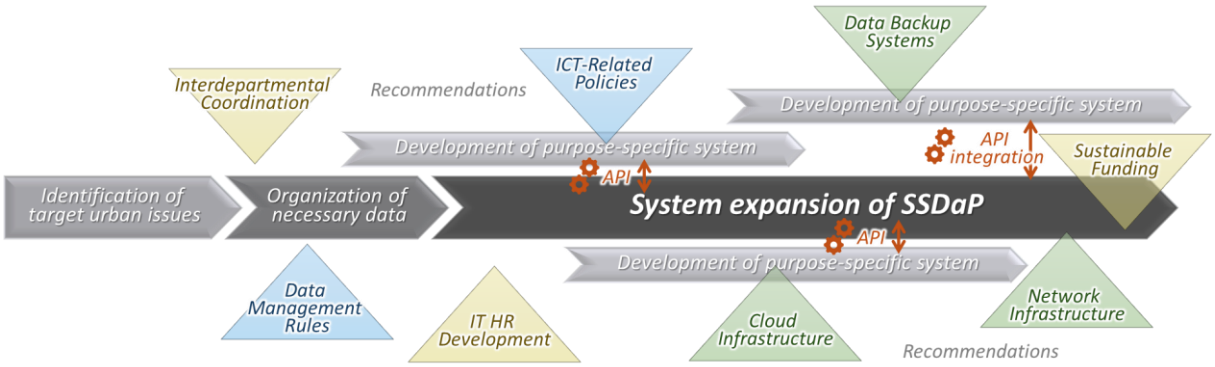
- A combination of on-premise and cloud-based backup solutions might effectively mitigate data loss risks.
- Regular backup operations and data redundancy measures would be key to maintaining data security.

6.6.3 Immediate Actions for Implementing the Recommendations

(1) Implementing Recommendations through SSDaP Expansion

When implementing the recommendations moving forward, one possible approach is to proceed with the system expansion of SSDaP as the central focus, as illustrated in Figure 6.6.2.

As the first step, the identification of the urban issues to be addressed shall be conducted. Based on this, the necessary data for solving those issues should be organized. Once the necessary data and their use are clarified, the recommendations can be more easily translated into action through the process of improving SSDaP and developing purpose-specific systems.



Source: Nippon Koei Co., Ltd.

Figure 6.6.2: Implementing Recommendations through SSDaP Expansion

(2) Opportunities for SSDaP Expansion

1) Clarifying System Design

It is essential to understand that the Smart City Data Platform serves as a "data circulation infrastructure". To enhance citizen services, it is necessary to develop separate systems focused on specific objectives, such as disaster alerts or traffic info services, in addition to SSDaP.

In this approach:

- SSDaP plays a central role, supplying data via APIs to external systems or applications.
- SSDaP acts as a foundational infrastructure, enabling multiple services and stakeholders to benefit in parallel.

Source: Nippon Koei Co., Ltd.

Figure 6.6.3: Relationship between SSDaP and Related Systems/Applications

2) Integrating New Data Sources

As a Smart City Data Platform, SSDaP is expected to contribute to solving urban issues. Incorporating new data sources is desirable in alignment with the four pillars of the sectoral approach outlined in the Roadmap. Key actions include:

