

Country Name	The Project for the Development of Intelligent Transport System for Expressways in Sri Lanka
Democratic Socialist Republic of Sri Lanka	

I. Project Outline

Background	The Southern Expressway (SEW) was constructed by ODA loans as the first expressway in Sri Lanka, and the service of the section between Colombo and Galle (approximately 96km) was commenced in November 2011. The Outer Circular Highway (OCH) connecting directly to the SEW, and the Colombo Katunayake Expressway (CKE, from Colombo to the Bandaranaike International Airport) connecting indirectly to the SEW were under construction at the time of ex-ante evaluation. It was forecasted that the traffic volume of the SEW would increase rapidly after the opening of those expressways. Consequently, the occurrence of traffic congestion was predicted as well as the increase of lane closure or full closure for incident clearance. Since there was no means of disseminating traffic information on the SEW, there was concern about worse traffic congestion and secondary accidents.			
Objectives of the Project	To promptly provide the accurate traffic information to drivers on expressways and their access roads, by introducing a traffic control system (Intelligent Transport System (ITS)) in the SEW and the OCH including their access roads, thereby contributing to increasing safety and convenience on these expressways.			
Contents of the Project	<ol style="list-style-type: none"> 1. Project Site: the SEW and the OCH¹ in Western and Southern Provinces 2. Japanese side: Provision of a grant necessary for procuring a traffic control system (ITS equipment such as servers, workstations, a wall map, rain gauges, traffic counters, variable message signs (VMS: for information provision for drivers on the expressway), traffic information boards (for information provision for service area users), and communication system, etc.) 3. Sri Lankan side: Preparation of a web server, traffic information provision (from Road Development Authority (RDA) and the traffic police), promotional activities to the general public, and operation and maintenance (O&M) of the ITS equipment 			
Project Period	E/N Date	March 18, 2013	Completion Date	June 10, 2015 (handing over of equipment)
	G/A Date	March 18, 2013		
Project Cost	E/N Grant Limit / G/A Grant Limit: 940 million yen, Actual Grant Amount: 914 million yen			
Executing Agency	Road Development Authority (RDA)			
Contracted Agencies	Main Contractor: Mitsubishi Heavy Industries Ltd. Main Consultants: Oriental Consultants Co., Ltd., East Nippon Expressway Company Limited (JV)			

II. Result of the Evaluation

<Constraints on Evaluation>

[Financial Statements of the Executing Agency] Financial statements of RDA are confidential information. Thus, while financial viability of RDA was verified through its financial statements within JICA, they cannot be presented in this report.

<Special Perspectives Considered in the Ex-Post Evaluation>

[Supplemental Information for Evaluating Impact] Indicators for evaluating impact of this project (contributing to increasing safety and convenience on these expressways) are not stated in the ex-ante evaluation sheet. Thus, in the ex-post evaluation, (1) the number of traffic accidents on the target sections and (2) average congestion time on the target sections were used as supplemental information to assess impact of the project. In addition, whether safety and/or convenience on the expressways has increased by providing drivers traffic information through ITS was checked qualitatively.

[Target Year for Evaluation] In the ex-ante evaluation sheet, it is stated that the target year for evaluation is 2017, which is three years after project completion. (The project was planned to be completed in August 2014.) However, this project was completed in June 2015 and three years after project completion is June 2018. Thus, in the ex-post evaluation, the target year was changed to 2018.

1 Relevance

<Consistency with the Development Policy of Sri Lanka at the Time of Ex-Ante and Ex-Post Evaluation>

The project has been consistent with Sri Lanka's development policy such as "development of national road networks" and "introduction of an advanced traffic management system" as set forth in "Vision for the Future (2010)", "National Road Master Plan (2007-2017)" and "Vision 2025".

<Consistency with the Development Needs of Sri Lanka at the Time of Ex-Ante and Ex-Post Evaluation>

The project has been consistent with Sri Lanka's development needs for ITS (particularly traffic control system) at the time of both ex-ante and ex-post evaluations.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The project was consistent with Japan's ODA policy as stated in "the Country Assistance Program for Sri Lanka (2004)", which included the "improvement of transportation and telecommunications grids" under the "improvement of economic infrastructure".

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

¹ The target sections were (1) the SEW (road sections around 11 interchanges from Kottawa interchange to Godagama interchange) and (2) the OCH (the access road (interchange entrance) to Kaduwela interchange).

<Effectiveness>

The project has achieved its objectives. The ITS equipment procured under the project is operated for 24 hours in 365 days, and the target for the indicator has been achieved after project completion. There are mainly four information sources for RDA's traffic control centre to obtain information related to incidents; i.e. (1) expressway users, (2) the expressway police, (3) the traffic control unit of the Expressway Operation Maintenance & Management Division (EOM&M) of RDA, which conducts regular patrols on expressways, and (4) CCTV cameras of the ITS. Necessary information obtained from these sources is immediately disseminated through VMS installed under the project. If information obtained from expressway users need to be verified by the traffic control unit, basic information is disseminated first, and further information is disseminated after the verification.

