

Republic of Paraguay

FY2022 Ex-post-Evaluation Report of Japanese ODA Loan Project

"Rural Roads Improvement Project"

External Evaluator: Hajime Sonoda, Global Group 21 Japan, Inc.

## **0. Summary**

"Rural Roads Improvement Project" (hereinafter referred to as "the Project") was implemented to build a road network in the eastern region of Paraguay by paving unpaved rural roads with gravel / rubble and replacing aged wooden bridges, thereby contributing to the economic revitalization of the country and the improvement of the living environment for local residents. The Project was consistent with Paraguay's development plans and needs at both the time of planning and ex-post evaluation, and with Japan's ODA policy at the time of planning. As active coordination and collaboration with other donors were also observed, the Project's relevance and consistency are high. The output was less than planned, and the project cost and project period were larger than planned, thus the efficiency of the Project is low. All the target roads are now open to vehicular traffic year-round, and the hazards posed by the aging wooden bridges have been eliminated. Since the Project also realized an increase in traffic volume, a decrease in travel time, and a decrease in travel costs, it is judged that the objectives of the Project were achieved. After the implementation of the Project, many residents along the road began to use vehicles to travel, and it was observed that the travel time to the town was significantly reduced, and the frequency of visits to medical institutions and shipments of agricultural products increased. Therefore, it is considered that the road improvement by the Project has led to improvements in various aspects of their lives, and for some residents, it has also led to an increase in their income. Based on the above, the effectiveness and impact of the Project are high. There are no particular policy, institutional, or technical issues regarding the sustainability of the Project. The operation and maintenance conditions of roads and bridges of the Project are generally good. However, due to financial constraints, the road maintenance directly managed by the Paraguayan Ministry of Public Works and Communication (hereinafter referred to as "MOPC") is not sufficient, and a clear direction for financing road maintenance in collaboration with local governments has not been decided. Therefore, the sustainability of the Project is moderately low. Based on the above, the Project is evaluated to be partially satisfactory.

## 1. Project Description



Project Location



Gravel paved rural road<sup>1</sup>

### 1.1 Background

In 2010, nearly 90% of the 60,000 km of roads in the Republic of Paraguay (hereinafter referred to as "Paraguay") were unpaved, and the paved road length per 1,000 population was only 0.8 km in Paraguay, compared to 3 km in Argentina and 4 km in Uruguay. Unpaved roads were often cut off by rainfall, making them impassable to vehicles and limiting the shipment of agricultural products for local consumption and even for exports, which had a major impact on the local economy. In addition, local residents' access to schools, hospitals, and other facilities was also suspended during rainfall, which interfered with their daily lives. On the other hand, many of the bridges on rural roads were wooden bridges that were more than 40 years old, and safety was a major problem due to accidents involving collapsed bridges caused by decay from aging.

MOPC, which is responsible for road construction and maintenance, has been promoting road maintenance with financial support from the Inter-American Development Bank (IDB) and others. For rural roads, the First Rural Road Improvement Program (PNCR-1) and the Second Rural Improvement Program - Phase I (PNCR-2 Phase I) have been implemented since 1993. The Project is a part of the succeeding Second Rural Road Improvement Program - Phase II, and the loan agreement was signed in September 2010 as a co-financing project with the Inter-American Development Bank (IDB) and the OPEC Fund for International Development (OFID).

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<sup>1</sup> All photographs in this report were taken by the external evaluator during the site visit.

