Ex-Post Project Evaluation 2022:

Package I-4 (Nicaragua・Indonesia)

Evaluation Reports

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Republic of Nicaragua

FY2022 Ex-Post Evaluation Report of
Japanese Grant Aid Project
"Project for Improvement of Educational Facilities in the Madriz and Nueva Segovia Departments"

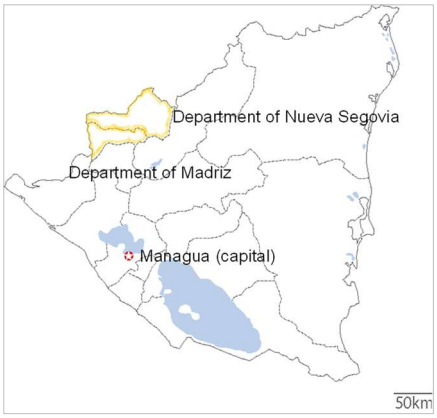
External Evaluator: Junko Noguchi
Foundation for Advanced Studies on International Development

0. Summary

This project was implemented to improve the learning environment where students can learn safely and securely in two northern departments of Nicaragua, by rebuilding and expanding basic education facilities, thereby contributing to improve access and quality of basic education in the target areas. The project was relevant with Nicaragua's development policies, which have emphasized the development of school facilities to foster human resources and improve the quality of basic education, as well as with the needs for school facilities in the target departments. Japan's assistance policy toward Nicaragua also emphasized the importance of improving the quality of basic education, including developing facilities; therefore, the project relevance and coherence are high. Although the project cost was within the plan, the project period significantly exceeded the plan due to two unsuccessful bids; therefore, efficiency of the project was relatively low. The student registration was slightly below the target due to external factors, but the project provided a safe and secure learning environment for students. In addition, it was confirmed that teachers, students, and parents have become motivated and that the methods of conducting classes were improved, although the toilets and kitchens have not been utilized for their original purpose in some schools. Thus, it can be said that effectiveness and impact of the project is high. Regarding sustainability, there have been some minor financial challenges in operating and maintaining facilities the project developed, but the prospects for improvement and resolution are high. Therefore, sustainability of the project effect is high.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location (Prepared by the External Evaluator with the Map Provided by JICA)

A School Constructed by the Project (Photograph Taken by the External Evaluator[1])

1.1 Background

In Nicaragua, although the net enrollment rate in primary education (six years) was relatively high at 89.1% (2013), the rate in secondary education (first three years and second two years) was much lower at 50.6% (2013). The high repetition and dropout rates majorly impeded human resource development. The Government of Nicaragua, in its *Strategic Plan for Education* (2011-2015), had identified as one of its priorities the rehabilitation and expansion of school facilities, along with improving the quality of basic education. According to the plan, there was a disparity between urban and rural areas regarding educational services, and the lack of classrooms in rural areas and the high percentage of school facilities that required rehabilitation and repair were identified as impediments to improve access to education. In the Departments of Madriz and Nueva Segovia located in the northern part of the country, the classroom shortage and the deterioration of existing school facilities were particularly pronounced.

1.2 Project Outline

The objective of this project is to improve the learning environment where students can learn safely and securely in two northern departments of Nicaragua, by rebuilding and expanding basic education facilities, thereby contributing to improving access and quality of basic education in the target areas.

Grant Limit / Actual Grant Amount	1,267 million yen / 1,234 million yen
Exchange of Notes Date / Grant Agreement Date	June 2015, May 2019 (Amendment) / June 2015, January 2018 (Amendment 1), May 2019 (Amendment 2)

[1] Photos inserted in this report were taken by the external evaluator in February 2023, except for the photo 10 which was taken by the local consultant.

Executing Agency	Ministry of Education (MINED)
Project Completion	November 2019
Target Area	Departments of Madriz and Nueva Segovia
Main Contractor	Tokura Corporation
Main Consultants	Mohri, Architect & Associates, Inc., Yachiyo Engineering Co., Ltd.
Preparatory Survey	May 2014 to May 2015
Related Projects	"Project for Rehabilitation of School Infrastructure in the Departments of Rivas, Boaco and Chontales" (Phase 1: 2005, Phase 2: 2006), "Project for the Rehabilitation and Equipment of the Scholastic Centers in the North Region of Nicaragua" (2008), "Project for Improving the Learning of Mathematics in primary education phase 2" (2012-2015)

2. Outline of the Evaluation Study

2.1 External Evaluator

Junko Noguchi, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: August 2022 to October 2023

Duration of the Field Study: February 12 to February 25, 2023

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance/Coherence (Rating: ③[3])

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Nicaragua

The *National Human Development Plan* (2012-2016) stated that classrooms and equipment were important to the teaching process as part of the education sector policy and that active school and community participation was required to maintain school facilities. The succeeding *National Human Development Plan* (2022-2026) similarly identified constructing and rehabilitating schools and classrooms as one of the education system's goals leading to human resource development. The *Strategic Plan for Education* (2011-2015), a development policy for the education sector, also prioritized rehabilitating and standardizing school facilities, along with improving the quality of basic education. Although a succeeding plan to this plan was under preparation at the time of the ex-post evaluation, in October 2022, the Ministress of Education stated that improving school facilities would be included in the

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[3] ④: Very High, ③: High, ②: Moderately Low, ①: Low

coming plan as well.[4]

In light of the above, Thus, both at the time of ex-ante and ex-post evaluation, the development of school infrastructure was identified as one of the policy objectives of the national development plan to improve the quality of education included, and the same is true for the education sector plan. Thus, the project is consistent with Nicaragua's development policy.

3.1.1.2 Consistency with the Development Needs of Nicaragua

The Departments of Madriz and Nueva Segovia are located in the upper reaches of the Coco River in a mountainous region with elevations ranging from 300 meters to 1,400 meters, and the topography is rugged. Many schools are located on sites where erosion cliffs are immediately approaching or on sloping sites, and many schools in the target area were at risk of damage from the inflow of sediment and muddy water from slopes and streams into the school sites; collapses; and falling rocks. Furthermore, at the time of project planning, many classrooms were buildings made of bricks or concrete blocks reinforced with concrete frames, buildings of blocks made of soil and mortar around them (Photo 1), or temporary wooden buildings. Because of the lack of classrooms, classes were sometimes held in the vacant spaces of neighboring houses or on vacant lots. Even at the time of ex-post evaluation, about 30% of the 9,105 schools nationwide needed immediate maintenance (Photo 2).[5]

Photo 1. A Classroom Used before the Project (Madriz)

Photo 2. Open-Air Class at the Time of Ex-Post Evaluation (Nueva Segovia)

The net enrollment rates in primary education in the Departments of Madriz and Nueva Segovia in 2013 were 83.4% and 80.1%, respectively, while the net enrollment rates in secondary education were 46.5% and 40.8%, respectively. Both educational levels were below the national average (primary education: 89.1% and secondary education: 50.6%). In both departments, net enrollment in primary education had been declining since 2011, and there should have been more classrooms to accommodate those who should have been enrolled. At the time of ex-post evaluation, secondary enrollment in both departments had improved since

[4] Statement on the national television program. TN8 website, https://www.tn8.tv/nacionales/ano-escolar-2022-y-metas-educativas-2023-en-nicaragua/ Accessed on March 8th, 2023.

[5] Interview result of MINED.

the time of the project planning, but primary enrollment was declining.

Table 1. Net Enrollment Rates in Primary and Secondary Education in Madriz and Nueva Segovia

(Unit: %)

		2011	2012	2013	2020	2021	2022
Primary	Madriz	85.6	81.2	83.4	78.0	78.4	77.9
	Nueva Segovia	88.1	83.7	80.1	74.7	74.5	72.3
	National Average	93.6	90.8	89.1	92.2	92.6	92.5
Secondary	Madriz	42.9	44.2	46.5	52.5	54.8	53.8
	Nueva Segovia	38.8	40.4	40.8	45.8	46.5	44.3
	National Average	46.4	47.9	50.6	57.1	58.5	58.9

Source: Preparatory Survey Report, Questionnaire answer of MINED.

Thus, the project is consistent with Nicaragua's development needs in two northern departments of Nicaragua, as was the need for expanding the school facilities and a safe environment with reduced risk of disaster at the time of both ex-ante and ex-post evaluation.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

In the *Country Assistance Policy for the Republic of Nicaragua* (2013), the basic principle (general objective) was "stable economic development through reduction of poverty and disparity." One of the priority areas was, "social development for the poor population and regions," which aimed to contribute to improve the quality of primary and secondary education, including maintaining facilities, to support the poor population in rural areas and other regions. Another priority area, "environmental conservation and disaster prevention," stated that support would be provided in the area of disaster management, including disaster risk reduction and response to disasters, utilizing Japan's knowledge and expertise. This project aimed to create a safe and secure learning environment for Nicaraguan students, incorporating the perspective of disaster prevention, it is consistent with Japan's ODA policy at the time of ex-ante evaluation.

3.1.2.2 Internal Coherence

In Nicaragua, improving the academic achievement of mathematics in primary education was an urgent issue, and the Japan International Cooperation Agency (JICA) implemented the "Project for Improvement on the Quality of Mathematics Teaching in Primary Education" (PROMECEM) (2006-2011), through which textbooks for students in Grades 1 to 6, teaching guides for teachers, and teaching plans for the "Mathematics and Teaching Methods" course were developed. In PROMECEM Phase 2 (2012-2015), efforts

were made to improve the teaching skills of mathematics instructors at teacher training schools (Normal Schools). Although the development of school facilities under this project and the efforts of PROMECEM Phase 2 complement each other to improve the quality of and access to education, no specific collaborative activities were planned or implemented.

3.1.2.3 External Coherence

The target area of the project is located in a mountainous region with poor accessibility, and little support from other partners had been implemented. Although overlap with other partners' projects was avoided, no particular collaborative activities aimed for synergistic effects were planned.

In light of the above, the project is relevant with the Nicaraguan development policies and needs. Additionally, it is consistent with Japan's ODA policy. Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

3.2.1.1 Outputs of the Japanese Side

(1) Facility Construction and Equipment Procurement

Under the project, construction and rehabilitation of school facilities in basic education; procurement of educational furniture such as desks, chairs, and whiteboards; and awareness-raising activities on disaster prevention were conducted in the Departments of Madriz and Nueva Segovia.

The original plan included constructing 109 classrooms in 32 schools, but the actual number of constructed classrooms in 28 schools was 97 (24 classrooms in 11 schools in Madriz and 73 classrooms in 17 schools in Nueva Segovia) (Table 2). Four schools were excluded because of the expected shortfall in construction costs due to soaring construction prices. According to the project consultant, the price hikes were beyond what had been anticipated at the time of planning,[6] and the number of target schools had to be reduced to fulfill the design criteria and implement the project within the grant amount.

The detailed design resulted in changes to the layout of the classroom buildings and toilet booths, as well as changes to the exterior construction (retaining walls, filling, and cutting). These changes were in response to the shape and size of each site and to ensure flow lines and did not directly affect the learning environment. In addition, the installation of building

[6] For reference, according to World Bank Data, the annual inflation rate for consumer prices in Nicaragua was 6.0% in 2014, 4.0% in 2015, 3.5% in 2016, 3.9% in 2017, 4.9% in 2018 and 5.4% in 2019, indicating a high level of price inflation.

entrance ramps was cancelled at 15 schools. This was due to the lack of sufficient space to install sloping ramps.

Table 2. Outputs of the Japanese Side (Facility Construction): Plan and Actual

	Plan	Actual
School Facility (Construction/expansion)	32 schools, 109 classrooms (44 classrooms / 65 classrooms)	28 schools, 97 classrooms (41 classrooms / 56 classrooms)
Principal's Room	2 rooms	2 rooms
Teachers' Room	2 rooms	2 rooms
Building Area	7,368 m^2	5,605 m^2
Construction Area	8,465 m^2	7,386 m^2
Storage/Kitchen	20	18
Toilet	33 (92 booths)	28 (76 booths)

Source: Project Completion Report, interview result of the consultant.

Procurement of educational furniture and equipment was conducted as planned in the 28 schools where facilities were constructed (Table 3). Regarding desks and chairs for students, 5% of the total was modified to the specifications for left-handed students at the request of MINED.[7]

Table 3. Outputs of the Japanese Side (Procurement of School Furniture): Plan and Actual

	Plan	Actual
Electricity equipment	18 (18 schools)	16 (16 schools)
Desk and Chair for Student	2,210 (31 schools)	2,010 (27 schools)
Table for Preschool Student	75 (18 schools)	69 (16 schools)
Chair for Preschool Student	300 (18 schools)	276 (16 schools)
Whiteboard	188 (32 schools)	168 (28 schools)
Bulletin board	113 (32 schools)	101 (28 schools)
Cabinet with Door	113 (32 schools)	101 (28 schools)
Cabinet without Door	16 (3 schools)	16 (3 schools)
Table for Teacher	108 (32 schools)	98 (28 schools)
Chair for Teacher	108 (32 schools)	98 (28 schools)

Source: Project Completion Report.

(2) Consulting Services

Consulting services such as detailed design, bidding and construction contract assistance, and construction supervision were implemented as planned.

[7] Interview result of DGIE.

(3) Capacity-Building Program (Soft Component)

Disaster preparedness awareness-raising activities to raise disaster preparedness awareness were implemented as planned, to improve the ability of school personnel and students to evacuate and respond to disaster risk aversion on their way to and from school in the event of a disaster (Table 4).

Table 4. Implemented Activities (Capacity-Building Program)

	Major Activities	Activity Results
Output 1	● The poster on integrated disaster prevention was prepared. ● Seminars for capacity development on disaster preparedness (description of target disaster types by school) were implemented.	● Participants understood the seminar contents and were highly satisfied. In particular, they gained a better understanding of what to do during a disaster and evacuation.
Output 2	● Seminars and workshops on disaster preparedness facilities and evacuation (explanation of how to develop an evacuation drill plan, and a school-specific evacuation drill implementation form) were implemented. ● Evacuation drills were conducted.	● Evacuation drills were conducted based on the prepared evacuation drill implementation forms and scenarios. In some cases, roles of first-aid teams and the like were added to the forms/scenarios, and maps of evacuation routes and risk locations were added.
Output 3	● Posters and leaflets on the risks of going to and from school were prepared. ● Water level gauges indicating the prohibition of going to and from school (crossing the river) were installed (3 schools). ● Workshops on river crossing during high water were implemented.	● Water level gauges enabled objective decisions to make on whether to cross the river. The students' understanding of the risk of disasters on their way to and from school was improved.

Source: Project Completion Report (Capacity-Building Program).

In light of the above, the outputs of the Japanese side were mostly produced as planned.

3.2.1.2 Responsibilities of the Nicaraguan Side

The responsibilities of the Nicaraguan side were implemented as planned, except that the electricity connection work was implemented after the project was completed (Table 5). Electricity was planned to be installed at six schools (all in Nueva Segovia) where electric lines had reached the front road of the site at the time of the preparatory survey. The connection work was done at two of these schools within the project period, but for the other four schools,

the work was not completed until February 2022, more than two years after the project was completed. The delay was because the National Electricity Transmission Company was proceeding with the electrical work according to their plan, which delayed the assignment of the planning period for the target municipalities.[8]

Table 5. Responsibilities of the Nicaraguan Side: Plan and Actual

	Plan	Actual
Before the Construction work	Securing the site (completion of registration).	Implemented as planned.
	Land clearing and development work.	Implemented as planned.
	Removal of above- and below-ground obstructions.	Implemented as planned.
	Obtaining construction permits.	Implemented as planned.
	Securing access roads for construction vehicles.	Implemented as planned.
During the Construction work	Securing storage for construction materials.	Implemented as planned.
	Application and construction of temporary electric power for construction.	Implemented as planned.
	Electricity connection work.	Completed after the project.
	Installation of municipal water supply (securing water supply).	Implemented as planned.
	Procurement of equipment.	Implemented as planned.

Source: Questionnaire answer of MINED, interview result of the consultant.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned total project cost was 1,293 million yen (Japanese side: 1,267 million yen, Nicaraguan side: 0.26 million yen). The actual cost was 1,266 million yen (Japanese side: 1,234 million yen, Nicaraguan side 0.32 million yen), which was within the plan (ratio against the plan: 98%). Expenditures on the Nicaragua side included removing existing structures, land development work, tree trimming, and electricity connection work.

3.2.2.2 Project Period

According to the plan at the time of ex-ante evaluation, the planned project period from the signing of the grant agreement to the completion of construction work was 25 months (July 2015 to July 2017). The actual period was 53 months (July 2015 to November 2019), which significantly exceeded the plan (ratio against the plan: 212%). The reasons for exceeding the

[8] Questionnaire answer from the Department Delegation of Nueva Segovia.

plan were two unsuccessful bids, repeated detailed designs, and construction delays due to political unrest in the country in 2018 (period for the detailed design and bidding/contract: 8 months planned and 27 months actual. Construction period: 16 months planned and 23 months actual).

In light of the above, the project outputs were mostly produced as planned. Regarding the input, although the project cost was within the plan, the project period significantly exceeded the plan. Therefore, efficiency of the project is moderately low.

3.3 Effectiveness and Impacts[9] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

(1) Number of Registered Students at School

The project aimed to develop a safe and secure learning environment for students. In this project, each target school site's vulnerability to a disaster was assessed during the preparatory survey, and based on the results, disaster prevention measures were taken, including isolating classroom buildings from the cliff slope; installing retaining walls, sediment catchment facilities, and drainage facilities; and raising school building foundations. In addition, design standards were followed to meet the MINED's facility design standards, which were prepared considering disaster prevention. Therefore, a "safe and secure environment" was interpreted as classrooms that the project developed and those which were judged to be continuously usable at the time of the preparatory survey. The number of students registered in the target schools was used as a quantitative indicator.

Table 6 shows the target and actual number of registered students at the target schools. The total students who registered in the regular class of pre-school, primary and secondar education was 4,651. Excluding the number of the students which had no registered students in secondary education and thus no target figure was set in the preparatory survey, the total number was 4,278, which is slightly below the target of 4,538 students. The first reason for this is presumably due to the migration and moving of students' families, both nationally and internationally. The number of Nicaraguans migrating out of the country has been increasing every year, and the rate of increase has been growing.[10] According to MINED, this may also be because it has been permitted for students to change from attending the normal shift (Monday through Friday) to attending the Saturday shift to receive education flexibly according to their or their families' convenience, as some families seasonally move to engage

[9] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

[10] According to the UNHCR database, the total number of refugees and asylum-seekers in 2014 was 2,298, and it has increased rapidly since 2019: 71,245 and 236,983 in 2019 and 2022, respectively. The average annual increase during this period was 73.0%.

in agricultural work. For students who move to other areas, information on them before their move is transferred to the Department Delegation of MINED in the new area. It should be noted that this registration figure is the number of students enrolled at the beginning of the school year and does not include students registered or transferred in the middle of the school year; therefore, the actual number of registered students may be higher. If the number of the students who registered in the Saturday class for the Youth and Adult (JYA), the total number of the registered students in 2022 was 5,039.[11]

Table 6. Registration of Students at the Target Schools

(Unit: persons)

	Baseline	Target	Actual value			
	2014	2022	2019	2020	2021	2022
		3 years after completion	Completion year	1 year after completion	2 years after completion	3 years after completion
a) Pre-school	409	540	478	504	511	477
b) Primary Education (Regular)	2,711	2,335	2,623	2,599	2,548	2,537
c) Primary Education (JYA)	NA	NA	0	16	13	7
d) Secondary Education (Regular)	1,578	1,663	1,255	1,377	1,765	1,637
e) Secondary Education (JYA)	NA	NA	364	372	332	381
f) Secondary Education (with target values)	1,578	1,663	862	1,014	1,378	1,264
Total (a+b+c+d+e)	NA	NA	4,720	4,868	5,169	5,039
Total (a+b+d)	4,698	4,538	4,356	4,480	4,824	4,651
Total (a+b+f)	4,698	4,538	3,963	4,117	4,437	4,278

Source: Data provided by MINED.

Note: The target value was recalculated for 2022 because the project completion was delayed for two years. Originally, the target value for 2019 was calculated based on the average increasing rate of registered students from 2010 to 2013.[12] The target figure for 2022 was recalculated based on this increasing rate as well. The target value was less than the baseline value because the number of registered students was decreasing in some municipalities. Both the target value and the actual values included data from the 32 originally planned schools. Registered students on the Saturday shift were not counted. JYA stands for the Youth and Adult class in the Saturday shift. The total (a+b+d) is the sum of the number of pre-school, primary, and secondary education students registered in regular classes that do not include Saturday classes. The total (a+b+f) counts only the number of students registered in schools where a target for the number of secondary education students was set at the time of project planning. In order to match the schools counted at the time of planning and at the time of ex-post evaluation, the total (a+b+f) was compared with the target value in the ex-post evaluation.

[11] The baseline figures confirmed in the Preparatory Survey did not include the number of students registered in Saturday shifts. Therefore, it is not possible to make a simple comparison.

[12] The rate of increase or decrease in the number of registered students varies slightly by municipality and education level. For example, according to the Preparatory Survey report, the minimum increasing rate in the number of students in pre-school education was calculated at 0.87 in the municipalities of Quilalí and Wiwilí of Nueva Segovia, while the maximum 1.09 in Telpaneca of Madriz. At the primary level, the minimum was 0.94 in El Jícaro of Nueva Segovia, and the maximum was 1.00 in San Juan de Río Coco, Telpaneca, and Totogalpa of Madriz. At the secondary level, the minimum was 0.89 in Telpaneca of Madriz, and the maximum was 1.05 in Murra of Nueva Segovia.

Although data on the number of migrants moving out of the target municipalities could not be confirmed, it can be inferred that the project had a certain effect on children from non-migrating families, because the migration was considered to have much exceeded the expected decrease in the number of registered students in 2014.

