Implementation for Knowledge Co-Creation Program “Practical Technology on Intelligent Transport Systems (ITS) ” and Trend Survey

Final Report (Abridged Version)

July 2025

Japan International Cooperation Agency (JICA)

Nippon Koei Co., Ltd.

East Nippon Expressway Co., Ltd.

ALMEC Corporation

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Abbreviations

Abbreviation	Full Name
AI	Artificial Intelligence
AGEROUTE	The Road Management Agency (Agence de Gestion des Routes)
ANSUT	National Agency for Universal Telecommunications- ICT Service (Agence Nationale du Service Universel des Telecommunications)
AMUGA	Urban Mobility Authority for Greater Abidjan (Autorité de la Mobilité Urbaine dans le Grand Abidjan)
BAD	African Development Bank (Banque Africaine de Développement)
BRT	Bus Rapid Transit
CCAM	Cooperative Connected and Automated Mobility
CCTV	Closed-circuit Television
C-ITS	Cooperative Intelligent Transport System
CTO	Chief Technical Officer
C-V2X	Cellular V2X
DITT	Directorate of Infrastructure, Transport and Topography (Direction des Infrastructures, des Transports et de la Topographie)
DIGESETT	General Directorate of Traffic Safety and Land Transport (Dirección General de Seguridad de Tránsito y Transporte Terrestre)
DGTTC	General Directorate of Land Transport and Traffic (Direction Générale des Transports Terrestres et de la Circulation)
DRVN	Directorate for Roads of Vietnam
DSRC	Dedicated Short Range Communication
DULT	Directorate of Urban Land Transport
EU	European Union
ETC	Electronic Toll Collection
ERTICO	European Road Transport Telematics Implementation Coordination
ERP	Electronic Road Pricing
EV	Electric Vehicle
EXAT	Expressway Authority of Thailand
FER	Road Maintenance Funds (Fonds d'Entretien Routier)
FIMOVIT	Mobility and Transportation Trust Fund (Fideicomiso de Movilidad y Transporte)
FITRAM	Trust for the Development of the Mass Transit System (Fideicomiso para el Desarrollo del Sistema de Transporte Masivo)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HOV	High-Occupancy Vehicle
IBTTA	International Bridge, Tunnel and Turnpike Association
ICT	Information Communication Technology
INTEC	Santo Domingo Institute of Technology (Instituto Tecnológico de Santo Domingo)
INTRANT	National Institute of Transit and Land Transportation (Instituto Nacional de Tránsito y Transporte Terrestre)
IT	Information Technology
ITARDA	Institute for Traffic Accident Research and Data Analysis

Abbreviation	Full Name
ITS	Intelligent Transport Systems
JICA	Japan International Cooperation Agency
KGM	General Directorate of Highways (Karayolları Genel Müdürlüğü)
JARTIC	Japan Road Traffic Information Center
LA	Los Angeles
LADOT	Los Angeles Department of Transportation
LiDAR	Light Detection and Ranging
MaaS	Mobility as a Service
MC	Master of Ceremonies
MCC	Millennium Challenge Corporation
MEER	Ministry of Road Infrastructure and Maintenance (Ministère de l'Équipement et de l'Entretien Routier)
MEPYD	Ministry of Economy, Planning and Development (Ministerio de Economía, Planificación y Desarrollo)
MiCEN	Ministry of Communication and Digital Economy (Ministère de la Communication et de l'Économie Numérique)
MLFF	Multi-Lane Free Flow
MMDA	Metropolitan Manila Development Authority
MOC	Ministry of Communication
MOI	Ministry of Interior
MOPC	Ministry of Public Works and Communications (Ministerio de Obras Públicas y Comunicaciones)
MOT	Ministry of Transport
MPWT	Ministry of Public Works and Transport
NDA	Non-disclosure Agreement
NEC	Nippon Electric Company
NEXCO	Nippon Expressway Company
NK	Nippon Koei
ODA	Official Development Assistance
OMSA	Metropolitan Bus Service Office (Oficina Metropolitana de Servicios de Autobuses)
OPRET	Transportation Reorganization Office (Oficina para el Reordenamiento del Transporte)
OSER	Office of Road Safety (Office de Sécurité Routière)
PPP	Public-Private Partnership
PSSR	Special Police for Road Safety (Police Spéciale de la Sécurité Routière)
PTUA	Abidjan Urban Transport Project (Projet de Transport Urbain d'Abidjan)
RDA	Road Development Authority
RFID	Radio Frequency Identifier
RTDA	Rwanda Transport Development Agency
SETEC	Société d'Études Techniques et ÉConomiques
SI	System Integration
SDUGA	Project for the Development of the Urban Master Plan in Greater Abidjan (Projet pour l'développement du Schéma Directeur d'Urbanisme du Grand Abidjan)

Abbreviation	Full Name
SDUGA2	Project for the Operationalization of Urban Master Plan in Greater Abidjan (Projet pour l'opérationnalisation du Schéma Directeur d'Urbanisme du Grand Abidjan)
SOCOPRIM	Bridge Concession Company (Société Concessionnaire du Pont)
SOTRA	Abidjan Transport Company (Société des Transports Abidjanais)
TCC	Traffic Control Center
UAV	Unmanned Aerial Vehicle
UASD	Autonomous University of Santo Domingo
UXD	User Experience Design
V2X	Vehicle-to-Everything
VICS	Vehicle Information and Communication System Center
VMS	Variable Message Sign
VTS	Variable Traffic Sign
4G	4th Generation Mobile Communication System

1 Introduction

1.1 Background and Objectives

Since 2013, Japan International Cooperation Agency (JICA) has launched a training program on ITS, Knowledge Co-Creation Program (KCCP) “Practical Technology on Intelligent Transport Systems (ITS)” and many trainees have participated by far.

From the countries participating in the training and the number of trainees, the attention and interest in ITS technology is increasing, and the knowledge of the trainees has been improved remarkably with each training session. Furthermore, supports according to the situation of each country for ITS maintenance, operation and maintenance is indispensable, and the importance of follow-up missions is enhancing the training outcomes.

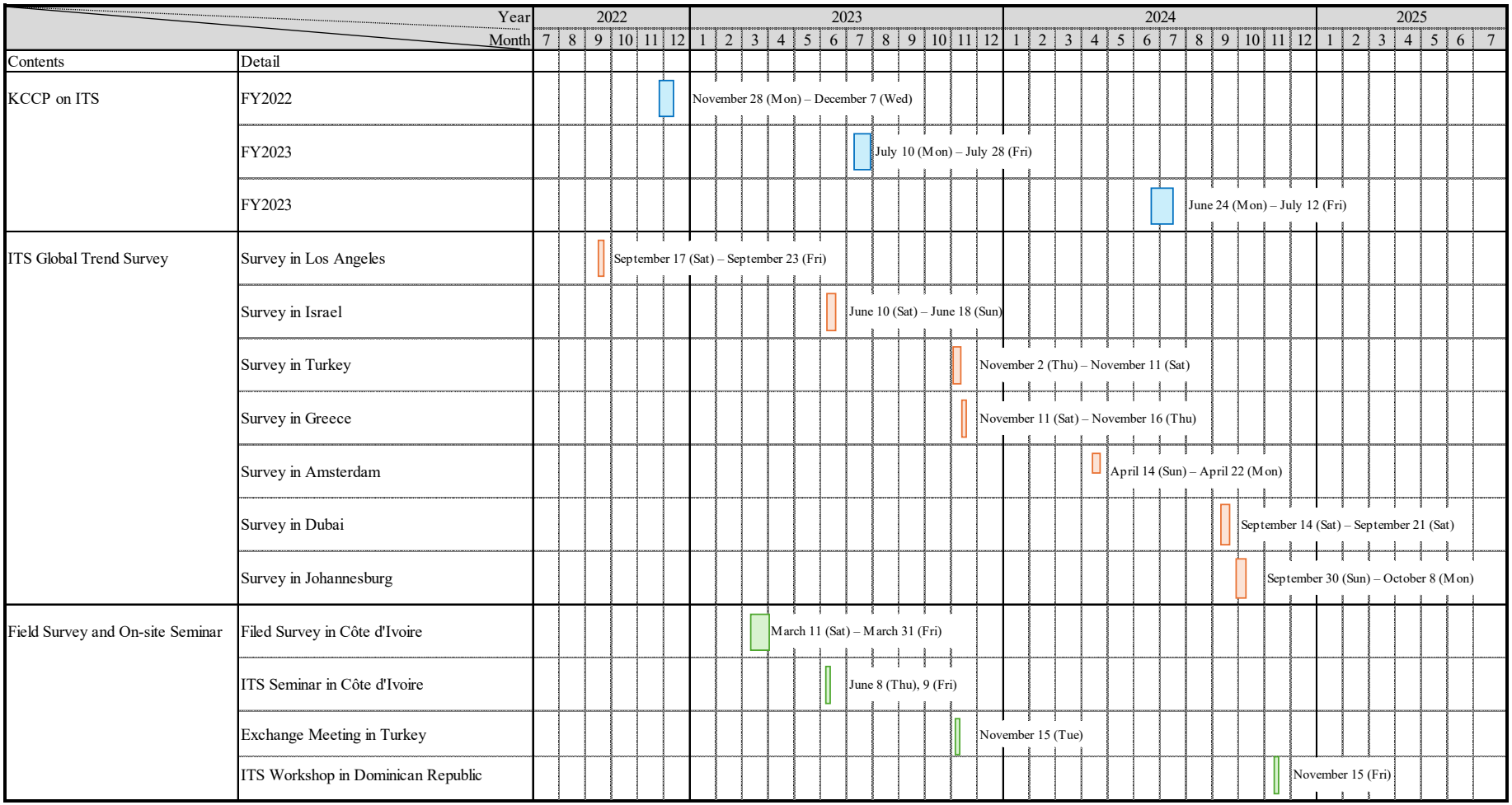
The consultant team supports the implementation of the training and conducts the follow-up missions after the training. It also includes research activities on ITS and global trends aiming to provide support and to improve the quality of KCCP on ITS implementation.

1.2 Scope of Work and Work Schedule

KCCP is designed to contribute to solving development challenges faced by developing countries through the transfer of Japan’s knowledge and experience. This work corresponds to one such program—namely, Practical Technology on ITS (hereinafter referred to as "training").

In addition, the work includes follow-up missions and research activities on ITS trends in partner countries. These involve field surveys to identify local transport issues and ITS-related needs, to organize local seminars to disseminate ITS technologies and expertise, and to investigate global ITS initiatives and emerging technologies as part of the research.

This work encompasses the full cycle of activities: supporting and managing the training, conducting follow-up missions and research activities on ITS trend in partner countries, and investigating global ITS trends. The work schedule is shown below.



(Source: JICA Study Team)

Figure 1-1 Work Schedule

2 KCCP on ITS

2.1 Outline of KCCP on ITS FY2022

2.1.1 Objectives

The objectives of this training are as follows:

1. To strengthen the capacity of government officials in participating countries by providing fundamental knowledge on ITS and their effective implementation.
2. To offer opportunities for trainees to gain insight into addressing transport-related challenges and introducing ITS through information sharing, and discussions with fellow trainees from other countries.
3. To facilitate networking among trainees through these activities.

2.1.2 Method

The training for FY2022 was conducted in an online format due to the continued impact of the COVID-19 pandemic since FY2020.

2.1.3 Participating Trainees

The trainees in FY2022 are listed in Table 2-1. A total of 10 participants were selected from 8 countries.

Table 2-1 Participating Trainees in KCCP on ITS FY2022

No.	Name		Country	Organization / Position
1	[redacted]	NIMBA Gow Ange Theodore (Mr.)	Côte d'Ivoire 	Mobility Organizing Authority for Greater Abidjan (AMUGA) Head of IT & Innovation, Direction of Planning and Studies, IT & Innovation Department
2	[redacted]	MOTONGA Emmanuel Saidimu (Mr.)	Kenya 	Kenyan Urban Road Authority (KURA) ITS Officer, Urban Traffic Management and Road Safety
3	[redacted]	SEREM Kenneth Kiprop (Mr.)	Kenya 	Kenyan Urban Road Authority (KURA) ITS Officer, Urban Traffic Management and Road Safety

No.	Name		Country	Organization / Position
4	[redacted]	KURIA Daniel Gikeri (Mr.)	Kenya 	Kenyan Urban Road Authority (KURA) ITS Officer, Urban Traffic Management and Road Safety
5	[redacted]	GANBOLD Odtuya (Ms.)	Mongolia 	The Capital City Governor's Office Specialist of Financial Statement and Training, Finance and Treasure Department
6	[redacted]	EGBOGBO Philip Onome (Mr.)	Nigeria 	Transport Secretariat, Federal Capital Territory Administration (FCTA) Head, Mechanical Maintenance, Abuja Rail Mass Transit
7	[redacted]	VALERIO Mc Jefferson (Mr.)	Philippines 	Provincial Government of Bataan Project Development Officer Ⅳ, Special Projects Division, Provincial Planning and Development Office
8	[redacted]	DAFFA George Leonard (Mr.)	Tanzania 	Tanzania National Roads Agency Manager of Road Safety Department, Directorate of Infrastructure Planning
9	[redacted]	OKOLONG JOSEPH (Mr.)	Uganda 	Kampala Capital City Authority (KCCA) Electrical Engineer, Directorate of Engineering and Technical Services

No.	Name		Country	Organization / Position
10	[redacted]	Vo Truong Giang (Mr.)	Vietnam 	Road Management Bureau No. 2, Directorate for Roads of Vietnam (DRVN) Head of Branch, Road Management Branch Ⅱ. 3

(Source: JICA Study Team)

2.1.4 Program

The program is listed in Table 2-2.

Table 2-2 Program for KCCP on ITS FY2022

Date	Time (JST)	Format	Contents	Presenting Organization
Nov. 28 (Mon.)	17:00 ～ 17:40		Program Orientation	JICA Tokyo Consultant Team
	17:45 ～ 18:20	Lecture	JICA's Cooperation on ITS	JICA
	18:30 ～ 20:00	Presentation	Country Report Presentation	Consultant Team
Nov. 29 (Tue.)	17:00 ～ 17:55	Presentation	Country Report Presentation	Consultant Team
	18:00 ～ 18:55	Discussion	Introduction to ITS	The University of Tokyo
	19:00 ～ 20:00	Lecture	Fundamentals of Traffic Engineering & Traffic Management	The University of Tokyo
Nov. 30 (Wed.)	17:00 ～ 18:15	Discussion	Group Discussion	Consultant Team
	18:25 ～ 19:30	Lecture	ITS Planning and Important Considerations for Planning and Implementation	Consultant Team
	19:35 ～ 20:00	Lecture	Guidance on Action Plan Preparation and Presentation	Consultant Team
Dec. 1 (Thu.)	17:00 ～ 17:55	Lecture	Funding and Maintaining ITS	JICA
	18:00 ～ 18:40	Lecture	ITS Technologies and Practices (1) 【Traffic Signal Control】	Nippon Signal
	18:50 ～ 20:00	Presentation	Examples of ITS Practices	Consultant Team
Dec. 2 (Fri.)	17:00 ～ 20:00	Practical Exercises	Consultation for Action Plan Preparation	Consultant Team
Dec. 3 (Sat.)			Holiday	
Dec. 4 (Sun.)			Holiday	
Dec. 5 (Mon.)	17:00 ～ 17:40	Lecture	ITS Technologies and Practices (2) 【ICT on Public Transportation】	NEC Corporation
	17:45 ～ 18:25	Lecture	ITS Technologies and Practices (3) 【Image Analysis】	Future Standard
	18:35 ～ 20:00	Discussion	Rehearsal on Presentation of Action Plan (by Group)	Consultant Team
Dec. 6 (Tue.)	17:00 ～ 17:40	Lecture	ITS Technologies and Practices (4) 【Utilization of Mobile Big Data】	Location Mind
	17:40 ～ 17:55	Lecture	Global Trend of ITS Reported in ITS World Congress 2022	Consultant Team
	18:00 ～ 18:30	Lecture	ITS Practices Implemented in the Developing Countries Under Japanese ODA and Lessons Learned (1) 【Operation of Expressway System】	Road Development Authority - Sri Lanka
	18:30 ～ 19:00	Lecture	ITS Practices Implemented in the Developing Countries Under Japanese ODA and Lessons Learned (1) 【 Development Project for Traffic Management System】	Department of Public Works and Transport of Phnom Penh Capital Administration – Cambodia

Date	Time (JST)	Format	Contents	Presenting Organization
	19:10 ～ 20:00	Practical Exercises	Preparation and Consultations for Finalization of Action Plan ）	Consultant Team
Dec. 7 (Wed.)	17:00 ～ 19:30	Presentation	Action Plan Presentation	Consultant Team
	19:30 ～ 20:00		Evaluation Meeting and Closing Ceremony	JICA JICA Tokyo The University of Tokyo Consultant Team

(Source: JICA Tokyo)

2.1.5 Summary of KCCP on ITS FY2022

The objectives of the online training were reviewed and summarized in Table 2-3 taking into account the outcomes of the previous year's online training as well as feedback and reflections shared during the debriefing meeting.