<Impact>

The expected impact has been observed to a certain extent. Although the number of traffic accidents on the target sections has increased after project completion, the traffic volume has increased as well. Thus, the accident rate (the number of traffic accidents per 1 million vehicles) was calculated. The rate in the SEW was decreased by approximately 20% in 2016 and 2017 compared with the rate in 2015 (it was increased again in 2018), while the rate in the OCH has decreased by approximately 40 to 50% after 2015. Traffic accidents occur due to many causes, and the ITS equipment procured under the project such as VMS does not have significant positive impacts on some types of accidents. However, the ITS equipment is useful to disseminate information on adverse weather and resulting safety requirements to drivers, and the rate of accidents due to adverse weather has been significantly reduced on both the SEW and the OCH after project completion, as shown in the table below. Thus, the ITS equipment is considered to have contributed to accident prevention to some extent. On the other hand, no noticeable impact has been observed in terms of traffic congestion time on the target sections. Nonetheless, according to RDA, expressway users' convenience has increased after project completion in terms of enabling them to estimate arrival time. Moreover, in the case of flood situations where access roads at interchanges are closed, such information is disseminated through VMS, which enables drivers to choose an alternate interchange to exit or enter.

Regarding other impacts, no negative impact on natural environment has been observed, and neither land acquisition nor resettlement has occurred under the project. However, two serious traffic accidents occurred during project implementation, i.e. one caused medium level injuries to five passengers in a vehicle, and the other caused serious level injuries to a driver and a vehicle, as sub-contractors did not have adequate capacity or safety standards and were not adequately supervised by the main contractor.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is fair.

Quantitative Effects

Indicator	Baseline 2012 Baseline Year	Target 2018 3 Years after Completion	Actual 2015 Completion Year	Actual 2016 1 Year after Completion	Actual 2017 2 Years after Completion	Actual 2018 3 Years after Completion
Time required for information provision to users after occurrence of an incident (minute)	Approximately 30(*)	Approximately 5	Approximately 5	Approximately 5	Approximately 5	Approximately 5

*Note: Maximum time required for the following actions: (1) The vehicle with VMS at the vehicle standby office goes to the site of an incident (in this case, the site is the place farthest from the vehicle standby office), (2) The vehicle with VMS grasps and reports the situation to the traffic control centre, and (3) The traffic control centre provides information to the users (through toll collectors).

Source: Ex-Ante Evaluation Sheet, Preparatory Survey Report, questionnaire survey and interview with RDA

Expected Impact

[Number of traffic accidents on the target sections]

	Actual 2014	Actual 2015 Completion year	Actual 2016	Actual 2017	Actual 2018
Traffic volume (Annual Average Traffic: AAT*) on SEW (Kottawa to Godagama)	31,129,755	37,446,080	47,020,030	53,743,330	48,788,090
Number of traffic accidents on SEW (Kottawa to Godagama)	603	851	821	952	1,093
Of which, number of traffic accidents due to adverse weather conditions	120	179	64	28	26
Number of traffic accidents on SEW (Kottawa to Godagama) per 1,000,000 vehicles	19.37	22.73	17.46	17.71	22.40
Of which, number of traffic accidents per 1,000,000 vehicles due to adverse weather conditions	3.85	4.78	1.36	0.52	0.53
Traffic volume (AAT) on OCH (Kadawatha to Kottawa)	N/A	8,204,470	27,452,015	35,280,900	39,989,765
Number of traffic accidents on OCH (Kadawatha to Kottawa)	29	84	170	182	201
Of which, number of traffic accidents due to adverse weather conditions	3	4	6	2	4
Number of traffic accidents on OCH (Kadawatha to Kottawa) per 1,000,000 vehicles	N/A	10.24	6.19	5.16	5.03

Of which, number of traffic accidents per 1,000,000 vehicles due to adverse weather conditions	N/A	0.49	0.22	0.06	0.10
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*AAT = AADT (annual average daily traffic) x 365

Source: Questionnaire survey and interview with RDA

3 Efficiency

The outputs of the project were produced mostly as planned². While the project cost was within the plan, the project period exceeded the plan (ratio against plan: 97%, 156%, respectively). The project period extended due to the two serious accidents caused by inadequate safety measures as mentioned above, and other reasons including heavy rains, presidential election and the mismatch of parts for gantries once transported to the project site. Therefore, the efficiency of the project is fair.