(2) Utilization of School Facility

Regarding the utilization status of the facilities, classrooms, and educational furniture, they were being utilized in all schools except one where the number of students significantly decreased more than planned. In that school, the number of registered students in 2014 decreased from 548 to 349 in 2023, and the vacant classrooms were being used for multipurpose functions such as for teachers' offices, library, and storage. Three unused toilet booths were being used for storage. The number of students decreased because the school was built in a new location away from the center of the municipality, and the students who used to attend the old school registered in another school.[13]

In addition to classrooms, the project constructed a kitchen/storage space and toilet booths. In all schools, the kitchen/storage space was being used to store food for school meals, but the sinks and stoves for cooking were not being used. The reasons for this were that there was no water running to the sink, and the students' parents in charge of cooking brought their food from home.[14] It was stated that it was more convenient for each parent to cook at home while caring for smaller sons and daughters and doing other household chores. The kitchen stove the project introduced was a mesh-type stove similar to those used for barbecues, but the parents were not accustomed to using it for cooking, and some commented that it required a lot of firewood and that it was dangerous for younger students to approach the kitchen because it did not have a door.

Photo 3. Storage (Nueva Segovia)

Photo 4. Kitchen Stove Introduced by the Project (Madriz)

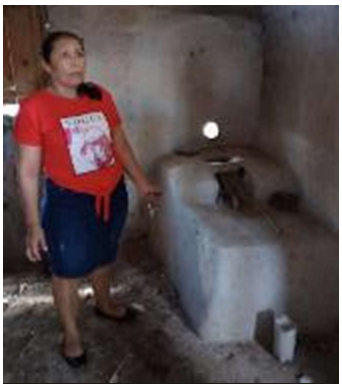


Photo 5. Generally Used Stove (Madriz)

[13] Interview results of school principals.
[14] Interview results of teachers and parents.

The toilets were equipped with an equal number of booths for boys and girls as a gender consideration. In 15 of the 26 schools, the use of booths was segregated by gender.[15] In other schools, they were separated by grade, or teachers and students used them separately.

Box 1. Utilization of Toilet Booths

The Interviews conducted with teachers and students during the field survey to confirm the actual use of the restrooms revealed that some toilets were not being utilized much. In the preparatory survey, it was assumed that excreta would be pumped once a year to maintain them, but none of the toilets had accumulated enough dirt to be visually confirmed. Male students often urinate outside without using the toilets. A few students seemed to be more accustomed to using the old toilets (which had a simple hole and no seats). In addition, students, especially in the lower grades, gave examples of reasons for not using the toilets more often: "I am afraid of falling into the hole," "I am afraid of the private room that can be locked," and "I am afraid because the toilet booth is far away from the classroom (where teachers are out of sight)" (Photo 6).

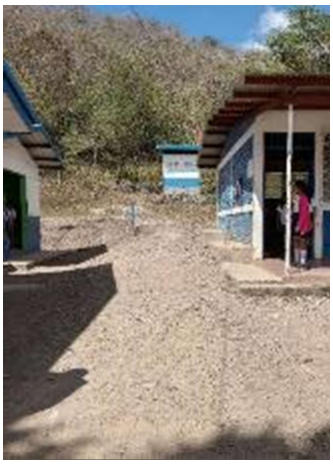


Photo 6. Toilet Booths Seen Backward, far from the Classroom Building (Madriz)

According to the female students, they do not have a problem with sharing the same toilet with male students as long as it is kept clean. Regarding their menstrual periods, a female student answered that "If I go to the toilet before leaving home and wear a napkin for long periods, there is no problem in not going to the toilet at school (in the morning session). My mother tells me to do so."

Source: Developed by the interview results with school principals, teachers, and students.

Photo 7. Toilet Booths which Used to be Utilized Before (Madriz)

Photo 8. Toilet Booths Constructed by the Project (Nueva Segovia)

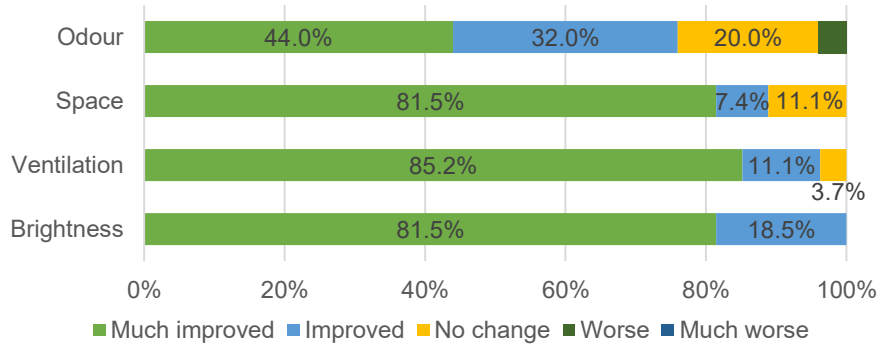
[15] Interview results of school principals.

3.3.1.2 Qualitative Effects (Other Effects)

(1) Improvement of the Learning Environment

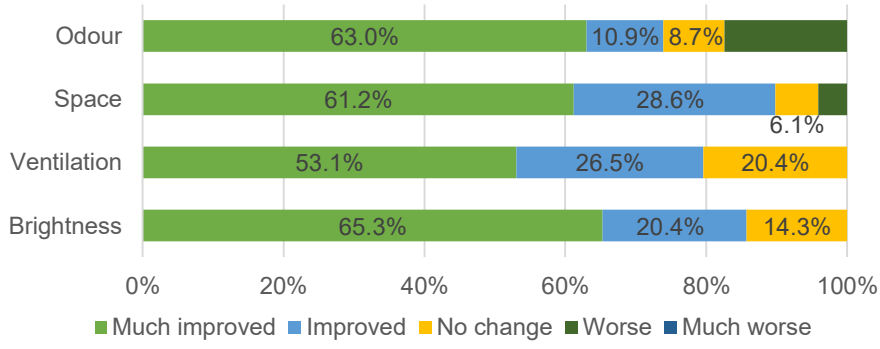
In the interviews with all of the target schools at the time of ex-post evaluation,[16] the majority of teachers indicated that the brightness, ventilation, space, and odor from the toilets had improved, as shown below (Figure 1). All respondents answered that brightness had "improved much" or "improved." For ventilation, space, and odor, 96.3%, 88.9%, and 76.0% respectively responded "much improved" or "improved." The relatively low rating for odor from the toilets may be due to the proximity of the classrooms used by the responding teachers to the project toilets or the old toilets. For the students, their ratings for brightness, ventilation, space, and odor from the toilets were lower than those of the teachers (Figure 2), but still, 85.7%, 79.6%, 89.8%, and 73.9% of them responded "much improved" or "improved," respectively.

Figure 1. Teachers' evaluation on the change in the teahcing environment



Source: Interview results of teachers.

Figure 2. Students' evaluation on the change in the learning environment



Source: Interview results of students.

When asked about the changes in the learning environment, teachers answered that, compared to the classrooms before the project, "it can be sheltered from rain and wind," "the

[16] A school principal, a teacher, one to six students (52 total, including 25 females), and one to six parents were interviewed at each of the 28 target schools.

temperature can be controlled by opening and closing the windows," "whiteboards can be placed on the walls and teaching materials can be posted," "it is not someone else's house, so we do not have to worry about it," "the floor is cleaner," "it is wider," "partition panels can be used to separate classrooms for different grades," and "students have desks and chairs." Other significant changes for students and parents were the "better look" and "having a school in the community."[17] Besides, the school now has space for physical activities on the grounds, allowing students to practice for physical education exercises and sports competitions with other schools.

Photo 9. Classroom Spacious Enough for the Teacher to Monitor Student Learning (Nueva Segovia)

Photo 10. Well-Equipped Classroom with Enough Space for Multigrade Teaching (Madriz)

In addition, a past ex-post evaluation of the school facility development project pointed out that some whiteboards and toilets were too high for younger students, but in this ex-post evaluation, the majority of schools responded that these heights were appropriate.[18] The height of whiteboards differs between preschool and primary classrooms, and if classrooms are appropriately assigned according to grade level, presumably the height should not be a problem (Photos 11 and 12).

Photo 11. Whiteboard Placed Relatively High (Madriz)

Photo 12. Whiteboard Enough Low for a Preschool Student (Madriz)

(2) Sensibilization of Disaster Reduction

Each school, each year, prepared the "School Safety Plan." The plan specifies the school's

[17] Interview results of school principals, teachers, students and parents.
[18] Interview results of school principals and teachers.

disaster risks, evacuation routes, and evacuation sites. In the preparatory survey, the lack of specific recognition of disaster risks was pointed out as a problem. However, in the interviews conducted during the field survey for this ex-post evaluation, in most schools, school principals, teachers, students, and parents recognized common risks such as falling trees due to strong winds and dangerous river crossing due to rainfall. Evacuation drills are regularly conducted per the "School Safety Plan." Besides teachers and students, parents, and, depending on the nature of the evacuation drills, the Health Ministry branch office and the fire station also participate in the drills. Students' families also have the "Family Response Plan" that identifies hazardous areas at home, on the way to school, and in the school.

Thus, it can be confirmed that awareness of disaster prevention among teachers, students, and parents has taken root. Teachers who participated in the seminar conducted under this project commented that their experiences of disaster prevention in other countries were helpful, that they recognized the importance of preparation, and that the evacuation drills were enhanced. According to the Technical Unit of Network for Disasters (UTED) of MINED, this was the first time that training on disaster management was directly incorporated into a facility development project. However, even before the project was implemented, the "School Safety Plan" had been prepared and evacuation drills had been conducted under MINED's direction. However, these improvements in disaster awareness might not have been the result of this project.

3.3.2 Impacts

3.3.2.1 Intended Impacts

First, regarding the improved learning environment, teachers' classroom management has been improved. They have become more positive in terms of their attitudes and feelings, as conveyed in the following comments: "The atmosphere has improved," "I can teach more comfortably because the classes are not affected by the weather," "I am more motivated in class," "I pay more attention to my students," and "The walls allow me to concentrate without outside noise." Additionally, they have had specific changes, as the following answers show: "I can use the whiteboards to draw pictures and draw diagrams," "I can do exercises in motion in a larger space," "I can give more interactive lessons," "The teaching method has been diversified," "I can store teaching materials in the cabinet with a lock," "The partitions make it easy to conduct multigrade teaching," "I can use audio-visual materials because there is electricity," and "I don't have a sore throat because I don't use chalk."[19]

Second, students' participation in the class has also changed. School principals, teachers, parents, and even the students all commented that: "the desks and chairs are comfortable, so I can concentrate in the class," "my concentration and motivation have increased," "I have more

[19] Interview results of school principals and teachers.

respect for the new, clean school," "I have more motivation to take classes," "I can now use the tablet," and "I can learn to read and write on the whiteboard." In addition, comments such as "registration has increased with the new school," "attendance has increased," "I like school more," "I have a positive attitude toward school," and "parents feel safer sending their preschool children to a safe classroom," suggest that the new school is a major motivator.

It had been assumed that an improved learning environment would improve the dropout problem in the long run. In both departments, the dropout rate for primary education increased in 2020 but has been decreasing since then. The dropout rate for secondary education similarly increased in 2020 in Madriz and then began to decline, while in Nueva Segovia it decreased in 2020 and then began to increase. In contrast, as previously mentioned, migration in and out of the country has a significant impact on school registration. In addition, river flooding due to rainfall, infectious diseases, and so on, and in secondary education, there are cases of female students dropping out of school due to pregnancy and male students not enrolling because they are expected to be workers.[20] Thus, it is difficult to verify the contribution the project made because there are many factors other than facilities and equipment that cause students to drop out of school.

Table 7. Dropout Rate in Primary and Secondary Education in Madriz and Nueva Segovia

(Unit: %)

		2019	2020	2021	2022
Primary	Target schools in Madriz	9.2	12.5	10.7	8.0
	Average of Madriz	4.5	8.1	5.1	4.6
	Target schools in Nueva Segovia	10.3	15.1	1.7	5.4
	Average of Nueva Segovia	7.1	10.9	2.9	1.7
Secondary	Target schools in Madriz	18.4	18.0	5.8	16.0
	Average of Madriz	8.4	11.6	10.9	9.5
	Target schools in Nueva Segovia	15.4	7.5	15.7	14.1
	Average of Nueva Segovia	10.7	10.8	5.3	5.7

Source: Calculated with data provided by MINED (number of registered and completed students).

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

This project was classified as Category C based on the JICA Guidelines for the Confirmation of Environmental and Social Consideration (April 2010) for sensitive sectors because it was judged to have minimal undesirable impacts on the environment. The project had no environmental impact.[21]

[20] Questionnaire answer of MINED, interview results of the Department Delegation of Nueva Segovia and school principals.

[21] Questionnaire answer of MINED, interview results of school principals.

2) Resettlement and Land Acquisition

There was no resettlement or land acquisition in the project.

3) Gender Equality

As previously mentioned, the project constructed an equal number of separate toilet booths for male and female students as a gender consideration. However, only about half of the toilets were being used as intended. In interviews with school principals and teachers, there was no recognition that the use of gender-segregated toilets would promote female students' school attendance. There were no complaints from female students about the non-use of gender-segregated toilets.[22] In some schools, male and female students have used separate toilets to encourage them to use the toilets without making them dirty, recognizing that they are their toilets. In several schools, there were instances of male students misbehaving by opening the door of the toilet booth when a female student was in the booth. Accordingly, two female students go to the toilet together, and while one student is using the toilet, the other student is outside watching. Many answered that the toilets in the project have doors and no gaps in the walls, so they can use the toilets safely, and that they can now go to the toilet alone.

4) Marginalized People

Children with disabilities are enrolled in either a special education school in each department or a regular school nearby, depending on the type and degree of disability. Otherwise, some children with disabilities study at home using MINED's home learning materials. In some of the schools visited during the field survey, several students with autism, hyperactivity, physical paralysis, low vision, hearing loss, and language disabilities have been enrolled. Some students use crutches or wheelchairs. As previously mentioned, in some schools, ramps were not installed as planned. In the areas where there were steps, siblings or classmates provided support. Any instances could not be confirmed in which equitable participation was impeded within the school facilities.

5) Social Systems and Norms, Human Well-Being and Human Rights

Any impact could not be identified as those related to social systems, norms, people's well-being, or human rights.

6) Unintended Positive/Negative Impacts

First, the improved school facilities have motivated parents to register and send their

[22] Interview results of female students.

children to school.[23] In addition, parents have become more united with each other, and they have been more cooperative in cleaning and maintaining the school facilities.

Second, the Directorate General of School Infrastructure (DGIE) of MINED evaluated the site assessment form used in the preparatory survey[24] for its usefulness in providing compact information (a single sheet of paper along with photos) on the vulnerability of school sites to disasters.[25] DGIE has since used the form.

Third, the kitchen has not been used for cooking, but utilized as a serving area for school meals. Previously, pots and dishes had been placed directly on the ground, but by placing them on the shelf top for serving, the sanitary environment has improved.[26]

Fourth, in the majority of schools, the facilities the project developed have not been used for anything other than school classes, but in some cases, they have been utilized for community activities such as polling stations and meetings with the Ministry of Health and the police.[27]

The project has improved the learning environment. Although student registration was slightly below the target due to some external factors, a safe and secure learning environment has been developed for students to learn. This improvement has contributed to the motivation of teachers, students, and parents, as well as to better class management. In contrast, in some schools, toilets and kitchens have not been utilized for their expected purposes. Thus, this project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

As previously mentioned, one of the priority areas of the *National Development Plan* (2022-2026) is "human resource development for national development from the national education system," and in this connection, the construction, repair, and expansion of schools and classrooms are listed with specific target values. The *Strategic Plan for Education* (2022-2026) was scheduled to be released around July 2023, and the Minister of Education stated in the media that the development of educational facilities would continue to be one of the priorities in the plan. The same confirmation was also obtained from DGIE, and thus it is judged that there are no issues regarding policy and institutional aspects, including the future prospect.

[23] Interview results of school principals and parents.
[24] Joint Venture (Mohri, Architect & Associates, Inc., Yachiyo Engineering Co., Ltd.) (2015) *Preparatory Survey Report of Project for Improvement of Educational Facilities in the Madriz and Nueva Segovia Departments*, Annex 9.
[25] Interview result of DGIE.
[26] Interview results of parents.
[27] Interview results of school principals and parents.

3.4.2 Institutional/Organizational Aspect

DGIE oversees the development and maintenance of school facilities. Since 2017, DGIE has been implementing the Program of Beautiful, Clean, and Safe Schools (Programa Escuelas Bonitas, Limpias y Seguras: BLS), part of which includes identifying hazardous areas and evacuation routes and cleaning and maintaining schools.

MINED has Department and Municipal Delegations that monitor school facilities. DGIE had 109 full-time and one temporary staff in the headquarters office and 30 full-time staff in the Department Delegations (school infrastructure coordinators in 20 administrative zones and school inventory coordinators in 10 departments) at the time of ex-post evaluation.[28] In addition, there were 221 fixed-term construction personnel (engineers, architects, bricklayers, carpenters, electricians, plumbers, welders, and so on) for all departments and regions.[29] Of these, the school inventory coordinator and the school infrastructure coordinator of the Department Delegations visit schools to check the condition of classrooms and educational furniture. Each month, approximately 15 days are spent monitoring, but it has been difficult for one coordinator in each department to handle all the schools.[30] However, each school communicates with the municipal office via phone. Problems with facilities can also be reported with attached photos, and there seems to be no problem in sharing information about school facilities in this way. Parents routinely cooperate in maintaining school facilities. The frequency and division of roles for maintenance are determined, although they vary across schools, such as sweeping classrooms and hallways, wiping with water, cleaning toilets, and so on.[31] In the field survey for the ex-post evaluation, many cases were observed in which mothers who brought their younger students to school were staying at the school, observing classes or cleaning the facilities (Photo 13).

Photo 13. A Parent who Sweeps Hallways (Nueva Segovia)

The communication route in case of problems in the maintenance of school facilities has been clearly defined. Teachers ask for parents' repair work or consult with the Municipal or Department Delegation of MINED.

Teachers for the additional classrooms the project developed have been allocated as planned.

[28] Questionnaire answer of MINED.
[29] Questionnaire answer of MINED.
[30] Interview result of the Department Delegation of Nueva Segovia.
[31] Interview results of school principals and parents.

Box 2. Organizational Structure of School Disaster Risk Management

In Nicaragua, following the devastation of Hurricane Mitch (1998), the National System for the Prevention, Mitigation, and Attention to Disasters (SINAPRED) was established in the Office of the President in 2000, and national efforts for disaster management were initiated. In MINED, as with other institutions, UTED has been established in the central, department, and municipal offices, and it has overseen mainstreaming disaster management. Specifically, UTED at the central level provides notices and information on disaster management, and UTED at the department and municipal offices conduct training for school principals and teachers.

At the beginning of each school year, the school principal and teachers identify the school's disaster risks and update the "School Safety Plan." The plan identifies on a map the hazardous areas (power lines, trees, ditches, and so on) in and around the school, and describes evacuation methods and routes to safe zones in the event of a disaster. Based on this plan, evacuation drills are held once every two months at each school, and four times a year under MINED's direction, evacuation drills are held simultaneously throughout the country. After the evacuation drills, a report is made to the Department Delegation with photographs. In each school, school safety sections are appointed (first aid section, evacuation section, fire control section, psychosocial section, and public safety section).

Source: Written based on the questionnaire answer of MINED, Department Delegations of Madriz and Nueva Segovia, and interview results of school principals.

In light of the above, the demarcation of roles among MINED, schools, and parents in facility maintenance and management has been kept clear. The number of personnel in charge of monitoring school facilities assigned to the Department Delegations of MINED has not been sufficient, but communication via phone has supplemented this. Regarding disaster risk management, each school has a "Safety Management Plan" and regularly conducts evacuation drills. Based on these, it is judged that there have been no problems in the institutional/organizational aspect in maintaining and managing the facilities by the project as a safe environment.

3.4.3 Technical Aspect

Each year, DGIE has conducted training on the BLS program, including how to maintain school facilities. As an online or in-person training, the trained personnel of the Department Delegation share the training with the Municipal Delegation personnel. Apart from this, there has been training dedicated to maintaining facilities. In March and April 2022, DGIE conducted online training for school principals nationwide, introducing them to the maintenance manuals. DGIE has planned the same training for 2023.[32] Two manuals for school principals and teachers have been printed and distributed, 10,800 copies and 10,700 copies, respectively, and both have been available for download from MINED's website.[33] However, when teachers were asked

[32] Interview result of DGIE.
[33] Documents prepared by MINED. MINED (2022) *Programa Escuela Bonitas, Limpias y Seguras*.

about the contents of the manuals during the ex-post evaluation survey, many answered that they did not know or did not remember them.

At each school, parents have managed to clean facilities, make simple repairs to furniture, install and repair fences, mow school grounds, and clean drains without technical difficulties.[34] As part of daily maintenance, each school has been provided with cleaning tools and supplies each year. When these tools and supplies are insufficient, teachers sometimes purchase them at their own expense or parents bring their own.[35]

Box 3. Technical Backup for School Disaster Risk Management

At each school, appointed school safety sections are responsible for conducting activities in the event of a disaster or during the evacuation drill. The responsibilities of the school safety sections are specified in the manual, *Guidebook for the School Security*, which the school principal presents to the section students. The manual also explains how to prepare the "School Safety Plan" and how to conduct evacuation drills.

As part of its annual plan, and through UTED, MINED has provided training to education supervisors in the Department Delegations or school principals nationwide on school safety (e.g., developing the "School Safety Plan," establishing the school safety sections in the school, and so on). After receiving the training, school principals explain its contents to their teachers. In addition, for example, students in the first aid section of the school safety sections can participate in training the Ministry of Health conducted in cooperation with the fire department, and students in the fire prevention section may participate in training the fire department conducts.

Source: Prepared based on the interview results of UTED of MINED and school principals.