Table 2-3 Achievement Status of the Training Objectives in FY2022

Objectives	Level of Achievement	What Was Achieved	What Was Not Achieved and Reasons
Supporting the capacity development of government officials in participating countries through learning fundamental knowledge on ITS and their effective implementation.	80%	● A broad and comprehensive training program was structured within an eight-day (effectively seven-day) course. ● By limiting the daily sessions to three hours, it was possible to incorporate a greater number of relevant topics. ● Lectures utilizing video materials were conducted to enhance participants' understanding.	● As the themes could not be narrowed down, new video materials were not produced. Instead, videos created in previous years were reused.
Providing opportunities to gain insights into solving transport challenges and promoting the introduction of ITS through information sharing and discussions with trainees from other countries.	70%	● A collaborative training session using Google Jamboard was introduced to explore methods for improving communication in online settings and to enhance the overall quality of online training. ● An action plan template (Google Slides) was distributed in advance to ensure a consistent level of	● Due to time overruns in some lecture sessions, several discussions and group work activities had to be canceled. ● As the training was conducted online, unlike in-person programs in Japan, there were no opportunities for informal communication

Objectives	Level of Achievement	What Was Achieved	What Was Not Achieved and Reasons
		quality across trainees' presentation materials. ● Various measures were taken to promote interactive lectures, such as assigning pre-session tasks.	outside of scheduled hours.
Providing networking opportunities through these activities.	40%	● Although time was limited, a minimum level of networking was successfully established. ● In particular, strong networks were formed with trainees and relevant institutions from the local survey target country, Côte d'Ivoire. ● Networking was also facilitated through tools such as WhatsApp, which enabled continued exchange of opinions throughout the training.	● Unlike in-person programs, the limited duration of the training was insufficient to fully develop deeper relationships among trainees and stakeholders. ● Similarly, the absence of shared daily experiences during the training made it difficult to foster stronger personal bonds. ● Certain limitations were felt in terms of online communication.

(Source: JICA Study Team)

2.2 Outline of KCCP on ITS FY2023

2.2.1 Objectives

The objectives of this training, the same as in FY2022, are as follows:

1. To strengthen the capacity of government officials in participating countries by providing fundamental knowledge on ITS and their effective implementation.
2. To offer opportunities for trainees to gain insight into addressing transport-related challenges and introducing ITS through information, sharing and discussions with fellow trainees from other countries.
3. To facilitate networking among trainees through these activities.

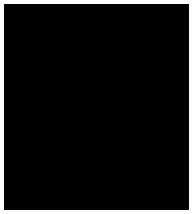
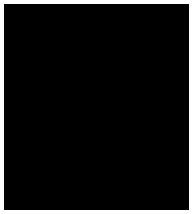
2.2.2 Method

The training in FY2023 was conducted as an in-person program in Japan after several years of online delivery due to the COVID-19 pandemic.

2.2.3 Participating Trainees

The trainees who participated in the training in FY2023 are listed in Table 2-4. One trainee was selected from each country, totaling 12 trainees.

Table 2-4 Participating Trainees in KCCP on ITS FY2023

No.	Name	Country	Organization / Position
1	 LAK Sivcheng (Ms.)	Cambodia 	Officer at Public Lighting and Traffic Signal Office, Department of Public Works and Transport of Phnom Penh Capital, Ministry of Public Works and Transport (MPWT)
2	 ISMAIL Alaa Ismail Maher (Mr.)	Egypt 	Director of Road Research Department / Senior Traffic and Transportation Engineer, General Administration of Road Research, General Authority of Roads and Bridges, Ministry of Transport

No.	Name	Country	Organization / Position
3	[redacted] ABD AL HADI Lubna Mohammad (Ms.)	Jordan 	Head Of Section, Provincial Affairs Directorate, Land Transport Regulatory Commission
4	[redacted] Arbi Bin Suhadat (Mr.)	Malaysia 	Assistant Secretary, Land Division, Ministry of Transport (MoT)
5	[redacted] BUJINLKHAM Zolzaya (Ms.)	Mongolia 	Senior Engineer, Traffic Management and Planning Division, Traffic Control Center
6	[redacted] KALAUNEE Gyanendra Prasad (Mr.)	Nepal 	Engineer, Suryabinayak Dhulikhel Sindhuli Bardibas Road Project, Department of Roads
7	[redacted] ALANO Julieto (Mr.)	Philippines 	Engineer II, Traffic Engineering Center / Traffic Signal Operation and Maintenance Division, Metropolitan Manila Development Authority (MMDT)

No.	Name	Country	Organization / Position
8	[redacted] SHYIRAMBERE Vincent (Mr.)	Rwanda 	Specialist, Transport services and Asset management, RWANDA TRANSPORT DEVELOPMENT AGENCY (RTDA)
9	[redacted] MTUI Hilda Eliawon (Ms.)	Tanzania 	Civil Engineering, Directorate of Transport and Infrastructure, Ministry of Works and Transport (Transport)
10	[redacted] MAHAPO Piyapak (Mr.)	Thailand 	Engineer, Testing, Quality Control and Standard Development Section, Research and Development Div., Expressway Authority of Thailand（EXAT）
11	[redacted] OZER Yalcin (Mr.)	Türkiye 	Assistant Branch Manager (Chief Engineer of Intelligent Highways Systems), Intelligent Transportation Systems Branch/Traffic Safety Department, Ministry of Transportation and Infrastructure
12	[redacted] WAMBI Caxton (Mr.)	Uagnda 	Traffic Signal Engineer, Engineering and Technical Services, Kampala Capital City Authority（KCCA）

(Source: JICA Study Team)

2.2.4 Program

The program is listed in Table 2-5.

Table 2-5 Program for KCCP on ITS FY2023

Date	Time (JST)	Format	Contents	Presenting Organization
Jul. 10 (Mon.)	10:30 ～ 12:00		Briefing Session	JICA Tokyo
	13:30 ～ 14:45	Lecture	Program Orientation	JICA Tokyo
	15:00 ～ 16:00	Lecture	JICA's Cooperation on ITS	JICA
Jul. 11 (Tue.)	9:30 ～ 16:00	Presentation	Country Report Presentation	Consultant Team
	16:15 ～ 18:30	Discussion	Group Work 1	Consultant Team
Jul. 12 (Wed.)	9:30 ～ 11:00	Lecture	ITS Planning and Implementation	Consultant Team
	11:10 ～ 12:40	Lecture	Road Traffic Management （Role of Traffic Police in Japan ）	Japan Traffic Management Technology Association
	14:30 ～ 16:30	Site Visit	Introduction of Japan Road Traffic Information Center Initiatives	JARTIC
Jul. 13 (Thu.)	10:00 ～ 11:30	Lecture	World ITS Trends	Consultant Team
	13:00 ～ 14:00	Lecture	Introduction to ITS	The University of Tokyo
	14:10 ～ 16:00	Lecture	Stakeholders of ITS	The University of Tokyo
	16:10 ～ 17:40	Lecture	Digital Road Map	Japan Digital Road Map Association
Jul. 14 (Fri.)	9:30 ～ 11:00	Lecture	Fundamentals of Traffic Engineering & Traffic Management	The University of Tokyo
	11:10 ～ 12:40	Lecture	Lecture by an ODA implementing agency (Online)	Phnom Penh TMC
	13:40 ～ 15:10	Lecture	ITS Measures for Reducing Traffic Congestion & Improving Road Safety	Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
	15:30 ～ 17:00	Lecture	Investigating and Analyzing Traffic Accident Data	ITARDA
Jul. 15 (Sat.)	～		Holiday	
Jul. 16 (Sun.)	～		Holiday	
Jul. 17 (Mon.)	～		National Holiday	
Jul. 18 (Tue.)	10:00 ～ 12:00	Site Visit	General Technology	NEC
	13:00 ～ 14:00	Site Visit	Tokyo Bay Aqua Line Expressway （Umihotaru PA）	Consultant Team
	15:30 ～ 17:30	Lecture	Integration of Toll Settlement ETC Multipurpose Use Service	Sony Corporation ETC Solutions
Jul. 19 (Wed.)	9:30 ～ 11:00	Lecture	The role of public transportation in solving transportation problems and the utilization of ITS	The University of Tokyo
	11:10 ～ 12:40	Lecture	Frequency Policy	Ministry of Internal Affairs and Communications (MIC)
	13:40 ～ 15:10	Lecture	Introduction of ETC Systems in Overseas Countries	Mitsubishi Heavy Industries
	15:20 ～ 16:50	Lecture	Technical Cooperation Project Introduction: Examples of Utilizing Traffic Data (Online)	Consultant Team
Jul. 20 (Thu.)	9:30 ～ 11:00	Lecture	Data Utilization	The University of Tokyo
	11:10 ～ 12:40	Lecture	ITS Roadmap	Degital Agency
	13:40 ～ 15:55	Discussion	Group Work 2	Consultant Team
	16:10 ～ 17:40	Lecture	Utilization of financial resources and expertise in private funds	JICA
Jul. 21 (Fri.)	10:00 ～ 11:30	Site Visit	Introduction of Expressway Control Center (Iwatsuki) and Global Business	NECO East
	14:30 ～ 17:00	Site Visit	Nippon Signal Co., Ltd. Kuki Plant	Nippon Signal
Jul. 22 (Sat.)	～		Holiday	

Date	Time (JST)	Format	Contents	Presenting Organization
Jul. 23 (Sun.)	～		Holiday	
Jul. 24 (Mon.)	9:30 ～ 12:30	Discussion	Preparation of Action Plan	Consultant Team
	13:30 ～ 17:30	Site Visit	City tour + experience (TOD, public transportation, roadside equipment, etc.)	Consultant Team
Jul. 25 (Tue.)	10:00 ～ 12:30	Site Visit	Image Processing Technology	Canon
	15:00 ～ 17:30	Lecture	Data Platform and Associted Technology	Nissho Electronics
Jul. 26 (Wed.)	10:00 ～ 11:00	Site Visit	Tokyo Metropolitan Police Department Traffic Control Center	Tokyo Metropolitan Police Department (TMPD)
	13:00 ～ 17:00	Practical Exercises	Individual Consultation (Action Plan Finalization)	Consultant Team
Jul. 27 (Thu.)	9:30 ～ 16:00	Presentation	Action Plan Presentation	JICA
Jul. 28 (Fri.)	9:30 ～ 10:00	Lecture	Guidance on how to use the Action Plan and follow-up activities	JICA Consultant Team
	10:10 ～ 11:20		Evaluation Meeting	JICA Tokyo
	11:25 ～ 11:50		Closing Ceremony	JICA Tokyo

(Source: JICA Tokyo)

2.2.5 Summary of KCCP on ITS FY2023

The objectives achieved, as well as not achieved, were reviewed and summarized in Table 2-6. This assessment also reflects a comparison with the previous year's online training and incorporates feedback gathered during the post-training debriefing meeting.

Table 2-6 Achievement Status of the Training Objectives in FY2023

Objectives	Level of Achievement	What Was Achieved	What Was Not Achieved and Reasons
Supporting the capacity development of government officials in participating countries through learning of fundamental knowledge on ITS and their effective implementation.	90%	● Unlike the online lectures until last year, this year's training program was structured to comprehensively cover a wide range of ITS-related themes. ● By holding prior discussions with organizations such as JICA and the University of Tokyo, the program was well-balanced, including both universally essential topics and current trends.	● Efforts were made to avoid overlapping content, but it was not perfect due to some duplication in materials prepared independently by each lecturer. ● Some sessions ran out of time due to the volume of presentations combined with consecutive interpretation.
Providing opportunities to gain insights into solving transport challenges	80%	● In contrast to last year's online training, the face-to-face format allowed for more effective instruction through group work and	● While trainees with limited English proficiency were supported by other trainees, the consultant team was

Objectives	Level of Achievement	What Was Achieved	What Was Not Achieved and Reasons
and promoting the introduction of ITS through information sharing and discussions with trainees from other countries.		individual guidance during the preparation of action plans. ● By distributing an action plan template in advance, the quality of presentation materials was standardized. ● By incorporating some participant-led sessions, the training went beyond lectures and enabled more efficient learning.	not able to provide sufficient follow-up. (English proficiency should indeed remain an important selection criterion.)
Providing networking opportunities through these activities.	90%	● Since the training was held in Japan, sufficient time was allocated for both the duration of the program and daily sessions, allowing for active communication and interaction among participants and consultant team. ● The field survey in Türkiye helped to deepen the network with trainees and allowed for in-depth investigation into ITS trends in emerging countries. ● Opportunities for informal interaction were available even after daily training sessions, helping to further strengthen relationships.	● It was not possible to fully respond to the needs of all trainees.

(Source: JICA Study Team)

2.3 Outline of KCCP on ITS FY2023

2.3.1 Objectives

The objectives of this training, the same as in FY2022 and FY2023, are as follows:

1. To strengthen the capacity of government officials in participating countries by providing fundamental knowledge on ITS and their effective implementation.
2. To offer opportunities for trainees to gain insight into addressing transport-related challenges and introducing ITS through information, sharing and discussions with fellow trainees from other countries.
3. To facilitate networking among trainees through these activities.

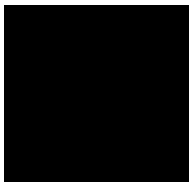
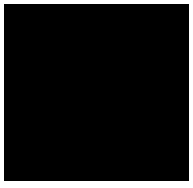
2.3.2 Method

The training in FY2024 was conducted as an in-person program in Japan, following the same format as in FY2023.

2.3.3 Participating Trainees

The trainees who participated in the training in FY2023 are listed in Table 2-7. As shown in Table 2-7, a total of 15 trainees were selected from 13 countries.

Table 2-7 Participating Trainees in KCCP on ITS FY2024

No.	Name	Country	Organization / Position
1	 HOSSAIN Mohammad Bulbul (Mr.)	Bangladesh 	Executive Engineer, Road Design & Standard Division, Roads & Highways Department
2	 KON Chanly (Mr.)	Cambodia 	Chief of Operating System Management, Technical Office, Phnom Penh City Bus Authority

No.	Name	Country	Organization / Position
3	[redacted] NIMBA Gow Ange Theodore (Mr.)	Côte d'Ivoire 	Head of IT & Innovation, IT & Innovation Department, Urban Mobility Transport Organizing Authority - Abidjan (Cote d'Ivoire)
4	[redacted] SANTANA MIRANDA Edgar Alexa (Mr.)	Dominican Republic 	Manager, Mobility Plans, National Institute of Transit and Land Transportation (INTRANT)
5	[redacted] Mr. DEBYAN Mahmoud Hamdy Mohamed (Mr.)	Egypt 	Director of Road Safety Department, Road Safety Department, General Authority for Roads and Bridges, Ministry of Transport
6	[redacted] Mr. NAROZ Yasser Adly Fathy (Mr.)	Egypt 	Team Leader, Development and Telecom Team, Development Sector, Trans IT, Ministry of Transport
7	[redacted] Mr. OSEI-ASAMOAH Samuel (Mr.)	Ghana 	Road Maintenance Manager, Maintenance/Road Maintenance, Ghana Highway Authority, Ashanti Regional Office

No.	Name	Country	Organization / Position
8	[redacted] Amalia (Ms.)	Indonesia 	Assistant Project Manager of Planning Division, Planning Division for South Sulawesi Province National Road, Ministry of Public Works and Housing
9	[redacted] PAMEKAS Satrio Fajar (Mr.)	Indonesia 	Staff of Freeway Technical Planning Subdirectorate, Directorate of Freeway, Directorate General of Highway, Ministry of Public Works and Housing
10	[redacted] BATKHUYAG Dorjsembe (Mr.)	Mongolia 	ITS Equipment Engineer, Information Technology and Technical Department, Traffic Control Center of Ulaanbaatar City
11	[redacted] BENNIS Fairouz (Ms.)	Morocco 	Head of Service of Innovation in Transport Systems, Road Transport Department, Transport and Logistics Ministry
12	[redacted] PANDEY Shova (Ms.)	Nepal 	Inspector, Nepal Police Road Safety and Traffic Management Office, Papa district, Nepal Police
13	[redacted] WAMALA Ahmed Omar (Mr.)	Tanzania 	Infrastructure Manager, Operations and Infrastructure Management Dept., Dart Rapid Transit Agency (DART)

No.	Name	Country	Organization / Position
14	[redacted] SUWANMANEE Kunatip (Mr.)	Thailand 	Civil Engineer, Middle Level, Bureau of Traffic Safety, Department of Rural Roads
15	[redacted] NAKIMBUGWE Solomey (Ms.)	Uganda 	Ag. Supervisor Traffic Signal Maintenance, Directorate of Engineering and Technical Services, Kampala Capital City Authority

(Source: JICA Study Team)

2.3.4 Program

The program is listed in Table 2-8.