## 1.2 Project Outline

To build a road network in the eastern region of Paraguay by paving unpaved rural roads with gravel / rubble and replacing aged wooden bridges, thereby contributing to the economic revitalization of the country and the improvement of the living environment for local residents.<sup>2</sup>

Loan Approved Amount/ Disbursed Amount	4,822 million / 4,549 million
Exchange of Notes Date/ Loan Agreement Signing Date	June 2010/ September 2010
Terms and Conditions	Interest Rates: 0.8% (0.01% for consultants) Repayment: 20 years (Grace period: 6 years) Conditions for Procurement: General untied
Borrower / Executing Agency	Republic of Paraguay / Ministry of Public Works and Communications (MOPC)
Project Completion	June 2020 (outputs covered by ODA loans)
Target Area	Eastern Paraguay (Misiones, Paraguairí, Guairá)
Main Contractor (Over 1 billion yen)	Compania de Construcciones Civil (Paraguay) / Vialtec S.A (Paraguay) / Empresa Constructora Bauman S.A (Paraguay) (JV)
Main Consultant (Over 100 million yen)	Latin America Koei Corporation (Japan) / Nippon Koei Co.
Related Studies (Feasibility Studies, etc.)	SAPI (Special Assistance for Project Implementation, JICA)
Related Projects	"National Rural Roads Program Stage 2" IDB / OFID, The World Bank's project to improve trunk and local roads in the three eastern provinces

<sup>2</sup> In the ex-ante evaluation sheet of the Project, it was stated as part of the project objectives that the project would "strengthen the organization and improve the maintenance and management system for road maintenance and management in local governments." The same was implemented under the IDB project, a co-financing project, but the Project did not have fund allocated for this purpose, nor was it planned in the consultant's scope of work. Therefore, the description in this ex-post evaluation is in line with what was actually planned for the Project.



Fig. 1 Departments covered by the co-financing projects

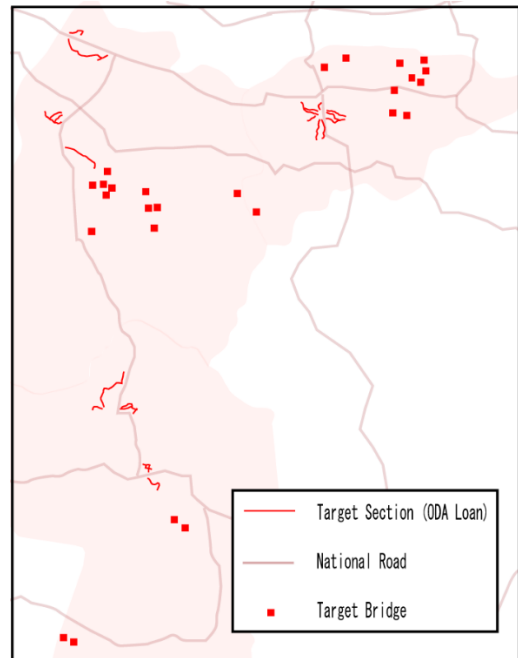


Fig. 2 Road sections and bridges covered by the ODA loan

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

### 2.2 Duration of Evaluation Study

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

Duration of the Study: December 2022 - March 2024

Duration of the Field Study: March 30 - April 19 and June 7 - 10, 2023

## 3. Results of the Evaluation (Overall Rating: C<sup>3</sup>)

### 3.1 Relevance / Coherence (Rating: ③<sup>4</sup>)

#### 3.1.1 Relevance (Rating: ③)

##### 3.1.1.1 Consistency with the Development Plan of Paraguay

Paraguay's road sector development policy was defined based on the MOPC's 2008-2013 Five-Year Plan. The plan included: (i) establishment of a trunk road network, (ii) improvement of road conditions for local industrial and civilian use, and (iii) fundamental improvement of the road maintenance system. The Project falls under (ii) and (iii), and was positioned as an important project in the transportation sector.

<sup>3</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>4</sup> ④: Very High, ③: High, ②: Moderately Low, ①: Low

"The National Development Plan: Paraguay 2030" at the time of the ex-post evaluation identified three strategic axes: (i) poverty alleviation and social development, (ii) inclusive economic growth, and (iii) entry into the international community. The Project is considered important in relation to improving access to social services for poverty alleviation and social development, and internal and external connectivity for inclusive economic growth.

Based on the above, the Project is consistent with the development policy at the time of planning and post-evaluation.