4 Sustainability

<Institutional Aspect>

EOM&M of RDA is responsible for O&M of the ITS equipment procured under the project. There are six ITS operators in three teams (two operators at each shift) working for 24 hours in the Traffic Section of EOM&M. There are also one engineer, one database administrator, one network superintendent and several technicians in the IT and Telecommunication Section of EOM&M for maintenance of the ITS equipment. According to EOM&M, the number of staff is sufficient, and no issue has arisen in O&M due to inadequate number of staff. The ITS equipment has been in continuous operation since project completion, and breakdowns and repairs have been handled in a timely manner in-house as much as possible. Local vendor support is used only when a case arises which cannot be handled in-house.

<Technical Aspect>

According to EOM&M, the staff in charge of O&M of the ITS equipment has been recruited based on necessary technical qualifications. All key staff who received the training (initial O&M guidance) under the project still work at EOM&M. While no formal training has been conducted in EOM&M after project completion, the ITS equipment has continuously been operated without significant disruptions till the time of ex-post evaluation. In addition, the IT and Telecommunication Section of EOM&M is improving and expanding the ITS by their own capacity, i.e. developing an expressway application for mobile devices which will be available for free download by users. Information from RDA's traffic control centre will be disseminated through the application as well as through VMS, which will widen the outreach of information dissemination. Therefore, EOM&M of RDA is considered to have a sufficient level of technical skills for O&M of the procured equipment.

<Financial Aspect>

EOM&M's revenue is through budget allocation from RDA, based on the toll revenues collected. By utilizing the most economical methods such as in-house repair and maintenance and using locally available parts and vendors, EOM&M has been able to keep its budget requirement at a reasonable and justifiable level, and it has consistently received the requested amount of budget allocation. RDA's relevant financial statements were disclosed to JICA as confidential information, and thus details cannot be presented in this report. However, JICA verified that RDA had a sufficient amount of revenue from the toll to cover necessary O&M cost of the ITS equipment.

<Current Status of Operation and Maintenance>

A maintenance plan of the ITS equipment has been incorporated into the overall monitoring and maintenance plan of the expressways, and a fully IT-based maintenance planning and recording system has been designed and implemented using open source software by the IT and Telecommunication Section of EOM&M. All the equipment procured under the project is maintained properly and in good conditions at the time of ex-post evaluation. Defective parts have been promptly replaced by spare parts in stock, through purchase from local vendors and the original equipment supplier during the defect liability period. However, it should be noted that access to software installed under the project to make necessary changes (expansion/modification of functions) in accordance with changing requirements for ITS is restricted by the original supplier, and some of the equipment may become obsolete in near future, without alternative solutions.

<Evaluation Result>

Therefore, the sustainability of the project effect is high.

5 Summary of the Evaluation

The project achieved its objective of enabling prompt provision of the accurate traffic information to drivers, and the expected impact of contributing to increasing safety and convenience on expressways has been observed to a certain extent. Regarding sustainability, while there is a concern about the possibility of some equipment becoming obsolete in near future, no problem has been observed regarding institutional, technical and financial aspects. As for efficiency, the project period exceeded the plan.

Considering all of the above points, this project is evaluated to be satisfactory.

III. Recommendations & Lessons Learned

Recommendations to Executing Agency:

- At the time of ex-post evaluation, traffic information only on the expressways (the SEW and the OCH) is provided through the ITS. However, user convenience could be further enhanced by providing traffic information on surrounding areas outside the expressways. Thus, RDA is advised to consider the integration of traffic information obtained from the ITS equipment procured under the project and the Advance Traffic Management System for metro Colombo, which is implemented by another department within RDA, in order to enhance the project effects.

Lessons Learned for JICA:

- As stated above, RDA requested for access to software installed under the project for expansion/modification of functions during

² Actual number of outputs was changed from the planned number as below: (1) rain gauges: 8 (plan) and 11 (actual), (2) traffic counters: 32 (plan) and 41 (actual), (3) VMS (on expressways): 16 (plan) and 21 (actual), (4) VMS (on access roads): 8 (plan) and 10 (actual). While it was originally planned to install the ITS equipment only up to Pinnaduwa interchange, the SEW became operational up to Matara with the addition of approximately 30km and three more interchanges by the time of project completion, and the increase of outputs became necessary.

project implementation, however, the request was not accepted by JICA and the original supplier. When implementing a similar project in future, it needs to be taken into account that executing agencies cannot afford to continuing with expensive proprietary technologies with their own funds, and expandability of functions and compatibility with other systems should be sought through providing open source software (or other similar methods), to enable executing agencies to make their choices as per their requirements and budgets.

- As stated above, two serious accidents occurred during project implementation, as sub-contractors selected by the Japanese contractor did not have adequate capacity or safety standards. In future projects, site safety requirements and remedial measures in case of safety lapses would need to be clearly defined in bidding documents. JICA would also need to emphasize to Japanese contractors their responsibility to closely monitor and supervise sub-contractors to meet safety and quality standards.



EOM&M's Traffic Control Centre



VMS on the Expressway