Table 2-8 Program for KCCP on ITS FY2024

Date	Time (JST)	Format	Contents	Presenting Organization
Jun. 24 (Mon.)	10:00 ～ 12:00		Briefing Session	JICA Tokyo
	13:30 ～ 15:15		Program Orientation	JICA Tokyo
	15:30 ～ 16:30	Lecture	JICA's Cooperation on ITS	JICA
Jun. 25 (Tue.)	9:00 ～ 16:00	Presentation	Country Report Presentation	Consultant
	17:00 ～ 18:30	Discussion	Group Work 1	Consultant
Jun. 26 (Wed.)	9:00 ～ 10:00	Lecture	Introduction to ITS	The University of Tokyo
	10:20 ～ 11:50	Lecture	Stakeholders of ITS	The University of Tokyo
	13:00 ～ 14:30	Lecture	Utilization of Financial Resources and Expertise in Private Funds	JICA
	15:30 ～ 17:30	Site Visit	System for Collecting, Processing, and Providing Road Traffic Information	VICS Center
Jun. 27 (Thu.)	9:00 ～ 10:30	Lecture	ITS Planning and Implementation	Consultant
	10:50 ～ 12:40	Lecture	Transport Administration and ITS	Japan Traffic Management Technology Association
	14:40 ～ 17:00	Site Visit	Provision of Road Traffic Information	JARTIC
Jun. 28 (Fri.)	9:00 ～ 11:30	Lecture	Global ITS Technology Trends and Best Practices	Consultant
	13:00 ～ 14:30	Lecture	Road Asset Management Technology based on Point Cloud Data	PASCO Corporation
	15:15 ～ 17:15	Lecture	Traffic Big Data	LocationMind Inc.
Jun. 29 (Sat.)	～		Holiday	
Jun. 30 (Sun.)	～		Holiday	
Jul. 1 (Mon.)	9:00 ～ 10:50	Lecture	Mobility Roadmap	Digital Agency
	11:10 ～ 12:40	Lecture	Analysis of Traffic Accidents	ITARDA

Date	Time (JST)	Format	Contents	Presenting Organization
	14:00 ～ 16:00	Lecture	Frequency Policy	Ministry of Internal Affairs and Communications (MIC)
	16:20 ～ 18:00	Discussion	Group Work2	Consultant
Jul. 2 (Tue.)	9:00 ～ 10:50	Lecture	ITS Measures for Reducing Traffic Congestion & Improving Road Safety	Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
	11:10 ～ 12:40	Lecture	Planning and control methods for signal-controlled intersections	Tokyo Metropolitan University
	14:00 ～ 15:30	Lecture	Traffic Engineering	The University of Tokyo
	15:50 ～ 17:30	Lecture	Japanese ODA Case Study-1 : Initiatives in Bengaluru	DULT, India
Jul. 3 (Wed.)	9:00 ～ 10:00	Lecture	Various initiatives by expressway operators	Consultant
	11:00 ～ 12:30	Site Visit	Tokyo Bay Aqua Line Expressway （Umihotaru PA）	Consultant
	13:30 ～ 15:30	Site Visit	Chiba Prefectural Police Headquarters Traffic Control Center	Chiba Prefectural Police Headquarters
	16:00 ～ 17:30	Site Visit	Chiba Monorail Experience	Consultant
Jul. 4 (Thu.)	9:20 ～ 10:50	Lecture	Digital Road Map	Japan Digital Road Map Association
	11:10 ～ 12:40	Lecture	Utilization of Traffic Data : JICA Study, Technical Cooperation Project	Consultant
	14:00 ～ 15:30	Lecture	The Role of Public Transportation and the Use of ITS	The University of Tokyo
	15:50 ～ 17:20	Lecture	Mobility Promotion and ICT Utilization	Nippon Koei
Jul. 5 (Fri.)	10:00 ～ 17:00	Site Visit	Traffic Node and ITS (in Yokohama City)	Consultant
Jul. 6 (Sat.)	～		Holiday	
Jul. 7 (Sun.)	～		Holiday	
Jul. 8 (Mon.)	10:00 ～ 11:30	Lecture	Road Pricing Technology	Mitsubishi Heavy Industries
	13:30 ～ 15:00	Lecture	Japanese ODA Case Study-2 : Initiatives in Sri Lanka	RDA (Road Development Authority), Sri Lanka
	15:20 ～ 16:50	Lecture	Japanese ODA Case Study-3 : Initiatives in Phnom Penh	Phnom Penh TMC, Cambodia
	17:10 ～ 18:30	Discussion	Group Work3	Consultant
Jul. 9 (Tue.)	10:00 ～ 13:30	Site Visit	Expressway Control Center (Iwatsuki)	NEXCO East
	14:30 ～ 17:00	Site Visit	Traffic Signaling Technology (Plant Tour)	Nippon Signal
Jul. 10 (Wed.)	10:00 ～ 12:00	Site Visit	Image Processing Technology	Canon Inc.
	14:30 ～ 17:00	Practical Exercise	Finalization of Action Plan	Consultant
Jul. 11 (Thu.)	9:00 ～ 16:00	Presentation	Action Plan Presentation	Consultant
Jul. 12 (Fri.)	9:45 ～ 10:00	Lecture	Guidance on How to Use the Action Plan and Follow-up Activities	JICA Consultant
	10:00 ～ 11:05		Evaluation Meeting	JICA Tokyo
	11:20 ～ 11:50		Closing Ceremony	JICA Tokyo
	12:00 ～ 13:00		Farewell Party	JICA Tokyo

(Source: JICA Tokyo)

2.3.5 Summary of KCCP on ITS FY2024

The objectives achieved, as well as areas not achieved, were reviewed and summarized in Table 4-4. This assessment also reflects a comparison with the previous year's online training and incorporates feedback gathered during the post-training debriefing meeting.

Table 2-9 Achievement Status of the Training Objectives in FY2024

Objectives	Level of Achievement	What Was Achieved	What Was Not Achieved and Reasons
Supporting the capacity development of government officials in participating countries through learning fundamental knowledge on ITS and their effective implementation.	90%	● Based on improvements identified in the previous year, the three-week program was efficiently structured to balance lectures and site visits, covering both technical and policy aspects of ITS. ● As in previous years, the program content was carefully coordinated in advance through consultations with JICA, the University of Tokyo, and others. As a result, the program included a well-balanced mix of universal themes, the latest global trends, and ITS topics relevant to developing countries—effectively capturing the interest of the participants. ● Three sessions were dedicated to showcasing ITS development projects implemented through Japan's ODA, with lectures delivered directly by officials from the respective partner governments. These sessions provided valuable insights from the perspective of the beneficiaries, which the participants found highly useful for their own future activities.	● Although the overall structure and content of the training program were carefully designed, some lectures may not have fully matched the participants' individual areas of expertise, addressing that this type of mismatch remains a challenge. ● Despite efforts to allocate appropriate time for each session, some lectures experienced time constraints, while others had more time than needed.
Providing opportunities to gain insights into solving transport challenges and promoting the introduction of ITS through information sharing and	90%	● Group work was conducted three times to support the development of action plans. By raising awareness about the action plan from the outset, participants were able to engage in deeper discussions within their groups. As a result, nearly all trainees had a action plan completed by the finalization stage.	● Due to the limited number of group work sessions, trainees were required to work in mostly fixed groups. It would have been preferable to allow for more flexible

Objectives	Level of Achievement	What Was Achieved	What Was Not Achieved and Reasons
discussions with trainees from other countries.		● As in the previous year, the training included participatory sessions where trainees engaged in group-based problem-solving activities.	group arrangements.
Providing networking opportunities through these activities.	90%	● In the second year since the resumption of in-person training in Japan, ample opportunities for communication and exchange were provided among participants and with the Consultant. A social gathering was also held at the consultant's office. ● Following the training, the program contributed to the formulation of a JICA project involving one of the participating government agencies. As part of the trend survey component, an ITS workshop was held in the target country, providing an opportunity to examine ITS-related issues and conduct pre-project follow-up missions.	● The progress of the action plans developed during the training could not be adequately tracked after the program's conclusion. ● Budget constraints prevented the inclusion of study visits to more distant locations. Such visits—especially those involving travel by Shinkansen—would have offered valuable opportunities for participants to experience Japan's advanced railway technologies firsthand.

(Source: JICA Study Team)

2.4 Outline of KCCP on ITS FY2025

2.4.1 Program (Draft)

Based on the result of the training in FY2024, a draft program for the training in FY2025 has been prepared as shown in the table below. The implementation period is set as follows, in accordance with the details already provided in the FY2025 General Information (GI):

- Period: Wednesday, November 19 to Wednesday, December 10, 2025
  (15 days excluding weekends and national holidays)

Table 2-10 Program for KCCP on ITS FY2025 (Draft)

	Date		Time (JST)			Format	Contents	Presenting Organization
1	11/19	Wed.	10:00	-	12:00		Briefing Session	JICA
			13:30	-	15:00		Program Orientation	JICA
			15:20	-	16:30	Lecture	JICA's Cooperation on ITS	JICA
2	11/20	Thu.	9:30	-	16:00	Presentation	Country Report Presentation	Consultant
			16:30	-	17:30	Discussion	Group Work 1 (Icebreaking Activity)	Consultant
3	11/21	Fri.	9:30	-	10:40	Lecture	Introduction to ITS	Academic Professional
			11:00	-	12:10	Lecture	Traffic Engineering	Academic Professional
			13:30	-	14:40	Lecture	Traffic Management	Japan Traffic Management Technology Association
	11/22	Sat.					Holiday	
	11/23	Sun.					Holiday	
	11/24	Mon.					Holiday	
4	11/25	Tue.	9:30	-	10:40	Lecture	Traffic Big Data and Visualization Method	Private Company
			11:00	-	12:10	Lecture	Traffic Accident Data Analysis	ITARDA
			14:20	-	15:50	Site Visit	Road Traffic Information System ①	JARTIC
			16:20	-	17:30	Site Visit	Road Traffic Information System ②	VICS
5	11/26	Wed.	9:30	-	10:40	Lecture	ITS Road Map	Digital Agency
			11:00	-	12:10	Lecture	ITS Planning and Implementation	Consultant
			13:30	-	15:00	Site Visit	Group Work 2 (Discussion on AP)	Consultant
6	11/27	Thu.	9:30	-	10:40	Lecture	Planning and control methods for signal-controlled intersections	Academic Professional
			13:30	-	15:00	Site Visit	Visit to Traffic Signal Manufacturer	Private Company
			16:00	-	17:30	Site Visit	Visit to a Traffic Control Center	Police
7	11/28	Fri.	9:30	-	10:40	Lecture	The Role of Public Transportation and the Use of ITS	Academic Professional
			13:30	-	14:40	Site Visit	Visit to Transport Hub and Experience of Integrated Fare Payment System	Consultant
	11/29	Sat.					Holiday	
	11/30	Sun.					Holiday	
8	12/1	Mon.	9:30	-	10:40	Lecture	Operation and Maintenance of ITS System	Private Company
			13:30	-	15:00	Site Visit	Visit to Expressway Traffic Control Center	Expressway Company
9	12/2	Tue.	9:30	-	10:40	Lecture	Roles and Frameworks of National, Local, and Private Sectors in Promoting ITS	MLIT
			11:00	-	12:30	Discussion	Group Work 3 (Development of a National ITS Institutional Framework Map)	Academic Professional
			14:00	-	15:10	Lecture	Utilization of Financial Resources and Expertise in Private Funds	JICA
			15:30	-	16:40	Lecture	Introduction of PPP Case Study: Automated Traffic Enforcement	IRF (International Road Federation)
10	12/3	Wed.	10:00	-	11:10	Lecture	Interface Design and Future Scalability	Academic Professional
			13:30	-	15:00	Site Visit	Traffic Data Platform	Private Company
11	12/4	Thu.	9:30	-	10:40	Lecture	Integration with AI and Smart City	Academic Professional
			13:30	-	15:00	Site Visit	Image Analysis Technology	Private Company
			16:00	-	17:30	Site Visit	Smart City (Integrated Platform)	Private Company
12	12/5	Fri.	9:30	-	10:40	Lecture	Introduction to Japanese ODA Case Study ①: Road Maintenance and Management	ODA Counterpart
			11:00	-	12:10	Lecture	Introduction to Japanese ODA Case Study ②: Traffic Signal	ODA Counterpart
			13:30	-	14:40	Lecture	Global Trends in ITS Technologies	Consultant
13	12/8	Mon.	9:30	-	12:00	Discussion	Group Work 4 (Rehearsal for Action Plan Presentation)	Consultant
			13:30	-	16:00	Discussion	Group Work 5 (Finalization of Action Plans and Individual Consultations)	Consultant
14	12/9	Tue.	9:30	-	16:00	Presentation	Action Plan Presentation	Consultant
15	12/10	Wed.	9:30	-	10:00	Lecture	Guidance on How to Use the Action Plan and Follow-up Activities	JICA・Consultant
			10:00	-	11:00		Evaluation Meeting	JICA
			11:20	-	11:50		Closing Ceremony	JICA
			12:00	-	13:00		Farewell Party	JICA

3 ITS Global Trend Survey

3.1 ITS World Congress 2022 in Los Angeles (Global ITS Trend Survey FY2022)

3.1.1 Objectives

Participation in the 28th ITS World Congress (Los Angeles), held in September 2022, involved attending various sessions, collecting information from the exhibition area, and conducting interviews with exhibitors. Through these activities, insights were gathered on the status of ITS deployment and traffic management initiatives in different countries.

- Event Name：28th ITS World Congress Los Angeles 2022
- Dates：Sunday, September 18 – Thursday, September 22, 2022
- Venue：Los Angeles Convention Center (LACC), Los Angeles, USA
- Number of Exhibitors：Over 200 (including 17 companies in the Japan Pavilion)
- Program Structure:
  Sessions and panels, Exhibition booths, Technical tours, Demonstrations

(Source: JICA Study Team)

Figure 3-1 Venue of the ITS World Congress (Los Angeles Convention Center)

3.1.2 Survey Method

The following programs were attended for the purpose of information gathering:

1. Exhibition Booths: Collected information from 13 exhibiting companies
2. Technical Tours:
   - LA Regional Transportation Management Center
   - LADOT Advanced Traffic System and Coordination Center
3. Sessions: Attended a total of 15 sessions, including Special Interest and Technical Sessions

Table 3-1 Survey Schedule in Los Angeles

Survey Period: September 17–23, 2022

Date	Contents
Sep. 17 (Sat.)	Travel (Haneda – Los Angeles)
Sep. 18 (Sun.)	ITS World Congress
Sep. 19 (Mon.)	ITS World Congress
Sep. 20 (Tue.)	ITS World Congress
Sep. 21 (Wed.)	ITS World Congress
Sep. 22 (Thu.)	ITS World Congress
Sep. 23 (Fri.)	Travel (Los Angeles – Haneda)

(Source: JICA Study Team)

3.1.3 Key Focus Areas for Information Collection

The main focus areas for information collection included traffic control systems, image analysis technologies, signal-related solutions, and AI-based technologies.