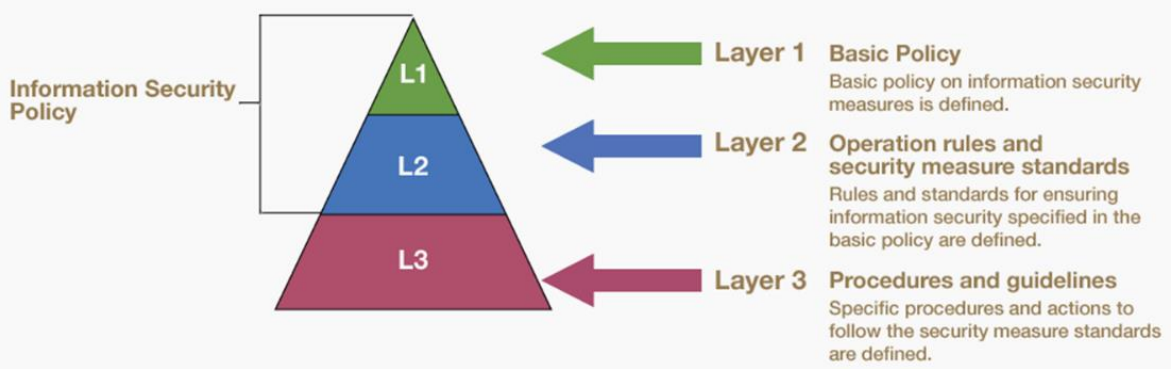
- Identify the required data items for citizen services.
- Considering the development of new data by installing observation equipment, rather than relying solely on existing data. Citizen-participatory data collection may also be an option.
- Strengthen coordination with existing external systems to acquire relevant data, such as those from government agencies and private companies.

3) Data Security and Privacy Measures

As the scope of data expands and the use of personal data may increase, it is essential to establish security policies and governance frameworks, as shown in Figure 6.6.4.

- SRPA is expected to develop a provincial information security policy, aligned with the national policies led by MPTC.
- MPTC has already drafted relevant regulations and is currently in the stage of internal discussions. It is important to stay updated on this progress.

Based on these frameworks, SSDaP functionalities should be enhanced as necessary to meet operational and security requirements.



Source: Doshisha University (https://www.doshisha.ac.jp/en/information_security_policy/index.html)

Figure 6.6.4: Information Security Policy

Siem Reap Provincial Administration

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap

Project Completion Report

Annex (II)
List of Products Produced by the Project

May 2025

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

Product 1: Presentation Material for the 1st Joint Coordination Committee Meeting

Product 2: Presentation Material for the 2nd Joint Coordination Committee Meeting

Product 3: Presentation Material for the 3rd Joint Coordination Committee Meeting

Product 4: Presentation Material for the 4th Joint Coordination Committee Meeting

Product 5: Presentation Material for the 5th Joint Coordination Committee Meeting

Product 6: Presentation Material for the 6th Joint Coordination Committee Meeting

Product 7: Presentation Material for the 7th Joint Coordination Committee Meeting

Product 8: Siem Reap Smart City Roadmap

Product 9: Siem Reap Smart City Consortium Members List

Product 10: Draft Articles of Incorporation of the Siem Reap Smart City Consortium

Product 11: Outline of the 1st Round of Pilot Projects (Initial Pilot Project Action Plan) (Pilot Project (1) ~ (6))

Product 12: Outline of the Additional Pilot Projects (Initial Pilot Project Action Plan) (Pilot Project (7) ~ (8))

Product 13: Pilot Project Report (Pre-Pilot Project)

Product 14: Pilot Project Report (Illegal Parking Monitoring)

Product 15: Pilot Project Report (Smart Waste Collection and Transportation)

Product 16: Pilot Project Report (Tourism Statistics Digitalization)

Product 17: Pilot Project Report (Government Internal Document Management)

Product 18: Pilot Project Report (Environment Monitoring)

Product 19: Pilot Project Report (Public Private Tourism Collaboration)

Product 20: Pilot Project Report (Data Platform System Development)

Product 21: Pilot Project Monitoring Sheet

Product 22: Pilot Project Implementation Manual

Product 23: MoU between GIZ and the JICA Project

Product 24: Draft Smart City Annual Action Plan 2023

Product 25: Draft Smart City Annual Action Plan 2024

Product 26: Draft Smart City Annual Action Plan 2025

Product 27: Draft Smart City Annual Action Plan 2026

Product 28: Terms of Reference for the Smart City Secretariat

Product 29: Siem Reap Smart City Project Pamphlet

Product 30: Siem Reap Smart City Project Movie

Product 31: MoU between Takamatsu and Siem Reap

Product 32: Report on the Expansion of the Pilot Project (Smart Waste Collection and Transportation)