In light of the above, operating and maintaining school facilities have been conducted without problems by the school principals, teachers, and parents. Training on maintenance and management has been conducted every year, and manuals have been available, although they have not been fully disseminated. Therefore, it is judged that there have been no problems in the technical aspect.

3.4.4 Financial Aspect

MINED's budget has been increasing slightly since 2019 (Table 8). Of this total, the budget for infrastructure investment has also increased slightly, while the budget for infrastructure maintenance has decreased from the year of project completion, with repeated increases and decreases. The Department Delegations of MINED have not had a budget specifically for maintenance and management.

[34] Interview results of school principals.
[35] Interview results of school principals and parents.

Table 8. National Budget and MINED's Budget

(Unit: million Córdova)

	2019	2020	2021	2022	2023
National Budget (Plan)	91,686.6	100,821.4	129,408.0	106,961.3	129,395.3
MINED Budget (Plan)	14,227.8	14,478.6	14,959.8	15,327.2	15,868.1
Infrastructure Investment	717.6	789.6	854.6	872.5	984.3
Infrastructure Maintenance	285.8	134.3	418.3	148.4	138.9
Personnel Cost	9,266.5	9,342.8	9,658.3	10,074.1	11,013.9
Others	3,957.9	4,211.9	4,028.6	4,232.2	3,731.0
MINED Budget (Disbursed)	13,937.8	14,427.9	14,768.4	13,786.0	NA

Source: Questionnaire answer of MINED.

Note: The disbursed amount of 2022 was as of December 20.

In Nicaragua, each municipality allocates 5% of its budget to the education sector.[36] The details of the expenditure (constructing facilities, maintaining facilities, and so on) are determined by the local education councils established in each municipality (in the case of municipalities, the council is composed of representatives from the municipal office, Municipal and Department Delegations of MINED, and so on). However, schools that were constructed recently are not eligible for this expenditure, such as the target schools in this project.[37] In 2022, 11 schools in nine municipalities in the Department of Madriz submitted budget applications for operation and maintenance, among which four schools in three municipalities were selected. In 2023, the budget allocations to the municipalities have increased, with four new classrooms planned in three municipalities and 10 school facility repairs in six municipalities.[38] In the Department of Nueva Segovia, the budget addressed the repair of seven school facilities in four municipalities. In the Municipality of Jalapa, a budget of one million Nicaraguan Cordoba was spent to paint the exterior walls and repair the roof and doors of one school, and two classrooms were installed in two schools each.[39]

The maintenance budget for the project had been supposed to include repainting the exterior walls after 10 years of project completion, which the municipality's budget and the budget of MINED headquarters would handle. Pumping waste from the latrines has not yet been implemented, but no specific plans have been determined regarding the cost of approximately USD 150 per pumping.

The school does not collect and manage cash from parents. Whenever there is a need to spend money on maintenance, the parents form a committee and collect cash from each family

[36] Besides the education section, 5% and 7.5% of the budget are allocated to the environment sector and the water sector, respectively.
[37] Interview result of the Department Delegation of Nueva Segovia.
[38] Interview result of the Department Delegation of Madriz.
[39] Interview result of the Department Delegation of Nueva Segovia.

in a non-compulsory manner for community water, hiring a security guard, and repairing drains, as examples.[40]

In light of the above, the facility maintenance budget of MINED has been on a decreasing trend and has not been fully distributed to the education sector from the municipal budget. However, daily maintenance of school facilities has not required a large budget, and there is a prospect of budgetary provision for exterior painting after 10 years of project completion. It is judged that there have been no major problems in the financial aspect.

3.4.5 Environmental and Social Aspect

No negative environmental and social impacts or risks have been reported to MINED or confirmed during the interviews at the schools. Presumably, they are not likely to occur in the future.

3.4.6 Preventative Measures to Risks

The precondition for the project implementation was that "the land registration of the target schools be done by the Nicaraguan government." This was implemented as planned and did not represent any risk to the project implementation. In addition, risks related to the operation and maintenance of the school facilities were not identified, including possible future risks.

3.4.7 Status of Operation and Maintenance

The status of operation and maintenance of the facilities and furniture the project developed is shown in the table below.

Table 9. Maintenance Status of the Facility and Furniture Developed by the Project

(Unit: Number of schools)

	Observation Point	No problem	Some problems but functioning	Major problem and not functioning
Classroom	Crack in Exterior Walls	28	0	0
	Leaks from Ceiling Boards	27	1	0
	Crack in Floor Tiles	22	6	0
	Problem with Door Fitting	28	0	0
	Missing Window Plates	15	13	0
	Problem with Window Fitting	24	0	4
	Problem with Electric Light	2	0	14

[40] Interview results of school principals.

Toilet	Dirt in Toilet Bowl	14	12	0
	Accumulation of the Waste	26	0	0
	Problem with Door	16	10	0
Furniture	Problem with Cabinet Key	17	11	0
	Problem with Desk for Teacher	14	12	2
	Problem with Desk/Chair for Student	0	28	0
	Damage in Whiteboard	28	0	0
Others	Drainage Ditch Clogging	25	2	1
	Damage in Drainage Ditch	19	9	0
	Damage in Bulletin Board	27	0	0
	Damage in Stove Brick	14	2	0
	Theft/Damage in Water Level Gauge	0	0	3

Source: Observation during the field survey.

Note: Inspection of electric lights was conducted in 16 schools where the electric system was installed. Additionally, toilets and water level gauges were inspected in 26 and three schools, respectively, where the toilet booths and water level gauges were constructed.

Photo 14. Missing Window Plates (Nueva Segovia)

Photo 15. Graffiti on the Desk (Madriz)

Photo 16. Facility Maintenance Poster Developed by the Project (Nueva Segovia)

Direct observation of classrooms, toilets, furniture, and so on during the field survey revealed that all schools have been generally maintained in good condition with few problems that would affect classes or school attendance. The following are common problems observed.

- Missing glass plates in windows: In 13 of the 28 schools, a part of the glass plates was missing. The reasons for this were breakage due to students' carelessness or natural fall. Parents paid for the damage their children's carelessness caused. None of the schools have left the windows in a damaged condition. In four schools, some of the window fittings were stuck and the glass plates could not be opened or closed.
- Cracks in floor tiles: Cracks were found on classroom floors at six schools. This was because the floor tiles were floating and cracked due to voids in the substrate and desk legs

had damaged them. Similar problems had been found and repaired during the defect inspection conducted from November to December 2020, but those found in the ex-post evaluation are new problems.

- Leaks from ceiling boards: There was a leak in only one school, and there were three schools with damp marks on the ceiling panels.
- Problem with lightning: Of the 16 schools with the installed electrical system, 14 schools did not have electricity connected to the lighting fixtures, thus, lights were not on. This was due to incomplete construction of connections at the site and lighting fixtures not being installed (or replaced).
- Dirt in latrines: Twelve of the 22 schools had latrines that were noticeably dirty and had a strong odor. None of the schools had a buildup of filth inside the fixed latrines. Although the pumping of waste had been expected every year, no schools have implemented or planned to implement such pumping. Ten schools had door fittings that were not in good condition and were difficult to open and close.
- Graffiti on the student's desk: There was graffiti on the desks in all schools, although to varying degrees.
- Drainage ditch: Cracks were found in three schools, and rainwater and mud were likely to accumulate in nine schools.
- Water level gauges: There were no gauge at all three schools; floodwaters had washed away one, a construction vehicle had destroyed one (Photo 17), and one was damaged or stolen due to mischief. However, neighbors and school principals have communicated via phone and no river passing has been allowed while the water level was rising. There are plans for DGIE to install them again in the three schools.

Photo 17. River where the Water Level Gauge Had been Installed in the Front Side (Nueva Segovia)

In light of the above, slight issues have been observed in the financial aspect, however, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to improve the learning environment where students can learn safely and securely in two northern departments of Nicaragua, by rebuilding and expanding basic education facilities, thereby contributing to improve access and quality of basic education in the

target areas. The project was relevant with Nicaragua's development policies, which have emphasized the development of school facilities to foster human resources and improve the quality of basic education, as well as with the needs for school facilities in the target departments. Japan's assistance policy toward Nicaragua also emphasized the importance of improving the quality of basic education, including developing facilities; therefore, the project relevance and coherence are high. Although the project cost was within the plan, the project period significantly exceeded the plan due to two unsuccessful bids; therefore, efficiency of the project was relatively low. The student registration was slightly below the target due to external factors, but the project provided a safe and secure learning environment for students. In addition, it was confirmed that teachers, students, and parents have become motivated and that the methods of conducting classes were improved, although the toilets and kitchens have not been utilized for their original purpose in some schools. Thus, it can be said that effectiveness and impact of the project is high. Regarding sustainability, there have been some minor financial challenges in operating and maintaining facilities the project developed, but the prospects for improvement and resolution are high. Therefore, sustainability of the project effect is high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

<u>To inform the pumping of sewage from fixed latrines.</u>

Although none of the schools had a large accumulation of waste in the fixed latrines, it will be necessary to pump out the waste in the future if the latrines are used for a long period. However, the need for pumping and the information on pumping companies were not well known. It is recommended to DGIE to disseminate information on waste pumping companies to each school through the Department Delegations, including the cost and budgetary source of the pumping.

<u>To take actions on defects in the facilities.</u>

It is recommended to DGIE that the defects in the facilities observed in this ex-post evaluation be prioritized in terms of their impact on the learning environment and that they should be repaired sequentially.

4.2.2 Recommendations to JICA

The JICA Nicaragua Office has conducted monitoring of the completed projects. For this project as well, it is recommended to monitor not only the status of operation and maintenance of school buildings (classroom buildings) but also the status of utilization and maintenance of kitchens and fixed latrines and then share the results with MINED.

4.3 Lessons Learned

Specifications of the Latrines

Concerning latrine specifications, the experience of prior projects led to introducing fixed latrines (those that are used semi-permanently, with periodic pumping of waste). However, most schools were not aware of the difference between this type of latrine and mobile latrines (those that are landfilled and newly constructed elsewhere when waste accumulates), and there was no maintenance plan for pumping. Fixed latrines, which can be used for a longer period than conventional latrines, are environment friendly and suitable for the financial cooperation scheme; therefore, they were introduced in this project, in agreement with MINED at the time of the preparatory survey, although they are not widely used in Nicaragua. When planning to introduce fixed latrines not only in Nicaragua but also in other areas where they are not common, the consultant should confirm the actual utilization and maintenance status at the target schools of the previous projects, which had been in place for a certain period since the project completion, during the preparatory study, and they should ensure that a concrete maintenance plan (contact information of the pumping company, costs, and so on) in the target area is presented. It is desirable that the consultant discuss with the Ministry of Education to ensure each municipality, without unification within the project, can select the latrine specification.

Location of the Toilet Building

While some students said they felt safe using the toilet because they were equipped with latrine seats and locked doors, others said they were afraid to go alone because the building was located far away from the classrooms in schools where the toilet building was located out of sight of the classrooms. Many younger students are not yet accustomed to using latrines. Toilets are located downwind of the classrooms to consider odor, but it is desirable to reflect the usability of the students (especially the younger grades) as much as possible.

Ensuring Safety and Security in Both Tangible and Intangible Aspects

In this project, the school sites' vulnerability to natural disasters was assessed, and various disaster prevention measures were planned as to reduce disaster risks. This has helped to ensure further the safety and security of the school facilities and enhance teaching methods and motivation for students and parents. In addition, training for teachers and parents on disaster risk management was planned and implemented to ensure further safety and security. In projects to improve facilities such as schools, from the disaster prevention perspective, a disaster risk assessment of the site should be conducted in the preparatory survey and necessary measures (tangible measures) should be included in the design to enhance the facility's safety. It is also effective to improve the capacity of relevant personnel for disaster prevention (intangible

measures) to enhance the safety of the facility and promote its use.

(End)

Republic of Indonesia

FY2022 Ex-Post Evaluation Report of Technical Cooperation Project[1]

"JABODETABEK[2] Urban Transportation Policy Integration"

"JABODETABEK Urban Transportation Policy Integration Project Phase 2"

External Evaluator: Maki Hamaoka

Foundation for Advanced Studies on International Development

0. Summary

"JABODETABEK Urban Transportation Policy Integration" (hereinafter referred to as "JUTPI1") was implemented to support the revision of the Master Plan for urban transport infrastructure development and the establishment of the necessary framework in order to coordinate the implementation of wide-area urban transport projects through the capacity building of central and local government officials involved in urban transport infrastructure planning in JABODETABEK, thereby contributing to urban development based on public transport systems in the area. "JABODETABEK Urban Transportation Policy Integration Project Phase 2" (hereinafter referred to as "JUTPI2") was implemented to improve the administrative functions of the urban transportation system by enhancing coordination and project implementation capacity among urban transportation agencies and organizations, thereby contributing to urban development based on public transportation systems in the area.

From the time of planning to the completion of the project, the contents of this project were consistent with the development policy of the Government of Indonesia, which emphasized the development of public transportation in JABODETABEK and with the development needs to promote public transportation. In addition, lessons learned from similar projects in the past were utilized in project implementation, and the approach was appropriate. Although the content of the project was consistent with the assistance policy of the Government of Japan for Indonesia at the time of ex-ante evaluation, no specific collaborative effects between the project and other JICA projects or linkages with other donors were identified. Based on the above, relevance and coherence of the project are high. With the implementation of this project, the approval of the draft Master Plan, which was set as the project purpose, was achieved as planned. As for the overall goal of the project, "to improve urban transportation comprehensively," although the legalization for the JUTPI2 Master Plan is still in progress, almost all the target local governments have reflected the findings from the Master Plan preparation process in their medium-term development plans, transportation plans, spatial plans, and so on. In addition, many cases of actual public transportation

[1] In this ex-post evaluation, the two technical cooperation projects are evaluated collectively as one project. Therefore, the two projects are referred to as "project."

[2] Name of the region taken from the first two (or three) letters of each city's name: Jakarta, Bogor, Depok, Tangerang, and Bekasi.

improvement efforts were confirmed. Therefore, the effectiveness and impacts of the project are high. Since both the project cost and project period exceeded the plan, the efficiency of the project is moderately low. Regarding the sustainability of the project effect, some minor issues have been observed in terms of the institutional/organizational and financial aspects. The prospects for improvement and resolution are currently uncertain. Therefore, sustainability of the project effects is moderately low.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description

Project Locations (Source: Document provided by JICA)

Improvement of Transportation Nodes in Kabupaten Bogor[3] (Source: Field survey)

1.1 Background

Transportation in JABODETABEK in Indonesia was heavily dependent on road traffic, and chronic traffic congestion was serious and caused significant economic losses. In the transportation sector in JABODETABEK, the Government of Indonesia and JICA have implemented various projects since the 1980s. Through the development study "Study on Integrated Transport Master Plan for JABODETABEK" (hereinafter referred to as "SITRAMP"), which was carried out from 2001 to 2004, an urban transportation Master Plan ("SITRAMP Master Plan") was developed. Among the projects proposed by SITRAMP Master Plan are the Bus Rapid Transit (BRT) and the Mass Rapid Transit (MRT),[4] which was constructed with the financial support of Japan's ODA Loan toward the improvement of transportation in JABODETABEK. Subsequently, the number of vehicles increased more rapidly than anticipated when the SITRAMP Master Plan was formulated. Therefore, the revision of the SITRAMP Master Plan and the implementation of projects necessary to alleviate traffic congestion became an urgent task. From 2009 to 2012, JUTPI1 was

[3] Development of transfer and transit facilities that interconnect different modes of transportation (and in some cases, the same mode of transportation). With the aim of enhancing the continuity of travel based on the findings from JUTPI2, construction is underway to connect Bojong Gede Station in Kota Bogor on the commuter network connecting JABODETABEK with a bus terminal located 400 meters northwest of the station via a skybridge.

[4] In March 2019, the Jakarta MRT North-South Line Phase 1 (between Lebak Bulus Station and Bundaran HI Station) with Japanese assistance started its operation, and the construction of MRT North–South Line Phase 2A (between Bundaran HI Station and Kota Station) is underway with JICA's ODA loan as of June 2023.

implemented to support the update of SITRAMP Master Plan and the establishment of the Jakarta Metropolitan Area Transportation Authority (JABODETABEK Transportation Authority, hereinafter referred to as "JTA"). Although JUTPI contributed to improving the policymaking capacity of counterpart agencies, the remaining issues after the implementation of JUTPI1, such as the establishment of a cross-sectoral framework between the central and local governments and the improvement of the capacity to implement projects to improve urban transportation, required continued support, and JUTPI2 was implemented from 2014 to 2020.

1.2 Project Outline

		JUTPI1	JUTPI2
Overall Goal		To improve the urban transportation system in JABODETABEK to ease traffic congestion and to develop urban economic activities.[5]	To promote urban development based on the public transport system in JABODETABEK.
Project Purpose		1. Enhancement of governance for implementing JABODETABEK urban transportation projects. 2. Improvement for capability and technical strength of target group on urban transportation planning.	To enhance institutional arrangement and capacity for improvement of urban transport–based system in JABODETABEK.
Output(s)	Output 1	Revised and updated of the SITRAMP (The Study on Integrated Transportation Master Plan for JABODETABEK).[6]	To develop a cross-ministerial and cross-boundary framework to promote integrated urban transportation policies in JABODETABEK.[7]

[5] English translation of the PDM in Japanese version: To improve the urban transportation system in JABODETABEK comprehensively to ease traffic congestion and to develop urban economic activities.
[6] English translation of the PDM in Japanese version: Continuous update and maintenance of the SITRAMP (Study on Integrated Transport Master Plan for JABODETABEK).
[7] English translation of the PDM in Japanese version: To develop a cross-ministerial and cross-boundary framework to implement integrated urban transportation policies.

	Output 2	Substantial progress toward establishment of JTA.[8]	To enhance capacity of urban transportation related agencies to implement transportation projects in JABODETABEK through implementation of pilot project.[9]
	Output 3		To enhance capacity of urban transportation related agencies to implement Transit-Oriented Development (TOD) projects in JABODETABEK.[10]
Total Cost (Japanese Side)		484 million yen	677 million yen
Period of Cooperation		July 2009-March 2012 (Extension period: October 2011-March 2012)	August 2014-September 2020 (Extension period: August 2017-September 2020)
Target Area[11]		JABODETABEK (see Figure 1): Jakarta Special Capital Province (DKI Jakarta), Kabupaten Bogor, Kota Bogor, Kota Depok, Kabupaten Bekasi and Kota Bekasi in West Java Province, Kabupaten Tangerang, Kota Tangerang and Kota Tangerang Selatan in Banten Province	
Implementing Agency		Coordination Ministry of Economic Affairs (CMEA), National Development Planning Agency (BAPPENAS), Greater Jakarta Transportation Authority of Ministry of Transportation (BPTJ)[12], above nine local governments in JABODETABEK	
Other Relevant Agencies/Organizations		General Directorate of Land Transport and General Directorate of Railways of Ministry of Transport, Ministry of Public Works and National Housing, Ministry of State Enterprises, various transportation operators	

[8] English translation of the PDM in Japanese version: Support for the establishment of the JTA preparatory committee.
[9] English translation of the PDM in Japanese version: To enhance capacity of urban transportation agencies and organizations to implement transportation improvement projects through the experience of implementing pilot project.
[10] English translation of the PDM in Japanese version: To enhance capacity of urban transportation related agencies and organizations to implement Transit-Oriented Development (TOD) projects.
[11] In Indonesia's local administrative divisions, the provinces are the highest level of local administrative units. Under the provinces are counties (Indonesian: kabupaten) and cities (Indonesian: kota), but they do not have an encompassing relationship and are institutionally at the same level.
[12] BPTJ was a counterpart organization for this project since its establishment in 2016.