3.1.4 Summary of Survey Findings

3.1.4.1 Exhibition Booths (Technologies from Various Countries)

- Regarding central software for traffic control and toll collection, there appeared to be an open and flexible approach to integrating subsystems. ETC systems also demonstrated compatibility with multiple communication protocols.
- Toll collection technologies are increasingly adapting to Multi-Lane Free Flow (MLFF) systems.
- Image analysis technologies utilizing artificial intelligence have become mainstream. Notably, many companies have their core expertise in AI and have expanded into the transport sector as a derivative application.
- Korea has also made significant progress in traffic management utilizing AI-driven image analysis technologies.
- New services are emerging in the field of micromobility, reflecting ongoing innovation in urban mobility.

3.1.4.2 Technical Tour

- The technologies adopted for traffic control (both highways and urban roads) did not necessarily feature cutting-edge innovations, but displayed characteristics are unique to the United States.
- Notable examples included ramp metering for freeway management, signal coordination between highways and arterial roads, HOV lane control, and the use of Bluetooth for traffic condition monitoring.
- An integrated traffic policy was observed, aimed at enhancing collaboration across multiple related agencies.

3.1.4.3 Session

- In advanced countries such as Japan, the United States, and EU member states, the sophistication of automated driving and ITS technologies is progressing within their respective frameworks.
- Key themes highlighted during the sessions included "Equity," "Universal Access," and "Mobility for All." These reflect characteristics unique to the U.S., shaped by its multi-ethnic society, aging population, and history as a car-dependent nation with vast land area.
- Under the Biden administration's policy framework for mobility and environmental improvement, a range of initiatives—supported by budgetary measures—are underway to promote innovations such as on-demand transport, integrated payment systems, and mobility platforms.

  In line with this trend, the integration of micromobility and on-demand services with existing public transport systems is accelerating. There is a growing movement toward realizing MaaS as a comprehensive solution, a trend likely accelerated by the COVID-19 pandemic.

3.2 Private Companies Survey in Israel (Global ITS Trend Survey FY2023)

3.2.1 Objectives

Israel is well known for its innovative initiatives led by IT-related companies, particularly startups. The cutting-edge technologies, products, and services developed by these companies are widely deployed internationally. The objective of the study was to collect information on the latest trends and initiatives related to ITS in Israel's IT sector.

3.2.2 Survey Method

Interviews were conducted with Israeli companies possessing distinctive technologies related to ITS. Through these meetings, the technological capabilities, current business status, and future development plans of each company were examined and assessed.

- ☐ Number of Companies Interviewed：6 companies (with some overlap across categories)
- ◆ Image Analysis：BriefCam, MobilEye
- ◆ Traffic Signal Control：Exelerate, Notraffic, Axillion
- ◆ Autonomous Driving/Connected Car：Mobileye, Notraffic
- ◆ Fleet Management / Logistics：Ituran
- ◆ Autonomous Driving:：Mobileye

(Source: JICA Study Team)

Figure 3-2 Interview with BriefCam

(Source: JICA Study Team)

Figure 3-3 Interview with Exelerate

Table 3-2 Survey Schedule in Israel

Survey Period: From June 10 to June 18, 2024

Date	Contents	
Jun. 10 (Sat.)	Travel（Abidjan – Addis Ababa） ※Travel from Abidjan to Addis Ababa following the ITS seminar in Côte d'Ivoire	
Jun. 11 (Sun.)	Travel（Addis Ababa – Tel Aviv）	
Jun. 12 (Mon.)	AM：Meeting with BriefCam	PM：Meeting with Exelerate
Jun. 13 (Tue.)	AM：Document Review	PM：Meeting with NOTRAFFIC
Jun. 14 (Wed.)	AM：Meeting with Axilion	PM：Meeting with MobileEye
Jun. 15 (Thu.)	AM：City Survey	PM：Meeting with Ituran
Jun. 16 (Fri.)	Public Transport Survey	
Jun. 17 (Sat.)	Travel（Tel Aviv – Addis Ababa）	
Jun. 18 (Sun.)	Travel（Addis Ababa – Tokyo）	

(Source: JICA Study Team)

3.2.3 Key Focus Areas for Information Collection

The main focus areas for information collection included image analysis, traffic signal control, autonomous driving, and fleet management.

3.2.4 Summary of Survey Findings

The findings from the site visits to 6 Israeli companies are summarized as follows:

- All of the companies visited possessed specialized technologies, with some recognized as global leaders in their respective fields.
- Each company demonstrated both a strong track record and high ambition in expanding into overseas markets
- While their current focus remains on developed countries as primary markets, developing countries are generally viewed as new and emerging markets. Nevertheless, the companies showed strong interest in expanding into these regions.
- The companies consistently emphasized not only the delivery of products but also post-delivery support and after-sales services.
- A common feature across the companies was the use of cloud-based systems and the enhancement of functionality through AI-driven deep learning technologies.
- All companies exhibited a high level of cost awareness, suggesting strong competitiveness through a combination of advanced technology and appropriate pricing.
- Each company expressed a strong willingness to collaborate with Japanese companies in order to participate in Japan's ODA projects.

3.3 Private Companies Survey in Türkiye (Global ITS Trend Survey FY2023)

3.3.1 Objectives

Türkiye, one of the participating countries in the training program, is an emerging country with a high level of IT and ITS technologies. It is also expected to participate in the development of C-ITS (Cooperative Intelligent Transport Systems), which is being actively researched and developed in Europe. Considering that the Turkish trainee expressed interest in Japan's ETC 2.0 during the training program, Türkiye was selected as the target country for the ITS trend survey.

The objectives of the survey are as follows:

1. To organize a joint meeting with the General Directorate of Highways (KGM), the agency to which the Turkish participant belongs, in which the Japanese side would introduce ETC 2.0 and other related systems, and the Turkish side would present the current status of ITS in Türkiye.
2. To collect information through visits to private Turkish companies with advanced IT technologies.

3.3.2 Survey Method

The survey schedule and the sites visited are summarized in Table 3-3. The survey was conducted as part of a joint itinerary with the Greece study described in 3.4.

Table 3-3 Survey Schedule in Tukey–Greece

Survey Period: November 2–16, 2023

Date	Content	Visited Organizations	Place
Nov. 2 (Thu.)	Travel	—	—
Nov. 3 (Fri.)			Ankara
Nov. 4 (Sat.)	Site Visit	Intetra（Traffic Control Center）	Ankara
Nov. 5 (Sun.)	Preparation	—	Ankara
Nov. 6 (Mon.)	Interview	ISSD ORTANA JICA Türkiye Office	Ankara
Nov. 7 (Tue.)	Interview	KGM (Joint Exchange Meeting） ULAK	Ankara
Nov. 8 (Wed.)	Interview Travel	Parabol aselsan	Ankara
Nov. 9 (Thu.)	Interview	INTETRA kentkart	Istanbul
Nov. 10 (Fri.)	Interview	Mosas Group	Konya
Nov. 11 (Sat.)	Travel	—	Athens
Nov. 12 (Sun.)	Site Visit	IBTTA Global Tolling Summit （Technical Tour）	Athens
Nov. 13 (Mon.)	Session	・IBTTA Global Tolling Summit	Athens

Date	Content	Visited Organizations	Place
	Attendance	(Session)	
Nov. 14 (Tue.)	Session Attendance	・IBTTA Global Tolling Summit (Session)	Athens
Nov. 15 (Wed.)	Travel	—	—
Nov. 16 (Thu.)			

(Source: JICA Study Team)

3.3.3 Key Focus Areas for Information Collection

☐ Companies Interviewed: 8 (some overlap across technical fields)

- ISSD : A comprehensive company engaged in consulting services, product development, equipment installation, and on-site technical guidance. It has particular strength in traffic signal control systems.
- ORTANA : A manufacturer of a wide range of ITS-related equipment such as VMS, VTS, and traffic volume measuring devices. In recent years, the company has expanded beyond manufacturing into systems integration and software development.
- ULAK : Specializes in the R&D and manufacturing of information and communication systems. In the ITS field, it is involved in C-V2X projects. Key products include 4G base stations, portable stations, and UAV-mounted base stations.
- Parabol : A compact and specialized software development company founded in 2011. It develops integrated software for traffic signal control systems, offering services that unify software from various vendors.
- ASELSAN : A military-affiliated company and the largest electronics contractor in Türkiye. It operates in five sectors, one of which includes security, transportation, and smart city technologies. Of over 10,000 employees, more than 7,000 are in R&D.
- INTETRA : A company engaged in the installation, operation, and maintenance of ITS equipment for expressways, including roadside units and central systems. It also manufactures equipment such as VMS and VTS at its own facilities.
- Kentkart : Established in 1998 with approximately 300 employees, the company manufactures and sells both software and hardware for public transportation systems (primarily buses, with some involvement in rail). It also provides solutions for fare systems and banking-related technologies.
- Mosas Group : A manufacturer of ITS equipment such as traffic signals and VMS. The company also develops software and systems for image analysis-based signal control, Weigh-in-Motion, and other ITS applications.

Interview Scene (1)

Interview Scene (2)

(Source: JICA Study Team)

Figure 3-4 Interview with ISSD

3.3.4 Summary of Survey Findings

The findings from the Survey in Türkiye are summarized in Table 3-4.

Table 3-4 Summary of Survey in Türkiye

Company	Summary	Considerations on Future Cooperation
ISSD	● The companies place a strong focus on the development of traffic-related software, particularly for signal control. ● The dynamic signal control system (CHAOS) has been deployed at over 750 locations, including sites in Türkiye and six other countries.	● Dynamic signal control systems are considered as a key technology for advanced traffic management and appear to be among the most cutting-edge technologies in Türkiye's ITS sector. If similar systems are to be explored in neighboring regions, collaboration with these companies would be of high value.
ORTANA	● Several companies specialize in manufacturing a wide range of ITS-related equipment such as VMS, VTS, and traffic volume sensors. ● While there is no record of implementation related to ETC, some companies are currently expanding their business scope to include system integration and software development in addition to equipment manufacturing.	● Companies that primarily manufacture ITS-related hardware claim to have strong price competitiveness. They could be considered potential partners for Japanese firms in future projects.
ULAK	● Research and development, as well as manufacturing of information and communication	● As a system integrator specializing in information and communication technologies,

Company	Summary	Considerations on Future Cooperation
	systems, are being actively pursued. In the ITS field, efforts are underway in C-V2X projects.	one company is considered a suitable partner for deployments in the region or neighboring countries.
Parabol	● Some companies are developing integrated platforms for traffic management, along with related software solutions. ● A key product is the traffic management analytics platform METIS.	● A software developer offering integrated platforms for managing different signal systems. Their solutions are geared toward system integration and may be adaptable to developing countries. Some level of collaboration may be feasible depending on project needs.
ASELSAN	● ASELSAN is a military-affiliated company and the largest electronics contractor in Türkiye. ● Activities include the development of integrated platforms for urban management through smart city monitoring and management systems. ● In addition, some companies are engaged in the design and manufacturing of signal heads, signal controllers, VMS, VTS, and other ITS equipment.	● One large-scale company backed by the government and military serves as a core actor in the ITS sector. However, due to its association with defense projects, its operational agility may be limited.
INTETRA	● ITS equipment for expressways—including roadside units and central control systems—is being installed, operated, and maintained by certain companies. These companies also manufacture VMS and VTS in-house.	● A company with significant domestic market share in highway ITS—from roadside equipment to central control operations—has extensive expertise in this domain. Their strong interest in overseas expansion suggests potential for collaboration if similar projects are planned.
Kentkart	● One company manufactures and sells both software and hardware for public transportation systems. ● Public transportation ticketing devices and electronic fare payment systems are developed and offered as complete packages.	● A specialized manufacturer of software and hardware for public transport, with a proven track record in JICA projects. Their products are well-suited to the conditions of developing countries, indicating strong potential for future collaboration.
Mosas Group	● Headquartered in Konya, one manufacturer specializes in ITS equipment such as traffic signals and VMS, and also develops	● As a group company affiliated with a larger parent, one firm could serve as a secondary supplier for transportation

Company	Summary	Considerations on Future Cooperation
	systems and software for signal control using image analysis and Weigh-in-Motion applications.	systems, depending on project conditions.
Overall	● Many companies possess AI-based technologies for image analysis and anomaly detection. ● Image analysis is also used to assess traffic volume and is applied in signal control and other systems. ● Traffic violations are detected through license plate recognition. ● Many companies are actively expanding into overseas markets, particularly in Europe, Central Asia, the Middle East, India, and Africa. ● All companies expressed a strong interest in expanding their business further if new opportunities arise.	● Technologies such as AI-based image analysis and advanced signal control are being actively developed in Türkiye, suggesting a high technical standard in ITS. ● Although some manufacturing firms claimed to develop software in-house, it appears likely that software is developed through partnerships with external vendors. ● Corporate relationships and hierarchies were clarified: ISSD and Parabol are software competitors; ASELSAN and INTETRA compete in both hardware and software; MOSAS serves as a subcontractor to ASELSAN. ● Both large enterprises and startups demonstrated high technological capabilities, with well-equipped R&D facilities. Many companies appeared open to collaboration with Japanese firms, especially considering Türkiye's favorable sentiment toward Japan. With appropriate conditions in place, there is strong potential for joint ventures or technical cooperation.

(Source: JICA Study Team)

3.4 IBTTA Global Tolling Summit in Greece (Global ITS Trend Survey FY2023)

3.4.1 Objectives

The IBTTA Global Tolling Summit features a significant number of technical sessions focused on tolling technologies. Given its relevance for understanding global trends in tolling systems, a study visit was conducted to collect information. As the 2023 summit was held in Greece, the visit was planned in continuation of the survey mission in Türkiye described in 3.3.

- Conference Name: IBTTA Global Tolling Summit
- Dates: Saturday, November 11 – Tuesday, November 14, 2023
- Venue: Grand Hyatt Athens, Athens, Greec
- Organizer: International Bridge, Tunnel and Turnpike Association (IBTTA)
- Host Organizations: 8 institutions
- Major Sponsors: 28 companies
- Exhibitors at the Exhibition Hall: 7 companies
- Pre-registered Participants: 254 attendees

(Source: JICA Study Team)

Figure 3-5 Main Venue of the IBTTA Global Tolling Summit

(Source: JICA Study Team)

Figure 3-6 Interview at the SICE Booth

3.4.2 Survey Method

Through participation in technical sessions at the IBTTA Global Tolling Summit, interviews conducted at exhibition booths, and a technical tour of the OLYMPIA ODOS motorway and its operations center—operated and managed by the concessionaire Olympia Odos S.A.—relevant information was collected.

The survey itinerary is summarized in Table 3-5. The activities in Greece were conducted as part of the same trip described in 3.3.

Table 3-5 Survey Schedule in Tukey–Greece

Survey Period: November 2–16, 2023

Date	Content	Visited Organizations	Place
Nov. 2 (Thu.)	Travel	—	—
Nov. 3 (Fri.)			Ankara
Nov. 4 (Sat.)	Site Visit	Intetra（Traffic Control Center）	Ankara
Nov. 5 (Sun.)	Preparation	—	Ankara
Nov. 6 (Mon.)	Interview	ISSD ORTANA JICA Türkiye Office	Ankara
Nov. 7 (Tue.)	Interview	KGM (Joint Exchange Meeting) ULAK	Ankara
Nov. 8 (Wed.)	Interview Travel	Parabol aselsan	Ankara
Nov. 9 (Thu.)	Interview	INTETRA kentkart	Istanbul
Nov. 10 (Fri.)	Interview	Mosas Group	Konya
Nov. 11 (Sat.)	Travel	—	Athens
Nov. 12 (Sun.)	Site Visit	IBTTA Global Tolling Summit （Technical Tour）	Athens
Nov. 13 (Mon.)	Session Attendance	・IBTTA Global Tolling Summit （Session）	Athens
Nov. 14 (Tue.)	Session Attendance	・IBTTA Global Tolling Summit （Session）	Athens
Nov. 15 (Wed.)	Travel	—	—
Nov. 16 (Thu.)			