### 3.1.1.2 Consistency with Development Needs of Paraguay

As mentioned above, at the time of appraisal of the Project, unpaved roads in Paraguay were cut off due to becoming muddy or flooded during rainy weather, which had a significant impact on the local economy and hindered the lives of local residents. In addition, the hazardous nature of aged wooden bridges was a problem.

According to the MOPC's Transportation Master Plan (revised in 2020) at the time of the ex-post evaluation<sup>5</sup>, as of June 2018, 6,939 km of Paraguay's total road network of 77,471 km were paved with asphalt or concrete, 2,407 km with rubble / gravel pavement which is same as the Project, and 88% of the total roads, or 68,125 km, were unpaved laterite roads. The Master Plan called for the improvement of unpaved roads to rubble / gravel pavement, as well as gradual improvement of the existing rubble / gravel roads to asphalt pavement. Since all the roads and bridges improved by the Project are fully utilized and leading to the Project's effectiveness (see Effectiveness and Impact section), their importance is considered to be maintained at the time of the ex-post evaluation.

Based on the above, the Project is consistent with Paraguay's needs at the time of planning and ex-post evaluation.

### 3.1.1.3 Appropriateness of the Project Plan and Approach

The following can be pointed out regarding the plan and approach of the Project. However, it cannot be said that these reduce the relevance of the Project.

- The project formation process was appropriate, as candidates for target roads were selected through a public participation process with objective selection criteria, and target roads were determined according to priority within the amount of funds available. However, the actual unit cost of constructing roads and bridges was much higher than assumed at the time of appraisal, and the Project was only able to build two-thirds of the planned road length (see Efficiency).

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<sup>5</sup> "ACTUALIZACIÓN DEL PLAN MAESTRO DE INFRAESTRUCTURA Y SERVICIOS DE TRANSPORTE DEL PARAGUAY 2018 - 2028"

- The issues related to the maintenance of roads and bridges of the Project have an unfavorable influence on sustainability (see Sustainability). At the time of appraisal, it was planned that, based on the results of maintenance through agreements with local governments to be tried in the IDB project, a similar system of maintenance would be implemented in the Project. However, in reality, there was no budget for such a system in the Project, and no such maintenance system was established. According to MOPC, the maintenance system established under the agreement with the local government for the IDB project ceased functioning once the project was terminated and financial resources were no longer available. Therefore, it cannot be said that the failure to implement this system in the Project had a significant impact on its sustainability.
- After the commencement of the Project, the detailed design and construction cost estimates for each bridge and road section revealed that the Project cost had increased significantly and that the proposed bridge and road segments could not be constructed entirely with the amount of the ODA loan agreement. Therefore, in November 2014, MOPC proposed to JICA that all bridges that urgently need to be cleared of hazards be included in the loan, while only about half of the road sections would be covered by the loan and the remaining sections would be constructed with other funds, to which JICA concurred. Subsequently, MOPC constructed a portion of the rural roads not covered by the ODA loan with funds from the Development Bank of Latin America and the Caribbean (CAF) and the FONPLATA Development Bank. The above arrangements were appropriate because the roads and bridges were constructed according to need and priority, within the limits of available funds.

### 3.1.2 Consistency (Rating:③)

#### 3.1.2.1 Consistency with Japan's ODA Policy

At the time of appraisal, based on the results of policy discussions with the Government of Paraguay, the Government of Japan had identified "poverty reduction," "sustainable economic development," and "governance" as three priority areas for assistance. Support for the road sector was considered extremely important in terms of both poverty reduction and sustainable economic development, and two of the six development issues identified under these priority areas of assistance, "improving the livelihoods of the poor" and "improving economic and social infrastructure," were consistent with the development of the road sector. Therefore, the Project is consistent with Japan's ODA policy at the time of planning.

#### 3.1.2.2 Internal Coherence

JICA has been supporting Paraguay's road sector through several ODA loan projects and

grant assistance since 1977. After the start of the Project, JICA has been supporting road development in the eastern region through the ODA loan "Eastern Region Export Corridor Improvement Project" (since 2014). However, no specific linkage with the Project was planned or implemented for either of these projects.