Consultant	Oriental Consultants Co., Ltd. ALMEC CORPORATION	ALMEC CORPORATION
Related Projects	[Technical Cooperation] <Technical Cooperation for Development Planning> • Study on Integrated Transport Master Plan for JABODETABEK (2000-2004) • Project for the Study on JABODETABEK Public Transportation Policy Implementation Strategy (2011-2012) <Technical Cooperation Project> • JABODETABEK Urban Transportation Policy Integration Project Phase 3 (JUTPI3) (2022-) <Preparatory Survey for Public-Private Partnership (hereinafter referred to as "PPP") Infrastructure Projects> • Jakarta Integrated Urban Transport Hub Development (2011-2013) • Preparatory Survey Lebak Bulus Station Area Development (2013-2015) • Preparatory Survey on Intelligent Transport System Project to Mitigate Traffic Congestion in Jakarta (2013-2015) <Individual Expert> • Advisor for MRT project (2007-) • Advisor for Road Policy (2005-) <Preparatory Survey> • Preparatory Survey for Jakarta Mass Rapid Transit North-South Line Section Extension Project (2009-2013) • Preparatory Survey for Jakarta Mass Rapid Transit East-West line project (2011-2013) • Preparatory Survey for Metropolitan Arterial Road Improvement Project (2011-2012) <ODA Loans> • Master Plan for Establishing Metropolitan Priority Area for Investment and Industry in JABODETABEK area (2011-2012) • Construction of Jakarta Mass Rapid Transit Project (2006-) • Tanjung Priok Access Road Construction Project (2005-)	

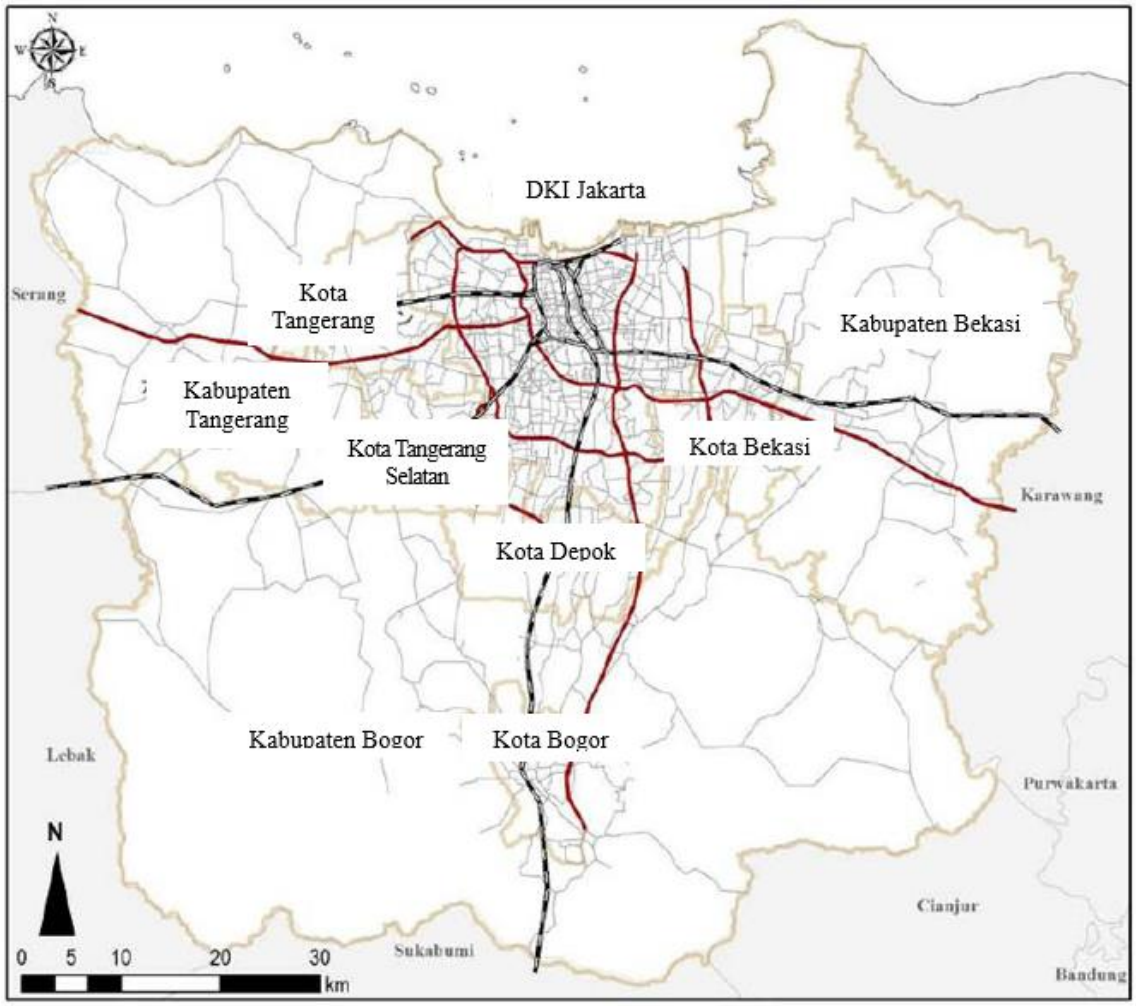


Figure 1 Target Area

Source: Documents provided by JICA.

1.3 Outline of the Final Report[13]

A summary of JUTPI2 at project completion is shown below. Please refer to "3.2 Effectiveness and Impacts" for the actual achievement at the time of project completion.

1.3.1 Projected Achievement of Overall Goals at Project Completion

In the JUTPI2 Final Report, the overall goal was expected to be achieved as follows:

- The SITRAMP Master Plan, which was updated by JUTPI1, was subsequently transformed into the JABODETABEK Transportation Master Plan (*Rencana Transportasi JABODETABEK*, hereinafter referred to as "RITJ") by BPTJ with the addition of new projects, and so on. RITJ was refined in JUTPI2 and became the JUTPI2

[13] In the ex-post evaluation report, a summary of the terminal evaluation of the final phase is to be stated for projects implemented in phases, but because no terminal evaluation was conducted for JUTPI2, a summary at the time of project completion is stated.

Master Plan. The JUTPI2 Master Plan included annual monitoring and evaluation sheets to enable the Indonesian side to prioritize transportation-related projects for the realization of future infrastructure development. The scenarios set up through the project also considered various future situations and were expected to serve as a reference for policymakers to increase the use of public transportation.

- Pilot projects implemented in the form of a pedestrian path, bus shelter, and wayfinding board would be beneficial in encouraging people to use public transportation and were expected to be further improved.
- The TOD guideline within the project's scope of work was expected to be a common guidance to TOD implementation across JABODETABEK. In addition, regulation integration regarding TOD was expected to soon be formulated by utilizing the reports of TOD within the scope of the project.

1.3.2 Recommendations from the Final Report

(1) Region-wide Administration

In terms of transportation issues of JABODETABEK, demarcation of authority, responsibility, and finance were not clear among central government agencies, local governments, or Kota/Kabupaten governments. Although the Government of Indonesia promoted autonomy of Kota/Kabupaten governments, urban transportation problems exceed the boundaries of Kota/Kabupaten and provinces. Actions, therefore, must be taken beyond administrative boundaries. On the other hand, financial resources for transportation and other policies were not transferred to Kota/Kabupaten governments. Although the Ministry of Home Affairs was examining the autonomy of local governments; authority, responsibility, and financial resources were recommended to be a package. Arguments on who must take the primary role in administration of urban transportation issues, the central government, or local governments must also be settled.

(2) Securing Human Resources for Transportation Planning

There was a quantitative shortage of human resources in charge of transportation planning in the Regional Development Planning Agency in local governments (Regional Development Planning Agency, *Badan Perencanaan Pembangunan Daerah*, hereinafter referred to as "BAPPEDA") of some Kota/Kabupaten. and as for the central government, some officials were busy with work in other regions and other departments, limiting their participation in the project. Therefore, it was recommended to secure human resources in the transportation sector, both in terms of quality and quantity.

(3) Financing Scheme

There was a lack in funding for the transportation sector in Indonesia compared to other countries. Investment in social capital, such as transportation infrastructure, was essential

to meet the demand to sustain economic growth of the nation. It was recommended that the private sector be involved through PPP schemes and other funding schemes such as PINA (nongovernmental budget equity financing), local government bond, and so on.

2. Outline of the Evaluation Study

2.1 External Evaluator

Maki Hamaoka, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: August 2022-December 2023

Duration of the Field Study: February 19, 2023-March 3, 2023

3. Results of the Evaluation (Overall Rating: B[14])

3.1 Relevance/Coherence (Rating: ③[15])

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Indonesia

At the time of ex-ante evaluation of JUTPI1, *the Medium-Term Development Plan 2004-2009* (*Rencana Pembangunan Jangka Menengah, RPJM 2004-2009*) focused on eliminating traffic congestion that had been an obstacle to economic growth in the JABODETABEK.[16] At the time of the project completion of JUTPI1, t*he Medium-Term Development Plan 2010-2014* (*RPJM 2010-2014*) set a policy goal for infrastructure development to improve the functioning of the transportation network in the JABODETABEK through intermodal integration and coordination based on an integrated urban transportation plan.[17] Shortly after the start of JUTPI2, President Joko Widodo took office in October 2014, and *the Medium-term Development Plan 2015-2019* (*RPJM 2015-2019*), which included nine priorities, was announced in January 2015. *The RPJM 2015-2019* had as its policies to improve international competitiveness, promote infrastructure development, and reduce regional disparities.[18]

3.1.1.2 Consistency with the Development Needs of Indonesia

From the time of ex-ante evaluation to the completion of the project, the population of the JABODETABEK accounted for approximately 10% of Indonesia's total population,

[14] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[15] ④: Very High, ③: High, ②: Moderately Low, ①: Low
[16] Source: JUTPI Ex-ante evaluation sheet, p. 2.
[17] Source: JUTPI2 Ex-ante evaluation sheet, p. 1.
[18] Source: *Country Cooperation Policy to Indonesia*, September 2017.

and its economy accounted for approximately 30% of Indonesia's total GDP. With Indonesia's robust economic growth, the number of vehicle registrations (motorcycles and passenger cars) had approximately doubled between 2009 and 2019.[19]

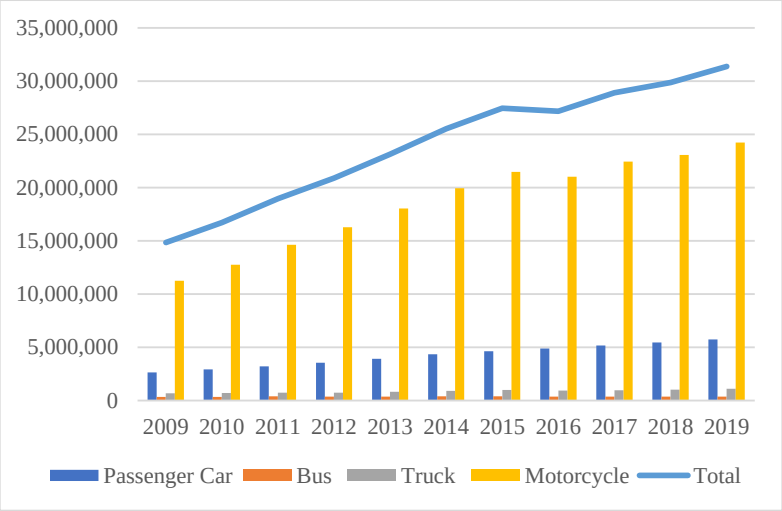


Figure 2 Number of Vehicles Registered in JABODETABEK
Source: BPS DKI Jakarta, Barat BPS Jawa Barat.

At the start of JUTPI1, the share of bus users among commuters had declined from 50.1% to 16.1% between 2002 and 2010, with no modal shift to public transportation. At the completion of JUTPI2, the public transportation share was 29.9% (2018)[20] and 32% (2019),[21] a large gap from the 2029 target (60%). In view of the above, there was a high need to develop and implement an integrated regional and intermodal transportation policy that would promote the use of public transportation to address the chronic traffic congestion in JABODETABEK.

3.1.1.3 Appropriateness of the Project Plan and Approach

The parties concerned with the project responded appropriately to the "Lessons learned from similar projects in the past and their application to this project" in the ex-ante evaluation sheet as follows:

(1) JUTPI1

Because the establishment of a region-wide transportation administration organization was proposed in the previous phase, SITRAMP, the following three points were raised to support the formation of the system.

[19] Source: JUTPI2 Ex-ante evaluation sheet, p. 1.
[20] Source: Answers to questionnaire by BPTJ.
[21] Source: Answers to questionnaire by BPTJ.

1) Ensuring Transparency

The first of the three points raised in the ex-ante evaluation sheet was "The Joint Coordination Committee (hereinafter referred to as "JCC") and the Urban Transport Policy Integration Action Board will share information on budget allocation and decision-making processes and ensure transparency to motivate the participation of all parties concerned and ensure fair and democratic organization management." SITRAMP was conducted as a development study, and the Indonesian side was not actively involved in the process of developing a Master Plan. On the other hand, in JUTPI1, which was implemented as a technical cooperation project, Japanese experts provided a forum for exchanging views with their Indonesian counterparts through focus group discussions and technical working group activities to ensure transparency.[22]

2) Regular Coordination Meetings

Regarding the second point, "In order to have a common understanding of the issues, SITRAMP Master Plan is used as a common tool, and regular coordination meetings are held to promote communication between central government and local governments and among local governments"; in addition to the JCC, regular study meetings are held every Tuesday and Thursday to have a common understanding of the issues. In these meetings, Japanese experts provided technical guidance to their Indonesian counterparts, opinions were exchanged between the central government and local governments, and between local governments, and the meetings also served as coordination meetings.[23]

3) Cooperation System on the Japanese Side

In response to the third point, "In order to deal with various urban transportation issues, it is necessary to strengthen the support system on the Japanese side, and a daily on-site coordination and communication system will be established with long-term Japanese experts at the core, supported by short-term Japanese experts as needed," the long- and short-term Japanese experts worked in the same office at all times, and a daily coordination and communication system was established.[24]

(2) JUTPI2

In JUTPI1, the Japanese side had requested that local government officials be seconded and stationed in CMEA as counterparts, but this was not realized due to the lack of smooth personnel transfers among the organizations concerned. Learning from this, in JUTPI2, Japanese experts devised an implementation process through monthly

[22] Source: Interview with JUTPI1 Japanese experts.
[23] Source: Interview with JUTPI2 Japanese experts.
[24] Source: Interview with JUTPI2 Japanese experts.

counterpart meetings, project working unit meetings, and email-based information sharing so that counterparts could be involved in project activities through task-based activities. For output 2, the capacity of local government counterparts involved in the urban transportation sector was enhanced through the planning, implementation, and evaluation of seven pilot projects.[25]

Based on the above, from the time of planification to the project completion, the relevance is judged to be high because the project was consistent with the development plan of the Government of Indonesia emphasizing the improvement of public transportation in JABODETABEK, and the development needs to improve the chronic traffic congestion in JABODETABEK. In addition, the approach was appropriate in that lessons from similar projects in the past were used in the project's implementation.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

The "*Country Assistance Policy for Indonesia*" (2004) identified "private-sector-led sustainable growth" as one of the priority areas and positioned "development of economic infrastructure to improve the investment environment" as a specific area of assistance. The "*JICA Country Rolling Plan*" (2009) identified "improvement of business and investment environment" as a development issue for sustainable private sector-led growth and positioned the "Comprehensive Urban Transportation Improvement Program for Metropolitan Area" as a core project. In addition, the "*Country Assistance Policy of the Republic of Indonesia*" (2012) identified "Support for Further Economic Growth" as one of the priority areas, and this project was positioned in the cooperation program "Program for Improvement of the Transportation and Transport Environment in the Capital Region" and "Planning, Institutional Improvement, and Capacity Building."

The project's objective of alleviating traffic congestion in JABODETABEK was therefore in line with Japan's ODA Policy for Indonesia.

3.1.2.2 Internal Coherence

In the urban transportation sector in Indonesia, there were no cases in which the

[25] (1) Installation of wayfinding board for the pedestrian in the Jatinegara area (nine locations) in DKI Jakarta, (2) Pedestrian way improvement in Pajajaran (Baranangsiang bus terminal area) in Kota Bogor, (3) Bus shelter in Jalan Raya Bogor near Cibinong Station.in Kabupaten Bogor, (4) Installation of bus shelters and pelican crossing in Jalan Ir. H Juanda (Saminten side and Sugutamu side) in Kota Depok, (5) Provision of the pedestrian bridge over the canal in Jalan Benteng Betawi, pelican crossing and pedestrian path improvement near Tanah Tinggi station in Kota Tangerang, (6) Installation of Provision of shelter in Jalan Cendrawasih near Jurang Mangu Station Kota Tangerang Selatan, and (7) Installation of a bus shelter and road separator in front of Bekasi Timur Station in Kota Bekasi. (Source: JUTPI2 Final Report, p. 44)

implementing agencies and JICA discussed and agreed on the contents and expected outputs of the collaboration during the ex-ante evaluation or during the implementation. During the implementation of this project, information was exchanged, and discussions were held between the project and several other projects in the urban transportation sector, but no concrete effects were identified.

3.1.2.3 External Coherence

No linkage or synergistic effects between the project and other donors' projects were identified either in the planning stage or during implementation.[26] Regarding coherence with international frameworks, the project contributes to SDG's Goal 9, "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation," and SDG's Goal 11, "Make cities and human settlements inclusive, safe, resilient and sustainable." The project is coherent with the international framework.

Regarding coherence, although the objectives of the project were consistent with Japan's ODA Policy for Indonesia at the time of the ex-ante evaluation, coherence is judged to be low because discussions between the project and other JICA projects were confirmed, but no specific effects could be confirmed, and collaboration with other donors was not confirmed.

In light of the above, relevance and coherence are high.

3.2 Effectiveness and Impacts[27] (Rating: ③)

3.2.1 Effectiveness

3.2.1.1Achievement of Project Purpose

The achievement level of the project purpose of each of JUTPI1 and JUTPI2 is as follows:

[26] Source: Answers to questionnaire by CMEA, answers to questionnaire by JUTPI2 Japanese experts.
[27] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 1 Achievement of Project Purpose (JUTPI1)

Project Purpose	Indicator	Actual
1. Enhancement of governance for implementing JABODETABEK urban transportation projects	Presidential decree (draft) on the establishment of JTA submitted to the Government of Indonesia[28]	[Achieved as planned] • To establish a cooperative framework among relevant agencies for the establishment of JTA, eight director general-level task forces on the transportation of JABODETABEK and 59 meetings with relevant agencies were held. Thus, communication among relevant ministries and local governments was improved. In addition, two focus group discussions and two director general-level meetings were held with participants like those in the JCC, and discussions regarding the establishment of JTA continued. • The support for the establishment of JTA was carried out as planned through "Output 2, Substantial progress toward establishment of JTA." Specifically, in December 2011, CMEA submitted a draft amendment to the Presidential Decree on the establishment of JTA to the Cabinet Secretariat, and in February 2012, the draft was in the process of being signed by relevant ministers.[29]

[28] The indicator for the project purpose was "Minutes of Understanding (MoU) among relevant agencies agreed upon implementation of the JABODETABEK urban transportation projects" at the beginning of the project. During the implementation of the project, the Indonesian side began to proactively promote the establishment of the JTA as the coordinating body for the implementation of the Master Plan based on the Presidential Decree, and the indicator was changed to "Presidential Decree (draft) on the establishment of JTA submitted to the Government of Indonesia," including the demarcation of the jurisdiction of transportation-related organizations and the draft Standard Operational Procedures and Terms of Reference, and so on. Because this change in the indicator was not reflected in the PDM, the evaluation was conducted at the time of the ex-post evaluation using the changed indicator based on the answer to the questionnaire of Japanese experts and interviews with them.

[29] After the completion of the project, CMEA struggled for three years from 2012 to 2015 to make JTA a ministerial-level organization reporting directly to the President but was unable to obtain the consent of the Ministry of National Service Utilization and Bureaucratic Reform to establish it. Instead, BPTJ was established by Presidential Decree (2015, No. 103) and Ministry of Transportation Decree (2016, No. 3) as part of the Ministry of Transportation.

2. Improvement for capability and technical strength of target group on urban transportation planning	Approval of the revised SITRAMP by JCC.	[Achieved as planned] • The SITRAMP database was updated through a traffic survey,[30] and based on the results of the analysis, the SITRAMP Master Plan was revised as a draft urban transportation Master Plan with the target year of 2030, which was approved by the JCC in March 2012. • Seven pilot projects[31] were conducted to study the feasibility of developing transportation management measures. These were developed by counterparts with an emphasis on the financial capacity of local governments and the possibility of developing soft measures that do not involve costs, such as effective use of existing facilities. The processes of planning, implementing, and evaluating pilot projects demonstrate the improvement of counterparts' knowledge and skills.

Source: Prepared by the evaluator based on the final report and interviews.

[30] A Large-Scale Commuting Surveys. 180,000 households, representing 3% of the population of JABODETABEK, were surveyed regarding commuting to and from work and compared to the results of the SITRAMP Person-Trip Survey. In addition, Person-Tracking Survey, Vehicle-Tracking Survey, and Mobility Constrained Persons Survey were conducted as Transportation Behavior Surveys. The Person-Tracking Survey was conducted on 600 households to determine their mobility characteristics, whereas the Vehicle-Tracking Survey was conducted on 300 cars and 300 motorcycles to determine vehicle usage and routes. (Source: JUTPI1 Final Report, pp. 29-34)

[31] (1) Road Traffic Information System (development of a simple system to monitor traffic flow between the city center and suburbs and inform drivers of congestion), (2) Bus Location System (development and operation of a system to inform drivers of location of a next bus and its waiting time), (3) Mobility Management (creation and distribution of bus route maps mainly for bus terminals in DKI Jakarta and Kota Bogor and Transjakarta), (4) Park and Ride (utilization of vacant spaces in the multi-story parking lot of a commercial complex adjacent to PD Cina Station in Kota Depok for commuter rail transfer parking), (5) Feeder service to the railway station (operation of feeder buses from residential areas to the station), (6) Car sharing campaign (publicity and awareness raising on car sharing and trial car sharing), and (7) *Angkot* (minibus) shift program (organizing three groups of minibus drivers on two bus routes in Kota Bogor, and allowing two of the three groups to operate the buses in turns to reduce the number of buses operating on the road and the number of operations, thereby avoiding excessive competition for passengers and eliminating traffic congestion). (Source: JUTPI1 Final Report, pp. 45-58)

Table 2 Achievement of Project Purpose (JUTPI2)

Project Purpose	Indicator	Actual
To enhance institutional arrangement and capacity for improvement of urban transport-based system in JABODETABEK	JUTPI2 Master Plan is approved by the JCC.[32]	[Achieved as planned] • The Master Plan, updated by JUTPI1, was subsequently updated by BPTJ with new projects, etc., and became the JABODETABEK Transportation Master Plan (*Rencana Transportasi JABODETABEK*, hereinafter "RITJ"), which was institutionalized as Presidential Regulation No. 55 in 2018. • Subsequently, through JUTPI2 Output 1, "To develop a cross-ministerial and cross-boundary framework to promote integrated urban transportation policies in JABODETABEK." Various transportation surveys [33] were conducted to forecast demand and examine future networks. As a result, the RITJ network alone was not sufficient to address future transportation demand, and an updated Master Plan capable of meeting key performance indicators (KPIs) and future transportation demand was required and the RITJ was detailed. • The public transportation plan proposed a public transportation network that includes two MRT lines, MRT Line 1 (North-South) and Line 2 (East-West), plus eight new MRT lines. The JUTPI2 Master Plan was approved by the JCC in October 2019.[34]

Source: Prepared by the evaluator based on the final report and interviews.

The project achieved its purpose of approving the draft master plan as planned. The draft master plan was developed through capacity building of counterparts, analysis of the results of traffic surveys, updating of the database on traffic planning, and integration of knowledge and skills gained from the implementation of the pilot projects into the draft master plan. It can thus be said that the project purpose was achieved through the accomplishment of the outputs.