(Source: JICA Study Team)

3.4.3 Key Focus Areas for Information Collection

The main focus of information gathering was on global tolling technologies—such as MLFF and smartphone-based toll collection—as well as asset management utilizing technologies such as AI.

3.4.4 Summary of Survey Findings

The findings from the Survey in Türkiye are summarized in Table 3-6.

Table 3-6 Summary of Survey in Greece

Categories	Findings and Impressions
Technical Sessions	● The main focus was on the Tolling Technology session on the first day, which concentrated most of the key technologies and topics of the summit. ● Presentations included: ➢ 3D LiDAR Technology – Introduction of advanced 3D LiDAR applications. ➢ Putting Users First with UX Design – Smartphone-based tolling

Categories	Findings and Impressions
	and user experience design case studies. ➢ Tolling Lessons from Bogotá and Utah – Road usage charging using GNSS technology. ➢ The Digital Evolution of Interoperability – Recent initiatives in Greece. ● Rather than focusing solely on sessions related to toll collection, the summit featured a wide range of presentations, including those on asset management and sustainable green mobility.
Exhibition Booths	● Notable technologies showcased at the exhibition included: ➢ Mobile-based tolling services (EMOVIS) ➢ Traffic management systems using integrated information platforms (SICE) ➢ Data-driven traffic analysis and prediction tools (VALERANN). ● Edge computing technologies, particularly roadside edge devices essential for AI processing, were also highlighted and seemed to reflect a growing hardware trend in the field.
Technical Tour	● Although no significantly novel facilities or systems were observed in road infrastructure, traffic control centers, or traffic management systems, road operators strongly emphasized the importance of maintenance and asset management. The use of IT and robotics for inspections and diagnostics was particularly underscored as a means of achieving efficient maintenance.

(Source: JICA Study Team)

3.5 Intertraffic Amsterdam in Amsterdam (Global ITS Trend Survey FY2024)

3.5.1 Objectives

Intertraffic Amsterdam, held in Amsterdam, the Netherlands, is one of the world's largest exhibitions focused on transport and Intelligent Transport Systems (ITS), featuring over 800 exhibitors. The event includes a wide range of corporate exhibitions and sessions covering the entire transport sector, where various companies, including startups, promote their technologies and deliver technical presentations. An ITS trend survey was conducted at Intertraffic Amsterdam with the aim of broadly collecting information on global ITS technologies and manufacturers.

- Conference Name：Intertraffic Amsterdam
- Dates：Tuesday, April 16 – Friday, April 19, 2024
- Venue：Amsterdam, Netherlands
- Organizer：RAI Amsterdam

(Source: JICA Study Team)

Figure 3-7 Main Venue of Intertraffic Amsterdam

(Source: JICA Study Team)

Figure 3-8 Interview at the TomTom Booth

3.5.2 Survey Method

After selecting target companies from among more than 800 exhibitors, the Consultant conducted interviews and attended relevant technical sessions.

The survey itinerary is shown in Table 3-7.

Table 3-7 Survey Schedule in Amsterdam

Survey Period: April 14–22, 2024

Date	Contents
Apr. 14 (Sun.)	Travel（Tokyo – Amsterdam）
Apr. 15 (Mon.)	Coordination Day and On-site Observation
Apr. 16 (Tue.)	Intertraffic (Exhibition Booths and Technical Sessions)
Apr. 17 (Wed.)	Intertraffic (Exhibition Booths and Technical Sessions)

Date	Contents
Apr. 18 (Thu.)	Intertraffic (Exhibition Booths and Technical Sessions)
Apr. 19 (Fri.)	Intertraffic (Exhibition Booths and Technical Sessions)
Apr. 20 (Sat.)	Amsterdam Urban and Public Transport Survey
Apr. 21 (Sun.)	Travel（Amsterdam – Tokyo）
Apr. 22 (Mon.)	Travel（Amsterdam – Tokyo）

(Source: JICA Study Team)

3.5.3 Key Focus Areas for Information Collection

Among the major conference themes listed in Table 3-8, the survey focused on "Traffic Management" as a key topic.

Table 3-8 Main Conference Themes of Intertraffic Amsterdam

No.	Themes
1	Infrastructure (Digital infrastructure, construction, improvement, maintenance, roadside equipment)
2	Traffic Management (Traffic information monitoring and control, incident monitoring, data collection)
3	Traffic Safety (Signal control, detection and regulation, provision of warning information, emergency services, roadside equipment)
4	Parking Solutions (Systems, payment, access, regulation)
5	Sustainable and Seamless Urban Mobility
7	Environmentally Friendly Cooperative, Connected and Automated Mobility (CCAM)
8	Electric Vehicles and Charging

(Source: JICA Study Team)

3.5.4 Summary of Survey Findings

This survey revealed several global trends in ITS technology. Notably, the emergence of data platforms that aggregate existing sensors and data for traffic management is gaining traction, alongside the increasing implementation of such platforms. In addition, products that emphasize durability and ease of maintenance are also becoming prominent. The utilization of data is particularly linked to the trend of data standardization in Europe, which is believed to be influenced by initiatives from the European Commission and national governments to promote standardization.

Regarding international expansion, while many companies currently operate only in their home countries or neighboring regions, a significant number expressed strong interest in expanding overseas, provided that a cooperative framework with local partners can be established. With respect to collaboration with Japanese companies, it is considered that partnerships in third countries—including developing nations—are feasible, provided that mutual trust and effective local cooperation frameworks are in place.

3.6 ITS World Congress 2024 in Dubai (Global ITS Trend Survey FY2024)

3.6.1 Objectives

The ITS World Congress held in Dubai, United Arab Emirates, serves as a valuable opportunity to grasp global technological trends related to Intelligent Transport Systems (ITS). The event features technical sessions aligned with transportation-related themes as well as exhibition booths by ITS-related companies. With the objective of collecting a wide range of information on ITS technologies and manufacturers, and establishing networks with session speakers and booth exhibitors, ITS trend survey was conducted at the ITS World Congress.

- Event Name：ITS World Congress 2024
- Dates：Monday, September 16 – Friday, September 20, 2024
- Venue：Dubai World Trade Centre, Dubai, UAE
- Organizer：Dubai Roads and Transport Authority
- Co-sponsors: ERTICO, ITS America, ITS Japan

(Source: JICA Study Team)

Figure 3-9 Main Venue of the ITS World Congress

(Source: JICA Study Team)

Figure 3-10 Interview at the WAYS1 Booth

3.6.2 Survey Method

By participating in the ITS World Congress, information was collected on ITS technology trends through attending technical sessions, conducting interviews at corporate exhibition booths, and building relationships with relevant stakeholders.

The survey itinerary is shown in Table 3-9.

Table 3-9 Survey Schedule in Amsterdam

Survey Period: September 14–21, 2024

Date	Contents
Sep. 14 (Sat.)	Travel（Tokyo – Dubai）
Sep. 15 (Sun.)	Travel（Tokyo – Dubai）
Sep. 16 (Mon.)	ITS World Congress (Exhibition Booths and Technical Sessions)
Sep. 17 (Tue.)	ITS World Congress (Exhibition Booths and Technical Sessions)
Sep. 18 (Wed.)	ITS World Congress (Exhibition Booths and Technical Sessions)
Sep. 19 (Thu.)	ITS World Congress (Exhibition Booths and Technical Sessions)
Sep. 20 (Fri.)	ITS World Congress (Exhibition Booths and Technical Sessions)
Sep. 21 (Sat.)	Travel（Dubai – Tokyo）

(Source: JICA Study Team)

3.6.3 Key Focus Areas for Information Collection

The following technical session themes were selected in advance based on their anticipated usefulness and relevance. The Consultant attended these sessions and conducted a survey at the exhibition area by visiting various company booths.

☐ Utilization of Financial Resources and Private Sector Funding

- Automated enforcement system business model innovation

☐ Latest Trends in Traffic Management

- AI and Traffic management: How risky and what action?
- Leveraging crowdsourced vehicle probe data for safer and more inclusive communities
- Advanced multimodal network & traffic management: latest advances of EU research

3.6.4 Summary of Survey Findings

In this survey, one of the observed trends in ITS technologies was the efficiency improvement of urban traffic control and management through system integration utilizing data platforms, which was also observed at Intertraffic Amsterdam. Technologies leveraging AI, such as image analysis, have now become common, and with further dissemination, it is expected that such technologies could be introduced at lower cost even in developing countries.

Additionally, technologies such as autonomous driving and V2X, along with their deployment status, were also exhibited. In the long term, it is anticipated that ITS planning will need to take these technologies into consideration.

3.7 Smarter Mobility Africa 2024 in Johannesburg (Global ITS Trend Survey FY2024)

3.7.1 Objectives

Smarter Mobility Africa, held in Johannesburg, South Africa, is a platform where sessions and panel discussions are held on topics such as promoting sustainable mobility, improving urban transportation, and introducing new technologies. With the objective of identifying current transportation challenges in Africa and investigating effective and sustainable solutions to address them, a survey on ITS trends was conducted at Smarter Mobility Africa.

- Event Name：Smarter Mobility Africa
- Dates: Wednesday, October 2 – Friday, October 4, 2024
- Venue: Gallagher Convention Centre, Johannesburg, South Africa
- Organizer: Vuka Group

(Source: JICA Study Team)

Figure 3-11 Main Venue of Smarter Mobility Africa

3.7.2 Survey Method

By participating in Smarter Mobility Africa, the Consultant gathered information on smart mobility solutions proposed to address urban challenges in African countries through attendance at technical sessions, interviews at corporate exhibition booths, and networking with stakeholders.

The survey itinerary is shown in Table 3-10.

Table 3-10 Survey Schedule in Johannesburg

Survey Period: September 30 – October 8, 2024

Date	Content
Sep. 30 (Mon.)	Travel（Tokyo – Johannesburg）
Oct. 1 (Tue.)	Travel（Tokyo – Johannesburg）
Oct. 2 (Wed.)	Smarter Mobility Africa (Exhibition Booths and Technical Sessions)
Oct. 3 (Thu.)	Smarter Mobility Africa (Exhibition Booths and Technical Sessions)
Oct. 4 (Fri.)	Interview with N3TC (Toll Road Operator)
Oct. 5 (Sat.)	Coordination Day
Oct. 6 (Sun.)	Travel（Johannesburg – Tokyo）
Oct. 7 (Mon.)	Travel（Johannesburg – Tokyo）
Oct. 8 (Tue.)	Travel（Johannesburg – Tokyo）

(Source: JICA Study Team)

3.7.3 Key Focus Areas for Information Collection

The sessions were primarily selected and attended based on the following themes. In addition, visits to corporate exhibition booths related to these themes were also conducted.

☐ Integration of Public Transport

- Ticketing & Payment Technology to Enable Integrated Mobility and a Seamless MaaS Experience
- Informal and Formal Public Transport Outlook 2024
- How to Introduce Bus Rapid Transit into Cities Mainly Served by Informal Transport?

☐ Utilization of Financial Resources and Private Sector Funding

- Financing rail infrastructure projects in Africa – challenges and solutions
- Bridging the Funding Gap through PPP's
- Financing Africa's Sustainable Transport Vision

3.7.4 Summary of Survey Findings

This survey revealed the following trends in ITS in the African region: increasing interest in EV and efforts to improve transport operations through digitalization of fleet management, payment, and revenue collection systems, as well as integration of services. On the other hand, key transport challenges remain, including the management of informal transport, integration of public transport, and development of transport-related infrastructure. Although ICT-based solutions and services for addressing these issues are not yet widely adopted, growing momentum for new services and technological advancements suggest that such initiatives are expected to expand further in the future.

4 Field Survey and On-site Seminar

4.1 ITS Seminar in Côte d'Ivoire (On-site Seminar FY2022)

4.1.1 Field Survey in Côte d'Ivoire

4.1.1.1 Outline

Based on the needs identified through the ITS issue-specific training conducted in FY2022 and the interests of Japanese companies, one country was selected where holding an on-site seminar was expected to be particularly effective. The country for the on-site seminar and field survey was selected based on a comprehensive evaluation of several factors, including whether past on-site seminars had been conducted, public security, the presence of Japanese ODA projects, JICA survey activity, and the specificity of action plans submitted by trainees.

As a result of this evaluation, Côte d'Ivoire was selected as the target country for the FY2022 on-site seminar and field survey.

4.1.1.2 Surbey Schedule

The field survey was conducted according to the schedule shown in Table 4-1. Meetings were held with 23 relevant organizations, including 11 government agencies, 7 private companies, 4 donor organizations, and 2 others.

Table 4-1 Survey Schedule in Côte d'Ivoire

Survey Period: March 11–31, 2023

Date	Content	Visited Organizations	Detail
Mar. 11 (Sat.)	Travel	—	Flight from Narita to Abidjan
Mar. 12 (Sun.)			
Mar. 13 (Mon.)	Report	JICA Côte d'Ivoire Office	Pre-survey Briefing
	Interview	AMUGA	Overview of ITS (jurisdiction, etc.)
Mar. 14 (Tue.)	Interview	Special Police	Cameras installed on national roads
	Interview	DGTTC	Management of vehicle registration data
Mar. 15 (Wed.)	Interview ※Online	SETEC	Traffic and ITS policies in Abidjan
	Interview	ANSUT	Projects promoted by ANSUIT
Mar. 16 (Thu.)	Interview	AGEROUTE	Overview and maintenance of national roads
	Interview	PI357	Development of taxi operation management platform
	Interview	SOTRA	Public transport in the city
	Interview	Millennium Challenge Corporation	Current status and plans of road development projects in the city
Mar. 17 (Fri.)	Site Visit	Highway between Abidjan	On-site inspection of road

Date	Content	Visited Organizations	Detail
		and Grand-Bassam, and Henri Konan Bédié Bridge (drive-through only)	conditions and installed facilities on expressways and toll bridges
Mar. 18 (Sat.)	Holiday	―	
Mar. 19 (Thu.)	Site Visit	Public Transport Observation in Abidjan	Observation of public transportation, traffic congestion, and traffic signal installation in the city
Mar. 20 (Fri.)	Interview	SOCOPRIM	Operation of toll bridges
	Interview	Ewarren	Integration of informal transport systems in the city
	Interview	Road Maintenance Funds	Operation of national toll roads
Mar. 21 (Tue.)	Site Visit	Seminar Venue (Hotel) in Abidjan	Inspection of three hotels
	Interview	MiCEN	Information on communications and digitalization
	Interview	Quipux	Vehicle registration database and city traffic violation detection cameras
	Interview	MEER	Overview of domestic roads and maintenance
Mar. 22 (Wed.)	Interview	MOT	Overview and maintenance of national roads (Greeting and explanation of the ITS training program only)
	Interview	World Bank	Financing for the BRT project
	Interview	French Development Agency	Future ITS projects
	Site Visit	Abidjan–Yamoussoukro Highway and Abidjan City Area	On-site inspection of road conditions and facility installations on expressways
	Interview	Scientific Police	Observation of traffic monitoring in Abidjan, including a visit to the camera monitoring center
Mar. 23 (Thu.)	Site Visit	AMUGA	Visit to the (temporary) data center
Mar. 24 (Fri.)	Site Visit	Seminar Venue (Hotel) in Abidjan	Inspection of one hotel
	Interview ※Online	African Development Bank	Financing for ITS projects
	Interview	HUAWEI	Status of domestic business participation and development
Mar. 25 (Sat.)	Holiday	―	―
Mar. 26 (Sun.)	Holiday	―	―
Mar. 27 (Mon.)	Interview ※Online	MWASALAT	Bus operations in Egypt
	Interview	AMUGA	Discussion on the ITS seminar program

Date	Content	Visited Organizations	Detail
Mar. 28 (Tue.)	Interview	SETEC	Future public transportation in Abidjan
Mar. 29 (Wed.)	Report	JICA Côte d'Ivoire Office	Reporting survey results
Mar. 30 (Thu.)	Travel	—	Flight from Abidjan to Narita
Mar. 31 (Fri.)			

(Source: JICA Study Team)

4.1.1.3 Survey Results

（1） ITS-Related Facilities in Côte d'Ivoire

Figure 4-1 shows the status of ITS-related facilities in Côte d'Ivoire.