### 3.1.2.3 External Coherence

The Project was a parallel type of co-financing for Phase II of the Second Rural Road Improvement Program with IDB and OFID separating the project implementation area.<sup>6</sup> The roads constructed under the Project, IDB, and OFID projects were all local roads in rural areas, and since the target departments were different, there were no synergies from interconnection at the facility level. On the other hand, as shown below, consulting services procured by MOPC through each donor fund were also used for other donor projects, suggesting that such interoperation that were not anticipated at the time of the appraisal resulted in synergies.

- MOPC has an IDB Project Implementation Unit supported by consultants hired with IDB funds, and the Project and other OFID-funded projects were implemented under this unit.
- The road sections and bridges to be covered by the Project were proposed by JICA through the "Special Assistance for Project Implementation" (hereinafter referred to as "SAPI Study") conducted after the loan agreement. Some of the bridges in urgent need were constructed with IDB funds and the rest with the Project.
- A portion of the road sections was implemented within the ODA loan funds of the Project, and a portion of the remaining sections was implemented with other funds. The detailed design of the bridges covered by the Project was prepared by the funds of the IDB Project. The consultant for the Project prepared the detailed design of the road sections proposed by SAPI Study, a part of which was financed by the ODA loan and the rest by other donors' funds.

It should be noted that the World Bank's "Road Maintenance Project" (2006-2016) improved National Highway No.4, which passes through the Misiones Department, the target area of the Project, but the road sections of the Project are not directly connected to the road sections improved by the World Bank.

Based on the above, the Project is consistent with Paraguay's development plans and needs at both the planning and ex-post evaluation stages, as well as with Japan's development

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<sup>6</sup> IDB and OFID signed loan agreements in September 2009 and October 2009, respectively.

cooperation policy at the time of planning. Active coordination and collaboration with other donors were also observed. Therefore, its relevancy and coherence are high.

### 3.2 Efficiency (Rating:①)

At the time of the appraisal, it was planned that improvement of all the road sections targeted by the Project would be financed with the ODA loan, however, based on the results of the SAPI study, it was decided to use other donor funds for some road sections. Therefore, comparison of the outputs, project cost, and project period between the plan at the time of the appraisal and the actual results was made for the entire Project, including the road sections covered by the ODA loan and other donor funds.

#### 3.2.1 Project Outputs

The outputs planned and implemented in the Project are shown in Table 1. Most of the road sections targeted by the Project are rural roads of 5 to 20 km in length connecting rural areas to local cities. At the time of appraisal, it was planned that the specific road sections and bridges to be improved by the ODA loan would be determined under certain criteria, selecting the sections with the higher priority within the planned project cost, in the selection study to be conducted after the signing of the loan agreement.

Table 1: Planned and actual outputs

	Planned outputs (at the time of appraisal)	Actual outputs
Road improvement: Rubble / gravel paving of unpaved roads	Approx. 350 km	ODA loan: 23 sections, 149 km Other funds: 7 sections, 49 km Total : 30 sections, 198 km
Bridge improvement: Replacement of wooden bridges with concrete bridges	Approx. 1,000m	27 bridges 943m
Consulting Services	Detailed design, bidding assistance, construction supervision, etc.	As planned

Source: Prepared by materials provided by JICA and MOPC

Note: At the time of planning, the target road sections and bridges had not been finalized and the number of bridges had not been specified.

After the signature of loan agreement in September 2010, a SAPI study was conducted from February to November 2011, which included "participatory road planning" involving local government and community representatives in the three target departments, review of detailed bridge designs funded by the IDB, unit costs study for road and bridge construction, and selection of target bridges and road sections. The study proposed 33 bridges (totaling 1,124 m) and 42 road sections (totaling 310 km) for the Project.