[32] The indicators for the project purpose in the PDM during project implementation were as follows: (1) Establishment of a sustainable framework for cross-sectoral and cross-regional coordination of transportation issues in JABODETABEK; and (2) More than half of planned projects and TOD model projects to be implemented. Because there was overlap between the project purpose indicators and the outputs indicators, at the time of the ex-post evaluation, the evaluator confirmed through questionnaires and interviews with Japanese experts that the goal to be achieved by the project completion was to have the draft JUTPI2 Master Plan approved by the JCC, which represented an integration of the three outputs.

[33] Activity-Travel Diary Survey, Screen Line Survey, Classified Vehicle Counting Surveys, and Cordon Line Survey were conducted. In the Activity-Travey Diary survey, socioeconomic and commute trip data were collected through paper-based home visit interview surveys on 5,000 people from 5,000 households and a smartphone-based survey using an open-source smartphone-based application for recording people's trips or movement. The Screen Line Survey and Classified Vehicle-Counting Surveys were conducted at 91 locations (55 locations within Jakarta [16-hour survey] and 36 locations in other areas) to verify the present OD matrices estimated based on the Activity Diary Survey and to determine the annual growth rate by observing traffic volumes at the survey sites covered in previous projects. (Source: JUTPI2 Final Report, pp. 21-34)

[34] The JUTPI2 Master Plan is a plan for the implementation of policies in 10 sectors of developing road and railway networks, developing bus transport systems and facilities, ensuring safety and security of transportation, developing traffic control systems, improving financial and demand management, developing freight transport systems, taking measures in urban planning, improving the environment, and setting up and reforming the financial system to ensure the implementation of the program itself was prepared based on the proposals of the Indonesian government (Source: JUTPI2 Final Report, p. 36).

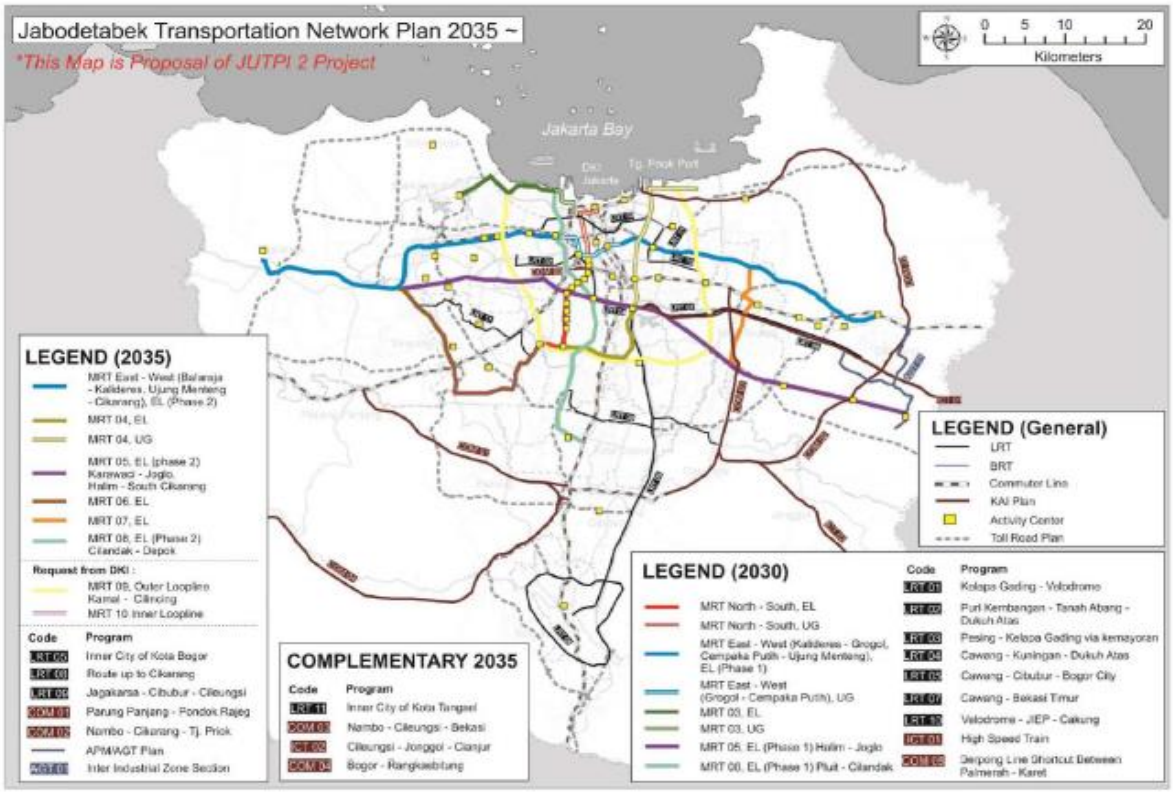


Figure 3 Public Transportation Network in JABODETABEK for 2035 proposed in the JUTPI2 Mater Plan

Source: Documents provided by JICA.

3.2.2 Impacts

3.2.2.1 Achievement of Overall Goal

(1) Achievement of Overall Goal in the PDM (JUTPI1)

The achievement of the overall goal of JUTPI1 three years after the completion of the project is as follows:

Table 3 Achievement of Overall Goal (JUTPI1)

Overall Goal	Indicator	Actual
To improve the urban transportation system in JABODETABEK to ease traffic congestion and to develop urban economic activities.[35]	Implementation of revised SITRAMP recommendation proposed by the Project	[Generally achieved] During the implementation of JUTPI2, projects proposed for implementation by 2015 in JUTPI were classified into three ranks: Rank A: implemented on schedule; Rank B: partially implemented or delayed; and Rank C: not implemented.[36] As a result, 28% of the projects were implemented on schedule, 44% were partially implemented or delayed, and 27% were not implemented. The total of Rank A and B projects resulted in an implementation rate of 72%, which was judged as a medium level that was generally achieved with reference to the status of similar technical cooperation projects on master plan formulation.[37]

Source: Prepared by the evaluator based on the answers to the questionnaires and interviews.

(2) Achievement of Overall Goal in the PDM (JUTPI2)

The level of achievement of the first indicator of the overall goal of JUTPI2, "Adoption of urban transportation policies" was verified separately at the central government and local government levels based on the means of verification[38] of the indicator in the PDM. For the central government level, based on the results of the questionnaire and interviews with Japanese experts during the ex-post evaluation, as an overall goal to which the project purpose "Approval of the JUTPI2 Master Plan" directly contributes, the indicator "Detailed RITJ legislation using the JUTPI2 Master Plan" was evaluated. The second indicator, "Implementation of projects in the JABODETABEK urban transportation Master Plan," was not examined in the ex-post evaluation because the RITJ revision reflecting the JUTPI2 Master Plan is in the process of being institutionalized in 2024 and the proposed Master Plan projects are also under review.[39]

[35] Under JUTPI1, a Master Plan for urban transport in JABODETABEK was developed with a target year of 2030, and various transport policies were proposed. This Master Plan was not only about the development of transportation infrastructure, but also included an implementation coordination framework, financial mechanism, and legal system.

[36] Source: JUTPI2 Final Report, p. 3.

[37] In the ex-post evaluation for "The Project for Nacala Corridor Economic Development Strategies in Mozambique" (ex- post evaluation in FY2018) and "The Project on the Corridor Development for West Africa Growth Ring Master Plan" (ex-post evaluation in FY2020) implemented as Technical Cooperation for Development, the projects that proceeded to the feasibility study were implemented, the same perspective was used in this ex-post evaluation.

[38] In the PDM, the means of verification is described as urban transportation policies and regulations of the related agencies in JABODETABEK: (1) Presidential decrees, (2) Ministerial decrees, (3) Local government regulations, (4) Transportation-related policies, and (5) Spatial plans.

[39] There are many projects included in both the RITJ and the JUTPI2 Master Plan, but it was difficult to check their progress during the ex-post evaluation because the names of the projects in the JUTPI2 proposed project list and those in the BPTJ database were often different. The "Annual Monitoring Evaluation Report" (AMER) was prepared for JUTPI2 as a form for monitoring the progress of projects included in the JUTPI2 Master Plan,

Table 4 Achievement of Overall Goal (JUTPI2)

Overall Goal	Indicator	Actual
To promote urban development based on the public transport system in JABODETABEK	Adoption of urban transportation policies	<Mostly achieved> (a) <u>At central government level (in progress)</u> • The updated RITJ is in progress toward institutionalization in 2024. • Under Article 13, the RITJ is to be evaluated and revised by the Ministry of Transportation at least every five years. However, the RITJ may be evaluated and revised without waiting for a five-year period if there is a need to revise the RITJ due to environmental or technological changes surrounding the national strategy, such as national strategic projects defined by presidential decree or technological innovations in the transportation sector (e.g., the spread of electric vehicles or introduction of automated driving technology). • The Japanese side expected that updating the RITJ utilizing the JUTPI2 Master Plan would undergo the process of evaluation and revision without waiting five years.[40] On the other hand, the Indonesian side recognized that the update of the RITJ was too early, as there was only one year between the institutionalization of the RITJ in 2018 and the JCC's approval of the JUTPI2 Master Plan in 2019.[41] • In 2020, the RITJ update did not progress due to the COVID-19 pandemic and travel restrictions on government employees; thus, the Indonesian government was busy with COVID-19 measures. In addition, since the completion of JUTPI2, the situation in JABODETABEK has changed with the progress of plans to relocate capital city functions, and the RITJ needs to be revised to take these changes into account. • BPTJ started the review and evaluation of RITJ in 2021 and is working on the revision. RITJ is expected to complete its review and evaluation in 2023, after which it will be institutionalized.[42]

but BPTJ counterparts were not aware of its existence at the time of the ex-post evaluation. BPTJ monitors the implementation status of projects included in the RITJ using the SPIRIT software. Even if the RITJ had been updated to reflect the JUTPI2 Master Plan, it is possible that the AMER would not have been utilized, and this remains an issue.

[40] Source: Documents provided by JICA, interview with JUTPI2 Japanese experts.

[41] Source: Answers to questionnaire by BPTJ and interview with BPTJ.

[42] As of August 2023, a coordination meeting was scheduled for early October 2023 for the BPTJ to invite relevant local governments and ministries regarding the review and evaluation of the RITJ; the results of the RITJ evaluation will be reported to the minister of transportation by the end of 2023, depending on the results of the coordination meeting. Completion of the RITJ renewal will depend on subsequent ministerial approval, and the following three scenarios are assumed: (1) Completion by the end of 2023: If the minister of transportation accepts the results of the RITJ evaluation by the end of 2023 and the current president approves it by the end of 2023, the RITJ update will be completed by the end of 2023. (2) Completion in 2024: If the acceptance and approval of RITJ by the minister of transportation and the current president take longer, the RITJ update will be completed in 2024. (3) Completion after the new president takes office: If the current president requests for the new president to approve the review and evaluation of the RITJ, it will be completed after the new president takes office (Note: Indonesian presidential election is scheduled on February 14, 2024) (Source: Answers to questionnaire by BPTJ).

		(b) At the local government level (Achieved) • Spatial Plan of DKI Jakarta: "The 2022 Detail Spatial Plan of DKI Jakarta," a plan focused on solving problems in DKI Jakarta such as citizens' activity patterns, traffic congestion and inefficient mobility, was developed.[43] • Bekasi City Transportation Master Plan: "Kota Bekasi Transportation Master Plan 2021" was developed based on the findings from the preparation of the JUTPI2 Master Plan and the TOD Model Project in Outputs 3.[44] • TOD Administration Regulation of Kota Bogor: "Regulation of the Mayor of the City of Bogor No. 187 of 2021 about Administration of Transit-Oriented Areas" was formulated with reference to the findings from the TOD model project implemented in the project and in accordance with the policies that Bogor city uses and confirmed in Regional Regulation Number 6 of 2021 about Spatial Plans (RTRW) which includes planning for city-scale TOD and sub-city-scale TOD development. • Utilization of JUTPI's experience on spatial planning in 2022 in Kota Depok: Learning from the TOD model project of the JUTPI 2 that the walking distance from station is around 400-800 meters was used in formulating the Spatial Regulation No. 9 of 2022.

Source: Prepared by the evaluator based on the answers to the questionnaires and interviews.

Regarding the JUTPI2's overall goal (i.e., that the detailed RITJ was not institutionalized as a presidential decree three years after the project completion), it was identified as an issue that the project team did not have a concrete plan for institutionalization, including a specific schedule and division of roles. One of the reasons is that JICA developed a new PCR format in FY2014, but the consultant in charge did not fully reflect the format in the Final Report for JUTPI2, and the "specific schedule to achieve the overall goal" included in the new format was not included in the Final Report. The fact that the project was completed without a concrete roadmap for achieving the overall goal having been worked out by the bilateral parties involved is an issue that will serve as a lesson for the future (see "4.3 Lessons Learned").

(3) Achievement of Overall Goal (Complementary Indicators)

Whereas the SITRAMP project's objective was to formulate a Master Plan, this project also aimed to build the capacity of counterparts through project activities. Therefore, in addition to the PDM indicators, in the ex-post evaluation, the evaluator examined how the counterpart

[43] Source: Interview with JUTPI2 Japanese experts and answers to questionnaire by JUTPI2 Japanese experts, *the 2022 Detail Spatial Plan*.

[44] Source: Interview with JUTPI2 Japanese experts and answers to questionnaire by JUTPI2 Japanese experts.

agencies utilized the ideas introduced in the Master Plan and the knowledge and technology introduced in the pilot projects as complementary indicators. Table 5 shows the results.

Table 5 Achievement of Overall Goal (Complementary Indicators)

Local Government	Cases
DKI Jakarta	A JUTPI2 Japanese long-term expert organized a seminar for officials of Jakarta DKI on the effective use of building floor area ratio as a method of TOD. The DKI Jakarta subsequently used this method to improve the Semanggi interchange. Specifically, when two right-turn multilevel roads were constructed at the interchange of two major streets, which caused serious traffic congestion, a Japanese company engaged in real estate development in the neighborhood was allowed to increase the floor-area ratio in exchange for the company contributing to the road construction costs.
Kota Tangerang	Utilization of the model project of TOD in Output 3 of JUTPI2 (case study of TOD in the Poris Plawad area): Based on the case study, Kota Tangerang, in coordination with BPTJ, is developing a bus terminal in the Poris Plawad area connected to the Batu Ceper Station through the PPP method.
Kota Bogor	Integrated pedestrian development: Using the findings from the pedestrian path improvement in Pajajaran (Baranangsiang bus terminal area), a pilot project of JUTPI2, the Kota Bogor government included comprehensive pedestrian development as one of its priority programs in the "Medium-Term Development Plan 2019-2024 of Kota Bogor."[45] Pedestrian way improvement in Pajajaran have succeeded in connecting Baranangsiang Bus Terminal with Suryakencana area, one of the economic sectors in Bogor city.
Kabupaten Bogor	Improvement of transportation nodes: Construction of a skybridge to connect Bojong Gede Station with a bus terminal located 400 meters northwest of the station via a sky bridge to enhance the continuity of travel. PT.KAI (state-owned railroad company) and Kabupaten Bogor bore community-owned land acquisition costs whereas the Ministry of Transportation bore the feasibility study, detailed design, and skybridge construction costs.
Kota Depok	• Bus shelter construction: The bus shelters developed under the pilot projects in JUTPI2 were well received by users because they do not block traffic while buses are stopped and prevent traffic congestion, and two bus shelters were constructed in 2022. • Railway Masterplan of Kota Depok: When preparing Railway Masterplan of Kota Depok in 2022, the Kota Depok government referred the plans in the JUTPI 2 Master Plan.
Kota Tangerang Seletan	Promotion of TOD plan: Utilization of the JUTPI2 TOD case study for designing TOD around the Jurang Mangu and Rawa Buntu stations.
Kota Bekasi	Utilization of findings from the JUTPI2 TOD case study in the following spatial planning for the kota: Skybridge development (LRT and West Bekasi Station integration). The skybridge development is being planned to connect the LRT station, West Bekasi station, shopping mall, park-and-ride, apartments, office buildings, and bus shelters to facilitate movement and transfers and allow for high-density use of space. In addition, the kota is promoting the integration of LRT and East Bekasi, LRT and Cikunir 1 station, LRT and Cikunir 2 station, and LRT and Jati Cempaka station.

Source: Prepared by the evaluator based on the answers to the questionnaires and interviews.

[45] Source: Answer to the questionnaire by Kota Bogor BAPPEDA and interview with Kota Bogor BAPPEDA.

In JUTPI2, the update of RITJ using the JUTPI2 Master Plan, one of the indicators of the overall goal, is progressing toward completion with BPTJ's efforts and the support of JUTPI3 at the time of the ex-post evaluation, and it is expected to be achieved next year. Almost all the local governments, as counterpart agencies, have reflected the project's findings in their local government medium-term development plans, transportation plans, and spatial plans, and a number of capacity-building outputs have been confirmed, including continued efforts to improve public transportation with reference to the pilot projects implemented in the project.
In light of the above, the project has mostly achieved its overall goal.

Bus Shelter in Kota Depok Developed Based on Pilot Project Findings (Source: Field survey)

Model of TOD Completion in the Poris Plawad Area of Kota Tangerang (Source: Field survey)

3.2.2.2 Other Positive and Negative Impacts

(1) Impacts on the Environment

The main activities of the project were institutional development and capacity building of Indonesian government officials, including the implementation of some pilot projects, but no large-scale works requiring land acquisition or resettlement were planned, and the project was considered to fall under Category C under the "JICA Environmental and Social Impact Guidelines" (April 2010). In fact, there were no negative environmental impacts from the implementation of the project.[46]

(2) Resettlement and Land Acquisition

The pilot projects implemented in JUTPI1 did not involve resettlement or land acquisition.[47] In addition, the target sites for the pilot projects in JUTPI2 were selected based on the criteria that they "must be located on land owned by the local government and not on land owned by residents or non-local government agencies" and that "pilot project activities should avoid land acquisition and resettlement," so resettlement and land acquisition were not involved.[48]

[46] Source: Answers to questionnaire by JUTPI1 and JUTPI2 Japanese experts.
[47] Source: Answers to questionnaire by JUTPI1 Japanese experts.
[48] Source: Answers to questionnaire by JUTPI2 Japanese experts.

(3) Gender Equality/Marginalized People/Social Systems and Norms, Human Well-being, and Human Rights

The impact on vulnerable transportation groups (elderly, disabled, children, pregnant women, etc.), both positive and negative, was not confirmed from the field survey, questionnaires, or interviews.

(4) Unintended Positive/Negative Impacts

None.

With the implementation of this project, the approval of the draft master plan, which was set as the project purpose, was achieved as planned. As for the overall goal, although the legalization of the JUTPI2 master plan is still in progress, almost all the target local governments have reflected the findings from the master plan formulation process in their local government medium-term development plans, transportation plans, spatial plans, and so on, and are working on actual public transportation improvements. Therefore, effectiveness and impacts of the project are high.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

(1) JUTPI1

Inputs	Plan	Actual
(1) Experts	• 2 Long-Term (project leader/urban transportation policy advisor, transportation coordination advisor, MM not stated*) • Short-Term to be dispatched as needed for effective project implementation (about 65 MM)	• 2 Long-Term (project leader/urban transportation policy advisor, transportation coordination advisor, 57 MM) • 14 Short-Term (65 MM)
(2) Trainees received	In the field of urban transportation system (estimated 10 persons per year)	Four times, 29 participants in total
(3) Equipment	Hardware and software for urban transportation planning as needed	Geographic information systems, traffic planning software, digital satellite image, copiers, printers, plotters, etc.
(4) Local expenses for the project activities	Not stated	Approximately 12.539 billion rupiah
Japanese Side Total Project Cost	Total approx. 463 million yen	Total 484 million yen
Indonesian Side Total Project Cost	Not stated	Not stated

* MM stands for man month.

Source: Ex-ante evaluation sheet for plan and documents provided by JICA for actual results.

Note: The total project cost for JUTPI1 is based on the following ex-post evaluation reference concept, which takes into account the addition of components and extension of the project period after the revision of the Record of Discussions (R/D): “When a change in project scope (increase or decrease in output) causes an increase or decrease in the project period or project cost, it is not evaluated simply by the actual increase or decrease. In the case where the component has been changed, the actual results shall be compared with the planned figures after the said change, if such change is deemed appropriate, based on the status of agreement between the counterpart government and JICA regarding this change, coherence with the project objectives, etc.”

(2) JUTPI2

Inputs	Plan	Actual
(1) Experts	• 1 Long-Term (urban transportation policy advisor, 36 MM) • Short-Term (urban transportation planning, etc., including seminars and pilot projects, MM not stated)	• 1 Long-Term (project leader/urban transportation policy advisor, 57 MM) • 11 Short-Term (56.1 MM)
(2) Trainees received	Training in Japan, training in a third country, and local in-country training in the field of TOD (number of participants not stated)	Seven times, 106 participants in total
(3) Equipment	Project vehicles, office equipment, etc. (cost not stated)	Transportation planning software, geographic information systems, computer satellite imagery, copiers, printers, plotters, etc.
(4) Local expenses for the project activities	Including cost of hiring local consultants, etc. (cost not stated)	Approx. 1.6 billion rupiah
Japanese Side Total Project Cost	Total approx. 484 million yen	Total 677 million yen
Indonesian Side Total Project Cost	Not stated	Not stated

Source: Ex ante evaluation table for plan and documents provided by JICA for actual.

3.3.1.1 Elements of Inputs

No problems were identified in terms of the quality and quantity of inputs on the Japanese side, but the timing of short-term experts for JUTPI2 was delayed for about two years due to delays in contract conclusion with them, and the long-term expert covered project activities for them during their absence, which delayed the entire activity from Outputs 1 to 3 and caused the extension of the project period.