Traffic congestion on major roads in central Abidjan

Traffic signals installed on major roads

Omnidirectional surveillance camera installed on a general road

Road information display board on a major road

Distant view of the toll gate on the Henri Konan Bédié Bridge (toll road bridge)

Control center inside the administrative building of the Henri Konan Bédié Bridge

Bus terminal located in the Plateau area of central Abidjan

Taxis in Abidjan
(color-coded according to service zones)

Small-scale ferry terminal

Exterior view of Treichville Station (railway station)

(Source: JICA Study Team)

Figure 4-1 ITS-Related Facilities in Côte d'Ivoire

（2） Overview of ITS in Côte d'Ivoire

The overview of ITS in Côte d'Ivoire is organized as shown in Table 4-2.

Table 4-2 Overview of ITS in Côte d'Ivoire

Field	Responsible Authority	Implementer / Operator	Installed ITS Equipment	Planned ITS	Related Manufacturers	Remarks
Traffic Violations, Enforcement, and Road Safety	MOT	Special Police、Quipux	● 100 AI cameras installed in Abidjan, used for traffic safety enforcement, targeting speed violations, reckless driving, and illegal parking through camera technology. ● 2 data centers ● Management of driver's license data ● Management of vehicle registration data		● Quipux、 ● Huawei is involved in providing the equipment.	● There is no specific information sharing with the Scientific Police
Vehicle Registration	MOT	DGTTC	● Management of vehicle registration data		● Quipux is also involved.	
Telecommunication Infrastructure Development	MOC	ANSUT	● OFC network covering 7,000 km nationwide (management only)			● Coordination with AIGF.
Security Enhancement and Crime Prevention	MOI	Scientific Police	● Approximately 4,500 to 5,000 surveillance cameras are installed nationwide, with about 70% concentrated in Abidjan.	● A single location currently houses both a Command Center for monitoring and a Call Center; a second center is under construction at a different site.	● All components including the central system and cameras are manufactured by Huawei.	● There is no specific information sharing with the Special Police.

Field	Responsible Authority	Implementer / Operator	Installed ITS Equipment	Planned ITS	Related Manufacturers	Remarks
Traffic Signal	MOT AMUGA	—	● Pilot traffic signal systems launched at five intersections in Abidjan; traffic signals will be installed, and standard specifications are planned to be developed.	● 8There are plans to expand to 89 intersections. ● A video monitoring system is being planned to cover regional cities, allowing centralized monitoring from the control center. The system will use 60-meter antennas installed every 20 km to transmit data wirelessly.	● Huawei is currently conducting a pilot project and may also participate in the bidding for the 89 locations.	● Responsible for the development and installation of traffic signal equipment and systems. ● The traffic signals are part of the PTUA project, which includes many urban infrastructure components such as bridges and road improvements.
Road Administration	MEER （Min of Rd Infra ＆ Maintenance）	AGEROUTE		● Coordinated traffic signals are to be installed at 89 intersections in Abidjan, with a future plan to expand to 400 locations. ● A new control center is also under construction.		● Owns and maintains traffic signal equipment assets.
Public Transport	MOT AMUGA	SOTRA	● Some buses are equipped with GPS, but the location tracking system is not yet functional. ● Bus route and schedule information is available via mobile applications.			● On certain routes, both buses and water buses can be used unlimitedly for a certain period with a commuter pass. For land-based buses, prepaid free passes are available.

Field	Responsible Authority	Implementer / Operator	Installed ITS Equipment	Planned ITS	Related Manufacturers	Remarks
Road Development and Maintenance	MEER	FER（Road Maintenance Fund）	● ETC systems (using RFID and DSRC) have been introduced on 7 toll roads.	● 13 toll roads are currently under construction, all of which are planned to adopt ETC.		● All toll roads except SOCOPRIM are under the jurisdiction of FER. The ETC equipment suppliers are all French manufacturers (GEA).
Telecommunication and Digitalization	MiCEN（Min of Commu. & Digital Economy）		● 5,000 km of optical fiber has been laid nationwide. ● Specifications for CCTV and other systems are shared with relevant domestic and international agencies.	● 2,000 km of additional fiber optic cables are scheduled to be installed.		● Use of fiber optics requires authorization from MiCEN. Frequency allocation is handled by the responsible agency EAIGF, with final approval by MiCEN.
Toll Road	MEER	SOCOPRIM	● ETC: RFID, DSRC ● 50 CCTV cameras have been installed nationwide, with anomaly detection capabilities and monitoring conducted at control centers.	● In the future, the system is expected to standardize on DSRC only.		● The toll plaza has 24 lanes, of which 8 lanes are reversible. ● RFID tags were distributed free of charge, but due to poor product quality, there is a desire to transition to DSRC. ● Although there was an attempt to lower ETC toll rates to promote adoption, the government rejected the proposal.
ITS-related Private Companies						
Construction of Traffic Control Centers Provision of ITS Equipment, Devices, and Solutions		HUAWEI	・Pilot traffic signal system implemented by AMUGA ・Implementation of Center for AMUGA, and for Scientific Police	Camera surveillance is also planned to be implemented in regional cities.		

Field	Responsible Authority	Implementer / Operator	Installed ITS Equipment	Planned ITS	Related Manufacturers	Remarks
Traffic Violations and Enforcement		Quipux	・100 AI cameras installed in Abidjan, used for traffic safety enforcement, targeting speed violations, reckless driving, and illegal parking through camera technology. Management of driver's license data Management of vehicle registration data		Huawei is involved in the provision of control center equipment.	Under the supervision of MOT and AMUGA, services related to traffic management using digital technologies are being developed.
Other Startup Companies						
Fleet Management and Dispatch Control		PI357		・A fleet management system is being developed for taxis and commercial vehicles (covering 8,000 taxis). ・A taxi dispatch service platform is provided.		・
Integration and Digitization of Informal Transport (Dispatching and Payment Systems)		e-Warren, Each Informal Transport Association	Efforts are underway to promote the use of informal transport by providing location information, ticketing services, transfer support, and simplified fare payments through a common smart card system.			・Support is being provided to stabilize the income of informal transport drivers and assist them in opening bank accounts. ・The common card system can be deployed across eight countries using a shared currency. ・In the future, integration with formal transport systems is also being considered.

(Source: JICA Study Team)

4.1.1.4 Identification of Issues and Recommendations

A summary of the identified issues and recommendations in the transport sector in Côte d'Ivoire is shown in Table 4-3.

Table 4-3 Identified Issues and Recommendations in the Transport Sector in Côte d'Ivoire

Issues	Contents of Issues	Recommendations
Traffic Congestion	● Serious traffic congestion occurs throughout the city, with congestion particularly evident around intersections. ● There is a need for long-term and comprehensive measures, such as the development of the road network, expansion of public transportation systems to shift demand, and decentralization of port functions. ● A reversal of traffic congestion directions depending on the time of day is observed, particularly during morning and evening rush hours. ● Bridges connecting islands act as bottlenecks.	● Installation of reversible lanes ● Development of road infrastructure to address jaywalking ● Improvement of traffic signal systems ● Measures to address illegal on-street parking ● Construction of new river-crossing routes and tunnels ● Other traffic demand management (TDM) measures ● Provision of comprehensive road traffic information ● Integration of toll collection systems on toll roads
Development and Enhancement of ITS for Advanced Utilization	● Although traffic is monitored using CCTV cameras, there is no established system for objectively and quantitatively understanding traffic conditions such as flow and volume. ● Various ITS technologies are being introduced by multiple organizations, including both public and private sectors, but no coordinated and integrated efforts have yet been implemented.	● Formulation of a master plan for ITS development ● Promotion of advanced use of ITS ● Establishment of governance led by the government

Issues	Contents of Issues	Recommendations
Public Transport Management	● The taxi management structure is complex, resulting in varied standards and policies. ● Informal pick-up/drop-off locations for shared minibuses disrupt smooth traffic flow. ● A modal shift from taxis to public transportation among users is taking place. ● The convenience of water buses has declined due to limited route coverage and low service frequency.	● Enhancement of bus operation information services ● Introduction of electronic payment systems useable across multiple modes of transportation ● Improvement of water-based transportation services ● Enhancement of transfer facilities, feeder services, and support for informal transport

(Source: JICA Study Team)

4.1.2 ITS Seminar in Côte d'Ivoire

4.1.2.1 Background and Objectives

Based on the findings from the on-site survey in Côte d'Ivoire described in 4.1.1, an on-site ITS seminar was conducted in the country. This seminar was held as part of the follow-up to the ITS training program and aimed primarily to broadly share Japan's technologies and know-how related to ITS with stakeholders in Côte d'Ivoire. Through discussions among the participants, the seminar also aimed to foster mutual understanding and generate momentum for cooperation between Côte d'Ivoire and Japan in addressing urban transport challenges using ITS as a core approach.

4.1.2.2 Theme, Schedule, and Program

（1） Theme

Taking into account the identified local challenges, current conditions, and future plans, the following themes were established for the seminar:

1. Comprehensive perspectives for promoting ITS
2. Advanced utilization of traffic data
3. ITS for expressway services
4. Traffic signal technologies and the promotion of signal-related projects
5. Initiatives involving CCTV cameras and traffic enforcement
6. ITS for improving public transport services
7. JICA's support in the transport sector

（2） Event Name

The Seminar for Intelligent Transportation System (ITS) Stakeholders in Côte d'Ivoire

（3） Date

June 8 and 9, 2023 (total of two days)

（4） Venue

HOTEL TIAMA（Address：Boulevard of the Republic, Plateau Abidjan）

（5） Method

Hybrid format combining in-person and online participation

（6） Program

Table 4-4 Program for ITS Seminar in Côte d'Ivoire（Day 1）

Time	Contents
9:00	Opening of the Venue
10:00	Opening Remarks
	Background and Objectives of the ITS Seminar (JICA Study Team)
	Remarks from the Ministry of Transport (Minister of Transport)
	Remarks from JICA Côte d'Ivoire (JICA)
10:25	Group Photo
10:35	Presentation by the JICA Study Team (JICA Study Team)
10:45	ITS Initiatives
	ITS-related Initiatives by the Government of Côte d'Ivoire (AMUGA)
	Q&A Session
	ITS Implementation Cases in Japan (The University of Tokyo)
	Q&A Session
11:45	Break
11:55	ITS in Toll Roads and Road Management
	Toll Road Operation and ITS in Côte d'Ivoire (Road Maintenance Fund)
	Q&A Session
	Initiatives toward Next-generation Expressways (NEXCO East) *Online
	Q&A Session
12:55	Lunch Break
13:55	ITS in Traffic Signal Control
	Lessons Learned from Japanese ODA-supported Traffic Signal Projects in Developing Countries (KCCA) *Online
	Q&A Session
	Area Control Traffic Signal Technology in Japan and Its Application in Developing Countries (Nippon Signal)
	Q&A Session
14:55	Networking Session
-	Closing of the Venue

(Source: JICA Study Team)

Table 4-5 Program for ITS Seminar in Côte d'Ivoire（Day 2）

Time	Contents
09:00	Opening of the Venue
10:00	Special Lecture: Demonstration Project on Human Mobility Visualization Using Cellular and GNSS Big Data (LocationMind) *Online
	Q&A Session
10:30	ITS – CCTV and Traffic Monitoring & Enforcement
	Phased Implementation of the CCTV Project (Scientific Police (DITT))
	Q&A Session
	Introduction and operation of CCTV systems (Quipux Afrique)
	Q&A Session
11:20	Break
11:30	Introduction of AI Analysis Technologies Using Image Processing and Data Platform (Nissho Electronics) *Online
	Q&A Session
12:00	Introduction of JICA Project (SDUGA2)
	Pilot Project of Abidjan Urban Transport Project by JICA (SDUGA2 JICA Study Team)
	Q&A Session
12:30	Lunch Break
13:30	Initiatives in the Road Transport Sector
	The Importance of Interoperable Payment Systems in Public Transport (SETEC)
	Q&A Session
	Digitization of Public Transport Including Informal Transport in Abidjan (e-WARREN)
	Q&A Session
	Case Study on the Integration of Public Transportation in Egypt (Mwasalet Misr) *Online
	Q&A Session
	Comprehensive BRT Technology Based on Global Case Studies (NEC)
	Q&A Session
15:30	Closing Remarks
	Speech by the Ministry of Transport
15:40	Group Photo
15:45	Networking Session
-	Closing of the Venue

(Source: JICA Study Team)

Opening by the MC

Presentation by the JICA Study Team

Presentation by the Trainee (AMUGA)

Presentation by Academic Experts

Introduction of Local Private Sector Initiatives

Online Participation

Minister of Transport and Chief of Cabinet

Minister of Transport and JICA Côte d'Ivoire Office Representative

Figure 4-2　ITS Seminar in Côte d'Ivoire

(出典：JICA 調査団)

4.1.2.3 Participating Organizations

Table 4-6 shows the participating organizations and the number of participants in the ITS seminar. From the Côte d'Ivoire side, the opening and closing remarks were delivered by the following two key officials.

◦

- Mr. Amadou KONE, Minister of Transport (Opening Remark)
- Mr. Dioman CONE, Chief of Staff, Ministry of Transport (Closing Remark)

Table 4-6 Participating Organizations and Number of Participants in ITS Seminar

Organizations	Number of participants
■Côte d'Ivoire	50
Governmental Organizations	38
・AMUGA（Autorité de la Mobilité Urbaine dans le Grand Abidjan）	12
・DGTTC (Ministère des Transports | Direction Générale des Transports Terrestres et de la Circulation)	4
・DITT (Scientific Police)	2
・FER（Fonds D'entretien Routier）	3
・MiCEN (Ministère de la Communication et de l'Economie Numérique)	1
・MOT（Ministère des Transports）	7
・OSER (Office de la Sécurité Routière)	1
・PSSR(Police Spéciale de la Sécurité Routière)	2
・PTUA（Projet de Transport Urbain d'Abidjan）	1
・SOCOPRIM（Société Concessionnaire du Pont）	1
・SOTRA（Société des Transports Abidjanais）	3
Private Sector	9
・BAD (Local Consultant)	1
・Ewarren	1
・Media（Frafmot、LeMondor、Organe de Presse）	1
・PI357	1
・Quipux Afrique	2
Donors	3
・BAD (Banque Africaine de Développement)	1
・MCC (Millennium Challenge Corporation- Coopération Américaine en Côte d'Ivoire)	2
■Japan	20
Governmental Organizations	1
・Embassy of Japan	1
Private Sector	10
・Location Mind	2
・NEC	1
・NEXCO East	1
・Nippon Koei	1
・Nippon Signal	1
・Nissho Electronics	1
・Toyota Tsusho Corporation	3
Academia	1
・The University of Tokyo	1
JICA	8
・JICA Côte d'Ivoire Office	3
・SDUGA2 Study Team	1
・JICA Study Team	4
■Other Countries	6
・Kampala Capital City Authority (Uganda)	1

Organizations	Number of participants
・Huawei (China)	3
・Mwasalat Misr（Egypt）	1
・SETEC (France)	1
Total	76

(Source: JICA Study Team)

4.1.2.4 Summary of Seminar

A total of 76 participants attended the seminar, surpassing the initially expected number of 60. The presence of key figures from Côte d'Ivoire, including the Minister of Transport, contributed to the seminar's success. This suggests that the event played a significant role in fostering momentum for future collaboration between Côte d'Ivoire and Japan in the ITS field. Moving forward, synergy effects with other JICA-supported projects, including those in the ITS domain, are expected.

On the other hand, local field research revealed that the Chinese company Huawei has already made notable inroads into the ITS sector in Côte d'Ivoire. However, based on information obtained during this visit, it appears that Huawei's involvement in the AMUGA Center is primarily centered on CCTV-based systems. Aside from the CCTVs deployed mainly by the Scientific Police, other major ITS systems are not yet in place. Considering that large-scale improvements to traffic signals are currently under discussion, support for signal improvement projects or the development of an integrated platform positioned above the AMUGA Center could be potential areas for future Japanese cooperation.

With regard to the potential for Japanese involvement in the ITS sector, the momentum generated by this seminar—combined with an awareness of China's growing presence—indicates the importance of taking timely action toward the formulation of specific projects.