As described in the "Relevance" section, it was found that the proposed bridges and road sections could not be constructed entirely with the agreed amount of the ODA loan, so all bridges that were urgently needed to eliminate hazards, with the exception of bridges that had already been constructed with other funds, and about half of the proposed road sections (total 149 km: about 70 km of rubble pavement and 80 km of gravel pavement) were covered by the ODA loan. Subsequently, out of the approximately 160 km of rural roads that were not covered by the ODA loan, MOPC constructed 49 km in the Misiones and Guairá Departments with funds from CAF and FONPLATA Development Bank. The construction contract for them included maintenance for 2 to 2.5 years, along with road improvement with rubble and gravel pavement. The road improvements in Misiones and Guairá Departments were completed in August 2022 and March 2023, respectively, and both will be maintained until March 2025. As a result, of the 310 km proposed by the SAPI study, a total of 198 km have been constructed with the ODA loan and other funds. This is 57% of the 350 km planned at the time of appraisal.

According to the results of the field inspections, the quality of the rubble pavement, bridges, drainage facilities, and other concrete structures that were constructed under the Project with ODA loan are all considered to be of sufficiently high. As for the gravel pavement, although there were some sections where road surface drainage was difficult due to the topography and other reasons, in general, it is considered that the appropriate materials were used for construction with sufficient compaction. Therefore, the construction quality of the Project is considered to be generally high.

#### <Participatory Road Planning>

The Project adapted the "Participatory Road Planning" introduced in the earlier projects implemented by MOPC with the support of the IDB. This involved prioritizing road sections applying selection criteria through workshops with community representatives, which were held three times each in each department. For the Project, they were conducted through the SAPI study, and the following selection criteria were taken into account. The beneficiary area of each road section was defined as 1.5 km from the road.

- |  |   |
|--|---|
| ➤ Number of connected municipalities               | ➤ Number of connected tourism attractions       |
| ➤ Importance of urban / rural connections          | ➤ Number of beneficiaries                       |
| ➤ Total length of rural roads to be connected      | ➤ Number of clinics and schools along the route |
| ➤ Number of markets to connect                     | ➤ Poverty rate                                  |
| ➤ Area of connected agricultural and pastoral land | ➤ Percentage of protected areas along           |

It should be noted that "traffic volume" and "number of grain silos" were planned to be included in the selection criteria at the time of appraisal, but were not considered in the SAPI study because measuring traffic volume on each road section requires a lot of fund and time, and there are few grain silos in the target departments.

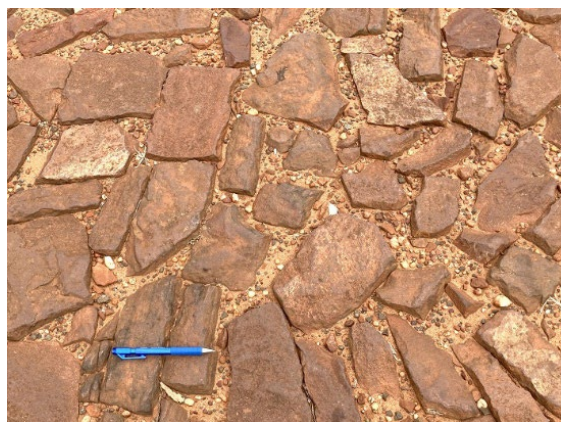
#### <Road improvement by the Project>

Rubble pavement is laid with broken stones, and its construction is time-consuming because it is done by hand. It is used in residential areas, in front of schools, and on slopes with large inclinations, since the speed of vehicles is reduced and there is less dust when the vehicles are traveling. It is resistant to rainfall, and periodic repair work on the road surface is virtually unnecessary. On the other hand, it has been pointed out that the vehicles vibrate violently when traveling, resulting in high maintenance costs for motorcycles and other vehicles.

Gravel pavement is made of a pebbly soil called *ripio* which is widely distributed in Paraguay. Gravel pavement is completed when *ripio* is spread, shaped, and compacted. If the pavement is kept in good condition, vehicles can travel at speeds of 70 to 80 km per hour, but dust is generated when the pavement dries out. If *ripio* is lost due to rainfall or water runoff, the road becomes just an unpaved road, and the road surface deteriorates. Drainage facilities are important, and the road surface needs to be regularly repaired by replenishing *ripio* and compaction according to the condition of the road surface.