Product 33: Report on the Expansion of the Pilot Project (Government Internal Document Management)

Product 34: Report on the Expansion of the Pilot Project (Data Platform System Development)

Product 35: Students' PoC Final Report (Tourism Foresight)

Product 36: Students' PoC Final Report (Pedestrian Safety)

Product 37: Smart City Model PoC Project Final Report (Smart Axiata Co., Ltd)

Product 38: Smart City Model PoC Project Final Report (Forval (Cambodia) Co., Ltd)

Product 39: 本邦研修「シェムリアップにおけるスマートシティアプローチ実装」実施報告書

Product 40: Training Completion Report on Training on the IT Passport Course

Siem Reap Provincial Administration

Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap

Project Completion Report

Annex (III)
Project Design Matrix (All Versions)

May 2025

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

1. Project Design Matrix (Project Monitoring Sheet I Version 1, dated 31st May 2022)

Project Monitoring Sheet I (Revision of the Project Design Matrix)

Version 1
Dated 31st May 2022

Project Title: Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap
Implementing Agency: Government of Siem Reap Provincial Administration
Target Group: Citizens and tourist in Siem Reap; Private sector in Cambodia
Period of Project: 3 years (May 2022- April 2025)
Project Site: Siem Reap

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions	Achievement	Remarks
Overall Goal A better urban environment in Siem Reap is realized through Smart City Approach	**(tentative)** (1) Satisfaction score of Citizen/tourist to Siem Reap (2) Index related to smart city (to be determined in phase 1; no. of tourists, environmental indicators, traffic congestion, etc.)	**(tentative)** (1) Official documents prepared by related agencies (2) Statistics report, Interviewing and questionnaire			
Project Purpose Smart City Approach will be implemented to solve urban issues in Siem Reap	**(tentative)** (1) Pilot projects related to smart cities are implemented. (2) The indicator related to the pilot project will be improved (indicators will be determined in the phase I)	**(tentative)** (1) Questionnaire to officials (2) Periodical Statistic report	Smart city promotion in Siem Reap is maintained		
Outputs	**Objectively Verifiable Indicators**	**Means of Verification**	**Important Assumptions**	**Achievement**	**Remarks**
1: Smart City Approach is formulated and cooperation among relevant organizations is established	**(tentative)** (1) Smart city roadmap is approved by an authority (identified in phase 1) (2) Seminars for Siem Reap officials on the smart city roadmap are held. (3) An effort to establish a coordination and cooperation mechanisms	**(tentative)** • Minutes of meetings of the JCC meeting • Project Progress Report • Periodical Publication of Siem Reap	No large-scale (substantial) reorganization or reshuffle of the personnel of the counterpart institutions occur.		
2: Implementation process of Smart City Approach is established through trial measures to solve urban issues	**(tentative)** (1) Pilot projects are implemented. (2) An analytical report (issues-solutions-actors-relationships) will be prepared	**(tentative)** • Project Progress Report • Report of Pilot project and the roadmap			

1

Project Monitoring Sheet I (Revision of the Project Design Matrix)

3: Establishment of monitoring and evaluation system of Smart City Approach	**(tentative)** (1) The function of one-stop contact point is established in Siem Reap province (2) Capacity development measures prepared by Project are implemented	**(tentative)** • Report of Pilot project and the roadmap • Capacity development program • Organizational structure of Siem Reap		-	-