4.2 Exchange Meeting in Türkiye (On-site Seminar FY2023)

4.2.1 Background and Objectives

As one of the participating countries in the FY2023 thematic training program, Türkiye expressed particular interest in Japan's ETC 2.0 system. With the potential for future collaboration in mind, a stakeholder meeting was organized. A joint session was held with the General Directorate of Highways (KGM), to which the Turkish trainee belongs. In this meeting, the Japanese side presented an overview of ETC 2.0 and related technologies, while the Turkish side provided an update on the current status of ITS in Türkiye. This served as a platform for mutual exchange of views.

4.2.2 Theme, Schedule, and Program

（1） Theme

The themes of the stakeholder meeting were set primarily with a focus on ETC-related areas, as outlined below:

1. Initiatives in Türkiye related to ITS projects (C-ITS, ETC)
2. Japan’s initiatives on ETC/ETC 2.0 and ITS Connect

（2） Event Name

Technology Exchange Meeting between KGM and Japanese Stakeholders

（3） Date and Time

Date: Tuesday, November 7, 2023
Time: 9:00 AM – 12:30 PM (local time)

（4） Venue

KGM Meeting Room（Address : Karayolları Genel Müdürlüğü Devlet Mahallesi İnönü Bulvarı No:14 06420 Çankaya/ANKARA）

（5） Method

In-person

（6） Program

Table 4-7 Program for Exchange Meeting in Türkiye

Time	Contents
9:00	Opening Remarks（KGM、ITS-TEA）
9:10	Presentations by Turkish Side
	Overview of KGM (organizational structure, etc.) (KGM)
	Introduction to Türkiye's road network and ITS projects (including C-ITS) (KGM)
	Introduction to Türkiye's ETC System (KGM)
	Q&A Session
10:40	Presentations by Japanese Side
	Overview and functions of ETC/ETC2.0 and ITS Connect (ITS-TEA)
	Technical overview of ETC/ETC2.0, Singapore's ERP/next-generation ERP, and RFID systems (MHIMS)
	Use Cases of ETC2.0 Probe Data in Japan (JICA Study Team)
12:20	Closing Remarks（KGM、JICA）

(Source: JICA Study Team)

Meeting Room

Participants from the Turkish Side

(Source: JICA Study Team)

Figure 4-3 Exchange Meeting with KGM

4.2.3 Participating Organizations

From the Turkish side, in addition to government officials involved in ITS, private companies associated with KGM also participated. From Japan, representatives from JICA, government-affiliated organizations, and private companies attended as presenters.

Turkish Side (Approx. 15 participants):

- ITS Division/Traffic Safety Department
- ETC Division/Motorways of Operation Department
- Maintenance, Operation and Systems of BOT Division/ Motorways of Operation Department
- Construction and Bridges Division/Motorways of Operation Department
- Strategic Planning Strategic Development Department

- ITS-related companies (e.g., INTETRA)

Japanese Side (Approx. 15 participants):

- Embassy of Japan
- JICA
- ITS-TEA
- MHIMS
- JICA Survey Team

4.2.4 Summary of Seminar

Although ETC onboard units in Türkiye have already transitioned to RFID-based systems, it remains uncertain to what extent the Turkish side will consider adopting data communication functions in the future similar to those operated in Japan's ETC2.0 (ITS Spot).

Since the frequency bands used by Japan's ETC2.0 differ from those of the current Turkish system, direct adoption is currently not feasible. To introduce ETC2.0 in Türkiye, technical adaptations such as frequency adjustments would be required, along with the cooperation of Japanese ETC-related manufacturers. Addressing these technical challenges is essential for any progress.

Nevertheless, the seminar contributed to enhancing Turkish stakeholders' understanding and knowledge of Japanese technology.

Although post-earthquake recovery remains Türkiye's top priority at present, it is important to continue monitoring the country's interest and intentions going forward.

Depending on future developments, there may be room to consider small-scale technical cooperation, such as short-term expert dispatches or preliminary surveys.

4.3 ITS Workshop in Dominican Republic (On-site Seminar FY2024)

4.3.1 Background and Objectives

In the Dominican Republic, one of the participating countries in the FY2024 training, a joint meeting was held with local ITS-related organizations to enhance the effectiveness of the training and support provided.

During the meeting, both Dominican and Japanese stakeholders shared information on the current status of traffic management and ITS in the Dominican Republic, as well as the country's Action Plan, with the aim of improving and advancing traffic management tailored to local conditions. The meeting also provided an opportunity to discuss the potential of traffic management utilizing a data platform, approaches to the effective use of road traffic and public transport data, and Japanese technical knowledge related to traffic signal systems.

The objectives of the workshop were as follows:

1. As a follow-up to the training, to broadly share Japanese ITS-related technologies and know-how with relevant Dominican stakeholders, taking into account local issues, and to foster mutual understanding through dialogue.
2. To build momentum for future collaboration between the Dominican Republic and Japan in addressing urban transport challenges with a focus on ITS.

4.3.2 Theme, Schedule, and Program

(1) Theme

Based on the country report and action plan prepared by the Dominican Republic trainee, interviews with personnel from INTRANT—the supervisory agency for the transport sector in the Dominican Republic to which the trainee belongs—and the results of the on-site survey, the seminar themes were determined as follows, taking into account the country's current issues, status, and plans:

1. Initiatives in traffic management and ITS in the Dominican Republic, and the ITS Action Plan
2. Traffic Data Platform
3. Utilization of traffic data
4. Integrated payment system for public transportation
5. Signal control technology

(2) Event Name

Innovation in Smart Mobility: Dominican Republic and Japan. "Towards Intelligent Transportation; Experiences and Proposals"

（3） Date and time

Date: Friday, November 15, 2024

Time: 8:30 AM – 12:15 PM (local time)

（4） Venue

Autonomous University of Santo Domingo、Laboratorios de Alta Tecnologia

（Address：Edificio de Laboratorios de Altas Tecnología Ing. Juan Miguel Rosado Montes de Oca - Aula LAB-FIA 505, quinto piso, lado sur en la Universidad Autónoma de Santo Domingo）

（5） Method

Hybrid format combining in-person and online participation

（6） Program

Table 4-8 Program for ITS Workshop in Türkiye

Time	Contents
8:00	Opening of the Venue
8:30	Opening Session
	Opening Remarks 1 (University of Santo Domingo)
	Opening Remarks 2 (JICA)
	Opening Remarks 3 (INTRANT)
	Group Photo
9:00	Presentations by Dominican Republic Side
	Initiatives on Traffic Management and ITS (INTRANT)
	ITS Action Plan (INTRANT)
9:40	Presentations from Japanese Side (1)
	Traffic Data Platform (Canon) *Online
	Utilization of Traffic Data (JICA Study Team)
	Break
10:40	Presentations by Japanese Side (2)
	Integrated Fare Payment in Public Transport (Nippon Koei)
	Signal Control Technology (Japan Traffic Management Technology Association) *Online
12:00	Closing Session
	Closing Remarks (INTRANT)
	Group Photo
12:15	Closure of the Venue

(Source: JICA Study Team)

Venue 1

Venue 2

Group Photo 1

Group Photo 2

(Source: JICA Study Team)

Figure 4-4 ITS Workshop in Dominican Republic

4.3.3 Participating Organizations

Participants from the Dominican Republic included government officials involved in ITS, as well as representatives from the police, local governments, and both public and private transport-related operators (public transportation, parking, road management, etc.). From Japan, in addition to JICA, representatives from private companies participated as presenters.

Dominican Republic Side (Approx. 50-60 participants):

- INTRANT (National Institute of Transit and Land Transport)
- Ministry of Public Works and Communications (MOPC)
- Ministry of Economy, Planning and Development (MEPYD)
- Ministry of Digital Agenda
- Santo Domingo City
- Local Governments (Alcaldias)

- 911 system competent authorities
- Traffic police (DIGESETT)
- Transportation Reorganization Office (OPRET)
- RD Vial
- Public bus operator (OMSA)
- Private bus operator
- Parqueate RD
- Trust for Housing and Transportation Maintenance and Construction (FIMOVIT)
- Trust for Mass Transportation (FITRAM)
- Autonomous University of Santo Domingo (UASD)
- Santo Domingo Institute of Technology (INTEC)
- Waze

Japan Side (Approx. 10 participants):

- JICA Dominican Republic Office
- JICA Study Team
- Canon
- Japan Traffic Management Technology Association

4.3.4 Summary of Seminar

More than 50 stakeholders from the Dominican Republic participated in the seminar, including key decision-makers such as the Director of INTRANT. Numerous questions were directed to the presenters, indicating a high level of interest in the presentations. The seminar served as a catalyst for enhanced information sharing between Japan and the Dominican Republic and is expected to generate a synergistic effect on the outcomes of JICA's cooperation projects.

INTRANT provided full support in organizing the seminar, demonstrating a proactive stance in addressing the country's transportation challenges. During meetings held in conjunction with the workshop, a strong demand for improvements to traffic signal systems was identified, offering an opportunity to further clarify the direction of future JICA support.

5 Information Compilation and Analysis

5.1 Training Information Compilation and Analysis

As part of the review of the training conducted over the past three years, the current issues in each country, existing ITS facilities, planned initiatives outlined in action plans, and constraints in their implementation were compiled. An example is shown in Table 5-1.

In addition, as part of organizing information from each training, a "Trainee Footprint Map" was created using the MyMap function of Google Maps.

Table 5-1 Summary of Issues, Needs, and Proposed Solutions by Country (Example)

Category	Confirmation Contents
Year	2022
Country	Cote d’Ivoire
Name	Ange Nimba
Organization name / position	Mobility Organizing Authority for Greater Abidjan (AMUGA) ／Head of IT & Innovation, Direction of Planning and Studies, IT & Innovation Department
Current Traffic Issues	Dysfunction caused by competition between public and private (informal) transportation, and the resulting losses. Improvements in transportation are a challenge for the government. Severe traffic congestion on major roads within the city. Independent control due to different types of signals and lack of coordination. Increased investment for the introduction of ITS.
Existing ITS・Related Initiatives	CCTV operation by the Scientific Police (DITT) Conduct signal coordination in collaboration with AMUGA Collaborating with social media Number plate recognition and traffic enforcement are operated by private companies under the jurisdiction of the Special Police
Needs and ITS Development Proposals	Construction of an advanced traffic management system (network, platform), datacenter, and control center
Other (restrictions, etc.)	Problems with data integration for traffic management Review of standards, elimination of conflicts of interest Fundraising Staff Skill Development

5.2 Initiatives in improving the quality of training

5.2.1 Compilation of Monitoring

To improve the quality of training, a questionnaire was conducted to monitor the status of reports submitted by trainees to their organizations after returning home, the implementation status of action plans, and requests for support from JICA and consultants. The questionnaire items are as follows.

Table 5-2 Questionnaire Items for Monitoring Activities

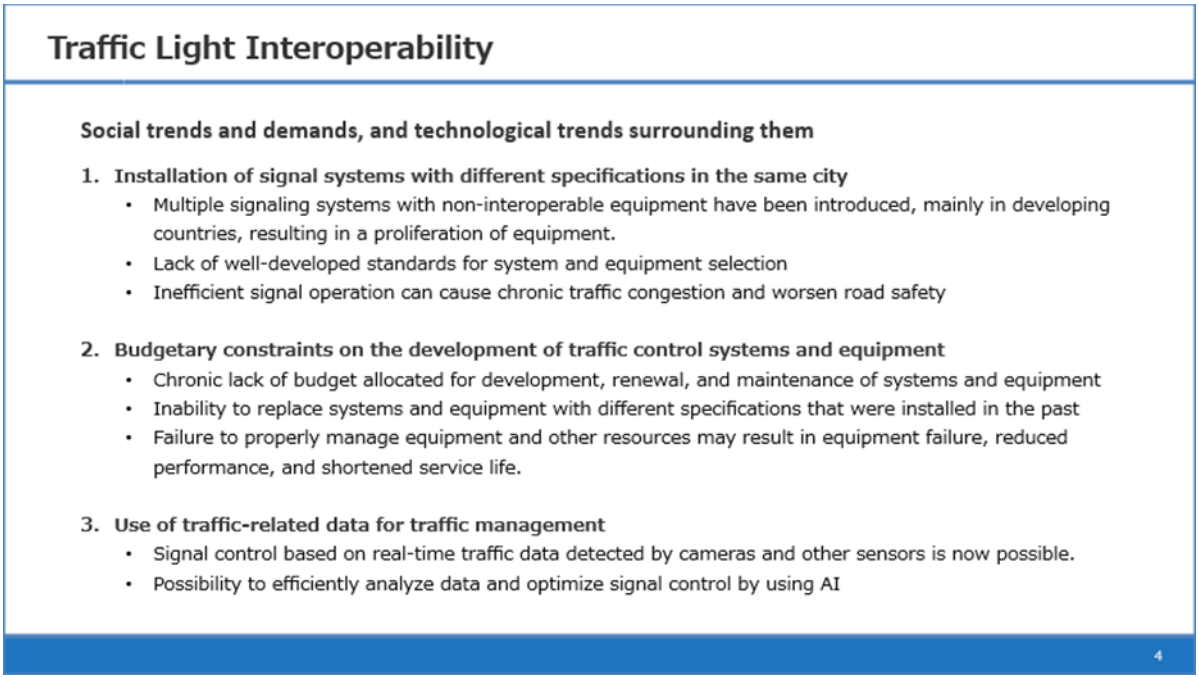
Category	Confirmation Contents
Contents of Action Plan	● Whether it was independently developed or based on existing plans of the organization or country If based on an existing plan of the organization or country: name and overview of the plan
Status of Training Reports	● Whether or not training results were reported to the affiliated organization after returning to their countries ● Reactions and evaluations from the affiliated organization regarding the formulated action plan
Status of Implementation of Action Plan	● Action plan implementation Status If implementation is ongoing or in preparation: Specific implementation activities If implementation is under consideration: Planned implementation schedule
Requests for Support from JICA and Consultants	● Requests for support or consultation with JICA or consultants ● Requests for technical introductions related to the challenges faced (including whether there are any Japanese companies of interests)

(Source: JICA Study Team)

5.2.2 Preparation of Training Materials

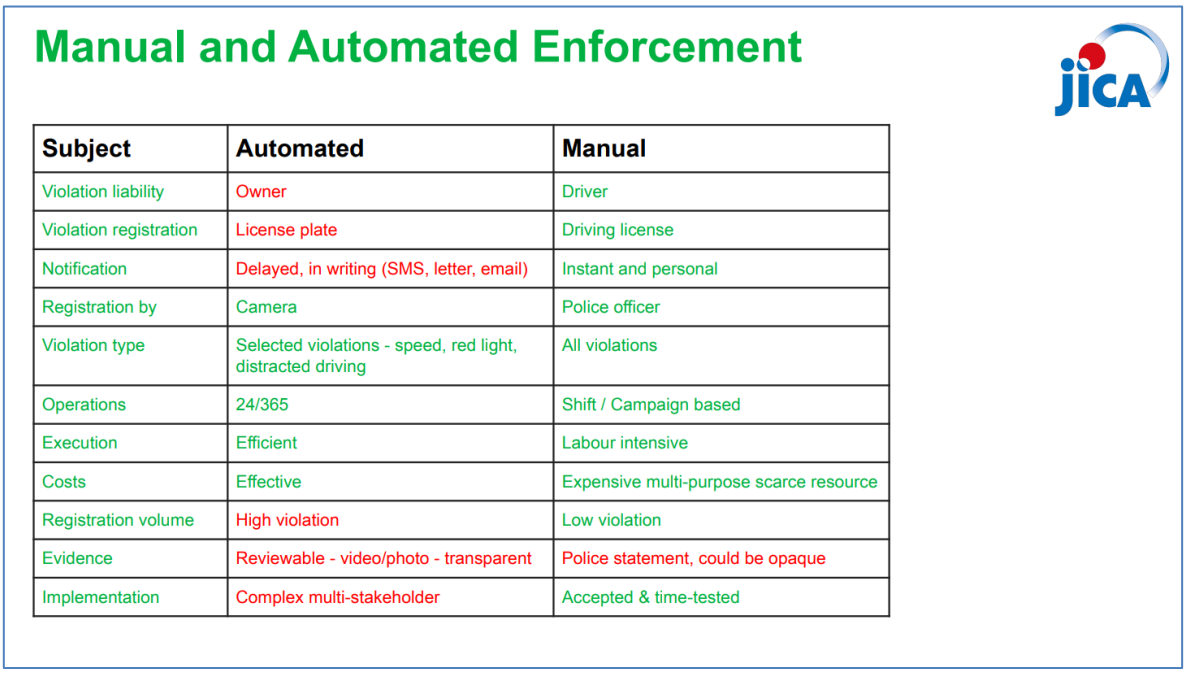
With the aim of enhancing the quality of the training, training materials were prepared based on the findings of the country-specific situation and trend analysis. Two types of training materials were prepared as proposals for use in the following fiscal year and beyond. The first presents social trends and demands related to transportation and ITS, corresponding technological developments, and technologies applicable to developing countries. The second presents best practices in developing countries concerning the introduction of automated traffic enforcement systems through PPP models.