Rubble paved section



Surface of rubble paved road



Gravel paved section



Example of unpaved road



Bridge after replacement

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

The total cost planned for the Project was 5,692 million yen (including 4,822 million yen of the ODA loan), and all civil engineering costs (excluding taxes) were planned to be covered by the ODA loan (Table 2). In reality, the cost of civil works increased because road sections that could not be implemented with the ODA loan were implemented with other funds. In addition, the cost of consulting services increased due to the prolonged project period. Although the project cost excluding the construction cost of the sections covered by other funds was within the plan, the total project cost, including the construction cost of the sections covered by other donor funds (696 million yen), was 5,998 million yen, which was 5% higher than the plan.

Reasons for the increase in civil works costs for the Project include the following.

- The detailed design of the bridges was conducted earlier with IDB funds, during which the width of some bridges was increased from 6 m to 10 m to allow for adequate room for two-way traffic in preparation for future road improvements and increased traffic

volume. In addition, a SAPI study reviewed the bridge design, and changes were made to the bridge design to ensure appropriate girder clearance heights and pier rooting depths according to hydrologic and geologic conditions, and to add abutment and pier scour countermeasures. These led to an increase in bridge construction costs.

Table 2: Planned and actual project cost

(Unit: million yen)

	Plan		Actual	
	Entire Project	ODA Loan	Entire Project	ODA Loan
Civil Works*	2,686	2,686	***4,142	3,446
Consulting Services	753	753	1,103	1,103
Price escalation**	1,190	1,190	0	0
Contingency	193	193	0	0
Interest during construction, etc.	146	0	146	0
Land acquisition	0	0	0	0
Administrative expenses	241	0	224	0
Tax	482	0	383	0
Total	5,692	4,822	5,998	4,549

Source: Prepared by materials provided by JICA and MOPC

Note: \* Some of the actual amount include estimated values (for road works funded by other funds).

\*\* An 8.4% annual price increase had been assumed for civil works.

\*\*\* Includes 696 million yen of other donor funds.

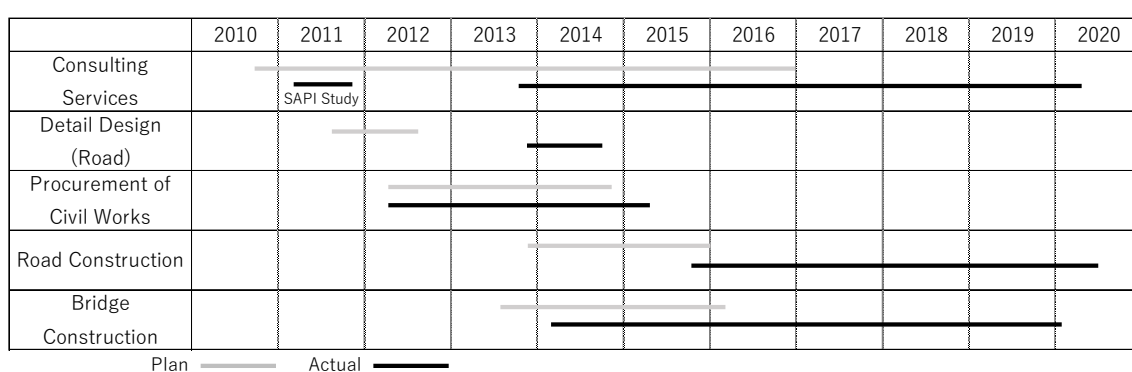
Exchange rate: Plan 1 yen = 52.63 guarani (July 2009)

Actual 1 yen = 57.38 guarani (June 2019)