In terms of inputs from the Indonesian side, there were delays in the assignment of counterparts and insufficient quantity (number of persons, frequency of participation) in JUTPI1, which sometimes prevented sufficient technology transfer in collaborative work such as traffic surveys and Master Plan revision.[49] At the beginning of JUTPI1, the Indonesian side recognized this project as the same development study as the SITRAMP project, and it took time for them to understand that JUTPI1 was a technical cooperation project in which Japanese experts and their Indonesian counterparts would work together to formulate an urban transportation plan. In daily meetings with CMEA and other central government department head-level policymakers, JUTPI was able to increase its capacity by introducing Japanese institutional and policy examples, experience, and knowledge.

As mentioned above, JUTPI1 faced challenges in terms of the timing of counterpart

[49] Source: Documents provided by JICA.

assignment and the method of participation. However, lessons learned from JUTPI1 were utilized in JUTPI2 to make activities for the project task-based. The Indonesian side gradually showed more initiative, and there were improvements in the involvement of counterparts, and it was judged that there were generally no problems over the long span of 10 years from the start to the completion of the two projects.

3.3.1.2 Project Cost

Table 6 shows the planned and actual project costs for the two phases of the project. The actual project cost was 1,161 million yen against the planned total of 947 million yen for the two phases, exceeding the plan (123% of the plan).

The comparison of planned and actual project costs is based on the concept of reference for external evaluation of JICA: "When a change in project scope (increase or decrease in output) causes an increase or decrease in the duration or project cost, the project will not be evaluated simply on the basis of the actual increase or decrease. In the case of a change in a component, if the change is deemed appropriate based on the status of the agreement between the counterpart government and JICA regarding the change, coherence with the project objectives, etc., the actual results are compared with the planned results after the said change." Because four components were added to JUTPI1 because of revision of R/D[50] in October 2011 and these additions were judged to be consistent with the project objectives, the project cost of JUTPI was compared with the actual results using the changed values as planned values, in line with the reference for external ex-post evaluation of JICA described above.

The main difference between the planned and actual project costs is due to an increase in project expenses (e.g., cost for Japanese experts) resulting from the extension of the JUTPI2 project period.

[50] In September 2010, under the vice president's initiative, the Indonesian government announced 20 priority policies to reduce traffic congestion. These included the preparation of a Master Plan for Urban Transportation in the Jakarta Metropolitan Area and the establishment of JTA. The Government of Indonesia asked JUTPI1 to respond to the above, and the R/D was revised with respect to the addition of four components and extension of the project period. The four additional components are (1) To formulate short-term action plans and to establish the monitoring system in cooperation with related urban transportation organizations in JABODETABEK, (2) To support development of Standard Operation Procedure (SOP) to define functions for each department of JTA and procedure for implementation of activities (3) To develop Operation Reference for sector wide policy in JTA and (4) To coordinate JUTPI-MP and MP for Establishing Metropolitan Priority Area (MPA) for Investment and Industry (Source: documents provided by JICA). The above four components are described in Japanese documents as follows: (1) Support for formulation of short-term action plans and establishment of project progress evaluation and supervision methods, (2) Support for development of detailing Standard Operation Procedure (SOP) of JTA, (3) Development of operation reference for new projects and (4) Coordination with Study for Master Plan for Establishing Metropolitan Priority Area (MPA) for Investment and Industry in JABODETABEK area.

Table 6 Project Costs

Unit: Million yens

	Plan	Actual	Ration to Plan (%)
JUTPI1	463	484	105%
JUTPI2	485	677	140%
Total	948	1,161	123%

Source: Documents provided by JICA.

3.3.1.3 Project Period

The project period exceeded the plan (137% of the plan) with an actual project period of 97 months compared to the plan of 71 months. In comparing planned and actual results, as with the project cost, for JUTPI1, the addition of the four components at the time of the R/D revision was consistent with the project objectives, so the period after the change was used as the planned value and the planned and actual values were compared. For JUTPI2, the R/D was revised twice, but the components were not changed, so the original plan was compared with the actual period. In addition, whereas the final inspection of the pilot projects for Output 2 of JUTPI2 was planned to be conducted after the completion of project activities stated in the PDM, the planned project period in the R/D was based on project activities stated in the PDM. Therefore, for JUTPI2, the end of the project period in efficiency was defined as the time when the series of activities stated in the PDM was completed.

Table 7 Project Period

	Plan	Actual	Ration to plan (%)
JUTPI1	34 months (June 2009-March 2012)	34 months (June 2009-March 2012)	100%
JUTPI2	37 months (May 2014-May 2017)	63 months (August 2014-October 2019)	170%
Total	71 months	97 months	137%

Source: Documents provided by JICA.

Note: Project period was calculated based on R/D.

This project exceeded the plan in both project cost and project duration. Therefore, efficiency of the project is moderately low.

3.4 Sustainability (Rating: ②)

3.4.1 Policy and System

The *Medium-Term National Development Plan 2020-2024* (*RPJMN 2020-2024*) identified the development of urban mass transit systems in six metropolitan areas, including JABODETABEK, as a priority project, with the aim of reducing potential economic losses

due to traffic congestion in the metropolitan area. The government of Indonesia emphasizes the development of an urban mass public transportation system to alleviate traffic congestion in the metropolitan area, and policy and institutional sustainability is ensured.[51]

3.4.2 Institutional/Organizational Aspect

(1) Sufficiency of Personnel in the Relevant Organizations

Regarding the planning and implementation of urban transportation plans, the BAPPEDA is responsible for the overall regional development planning for annual, mid-term (5 years), long-term (20 years), and regional spatial (20 years) planning in every sector, whereas the Transportation Agency is responsible for the planning and the implementation of urban transportation.

The sufficiency of personnel was confirmed through questionnaires and interviews with nine counterpart local governments in JABODETABEK. Five local governments indicated that they were short-staffed, and four indicated that they were adequately staffed. The reasons for the shortage were that they were insufficient in quantity to perform a series of tasks, such as developing regional plans, including transportation plans, conducting surveys and analyses related to transportation policy planning, and evaluating the plans.[52] Shortage of personnel has been an issue that has been pointed out since the SITRAMP and was also pointed out in the detailed planning survey of JUTPI3. The Government of Indonesia was conducting a workload analysis to identify needs for human resources to make decisions on hiring new central or local government officials as of June 2023, but it appears that it will take time to resolve the issue.

[51] Source: *Appendix Presidential Regulation No.18 of 2020 concerning the National Medium-Term Development Plan for 2020-2024.*

[52] Source: Answers to questionnaires by local governments.

Table 8 Sufficiency of Local Government Staff

	Local government	BAPPEDA		Transportation Agency		Answer	Reasons for staffing shortages
		Administrative staff	Technical staff	Administrative staff	Technical staff		
1	Jakarta DKI	1	4	n.a.	n.a.	No	BAPPEDA has many tasks. First, related to the preparation or drafting of the local government work plan for annual planning, regional medium-term development plan, regional long-term development plan, and regional spatial plan. Second, related to the coordination of transportation planning in national strategic projects. Both tasks require enough staff to function properly.
2	Kota Bogor	11	35	272	26	No	Kota Bogor still have insufficient number of employees with background of bachelor's degree in engineering with major focus in land transportation and mapping.
3	Kabupaten Bogor	1	5	10	27	No	Lack of quantity.
4	Kota Depok	1	3	150	11	No	11 technical staff is not sufficient to carry out the work of three departments and three technical implementation units. The scope of work includes planning, evaluation, traffic analysis, traffic engineering, and management.
5	Kota Tangerang	1	2	5	69	Yes	
6	Kota Tangerang Selatan	1	3	1	3	Yes	
7	Kota Bekasi	2	3	164	26	Yes	
8	Kabupaten Bekasi	2	2	40	16	No	Collecting data, location survey and coordination with related agencies are difficult due to insufficient staffing.
9	Tangerang District	1	2	1	2	Yes	

Source: Prepared by evaluator based on answers to questionnaires and interviews.

(2) Authority in Implementation of Urban Transportation Plans

The Ministry of Transportation has the authority to implement transportation plans. As for highways, the Highway Department of the Ministry of Public Works has the authority for licensing and approval. As a result of decentralization, various functions have been

transferred to local governments, and there are no problems.[53]

(3) Progress in Establishing Coordination Mechanisms among Stakeholders

It is important to establish a cross-ministerial and cross-boundary framework in the implementation of urban transportation policies in a wide area; although the establishment of a JTA to centrally coordinate transportation policies in JABODETABEK, as envisioned in JUTPI1, did not materialize, efforts have been made in JUTPI2 to establish a cross-ministry and cross-boundary framework. In JUTPI3, which is currently being implemented, subtasks have been created to determine how to respond to various issues; pilot projects for TOD, the main component of JUTPI3, are being implemented while information on urban transportation is being centralized with the BPTJ as the core; and coordination mechanisms are being strengthened to enable consultation among relevant agencies.[54] Regarding the framework with the BPTJ as its core, regular communication between the BPTJ and local governments and support from the BPTJ to local governments have been observed, and progress has been made in establishing a coordination mechanism.

The coordination framework of the transportation sector in JABODETABEK, with BPTJ at its core, is improving through the support of JUTPI3, is a positive aspect. However, securing human resources to engage in transportation planning has been pointed out since the time of SITRAMP and was identified as an issue to be addressed by the government of Indonesia as of completion of JUTPI2. The prospects for immediate improvement in securing human resources are low, and the sustainability in terms of institutional/organizational aspect is judged to be somewhat low.

3.4.3 Technical Aspect

As mentioned in "3.2.2.1 Achievement of Overall Goal," the preparation of the Master Plan for Urban Transport Planning in JABODETABEK, namely the detailing of the RITJ, utilization of the JUTPI2 Master Plan is expected to be completed in 2024 with the support of JUTPI3. In addition, BPTJ and local governments are utilizing the transportation database developed under the project and reflecting it in their own regional development plans and transportation plans.[55] The Indonesian counterpart organizations have a certain level of technical knowledge and skills, and the technical sustainability is judged to be high.

[53] Source: Answers to questionnaire by JUTPI2 and JUTPI3 Japanese experts and interviews with JUTPI2 and JUTPI3 Japanese experts.
[54] Source: Interview with JUTPI3 Japanese experts.
[55] In the questionnaire, all nine local governments indicated that they use the transportation database developed through the project for local government planning.

3.4.4 Financial Aspect

Indonesia's fiscal laws regulate the national and local fiscal system, subsidies, and taxation. The national budget consists of revenues, expenditures, and annual finances and is financed by tax revenues, nontax revenues, and loans. The budget is allocated to the central government, local governments, and villages, but most of it is allocated to the various central ministries and agencies. Local government revenues include local government revenue, government grants, and loans.

In the list of "Medium-Term Foreign Loan Plans 2020-2024 (revised 2023)," the Government of Indonesia has secured US$5,079 million (approximately ¥716.2 billion) in loans in the urban transportation sector. These loans include the construction of the MRT East-West Line and the MRT North-South Line, which are currently being implemented through these Japanese loans.[56]

Although some large-scale projects are being undertaken through loans and PPPs, the chronic lack of budget for transportation-related sectors in Indonesia has been pointed out since the time of SITRAMP and in the JUTPI3 detailed planning study. In the JUTPI2 Final Report, it was stated that investment in social infrastructure, such as transportation infrastructure, is essential to meet the demand to sustain the nation's economic growth and that funding resources for this could be created by reducing the fuel subsidy and earmarking of fuel tax to infrastructures as well as involvement of private sectors through PPP scheme and other funding schemes, such as PINA (nongovernment budget equity financing) and a local government bond.

With limited public budgets, the BPTJ has made efforts to promote the use of alternative funding sources, such as PPPs, and to hold seminars and workshops on PPPs for local governments, but challenges remain in finding a scheme that guarantees economic and financial benefits that will attract investors. Pilot projects for TOD, which include the development of a funding plan, are underway in JUTPI3. The funding approach is expected to be improved through this activity; however, because the pilot projects are still under implementation, it is too early to make a judgment regarding the prospects for securing funding sources.

The budgets for public transportation infrastructure in the seven local governments[57] that provided responses to the question on their budget have increased every year from FY2018 to FY2022, except for FY2020, when the emphasis was on the measures for COVID-19. However, measures for COVID-19 also increased the Public Service Obligation (PSO) or

[56] Source: Documents provided by the implementing agency.

[57] Information on the budget was obtained from seven of the nine local governments: DKI Jakarta, Kabupaten Bogor, Kota Bogor, Kota Depok, Kota Bekasi, Kota Tangerang, and Kota Tangerang Selatan.

Public Transportation Subsidy given to public transportation operators. In addition, BPTJ and the six local governments[58] indicated that their budgets are expected to be secured to a certain extent, given the policy emphasis on public transportation and the increasing trend in government budgets. On the other hand, regarding budget sufficiency, seven local governments[59] indicated that the budget for public transportation infrastructure is not sufficient, indicating that the public budget alone is not sufficient for infrastructure development, which requires a huge amount of funds.

Although the budget for the public transportation sector has been increasing over time, the PPP scheme the Government of Indonesia promoted has yet to improve its financing methods, so the financial sustainability is judged to be somewhat low.

3.4.5 Environmental and Social Aspect

No negative impacts in terms of environmental and social considerations were identified, as stated in "3.2.2.2 Other, Positive and Negative Impacts."

3.4.6 Preventative Measures to Risks

No risks were assumed at the time of planning, nor were any risks encountered during the implementation of the project.

Some minor issues have been observed in institutional/organizational and financial aspects. The prospects for improvement and resolution are uncertain currently. Therefore, sustainability of the project effects is moderately low.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

JUTPI1 was implemented to support the revision of the Master Plan for urban transport infrastructure development and the establishment of the necessary framework in order to coordinate the implementation of wide-area urban transport projects through the capacity building of central and local government officials involved in urban transport infrastructure planning in JABODETABEK, thereby contributing to urban development based on public transport systems in the area. JUTPI2 was implemented to improve the administrative functions of the urban transportation system by enhancing coordination and project implementation capacity among urban transportation agencies and organizations, thereby

[58] DKI Jakarta, Kota Bogor, Kota Depok, Kabupaten Bekasi, Kota Bekasi and Kabupaten Tangerang.
[59] DKI Jakarta, Kabupaten Bogor, Kota Bogor, Kota Depok, Kota Bekasi, Kota Tangerang, and Kota Tangerang Selatan.

contributing to urban development based on public transportation systems in the area.
From the time of planning to the completion of the project, the contents of this project were consistent with the development policy of the Government of Indonesia, which emphasized the development of public transportation in JABODETABEK and with the development needs to promote public transportation. In addition, lessons learned from similar projects in the past were utilized in project implementation, and the approach was appropriate. Although the content of the project was consistent with the assistance policy of the Government of Japan for Indonesia at the time of ex-ante evaluation, no specific collaborative effects between the project and other JICA projects or linkages with other donors were identified. Based on the above, relevance and coherence of the project are high. With the implementation of this project, the approval of the draft Master Plan, which was set as the project purpose, was achieved as planned. As for the overall goal of the project, "to improve urban transportation comprehensively," although the legalization for the JUTPI2 Master Plan is still in progress, almost all the target local governments have reflected the findings from the Master Plan preparation process in their medium-term development plans, transportation plans, spatial plans, and so on. In addition, many cases of actual public transportation improvement efforts were confirmed. Therefore, the effectiveness and impacts of the project are high. Since both the project cost and project period exceeded the plan, the efficiency of the project is moderately low. Regarding the sustainability of the project effect, some minor issues have been observed in terms of the institutional/organizational and financial aspects. The prospects for improvement and resolution are currently uncertain. Therefore, sustainability of the project effects is moderately low.
In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

It is recommended that BPTJ, with the support of JUTPI3, complete the review and evaluation of the RITJ while utilizing the JUTPI2 Master Plan by December 2023, the end of Indonesia's fiscal year, and institutionalize the updated RITJ in 2024.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Sharing the Path to Achieving the Overall Goal at the Time of Project Completion

In JUTPI2, a new format of Project Completion Report of JICA introduced in 2015 was not fully utilized at the time of project completion, and the Project Completion Report

(Japanese report name is Final Report) did not include a description of the specific plan to achieve the overall goal, which is included in the new format. Specific plans for achieving the overall goal were expected to be discussed between the two countries and included in the report, but the project was completed without this discussion. As a result, the Japanese and Indonesian parties understood differently the process of detailing and formally approving the RITJ using the JUTPI2 Master Plan. In addition, there was no monitoring or follow-up by the JICA Indonesia office until the overall goal was achieved.

If the project involves a plan that will require formal approval by the counterpart country after the project is completed (e.g., a master plan, etc.), it is desirable that the counterpart organization and the Japanese expert prepare a plan that includes specific activities, schedule, and division of roles to achieve the overall goal, and that the JICA overseas office monitor the plan on a regular basis.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

None.

Republic of Indonesia

FY2022 Ex-Post Evaluation Report of
Japanese Grant Aid Project
"The Project for Improvement of Equipment for Disaster Risk Management"

External Evaluator: Mayumi Hamada
Foundation for Advanced Studies on International Development

0. Summary

This project was implemented to enhance the capacity for earthquake and tsunami analysis and to improve the accuracy of seismic source and seismic intensity analysis by providing seismic observation equipment to the Agency for Meteorology, Climatology and Geophysics (BMKG) and the Indonesian Institute of Sciences (LIPI, which was merged into the National Research and Innovation Agency (BRIN)[1] of Indonesia), which are the Indonesian seismic observation agency and research institution, respectively, thereby contributing to the enhancement of the country's disaster prevention capacity. This project, which is intended to strengthen the capacity for earthquake and tsunami analysis, is highly consistent with Indonesia's policy and development needs and aligned with Japan's ODA policy at the time of planning. Although the project and a technical cooperation (TC) project were intended to be linked at the time of planning, the commencement of the TC project was delayed until after the completion of this project due to the Palu earthquake and the COVID-19 pandemic. Therefore, there was no linkage between the two projects. Although there was no planned and coordinated linkage with the projects supported by other aid agencies, the project is consistent with the direction of the *Sendai Framework for Disaster Reduction 2015-2030*. Therefore, the project's relevance and coherence are high. The project outputs were mostly achieved as planned, and additional components were implemented with the residual funds. Although the project cost was within the plan, the project period significantly exceeded the plan. Therefore, the project's efficiency is moderately low. The quantitative and qualitative effects of the project objective, i.e., the enhancement of capacity for earthquake and tsunami analysis, were mostly achieved. The project did not achieve the expected impact of improving the capacities of government agencies related to disaster prevention for disaster initial and emergency responses and restoration. However, some positive impacts emerged, such as enhancement of the accuracy of the UNESCO-led Indian Ocean Tsunami Warning and Mitigation System (hereinafter referred to as IOTWS) and utilization of some of the equipment provided to BRIN for undergraduate students' thesis guidance. Therefore,

[1] In Indonesian, it stands for "Badan Riset dan Inovasi Nasional." The National Research and Innovation Agency was established in 2020, integrating a number of research institutions, including the National Institute of Aeronautics and Space, the Indonesian Institute of Sciences (LIPI), the National Nuclear Energy Agency of Indonesia, and the Agency for the Assessment and Application of Technology, to conduct research necessary for national development. The purpose of the integration is to combine the research institutions' funds, infrastructure, and human resources to coordinate all government research programs properly. However, the location of the former LIPI (Bandung) and key personnel at that time remain unchanged at the time of ex-post evaluation. To avoid confusion, in this report, "LIPI" denotes the project from the time of planning to the time of implementation and "BRIN" the project after completion.

effectiveness and impacts of the project are high. Slight issues have been observed in the institutional/organizational, technical, financial aspects. However, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description

Project location
(source: formulated by the evaluator based on the map JICA provided)

A seismic station constructed to install the seismic observation equipment
(source: a photo taken by the evaluator)

1.1 Background

Indonesia is an island nation formed along an oceanic trench and is prone to massive earthquakes, similar to the Japanese archipelago. It is also one of the countries in Southeast Asia where natural disasters occur most frequently. Natural disasters in Indonesia range widely, including earthquakes, landslides and slope failures, volcanic eruptions, floods, forest fires, wind storms, and tidal waves and storm surges. The country has numerous faults and one of the longest coastlines in the world, extending more than 50,000 km, and has frequently suffered from disasters such as earthquakes, volcanic eruptions, and large tsunamis caused by major earthquakes along the Pacific Coast. In particular, the region is prone to plate earthquakes, and because the ocean trench is located near the coast, the time between the occurrence of an earthquake and the arrival of a tsunami is short.

Whereas Indonesia enacted *the Disaster Management Law* after the 2004 Sumatra Earthquake, Japan enacted *the Act on Special Financial Assistance and Grants for Coping with the Great East Japan Earthquake* in response to the devastating damage the Great East Japan Earthquake caused in March 2011. Based on this, it was decided to implement "Japan's Grant Aid for Disaster Prevention and Reconstruction (Type I-D)," which procures disaster prevention equipment related to earthquake and tsunami for Indonesia. In October 2011, Japan conducted the "Data Collection Survey on Earthquake and Tsunami Observation Systems in Indonesia" to comprehend Indonesia's situation and needs for earthquake and tsunami disaster prevention. Subsequently, the requests were summarized, which led to the implementation of the project. Under these

circumstances, this project was required to include in the plan as much as possible the procurement of products that would contribute to the promotion of industries in the "specified disaster areas" defined by the Great East Japan Earthquake (products from the disaster areas) and to procure disaster prevention-related equipment, including advanced Japanese technology, as countermeasures against earthquakes and tsunamis. For this reason, it was mandatory that the equipment to be procured was made in Japan ("Japan-tide"), in principle.

1.2 Project Outline

The objective of this project is to enhance the country's capacity for earthquake and tsunami analysis and to improve the accuracy of seismic source and intensity analysis in Indonesia by providing seismic observation equipment to BMKG and LIPI, seismic observation and research institutes, respectively, thereby contributing to improving the country's disaster prevention capacity.