Activities	Inputs				
	Japanese side	Cambodian side			
Output 1: <Phase 1> • 1-1: Review of smart city related organizations and analysis of their issues. • 1-2: Formulation and finalization of the roadmap • 1-3: Consideration of coordination and cooperation mechanisms necessary to implement the roadmap <Phase 2> (tentative) • 1-4: Establishment and operation of coordination and cooperation mechanisms • 1-5: Suggestion of legal and institutional improvements for promoting smart cities	1) Dispatch of Experts ➢ Chief Adviser/ Project Management (long term) ➢ Smart City/ Urban management/ Project coordination (long term) ➢ Smart technology / PPP ➢ Finance and Project Planning ➢ Pilot project planning and implementation 2) Training ➢ Training programs in Japan related to smart city 3) Machinery and Equipment ➢ To be decided in the phase 1.	1) Assignment of Counterpart personnel and relevant travel costs 2) Provision of adequate office space and facilities (electricity, water supply, air conditioning) for the project team ➢ Office space in Siem Reap Provincial Hall 3) Provision of available data information ➢ GIS data etc. 4) Issuance of official documents for project implementation ➢ Letters ➢ Free pass for heritage area	Pre-conditions ➢ Cambodian side assigns proper counterpart personnel and budget for the Project in accordance with the membership (in the R/D). ➢ Siem Reap Provincial Hall coordinates with stakeholders of the Project. ➢ Experts are able to have access in heritage area		
Output 2: <Phase 1> • 2-1: Identification of the pilot projects to be implemented • 2-2: Reviewing of lessons learned from the pilot project implemented in the data collection survey. • 2-3: Analysis on issues-solutions-actors-relationships <Phase 2> (tentative) • 2-4: Implementation of pilot projects based on roadmap					
Output 3: <Phase 1> • 3-1: Implementation of capacity assessment (organizations, individuals, infrastructure) and consideration of capacity development program					

2

Project Monitoring Sheet I (Revision of the Project Design Matrix)

• 3-2: Support to draft the ToR, roles and responsibility for the Smart city office which will be opened in Siem Reap • 3-3: Establishment of a one-stop contact point for strengthening private-sector collaboration, etc. • 3-4: Knowledge sharing with various stakeholders <Phase 2> (tentative) • 3-5: Implementation of capacity development program • 3-6: Systematization of operation of one-stop contact point		5) Information and support for access to medical services ➢ Measures for COVID-19			

3

2. Project Design Matrix (Project Monitoring Sheet I Version 4, dated 31st August 2023)

Project Monitoring Sheet I (Revision of the Project Design Matrix)

Version 4
As of 31st August 2023

Project Title: Project for Implementation of Smart City Approach to Solve Urban Issues in Siem Reap
Implementing Agency: Government of Siem Reap Provincial Administration
Target Group: Citizens and tourist in Siem Reap; Private sector in Cambodia
Period of Project: 3 years (May 2022- April 2025)
Project Site: Siem Reap

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions	Achievement	Remarks
Overall Goal A better urban environment in Siem Reap is realized through Smart City Approach	Indicator 1: Urban Environment indicators (number of tourists, environmental indicators, traffic congestion, etc.) Indicator 2: Implementation of Smart City Projects				
Project Purpose Smart City Approach will be implemented to solve urban issues in Siem Reap	Indicator 1: Continuous updates of the Smart City Annual Action Plan Indicator 2: Implementation of Smart City Pilot Projects in line with Siem Reap Smart City Roadmap		Smart city promotion in Siem Reap is maintained		
Outputs	**Objectively Verifiable Indicators**	**Means of Verification**	**Important Assumptions**	**Achievement**	**Remarks**
1. The Smart City Roadmap is formulated and cooperation among relevant organizations is established	Indicator 1: Approval of the Siem Reap Smart City Roadmap by Siem Reap Provincial Administration Indicator 2: Formulation of effective implementation structures in which the roles of each smart city-related organization are effectively considered	• Letter of approval from the governor of Siem Reap Province • Implementation structure diagram	No large-scale (substantial) reorganization or reshuffle of the personnel of the counterpart institutions occur.	• Siem Reap Smart City Roadmap is approved in the 3rd project JCC meeting held in March 2023	
2: Implementation process of Smart City Approach is established through trial measures to solve urban issues	Indicator 1: Formulation of a Smart City Annual Action Plan of priority projects proposed in the Smart City Roadmap Indicator 2: Formulation of action plans for pilot projects to contribute to improving the urban environment	• The Smart City Annual Action Plan of the Smart City Roadmap • The action plan of pilot projects			
3: Establishment of monitoring and evaluation system of Smart City Approach	Indicator 1: Establishment of the monitoring structure of the Smart City Annual Action Plan Indicator 2: Holding meetings to monitor the Smart City Annual Action Plan Indicator 3: Examination and Implementation of countermeasures to reflect on the monitoring situation	• Monitoring Sheets of Pilot Projects • Report of Pilot Projects implementation • Pilot project implementation manual			
4. Promotion of the implementation of the Smart City Approach	Indicator 1: Advices on National Smart City Policy/Guideline Indicator 2: Advices on Data Management for the Smart City Approach	• The minutes of meetings of the Joint Coordination Committee • Monitoring Sheets		• Input to National Smart City Roadmap has been conducting. Also, the persons in charge of the national smart city policy have been involved to the projects' CD program.	