An example of the materials is shown below.



(Source: JICA Study Team)

Figure 5-1 Example of Training Material on ITS Trend



(Source: JICA Study Team)

Figure 5-2 Example of Training Material on the Introduction of an Automated Traffic Enforcement

5.3 Extraction of ITS Including New Technologies and Consideration of Development Strategies

5.3.1 Extraction of ITS Menus

Information collected through training, field surveys, and ITS trend survey under this project was consolidated to identify ITS menus applicable to each developing country. Specifically, based on the current status of transport and ITS in each city, as well as the high-priority components proposed in ITS infrastructure development and action plans, ITS menus were categorized into short-, medium-, and long-term measures, and a phased development strategy was formulated.

Table 5-3 ITS Menus, Needs (Priority) and Implementation Timing of Each Country

ITS Technology	Proposals Based on Action Plans	Implementation Timeline
ITS Master Plan	Kenya, Nigeria, Philippines, Cambodia, Mongolia, Rwanda, Morocco, Uganda	Short
Traffic Signal Control System	Kenya (3), Uganda (2), Nepal (2), Tanzania, Morocco	Short - Medium
Overloaded Vehicles	Malaysia, Ghana, Tanzania	Short
Parking Management	Rwanda	Short
Public Transportation	Egypt, Jordan, Cambodia	Short
Traffic Monitoring and Control Center	Cote d'Ivoire, Uganda (3), Egypt, Nepal (2), Philippines, Rwanda, Tanzania, Mongolia, Morocco	Short – Long
Service Integration (Image Analysis, AI, Analysis, Other New Technologies)	Dominican Republic	Short – Long
Data Platform	Cote d'Ivoire	Medium
MLFF	Thailand, Indonesia	Short - Medium
C-ITS (V2X)	Turkey, Egypt, Thailand	Long
BRT	Mongolia, Egypt, Tanzania	Medium
Implementation of a Comprehensive ITS Menu	Philippines, Tanzania, Bangladesh, Indonesia	Short – Long
ETC (e.g. RFID)	Ghana, Tanzania	Short - Medium

(Source: JICA Study Team)

5.3.2 Consideration of Development Strategy

Based on the needs of trainees from each region identified during training program, as well as the

issues extracted and the varying levels of ITS development across cities, careful consideration was given to the fact that challenges differ by context. Accordingly, development measures were examined by phase and by implementation timeline.

Table 5-4 ITS Development Strategy by Stage

Stage and Budget	Development Strategy	Detail Contents of Development
Conceptualization and Planning Stage (FS) Budget Review (Estimating approximate costs, Reviewing funding options (government budget, international aid, PPP, etc.))	**Current Situation Analysis and Issue Identification**	Collect and analyze data on traffic volume, accident occurrence, congestion points, etc. Understand regional characteristics and user needs
	Clarify Implementation Objectives	Congestion relief, improved safety, reduced environmental impact, improved public transportation convenience, etc.
	Setting Target Areas and Priorities	Prioritize the effective or urgent area Align with regional transportation policies and urban planning
Besic Plan Formulation Stage (MP) Budget Clarification (clarification of budget allocation burdens (government, private sector, international organizations, etc.)	**Technology selection and system design**	Suitable ITS technologies (e.g., traffic signal control, ETC, CCTV, AI cameras, etc.) Considering system interoperability and scalability
	Coordination with relevant organizations and securing budget	Collaborate with central and local governments, police, private sector operators, etc. Consider utilizing subsidies and public funds
	Phased Implementation Plan (Roadmap)	Short-term (1-3 years), medium-term (3-5 years), and long-term (5+ years) implementation schedules From pilot projects to full-scale implementation
Implementation Design and Implementation Phase (DD, SV) Budget Confirmation and execution (budget securing is a prerequisite; if	**Formulation of Implementation and Construction Plans**	Planning of construction period, construction method, and traffic regulations Also important to inform and explain to residents
	Establishment of Systems and Legal Frameworks	Data sharing, privacy protection, and clarification of operational responsibility systems Legislative revisions and introduction of new systems
	Cooperation with Relevant	Cooperation with central and local governments, police, private companies, residents, etc.

Stage and Budget	Development Strategy	Detail Contents of Development
insufficient, there is a risk of postponement or cancellation)	**Organization**	Clarification of governance
Operation and Maintenance Phase (OM)	**Establishment of Operation and Maintenance System**	Establishment of continuous monitoring and maintenance system Establishment of improvement cycle through data utilization
Sustainable Funding Plan for budget (securing financial resources is most important for developing countries)	**Effectiveness Verification and Feedback**	Quantitative evaluation of effectiveness after introduction Implement improvements and expansions as necessary

(Source: JICA Study Team)

Table 5-5 ITS Menus and Development Details by Implementation Period

Period	ITS Menus	Content and Conditions
Short Term	ITS Master Plan	This is a maintenance plan that will be useful for the gradual introduction of ITS equipment over the short, medium, and long term, and is necessary for the full-scale introduction of ITS. It is desirable to formulate this plan before full-scale introduction.
	Traffic Control (Short Term)	In the short term, equipment will be introduced at multiple intersections, including major intersections, and the intersection cycle will be optimized based on the traffic volume passing through the intersections to alleviate traffic congestion.
	Measuring Overloaded Vehicles	Camera and sensor equipment will be installed on the main road to limit the target section and identify target vehicles, and VMS equipment for guidance, equipment for measuring vehicle weight, and equipment for collecting appropriate tolls for road maintenance will be installed.
	Parking Management (can be implemented independently by the private sector)	Gate equipment, camera equipment, sensors, and cameras necessary for parking lot management will be installed. In addition, equipment will be installed to allow payment by cash, cashless payment, or smartphone app. There are also

Period	ITS Menus	Content and Conditions
		solutions that systemize the process of tracking and imposing fines on unpaid users in the case of gate-less parking.
	Public Transportation (can be implemented independently by the private sector)	Equipment for automatic fare collection for public transportation (mainly buses), card issuance, and the establishment of a bus operation management center will be implemented to provide operation information to bus users. These measures can be introduced and operated independently by the private sector.
	Traffic Control Center (short term)	In the short term, equipment will be introduced to accurately monitor and control traffic signals, CCTV, and other surveillance targets. Optical fiber lines or wireless communication networks will be installed to enable communication with roadside equipment, and connections to the center will be established. The center will also be equipped with video walls, various terminals, and other initial equipment necessary for traffic control.
	MLFF (short term)	MLFF gantries, tag sensors, cameras, and other equipment will be installed on the main road in toll-paying sections. Vehicles will be equipped with RFID tags. Toll collection systems will also be installed at management offices to enable automatic toll collection.
	BRT (short term) (can be implemented independently by the private sector)	In the short term, we will identify the target sections, construct dedicated lanes, and operate BRT. On the BRT side, we will install various sensors such as GPS and equipment for automatic toll payment. At the center, we will introduce a system to monitor BRT operations and provide bus operation information to BRT users.
	ETC (short term)	In the short term, some of the existing toll booths on toll roads will be modified, and ETC-dedicated lanes will be established in conjunction with communication equipment. Vehicles will be equipped with OBU or tags compatible with the ETC system. Additionally, an automatic toll payment system linked to bank accounts will need to be established as a back-end system.
Medium Term	Traffic Control (medium Term)	Expansion of signal control areas

Period	ITS Menus	Content and Conditions
	Traffic Control Center (medium term)	Expansion of equipment in line with the expansion of the traffic control center's jurisdiction area
	Data Platform	The installation of a data center, center equipment (introduction of hardware and software), consolidation of traffic-related data and integration with data from other fields, and gradual expansion of data services and integration enhancements will be required, so the introduction period is expected to be in the medium term.
	MLFF (medium)	Expansion of MLFF areas and expansion of center facilities in line with area expansion
	BRT (medium) (can be implemented independently bt the private sector)	Expansion of BRT areas and expansion of center facilities in line with area expansion.
	ETC (medium term)	Expansion of ETC toll gate facilities, area expansion, etc. Expansion of back-end systems, etc.
Long Term	Traffic Control Center (long term)	Expansion of equipment and technical services, integration of different technical services, and introduction of new technologies will be implemented in line with the expansion of the traffic control center's jurisdiction area.
	C-ITS	The introduction of Cooperative Intelligent Transport Systems (C-ITS) technology, which is being promoted primarily in Europe, is considered premature for developing countries, so long-term consideration is necessary, starting with foundational research aimed at future implementation.

(Source: JICA Study Team)

5.4 Identification of Issues Related to Management Systems, Organizations, and Funding, and Consideration of Countermeasures

Based on the country reports, lectures on JICA-supported countries during the training program, and the results of field surveys, the following issues related to the operation and maintenance of ITS equipment after its implementation were identified and organized.

Table 5-6 Identification of Issues Related to Operational Maintenance Management Methods

Issues
Organizational Aspects ・ There are no operational engineers with specialized knowledge, or there is a shortage of such engineers. ・ Human resources are not being passed on, and talented engineers are leaving the country. ・ Parts are not available locally when equipment breaks down. **Systematic Aspects** ・ Regular inspections and maintenance plans are not clearly defined. ・ Responsibility for responding to breakdowns and other incidents is unclear. **Financial and Other Issues** ・ Funding is not secured. ・ There are few services that generate revenue (e.g., toll collection, traffic information fees). Damage or theft

(Source: JICA Study Team)

Furthermore, based on the above issues and countermeasure cases from past ITS development projects supported by JICA, possible solutions regarding institutional frameworks, organizational structures, and financial arrangements in developing countries were examined. Consideration was also given to potential challenges that may arise in future developments, and the findings are summarized as follows.

Table 5-7 Consideration of Countermeasures Related to Management Systems

Category	Proposed Measures	Points to Consider After Implementation
Organizational and Technical Aspect	● Establish local engineer training programs; promote collaboration with local contractors ● Ensure thorough knowledge	● Gaps may arise between training and practical needs, resulting in personnel not being immediately effective

Category	Proposed Measures	Points to Consider After Implementation
	transfer through capacity building and on-the-job training by international experts ● Support workforce retention by improving salaries and working conditions to prevent brain drain ● Adopt technologies and spare parts that can be procured locally ● Introduce modular and standardized systems to reduce maintenance costs ● Implement systems that allow for remote maintenance to improve efficiency and reduce labor burden	● Training programs may incur high costs, increasing overall expenditure ● Technological gaps between regions may weaken maintenance capacity in rural areas ● Introduction of advanced systems could increase the impact of system failures ● Coexistence of old and new systems may cause compatibility issues and complicate maintenance work ● Advancement of systems may lead to increased cyber security threats such as hacking or data breaches
Institutional Aspect	● Develop long-term maintenance plans, including clear roadmaps from the development to operation and maintenance phases ● Clarify institutional responsibilities by establishing and documenting roles and accountability of managing entities	● Clear division of responsibilities between public and private sectors may lead to friction or conflicts ● Excessive rules and procedures may hinder flexible responses
Financial and Other Aspect	● Utilize PPPs for financing, leveraging private sector expertise to ensure sustainable operations ● Seek support from international development agencies (e.g., World Bank, ADB, JICA) at appropriate project stages ● Introduce budgeting and financial management systems to improve transparency in fund flows ● Promote community involvement to enhance local ownership and	● Overreliance on the private sector may compromise public interest, prioritizing profit and reducing service quality ● Excessive dependence on international aid may undermine long-term sustainability ● Budget and financial management may become more complex ● Conflicts of interest may arise with local residents, especially if benefits are not evenly distributed

Category	Proposed Measures	Points to Consider After Implementation
	protection of infrastructure	

(Source: JICA Study Team)

5.5 Collection and Compilation of ITS Standardization Trends, and Organization and Comparison of Technologies and Products

Based on ITS technical information gathered through the training program, field surveys, and global trend surveys under this project, trends in standardization and de facto standards (key technologies) in Japan, Europe, the United States, and other developed countries were compiled.

As an example, the following presents a case study focusing on signal control technologies.

Table 5-8 Major Signal Control Technologies (Global)

Technology	System / Method Name	Main Applications / Features	Country / Region
Adaptive Signal Control	SCOOT (UK) / SCATS (Australia)	● Real-time signal adjustment based on traffic flow ● Contributes to the efficiency of urban traffic	UK, Australia, Asia, and the Middle East
AI-Based Signal Control	Surtrac（USA）	● Signal optimization using AI ● Considers real-time behavior of traffic volume, pedestrians, and emergency vehicles	USA (Pittsburgh), India, and others
V2I Coordinated Control	C-V2X（Cellular Vehicle-to-Everything）	● Coordinated control through communication between vehicles and traffic signals ● Integration with autonomous driving and MaaS	Selected cities in China, the United States, and Europe
Standard Communication Protocols	NTCIP (USA) / OCIT (Europe)	● Standardized communication protocols between signal control devices ● Ensures interoperability among devices from different manufacturers	Traffic control systems in North America and Europe
Cloud-Based Signal Control	Econolite Centracs／ Siemens Sitraffic	● Centralized management of signal control, monitoring, and analysis via cloud ● Designed for smart city	USA, Germany, UAE, and others

(Source: JICA Study Team)

Table 5-9 Major Signal Control Technologies (Japan)

Technology	System / Method Name	Main Applications / Features	Country / Region
Basic Control Method	Time-of-Day Signal Control	● Adjusts signal patterns based on commuting and school hours ● Widely implemented in urban areas	Municipal governments in urban areas
Traffic-Responsive Control	Vehicle-Actuated Signals (linked with detectors)	● Dynamically controls signals by detecting vehicles and pedestrians ● Adopted at many intersections nationwide	Local governments nationwide and the National Police Agency
Centralized Control	UTMS (Universal Traffic Management System)	● Traffic management system led by the National Police Agency ● Integrates signal control, traffic information services, and emergency vehicle prioritization	National Police Agency, NEC, Omron, Kyosan Electric Manufacturing Co., Ltd., and others
Next-Generation Control	AI-Based Signal Control (Pilot Stage)	● AI learns traffic flow and performs optimized signal control ● Contributes to congestion mitigation and CO_2 reduction	Selected municipal governments, universities, and private companies (e.g., NEC)
Vehicle-Coordinated Control	ITS Connect (V2X Integration)	● Enables signal prediction and priority passage through vehicle-signal communication ● Designed for integration with autonomous driving systems	Toyota, National Police Agency, Ministry of Land, Infrastructure, Transport and Tourism (MLIT), and

Technology	System / Method Name	Main Applications / Features	Country / Region
			ITS promotion organizations

(Source: JICA Study Team)

Table 5-10 Estimated Initial Installation Costs by Signal Control Method

Method	Approximate Installation Cost (per intersection)	Features
Fixed-Time Control	500,000 yen to 1,000,000 yen	● The most basic signal control method ● Signal changes at fixed intervals regardless of traffic volume ● Low-cost but lacks flexibility
Vehicle-Actuated Control	1,500,000 yen to 3,000,000 yen	● Vehicle detectors (e.g., loop coils or infrared sensors) are installed ● Enables control based on traffic volume
Centralized Control (UTMS)	5,000,000 yen to 10,000,000 yen	● Linked with a traffic control center ● Requires large-scale communication and control infrastructure ● Widely implemented in urban areas
AI-Based Signal Control (Decentralized)	3,000,000 yen to 6,000,000 yen (Pilot Stage)	● AI units are added to existing signal controllers ● Enables real-time control based on traffic prediction ● Tends to reduce maintenance costs
ITS Connect	5,000,000 yen to 12,000,000 yen	● Enables signal prediction and priority passage through communication between vehicles and signals ● Designed for integration with autonomous driving systems