Grant Limit / Actual Grant Amount	1,500 million yen / 1,500 million yen
Exchange of Notes Date / Grant Agreement Date	March 2013 / November 2013
Executing Agencies	BMKG and LIPI
Project Completion	July 2019
Target Area	All over Indonesia
Main Contractors	Package 1: TEC International Inc. Package 2: NEC Corporation Package 3: TEC International Inc.
Main Consultant(s)	The consortium consisting of Oriental Consultants Global Co., Ltd. and Pacific Consultants Co., Ltd.
Procurement Agency	Japan International Cooperation System
Preparatory Survey	March 2012 - July 2014
Related Projects	**Technical Cooperation Project** - The Project for Enhancement of the Disaster Management Capacity of National Disaster Management Authority (BNPB) and Regional Disaster Management Authority (BPBD) (2011 - 2013) - Capacity Development on Operation of Earthquake and Tsunami Analysis and

	Warning Dissemination (2022 - 2025) - The Project for Enhancement of Disaster Risk Reduction through Improvement of the Disaster Risk and Communication Framework (2023 - 2026); **Other International Organizations, Donors, etc.** - Japan-Indonesia Seismic Network (JISNET) of National Research Institute for Earth Science and Disaster Resilience (NIED) (2001 - 2010)

2. Outline of the Evaluation Study

2.1 External Evaluator

Mayumi Hamada, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted according to the following schedule.

Duration of the Study: August 2022 - December 2023

Duration of the Field Study: January 15, 2023 - January 27, 2023

May 22, 2023 - May 30, 2023

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance/Coherence (Rating: ③[3])

3.1.1. Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Indonesia

At the time of planning, the National Disaster Management Agency (BNPB) developed *the National Disaster Risk Reduction Action Plan 2010-2012* to promote specific activities of *the National Disaster Management Plan 2010-2014*. The action plan's priorities include "strengthening risk identification, assessment, monitoring and early warning." In addition, *the BMKG's Medium-term Strategic Plan 2010-2014* called for the installation of 500 strong-motion seismographs.[4] At the implementation stage, *the National Disaster Management Plan 2015-2019* specified the roles of the 37 ministries and agencies involved in disaster management and set forth efforts to mainstream disaster management with the BNPB, the key organization. *The National Disaster Management Plan 2020-2024* also calls for a more robust earthquake information system and tsunami early warning and emphasizes increasing the population's response time as a tsunami preparedness and mitigation measure.[5] The action plan includes strengthening the integrated early

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[3] ④: Very High, ③: High, ②: Moderately Low, ①: Low
[4] The Ex-ante Project Evaluation Sheet pp.1-2, Preparatory Survey Report pp.1-3
[5] Chapter 2 p.43

warning system and utilizing disaster prevention-related research, innovation, and technology through collaboration among multiple agencies.[6]

In addition, the Government of Indonesia has identified disaster management as one of the nine priorities in *the National Medium-Term Development Plan (RPJMN) 2015-2019.*[7] *The RPJMN 2020-2024* includes "improvement of the environment and capacity building for disaster reduction and climate response" as one of the seven development agendas.[8] In addition, *Presidential Decree No. 93 of 2019* sets forth the strengthening of the development of earthquake information systems and tsunami early warning systems, which is still valid at the time of ex-post evaluation. Therefore, the direction of the project to strengthen the country's capacity to prevent disasters, such as earthquakes and tsunamis, has been consistent with Indonesia's policy since the time of planning to the time of ex-post evaluation.

3.1.1.2 Consistency with the Development Needs of Indonesia

On the west side of Sumatra, Indonesia, the Indo-Australian Plate is subducting beneath the Eurasian Plate, and there is a reverse fault zone parallel to the island, which causes frequent large earthquakes. At the time of planning, the amount of seismic observation equipment in Indonesia was small compared to the national land area, and there were problems with the accuracy of seismic source analysis and magnitude estimation. Regarding tsunamis, there was insufficient reconciliation between simulation results and actual observed wave heights, and the number of tsunami simulation scenarios stored in the database was small. Therefore, it was not possible to estimate adequately the damage caused by tsunamis. In addition, some equipment in the existing warning systems was not functioning due to inadequate maintenance.[9] From the time of implementation to the time of the ex-post evaluation, there has been no particular change in the geological conditions related to the occurrence of earthquakes in Indonesia. In addition, Table 1 shows the number of earthquakes that caused more than 50 fatalities in Indonesia from 2000 to 2022.

[6] Chapter 3, p.82, Appendix pp.158-161
[7] The project was positioned as "Disaster Preparedness and Mitigation" in the area of "Natural Resources, Permanent Living Environment and Disaster Management" under "Realization of Economic Independence by Mobilizing Strategic Sectors in the Domestic Economy."
[8] The Information collection and verification study for disaster management in Indonesia p.1 of Summary
[9] The Ex-ante Project Evaluation Paper p.1

Table 1: Occurrence of Earthquakes in Indonesia
(with more than 50 fatalities from 2000 to 2022)

	Year	Month	Name	Number of Deaths (persons)
1	2000	APR	Major Earthquake off the Coast of Sumatra and Tsunami in the Indian Ocean (2000)	100
2	2004	DEC	Major Earthquake off the Coast of Sumatra and Tsunami in the Indian Ocean (2004)	220,000
3	2005	MAR	Major Earthquake off the Coast of Sumatra and Tsunami in the Indian Ocean (2005)	2,000
4	2009	SEP	Major Earthquake off the Coast of Sumatra and Tsunami in the Indian Ocean (2009)	1,100
5	2010	OCT	Major Earthquake off the Coast of Sumatra and Tsunami in the Indian Ocean (2010)	400
6	2018	AUG	Lombok Island Earthquake	460
7	2018	SEP	Palu Earthquake	4,340
8	2021	JAN	Mamuju Earthquake	90
9	2022	NOV	Cianjur Earthquake	327

Source: Preparatory Survey Report p1-1, BMKG Questionnaire
Note: As indicated in the subtitle (in parentheses), the above shows only the earthquakes in Indonesia since 2000 in which 50 or more people died.

Although the 2004 Sumatra earthquake stands out, casualties from earthquakes remains high from the time of planning through the time of ex-post evaluation. Therefore, the importance of accurate earthquake observation and prompt issuance of warnings remains high.

3.1.1.3 Appropriateness of the Project Plan and Approach

Sites for seismic stations were selected based on the location of nationwide observation stations of BMKG and seismic observation needs, and there was no unfair selection due to ethnic or other factors.[10] Moreover, Package 3 (real-time seismic observation system) and “Installation of IT seismic intensity meter and guidance on operation and maintenance” were implemented using the residual funds. Both were conducted based on the agreement with BMKG, and there was no problem with an addition to the scope. Furthermore, lessons learned from similar past projects revealed the existence of cases in which operation and maintenance management were not properly carried out although hardware support, such as a prewarning system, was provided. So, efforts were made to mitigate this risk through the collaboration between this project and the technical cooperation project. Details are described in the Sustainability section (3.4.6 Addressing Risks). Based on the above, there were no problems with the appropriateness of the project plan and approach.

[10] Questionnaire for BMKG

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

At the time of planning, the *Country Assistance Policy for Indonesia (2012)* included "Assistance for correction of inequality and establishment of a safe society" as a priority area, and this project was positioned within the "Disaster Reduction Capacity Improvement Program.[11]" Therefore, this project was in line with Japan's ODA policy at the time of planning.

3.1.2.2 Internal Coherence

At the time of planning, the project was planned and coordinated to improve seismic observation capacities as well as equipment maintenance and management systems through collaboration between the project and the "Capacity Development on Operation of Earthquake and Tsunami Analysis and Warning Dissemination" (TC project), taking advantage of lessons learned from the past.[12] However, the commencement of the TC project was postponed due to the BMKG's response to the Palu earthquake in Sulawesi and the COVID-19 disaster, which led to the modified project duration from February 2022 to February 2025.[13] As the TC project was postponed due to these external conditions, two years and seven months elapsed between the completion of this project in July 2019 and commencement of the TC project. Therefore, it cannot be said that the two projects were linked at the implementation stage. As for other JICA projects, there was no substantial concrete collaboration with the project.

3.1.2.3 External Coherence

At the time of planning and implementation of the project, there were no plans or coordination intended to produce specific effects by linkage between this project and projects supported by other Japanese organizations or international donors. Among 93 observation stations supported under this project for BMKG, equipment at 15 stations was installed under Japan-Indonesia Seismic Network (JISNET) support the NIED of Japan provided. This project was intended to upgrade the equipment at the JISNET sites, which were due for renewal.[14] However, because the above project was already completed before the start of this project, it cannot be said that there is external coherence between them. Regarding the consistency with international frameworks, the project is consistent with the direction of the Sendai Framework for Disaster Reduction 2015-2030, which was adopted at the Third World Conference on Disaster Reduction in 2015, which called for reduction of disaster risks and losses.[15]

[11] The Ex-ante Project Evaluation Paper p.2
[12] Questionnaire for and interview with BMKG
[13] Interviews with JICA experts of the above TC project and implementation consultant of this project. In addition, the record of discussions (R/D) of this project stipulates that the date the Japanese expert arrived in Indonesia was the project commencement date although the contract between JICA and the consultant started in 2020. Therefore, the commencement of this project was February 2022.
[14] Preparatory Survey Report p.3-2
[15] The Information collection and verification study for disaster management in Indonesia p.9 of Summary

From the planning stage to the post-evaluation stage, the project has been consistent with Indonesia's policy of strengthening disaster prevention and the development needs of the country, which is prone to earthquakes. There were no problems with the appropriateness of the project plan and approach. In addition, the project was consistent with Japan's ODA policy at the time of planning. Regarding internal consistency, although the project and the TC project were coordinated at the time of planning, the project started after the completion of the TC project due to the postponement of the TC project's start date. Therefore, the two projects were not linked. As for external consistency, no planned and coordinated linkage was found. On the other hand, the project is consistent with the direction of the "Sendai Framework for Disaster Reduction 2015-2030." Therefore, its relevance and coherence are high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

A) Japanese Side

1) Civil Works and Equipment Procurement

Table 2 shows the planned and actual outputs.[16] The project outputs were implemented as planned, and additional outputs were achieved using the remaining funds. Package 3 (actual amount: 35,077 thousand yen) and Package 4,[17] "Installation of IT seismic intensity meter and guidance on operation and maintenance" (actual amount: 59,985 thousand yen), are additional outputs using the remaining funds. The former is an additional procurement of equipment for BMKG and does not include installation. The latter is the installation of 198 IT seismic intensity meters[18] procured under Package 2, selecting appropriate sites, installing the equipment as well as providing guidance on installation, operation, and maintenance (no procurement). Initially, the equipment provision included only procurement, but as it was expected that it would take time to install the IT seismic intensity meter due to the delay in securing the budget for BMKG, it was proposed that the Japanese side install the IT seismic intensity meter in light of the importance and urgency of expanding the observation network.

[16] The procurement for this project was done through a procurement agent. Therefore, the planned amount is the amount indicated in the Detailed Design Survey.
[17] The formal name is "IT seismic intensity meter installation and guidance for operation and maintenance." However, to avoid confusion, "Package 4" denotes the above component in this report.
[18] Two sets of the 200 sets in total were excluded as they were installed at BMKG headquarters.

Table 2: Planned and Actual Civil Works and Equipment Procurement

Package	Name	Name of the Organization	Equipment	Plan	Actual	Changes from D/D
1	Real-time earthquake observation system	LIPI	Strong-motion seismograph	10 sets	10 sets	None
			PS logging equipment	1 set	1 set	
			Array microtremor measurement equipment	4 sets	4 sets	
2	Real-time earthquake observation system	BMKG	Broadband seismograph	20	20	Change of 13 sites (due to change of use policy by land owners and leaseholders) and the additional survey of the consultant (for survey of 23 sites outside BMKG's hands, where the land owners and leaseholders could not be contacted)
			Broadband strong-motion seismograph	20	20	
			Strong-motion seismograph	93	93	
			Equipment for BMKG headquarters	1	1	
			Civil works for constructing new stations	73	73	
			Solar power generation facilities	9	9	
			Satellite communication system	93	93	
			IT seismic intensity meter	200	200	
3	Real-time earthquake observation system	BMKG	Multichannel elastic wave exploration equipment	—	1 set	All of them are the changes from O/D or D/D because they were added with the use of the balance.
			Array microtremor measurement equipment	—		
			A. Array microtremor measurement equipment	—	8 sets	
			B. Wireless LAN unit	—	2 sets	
			C. Data analysis software	—	2 sets	
4	Installation of IT seismic intensity meter as well as guidance for operation and maintenance	BMKG	IT seismic intensity meter	—	198 sets	All of them are the changes from O/D or D/D because they were added with the use of the balance.
			Uninterruptible power-supply system	—	198 sets	

Source: Documents provided by JICA

Strong-motion seismograph

Source: Material from JICA

Broadband seismometer

Source: Material from JICA

Broadband strong-motion seismograph

Source: Material from JICA

2) Consulting services / software components

Table 3 shows the planned and actual consulting services. All were implemented as planned. The capacity building program (soft component) was not included in this project.

Table 3: Consulting Services

Plan	Actual
Preparation of bidding documents	same as on the left
Bidding and contract assistance	same as on the left
Supervision of equipment installation	same as on the left

Source: Documents provided by JICA

(B) Items borne by the Indonesian Side

The planned and actual results of the counterparts' contribution were as follows. It was implemented as planned except for the installation of eight strong-motion seismographs of the equipment provided to LIPI.

Table 4 Items Borne by the Indonesian Side

Plan	Actual
1. Conclusion of electricity contract for operation of the equipment (for BMKG package)	Implemented as planned.
2. Budgetary allocation for data communication (for BMKG package)	- ditto -
3. Establishment of operation and maintenance system of earthquake observation systems (for BMKG package)	- ditto -
4. Establishment of operation and maintenance system of earthquake observation systems (for LIPI package)	Two of the ten strong-motion seismographs were installed at BRIN, and the remaining eight and other equipment are stored at BRIN's warehouse. These eight sets were supposed to be installed in universities (Padang State University in West Sumatra Province, Syiah Kuala University in Aceh Province, etc.), but this did not happen because the budget for installation could not be secured in 2019 and the government budget for 2020-2022 was restructured due to the COVID-19 pandemic.[19] At the time of ex-post evaluation, the maintenance and management system at BRIN was in place, but the future will be described in the Sustainability section.
5. Proper operation and maintenance after handing over (for both BMKG and LIPI packages)	Regarding BRIN, it has been partially unimplemented with the same reasons mentioned in 4 above. Regarding BMKG, it was implemented as planned.

Source: Preparatory Survey Report p3-2, BMKG Questionnaire

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost was 1,500 million yen for the Japanese side and within the plan as the planned cost was 1,500 million.[20] As aforementioned, the residual funds were also used. The total cost of equipment procurement and of Package 4,[21] which was included in the actual input, was 1,224 million yen, broken down by package as follows. Whereas the equipment provided to BMKG under Package 2 accounted for 88% of the total equipment, the equipment provided for LIPI accounted for only 4%, a small proportion. The cost of consulting services, including Package 4, totaled 239 million yen.[22]

[19] Questionnaire for and interview with BRIN
[20] The procurement for this project was done through a procurement agent. Therefore, the planned amount is the amount mentioned in the E/N, and the actual amount is the contract amount.
[21] As aforementioned, Package 4 did not include equipment procurement but only equipment installation and guidance for operation and maintenance. Although Table 5 includes Package 4 for the purpose of comparing the cost of the packages, the cost of Package 4 is part of the consulting services cost in terms of financial management.
[22] The amount includes the cost of Package 4, i.e., 56 million yen, as Table 5 shows.

Table 5: Actual Cost of Each Package for Equipment

Package	Organization	Actual Amount (million yen)	Ratio (%)
1	LIPI	55	4
2	BMKG	1,084	88
3	BMKG	29	2
4	BMKG	56	4
Total		1,224	98

Source: Documents provided by JICA
Note 1: Percentages do not add up to 100% due to rounding to the nearest million yen, but the actual figure is 100%.
Note 2: From the financial aspect, Package 4 is part of the consulting service fee.

This project had residual funds of approximately 270 million yen from the beginning. The major reasons are as follows: 1) This project was an emergency comprehensive grant aid project using the third supplementary budget after the Great East Japan Earthquake, and the contents and structure of the main equipment and the grant amount had already been decided at the time of basic design. 2) The cost estimate of installation work based on JICA standards may not have been appropriate for the actual situation (lower than the actual). (The cost of managing 100 construction sites over 5,000 km from east to west (personnel costs for managers, airfare, accommodation, etc.) should have been added to the actual construction cost per site, but JICA's cost estimation rules do not allow for such an increase). 3) At the bidding stage, the successful bidder won the contract at 86% of the consultant's cost estimate due to corporate efforts.[23]

3.2.2.2 Project Period

The project duration in the original plan was 24 months.[24] During the implementation stage, the project was extended twice. Of these extensions, the one for the implementation of Package 4 using the residual funds (5 months, from February 2019 to mid-July 2019) is considered an addition to the scope because it was beyond the original plan's scope and agreed on through an appropriate process. Therefore, with the addition of the above extension period, the planned period is 29 months.

The actual project period lasted from November 2013 to July 2019 (69 months).[25] Table 6 shows the breakdown.

[23] Information collected through email from the consultant
[24] Because of the procurement agency method, the count is taken from the month the GA is signed. In addition, completion is defined as completion of construction.
[25] Because this project is a procurement agency method and materials and equipment are added in Package 3, it is a "case that the planned quantity (output) is being modified." For this reason, the period of project implementation with the residual funds is included in the actual results.

Table 6: Planned and Actual Project Period

	Plan (2012)	Actual (2023)
Conclusion of Grant Agreement (G/A)	November 2013	November 2013
Detailed Design	No description on the Ex-ante Evaluation Sheet or implementing schedule	August 2015 – March 2016 (8 months)
Bidding	August 2015 – July 2016 (12 months)	September 2016 – December 2016 (4 months)
Equipment Procurement and Civil Works	August 2016 – July 2017 (12 months)	May 2017 – July 2019 (27 months)
Extension for Package 4	Mid-November 2018 – Mid-April 2019 (5 months)	Mid-February 2019 – Late July (5 months)
Completion	July 2017	July 2019
Total	29 months	69 months

Source: Document provided by JICA for the planned bidding period, equipment procurement, and construction period at the time of the ex-ante evaluation. The number of months at the time of planning is based on the Ex-ante Project Evaluation Sheet and the actual results at the time of ex-post evaluation on documents provided by JICA.

The project period was 237% of the plan and therefore significantly exceeded the plan. "The real-time earthquake observation system equipment (Package 3)" was provided, and "installation of IT Seismic intensity meter and guidance of operation and maintenance" were conducted additionally using the residual funds (both completed in July 2019). Delays in concluding G/A and Banking Arrangement due to procedural delays on the Indonesian side, contract negotiations with the procurer of Package 2, additional software, and extension of the procurement and installation period due to changes in satellite communication companies, etc., led to project delays.[26]

As aforementioned, the project outputs were mostly achieved as planned, and additional components were implemented with the residual funds. The items to be borne by the Indonesian side were implemented as planned, with the exception of the non-installation of some of the equipment provided to LIPI. On the other hand, the project cost was 100% of the plan, but the project period was 237% of the plan. Therefore, efficiency of the project is moderately low.

3.3 Effectiveness and Impacts[27] (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation and Effect Indicators)

Table 7 shows the actual values of the operation and effect indicators for quantitative effects

[26] Questionnaire for the consultant
[27] When providing the sub-rating, Effectiveness and Impacts are to be considered together.

set at the time of planning.

Table 7: Operation and Effect Indicators

	Basic value (2014)	Target value (2022) 3 years after completion	Actual value		
			2020	2021	2022
1. Time required to determine the earthquake source of large-scale earthquakes (minutes)	5	3	2	2	2
2. Time required to announce tsunami warning publicly (minutes)	5	3	4.1	4.7	3.8
3. Time required to prepare seismic intensity maps (minutes)	7	5	4.1	4.7	3.8
4. Time required to announce isoseismal map publicly (modified to ShakeMap) (minutes)	60	30	30	30	30
5. Collection rate of observed seismic data (%)	70	90	**90.2**	**88.5**	**90.5**
IT seismic intensity meter			99.5	96.5	100
Strong-motion seismograph			73.2	83.9	88.2
Broadband seismometer			93.8	87.2	87.9
Broadband strong-motion seismograph			94.5	86.7	85.9

Source: Ex-ante Evaluation Sheet P4, questionnaire for and interview with BMKG

Note 1: At the time of planning, Indicator 3 was described as "to be announced through BNPB," but at the time of ex-post evaluation, BMKG uploaded to its website.

Note 2: Indicator 4 is uploaded to BMKG's website.

Note 3: According to an interview with BMKG, Indicator 4 has been changed to ShakeMap because it is now technically possible to create a ShakeMap.

Among the five indicators, the time required to determine the source of a large-scale earthquake (indicator 1), and to prepare for seismic intensity maps (indicator 3) were achieved, exceeding the target value. And the time to announce isoseismic intensity maps publicly (indicator 4) (as it became technically possible to create ShakeMaps, these were changed to ShakeMaps) were achieved. The collection rate of seismic observation data (Indicator 5) was also mostly achieved. However, the broadband strong-motion seismographs[28] were not utilized for the analysis of seismic observations although the observation data were received. Although the broadband strong-motion seismographs[29] were located at the same stations as the broadband

[28] The broadband strong-motion seismograph is a seismometer that has strong-motion and broadband strong-motion seismometer functions and is a technology unique to Japan (interview with expert from Indonesia (TC project), "Project to Improve Earthquake and Tsunami Observation and Information Dissemination Capacity"). A strong-motion seismograph is a seismometer that can record strong tremors caused by earthquakes of large magnitude without shaking.
URL: https://www.jishin.go.jp/main/pamphlet/wakaru_shiryo2/wakaru_shiryo2_5.pdf (accessed July 28, 2023).