Project Monitoring Sheet I (Revision of the Project Design Matrix)

Activities	Inputs				
	Japanese side	Cambodian side			
Output 1: <Phase 1> • 1-1: Analysis of the issues of smart-city-related organizations • 1-2: Examination on coordination and cooperation mechanisms necessary to implement the Siem Reap Smart City Approach • 1-3: Formulation and finalization of the Siem Reap Smart City Roadmap <Phase 2> • 1-4: Establishment and operation of coordination and cooperation mechanisms • 1-5: Suggestions of legal and institutional improvements for promoting smart cities	1) Dispatch of Experts ➢ Chief Advisor / Project Management (long term) ➢ Smart City / Urban management/ Project coordination (long term) ➢ Smart technology / PPP ➢ Finance and Project Planning ➢ Pilot project planning and implementation / branding / training	1) Assignment of Counterpart personnel and relevant travel costs 2) Provision of adequate office space and facilities (electricity, water supply, air conditioning) for the project team ➢ Office space in Siem Reap Provincial Hall 3) Provision of available data	Pre-conditions ➢ Cambodian side assigns proper counterpart personnel and budget for the Project in accordance with the membership (in the R/D). ➢ Siem Reap Provincial Hall coordinates with stakeholders of the Project. ➢ Experts are able to have access in heritage area		
Output 2: <Phase 1> • 2-1: Reflection on lessons learned from the pilot project implemented in the data collection survey.					

Project Monitoring Sheet I (Revision of the Project Design Matrix)

• 2-2: Formulation of the Smart City Annual Action Plan • 2-3: Selection of pilot projects based on the Smart City Annual Action Plan and the preparation of action plan for pilot projects • 2-4: Analysis on issues-solutions-actors-relationships <Phase 2> • 2-5: Implementation of pilot projects	➢ Data management ➢ Waste collection Improvement 2) Training ➢ Training programs in Japan related to smart city 3) Machinery and Equipment ➢ Machinery and Equipment to be used in the pilot projects	information ➢ GIS data etc. 4) Issuance of official documents for project implementation ➢ Letters ➢ Free pass for heritage area 5) Information and support for access to medical services ➢ Measures for COVID-19			
Output 3: <Phase 1> • 3-1: Support to draft the ToR, roles and responsibilities for the Smart City office within Siem Reap Province Office <Phase 2> • 3-2: Monitoring and analysis of pilot projects by Smart City related organizations • 3-3: Drafting the Smart City Annual Action Plan for the following year based on the monitoring and analysis					
Output 4: <Phase 1> • 4-1: Implementation of capacity assessment (organizations, individuals, infrastructure) and consideration of capacity development program • 4-2: Public Relations and Branding • 4-3: Promotion for City-to-City Collaborations <Phase 2> • 4-4: Implementation of capacity development programs • 4-5: Recommendations on National Smart City Policy/Guideline • 4-6: Recommendations on Data Management (Organizations, infrastructure, management)					

3