[29] Broadband seismometers can record ground shaking over a wide range of frequencies, from very slow to fast vibrations. The observation network of broadband seismometers can help comprehend the mechanism of fault

seismographs, only one of them could be recognized at a time due to software limitations, and the broadband seismographs were given priority.[30]

On the other hand, the time to issue a tsunami warning (Indicator 2) was not achieved. It is necessary to collect more necessary data and carefully analyze them for issuing accurate warnings because tsunami analysis requires more data and modeling than that of earthquakes, and Indonesia does not have seismic observation equipment installed in the ocean, unlike Japan. This is also recognized as one of the reasons for the failure.[31] At the time of ex-post evaluation, BMKG's standard operating procedures (SOPs) stipulate a tsunami warning should be issued within 4 minutes, so BMKG's internal standard had been achieved by 2022.

Based on the above, it is believed that the operational and effectiveness indicators for quantitative effects have been mostly achieved. However, it is an issue that the data from the broadband seismograph was not actually utilized.

3.3.1.2 Qualitative Effects (Other Effects)

Table 8 shows the actual status[32] of the qualitative effects at the time of ex-post evaluation, which were assumed at the time of planning.[33] The improvement of the capacities for disaster initial and emergency responses and restoration is analyzed in the Impact section

Of the five indicators, earthquake observation accuracy (Indicator 1) and early damage estimation (Indicator 2) are believed to have been achieved. Calculation accuracy of magnitude estimation (indicator 3) and data accumulation and research (indicator 4) has been high since the time of planning to the time of ex-post evaluation, and no significant changes were observed. On the other hand, although some contributions to BRIN's research on ground characteristics (Indicator 5) were observed, the level of contribution has not reached the expected level because some of the equipment has not been utilized. However, when we look at the breakdown of equipment cost, the equipment provided to BRIN accounts for only about 4% of the total equipment cost.

movement for earthquakes of magnitude 3 or greater and the progress of fault rupture in the epicenter region.
URL: https://www.jishin.go.jp/main/pamphlet/wakaru_shiryo2/wakaru_shiryo2_5.pdf (accessed on July 28, 2023).
[30] Interview with BMKG
[31] Interview with and information through email from BMKG
[32] It was explained that these effects did not occur due to the project alone but also due to the BMKG's budgetary measures and capacity (questionnaire for and interview with BMKG).
[33] The Ex-ante Project Evaluation Paper p.4

Table 8: Qualitative Effects

No.	Qualitative Effect	Actual status
1	The accuracy of the analysis of earthquakes and observations is improved.	The accuracy of seismic observation has improved (on a 5-point scale, the accuracy was 4 at the time of project completion and ex-post evaluation and 3 at the time of planning, showing an improvement). The high accuracy of the provided equipment, such as seismic intensity meters and strong-motion seismographs, contributed to this improvement.
2	Rough damage estimations are possible at an early stage.	Rough damage estimations have improved; on a 5-point scale, they were rated a 2 at the time of planning, 3 at project completion, and 4 at ex-post evaluation. At the time of planning, it was done manually, but since being automated in 2017, it has gradually improved.
3	The accuracy of the earthquake source and magnitude calculation is enhanced.	No significant change has arisen in the accuracy of the calculation of the epicenter and magnitude estimates, which BMKG rates a 4 on a 5-point scale for planning, completion, and post-evaluation.
4	The data is collected and accumulated for review and analysis for introducing the early warning system in the future.	BMKG recognizes that no major changes or problems have arisen in data accumulation and research since the time of planning and that it was rated a 4 on a 5-point scale at the time of the planning and at the time of the ex-post evaluation.
5	The project contributes to estimation of ground strength, understanding of ground characterization, acquisition of seismic waves and seismic waveforms, and comprehension of seismic characterization in the research conducted by LIPI.	Regarding the equipment provided to BRIN, as mentioned regarding the efficiency of the items to be borne by the Indonesian side, 8 of the 10 strong-motion seismographs have not been installed. Therefore, the effect of acquiring seismic waves and seismic waveforms and understanding seismic characteristics has not emerged. On the other hand, PS loggers and microtremor array probes began to be utilized in 2019 in a study on liquefaction in Central Sulawesi (Palu and Sigi) and has been utilized in 2023. Because the study is intended to comprehend geotechnical characteristics, they have contributed to the estimation of ground strength and the understanding of geotechnical properties.

Sources: The ex-ante Evaluation Sheet, BMKG questionnaire and interview, BRIN questionnaire and interview

Based on the above, the expected qualitative effects have emerged.

3.3.2 Impacts

3.3.2.1 Intended Impacts

At the time of planning, there was no intended impact assumed by the project. However, the "improvement of capacities for disaster initial and emergency responses, and restoration through the sharing of more accurate earthquake information with BNPB and other disaster management agencies" that was assumed as one of the qualitative effects of effectiveness is analyzed as an assumed impact because it is expected to be realized as a result of improved earthquake and tsunami analysis capacities.

The seismic information from BMKG is shared with BNPB and other government agencies

related to disaster management through the Indonesia Tsunami Early Warning System (Ina-TEWS) software. However, the expected impact has not been achieved because the linkage between the improved accuracy of BMKG earthquake information and the improved capacities of government agencies related to disaster management for disaster initial and emergency responses and restoration has not been confirmed. Actual warnings for residents are issued by the provincial, district, and regency levels of Regional Disaster Management Agency (BPBD) based on earthquake information the BMKG provides, but there are large differences in capacity among municipalities, and there is no data showing nationwide trends.[34] In addition to the BPBD, other government bodies, such as the military and police, that are involved in evacuation, etc., also play an important role in initial and emergency responses. Therefore, it is logically difficult to expect to improve capacities for initial and emergency responses and restoration after earthquakes and tsunamis only by improving the accuracy of seismic information. This may be attributed to the fact that external conditions beyond the implementing agencies' control were too large and the level of impact set at the time of planning was too high.

3.3.2.2 Other Positive and Negative Impacts

1) Impacts on the Environment

No negative environmental impacts were found. Because the construction zone of the seismic station building was very small, no environmental assessment was required in this regard.[35]

2) Resettlement and Land Acquisition

No land acquisition or resettlement occurred during the implementation of this project.[36]

3) Gender Equality

4) Marginalized People

5) Social Systems and Norms, Human Well-being, and Human Rights

No positive or negative impact was observed as to 3) to 5).[37]

6) Unintended Positive / Negative Impacts

The improvement of the accuracy of Ina-TEWS observation data through the equipment provided by this project directly affected the improvement of the accuracy of data from the UNESCO-led IOTWS, which utilizes Ina-TEWS data.[38] In addition, some of the equipment provided to BRIN was used for undergraduate thesis guidance.[39] No negative impact was observed. Therefore, a positive impact was observed as the other impact.

The operation and effect indicators of quantitative effects as well as indicators of qualitative

[34] Interview with BNPB
[35] Questionnaire for and interview with BMKG
[36] Questionnaire for BMKG
[37] Questionnaire for BMKG
[38] Questionnaire for BMKG
[39] Interview with BRIN

effects for effectiveness were mostly achieved. The project's expected impact cannot be said to have been achieved because no linkage was confirmed between the improved accuracy of BMKG's earthquake information and the status of improved capacities of the government agencies related to disaster management for disaster initial and emergency responses and restoration. On the other hand, no negative impact was observed, and some positive impacts, such as improvement of IOTWS data accuracy, were observed. Therefore, the impact is mostly achieved.

In conclusion, this project has mostly achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

The project has been highly consistent with Indonesian policies since the time of planning to the time of ex-post evaluation, as stated in the Relevance section. In particular, at the time of the ex-post evaluation, *the National Disaster Management Plan 2020-2024* calls for further strengthening of earthquake information systems and tsunami early warning, and *the RPJMN 2020-2024* calls for "strengthening the environment and improving resilience against natural disaster and climate change." In Indonesia, where large-scale earthquakes occur frequently, the importance of earthquake and tsunami observation in policy is unlikely to change in the future, considering the policy direction regarding the strengthening of disaster prevention up to the time of ex-post evaluation.

3.4.2 Institutional/Organizational Aspect

The functions and positioning of BMKG have not changed since the time of planning. The number of staff in the two departments related to this project at BMKG; Earthquake and Tsunami Department (PGT) and Seismology, Potential Geophysics and Time Signal Department (PSGT) increased from 95 in 2014 to 147 in 2022. As for the maintenance and management system at BMKG, seismic intensity meters are maintained by BMKG staff and strong-motion seismograph are maintained by an external contractor. The number of maintenance and management personnel was sufficient from 2019 to 2021, with five PSGT staff and a local contractor, but more technical staff is expected to be needed in the future. Therefore, BMKG plans to increase the number of staff and aims for digitalization and automated monitoring.[40]

Meanwhile, LIPI was merged into BRIN due to governmental restructuring. The Research Center for Geological Disaster of BRIN in Bandung has operated and maintained the equipment provided to LIPI since its merger. There was one maintenance personnel from 2019 to 2021 and two in 2022. However, in January 2023, the Directorate General of Infrastructure, Research, and

[40] Questionnaire for BMKG

Innovation, which is responsible for the operation and maintenance of all BRIN equipment, indicated that the equipment in Bandung, including the equipment provided under this project, may be centrally managed at BRIN's facility in Serpong, Banten Province. If this policy is implemented, researchers will need to apply for the use of the equipment each time they want to use it, and they will need to cover their transportation expenses. In addition, at the time of the ex-post evaluation, the responsible department at Serpong had no personnel familiar with the operation and maintenance of the equipment in question.[41] Therefore, concerns arose about the future operation and maintenance of the equipment. As a result of internal discussions in BRIN in February 2023, it was decided that BRIN in Bandung would manage the equipment provided under the project for the time being.[42] According to the BRIN in Serpong, the handling of the equipment is still under discussion.[43] As background for this issue, BRIN, which was formed through the merger of a number of government research institutes, had many overlapping research equipment and facilities, so it has been reorganizing its research facilities and equipment to ensure efficient operation and maintenance of the facilities and equipment as well as equal access to the facilities and equipment for all researchers. By consolidating research facilities and equipment into multiple locations based on similarities and hiring new undergraduate graduates to maintain and operate them, BRIN aims to create a system in which researchers can concentrate on their research. However, for special equipment that requires advanced handling, the operation, maintenance, and management of the equipment will be assigned to researchers in specialized fields. At the time of the ex-post evaluation, it has not been determined into which category the procured equipment will be classified.[44]

Therefore, there is no problem with BMKG, which is this project's main target. Regarding BRIN, there is no problem at the time of ex-post evaluation, but it is necessary to monitor the transition of the maintenance management system in the future.

3.4.3 Technical Aspect

Regarding the operation and necessary maintenance skills for the procured equipment, there is no problem for BMKG.[45] BRIN has no problem at the time of ex-post evaluation, but if the equipment is transferred to Serpong as per the abovementioned policy of centralized management of all equipment and if the equipment is not recognized as special equipment that requires advanced handling, concerns will arise about the maintenance and management technology. The assignment of personnel with sufficient skills is necessary to ensure sustainability.

The unification of communication methods for BMKG that was envisioned at the time of

[41] Interview with Research Center for Geological Disaster, BRIN
[42] Reply by email from BRIN (Bandung) in April 2023
[43] Interview with BRIN (Serpong)
[44] Interview with BRIN (Serpong)
[45] Questionnaire for BMKG

planning did not take place as envisioned; problems occurred with VSAT[46] satellites, and after considering its cost performance and other considerations, the switch to GSM[47] began in 2021 (23 sites in 2021, 18 sites in 2022 were already switched. 31 sites will be switched in 2023). VSAT is more stable and powerful than GSM, but GSM is superior in terms of budget, and BMKG expects the quality of GSM to improve in the future.[48]

3.4.4 Financial Aspect

Table 9 shows the actual expenditures for the BMKG. Comparison of actual expenditures in 2013, the year of commencement, and the year of completion (2019) reveals a significant increase in the year of completion. Although fluctuations occurred in expenditures after the project was completed, the level of expenditures has remained almost the same as in the year of completion, with the exception of 2020, and no problems have been observed.

Table 9: Budget Status of BMKG

(Unit: Million Indonesian Rupiah)

	2013 (Commencement year)	2019 (Completion year)	2020	2021	2022
Expenditure	1,434,225	2,408,284	2,076,802	2,462,938	2,398,121

Source: BMKG

Tables 10 and 11 show the budget status of the responsible departments in LIPI and BRIN.

Table 10: Budget Status of LIPI (Before the Start of the Project)

(Unit: Million Indonesian Rupiah)

	2010	2011	2012
Total Budget of LIPI	512,629	771,005	769,276
(of which) Research Center for Geotechnology	17,390	18,535	24,672

Source: Preparatory Survey Report p2-10

[46] VSAT stands for "very small aperture terminal," a nano-satellite communications Earth station with a 2-meter-class antenna or smaller, generally used for corporate communications and anti-disaster applications because VSAT is always operated under the control and monitoring of an Earth station, It can be easily deployed without the need for radio personnel (Source: https://www.soumu.go.jp/main_sosiki/joho_tsusin/policyreports/joho_tsusin/idou_eisei/pdf/081226_1_si1-3-1.pdf) (accessed on July 28, 2023).

[47] GSM stands for Global System for Mobile communications and is a type of digital communication system used in cell phones. It is used in Europe, North America, Asia, Africa, and other regions (source: https://kotobank.jp/word/GSM-3865 accessed on July 28, 2023).

[48] Interview with BMKG

Table 11: Budget Status of BRIN (After Project Completion)

(Unit: Million Indonesian Rupiah)

	2020	2021	2022
Research Center for Geological Disaster	N/A	N/A	5,000

Source: Research Center for Geological Disaster, BRIN

The budget of the Research Center for Geotechnology, LIPI, before the project implementation was on the rise. Comparing this budget with that of the Research Center for Geological Disaster, BRIN at the time of the ex-post evaluation, the budget at the time of ex-post evaluation has decreased significantly because the assumption that the research and maintenance budgets are annually allocated is no longer valid due to a change in government policy, and if research expenses including equipment maintenance cost requested in the proposal are obtained on a competitive basis internally and externally by, the maintenance budget can be secured during the implementation of the relevant research. Although data on the budget for the Research Center for Geological Disaster for 2020 and 2021 were not available, BRIN's internal research budget of Rp. 5,000 million was obtained on a competitive basis in FY2022.[49] Although it cannot be necessarily said that there is a serious budgetary problem at the time of ex-post evaluation, it is necessary to monitor future trends in the maintenance budget and research expenditures. However, as aforementioned, equipment for BRIN accounts for only about 4% of the total equipment cost, which is a small percentage of the total equipment provided.

3.4.5 Environmental and Social Aspect

As stated in the Impact section, the project is considered to have minimal undesirable impact on the environment and was judged as Category C in *the JICA Guidelines for Environmental and Social Considerations (2010)*. Because the project involves the provision of seismic-observation equipment, no negative impact on the natural environment was observed during the project implementation or at the time of ex-post evaluation,[50] and such an impact is unlikely to occur in the future.

3.4.6 Preventative Measures to Risks

As mentioned in the Relevance section, based on the lessons learned from similar projects in the past, it was intended to mitigate the risk of reduced project effects due to lack of operation and maintenance by implementing a TC project ("Project to Improve Earthquake and Tsunami Observation and Information Transmission Capability") to maintain the equipment provided and strengthen the Ina-TEWS.[51] However, as mentioned in the Coherence section, it is expected to

[49] Interview with BRIN
[50] Interview with BMKG and BRIN
[51] The Ex-ante Project Evaluation Paper p.3

take more time to realize the project's benefits fully because the start of the TC project was delayed due to BMKG's response to the Palu earthquake and the COVID-19 disaster.[52]

3.4.7 Status of Operation and Maintenance

At the time of ex-post evaluation, most of the equipment provided to BMKG was being maintained and managed extremely well. However, the software provided to the BMKG headquarters was not user friendly due to its complexity and inability to improve the system (it was not an open system), but this problem was solved by integrating it into the national system.[53] As for the satellite communication system, there was a problem with VSAT in the past, but the system has been gradually shifted to GSM, and it has been improved. The observation stations are expected to be maintained according to Indonesian standards in the future from a budgetary perspective.[54] As mentioned in the Effectiveness section, although the broadband strong-motion seismograph data was received, it was not utilized in the analysis of seismic observations at the time of the post-evaluation. On the other hand, in the activities of the ongoing "Project to Improve Earthquake/Tsunami Observation and Information Dissemination Capability" (the TC project), there is a discussion that "the strong-motion seismic data should be more utilized to improve the accuracy of magnitude calculation," and the use of strong-motion seismometers and broadband strong-motion seismometers[55] has been reviewed. Therefore, they may be used for analysis in the future; thus, the operation and maintenance status of BMKG at the time of ex-post evaluation is generally good.

As for the operation and maintenance of equipment by BRIN, two of ten strong-motion seismographs have been installed and are in operation, but the remaining eight are not being utilized at the time of ex-post evaluation. The expected installation at distant universities and local governments was abandoned due to budget problems. The installation is scheduled to take place in 2023 (two sets in August and six sets in December) in the vicinity of Bandung and other locations, while the budget is already secured. The installation will be done using telemetry equipment with the secured budget, so it will be unnecessary to pay for transportation to use the strong-motion seismographs installed in remote locations. All equipment other than the strong-motion seismograph is portable and brought to the survey site, so it is usually stored in BRIN's storage facility and used as needed.[56] However, as aforementioned, the equipment still may be moved to BRIN in Serpong, and it is necessary to monitor the situation in the future.

Based on the above, slight issues have been observed in the institutional/organizational,

[52] Interview with Expert of the TC project mentioned above
[53] Interview with BMKG
[54] Interview with BMKG
[55] Interview with Expert of the aforementioned TC project
[56] Questionnaire for and interview with BRIN

technical, and financial aspects. However, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high.

Installed IT seismic intensity meter
(Source: photo taken by the evaluator)

PS logging equipment
(Source: photo taken by the evaluator)

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to enhance the capacity for earthquake and tsunami analysis and to improve the accuracy of seismic source and seismic intensity analysis by providing seismic observation equipment to the BMKG and LIPI (which was merged into the BRIN of Indonesia), which are the Indonesian seismic observation agency and research institution, respectively, thereby contributing to the enhancement of the country's disaster prevention capacity. This project, which is intended to strengthen the capacity for earthquake and tsunami analysis, is highly consistent with Indonesia's policy and development needs and aligned with Japan's ODA policy at the time of planning. Although the project and a TC project were intended to be linked at the time of planning, the commencement of the TC project was delayed until after the completion of this project due to the Palu earthquake and the COVID-19 pandemic. Therefore, there was no linkage between the two projects. Although there was no planned and coordinated linkage with the projects supported by other aid agencies, the project is consistent with the direction of the Sendai Framework for Disaster Reduction 2015-2030. Therefore, the project's relevance and coherence are high. The project outputs were mostly achieved as planned, and additional components were implemented with the residual funds. Although the project cost was within the plan, the project period significantly exceeded the plan. Therefore, the project's efficiency is moderately low. The quantitative and qualitative effects of the project objective, i.e., the enhancement of capacity for earthquake and tsunami analysis, were mostly achieved. Although the project did not achieve the expected impact of improving the capacities of government agencies related to disaster prevention for initial and emergency responses and restoration, some positive impacts emerged, such as enhancement of the accuracy of the UNESCO-led IOTWS, and utilization of some of the equipment provided to BRIN for undergraduate students' thesis

guidance. Therefore, effectiveness and impacts of the project are high. Slight issues have been observed in the institutional/organizational, technical, financial aspects. However, there are good prospects for improvement/resolution. Therefore, sustainability of the project effects is high. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Due to the restructuring and the COVID-19 pandemic, eight strong-motion seismographs out of the equipment provided to LIPI under the project have not been installed at the time of the ex-post evaluation. It is recommended that BRIN, which merged LIPI, install the above eight strong-motion seismographs by the end of 2023, properly operate and maintain the equipment under appropriate personnel, and properly operate and maintain other equipment provided under this project.

4.2.2 Recommendations to JICA

(1) The JICA Indonesia Office and JICA Global Environment Department are hoped to monitor the progress of the "Project for Capacity Enhancement of Earthquake and Tsunami Observation and Information Dissemination," taking also into account the point of view to enhance this project's sustainability and to provide support as necessary.

(2) The JICA Indonesia Office should monitor the installation of the remaining equipment by BRIN and the maintenance of the equipment by BRIN and BMKG and provide advice as necessary.

4.3 Lessons Learned

<u>Setting Impact and Authority of Implementing Agencies for Equipment Provision Projects</u>

This project is a grant aid project to provide earthquake observation equipment. The expected impact of this project was to contribute to the improvement of the partner country's disaster management capacity, specifically to "improve the capacities for initial and emergency responses and restoration" by sharing more accurate earthquake information with disaster management-related organizations. On the other hand, the counterpart implementing agency is an agency that collects, analyzes, and shares earthquake observation data with related agencies (BMKG) and conducts research (LIPI). Although many government agencies, including BNBP and other ministries, local governments, police, and the military, play an important role in the disaster initial and emergency responses and restoration, they are not included in the mandate of the implementing agency for this project. The implementing agencies have no room to influence how disaster management-related agencies will respond after receiving the analysis and dissemination of earthquake information. In other words, the expected impact of the provision of equipment is

largely dependent on factors over which the project and implementing agencies have no control because the level of the overall goal set at the time of planning was too high. Furthermore, no information was available to determine nationwide trends in the disaster initial and emergency responses of local governments, which are responsible for notifying residents of disasters, making it difficult to verify the improvement of these capacities.

When setting the level of impact for equipment provision projects, it is important to consider the roles of the implementing agency, other government agencies, and local governments as well as the degree of influence of social factors other than equipment provision before setting the appropriate level. In addition, it is important to set it after confirming verifiability of achievement level.

5. Non-Score Criteria

5.1 Performance

5.1.1 Objective Perspective

BMKG and LIPI received the right support from the consultant and the JICA Indonesia office.[57]

5.2 Additionality

None.

(End)

[57] Questionnaires for BMKG and BRIN