- The unit cost of road improvement (cost per km) increased significantly from 4.82 million yen/km for gravel pavement and 6.75 million yen/km for rubble pavement assumed at the time of appraisal (2009), 7 million yen/km for gravel pavement and 10.6 million yen/km for rubble pavement assumed during the SAPI Study (2011) to 16.89 million yen/km during detailed design (2014: The unit cost of each pavement type is not known, and the improved extension was approximately half for gravel pavement and half for rubble pavement). The reasons for this increase are thought to be that the contract period was later than expected at the time of appraisal, which caused prices to rise, and that the amount of construction work, such as land fill and drainage facilities, increased due to topographical and geological conditions. In addition, the ratio of rubble pavement, which has a large unit cost, increased from 23% assumed at the time of appraisal to 46%, taking into account changes in local conditions such as the expansion of residential areas and the desire of roadside residents to use rubble pavement, leading to an increase in road improvement costs.

### 3.2.2.2 Project Period

The Project was planned to be implemented over 65 months (5 years and 5 months) from the signing of the loan agreement in September 2010 to the start of facility operation in January 2016. In fact, the loan agreement was signed in September 2010, and the ODA loan portion of the project was implemented for 118 months until June 2020 (182% of the plan), and the final disbursement date was extended once. The road improvement works of the Project financed by other donors was completed in March 2023. Including this period, the project period was 151 months (September 2010 to March 2023, 232% of the plan). Thus, the project period for the Project was much longer than planned.



Source: Prepared by materials provided by JICA and MOPC

Figure 1: Planned and actual implementation period (ODA loan portion)

Factors contributing to the increased implementation period include the following.

- After signing the loan agreement, it took approximately seven months for the agreement to enter into force due to the time required in the Paraguayan side to prepare the necessary documents.
- Prior to the consultant contract, a SAPI Study was conducted to review the bridge detailed design prepared by IDB funding and select the target road sections. The delay in the IDB-funded bridge detailed design work delayed the start of this study. Also, it took longer than expected to select the target road sections.
- Due to the change of administration in Paraguay, it took longer than expected to procure consultants.
- Design changes were required for the bridge as a result of the topography changes caused by the torrential rains and flooding from April to September 2014. In addition, heavy rainfall and flooding in 2015-2016 interrupted construction, extending the construction period by nearly two years.



- The bidding process for the roads started late due to the time required for detailed design and review of the road sections to be covered by the ODA loan. In addition, the construction period was extended by nearly a year due to the heavy rainfall and flooding in 2015-2016. In addition, the construction period was extended due to the addition of drainage facilities following a review of design rainfall and the design modifications to match the width of the road right-of-way, etc.

### 3.2.3 Results of Calculations for Internal Rates of Return (Reference only)

At the time of appraisal, it was assumed that the economic internal rate of return (EIRR) for the road improvements of the Project would be at least 12%, with construction and operation and maintenance costs as costs, reduction of travel and time costs as benefits, and a project life of 20 years. After the selection of the target road sections, the consultant of the Project conducted a traffic volume survey and calculated the EIRR based on the following assumptions, which ranged from 12% to 84%, depending on the section.

Cost:	Construction, operation and maintenance costs
Benefit:	Reduced travel and time costs, increased agricultural production through farmland expansion and increased agricultural productivity
Project life:	10 years

No recalculation was performed in this ex-post evaluation because sufficient information for recalculation was not available. While, in 2020, the IDB conducted an economic analysis of some of the targeted sections of the overall co-financing project with the benefits of travel and time cost savings and reduced operation and maintenance costs, which resulted in an economic internal rate of return of 26%.<sup>7</sup>

Based on the above, the output of road improvement was 198 km (149 km with the ODA loan and 49 km with other donor's funds: 57% of the plan) compared to the 350 km planned at the time of the appraisal, which was far below the plan. The actual project cost, including the cost of other donor-funded sections, exceeded the plan at the time of the appraisal by 5%. The actual project period including other donor-funded sections was 232% of the plan at the time of the appraisal, which was significantly higher than the plan. Therefore, the efficiency of the Project is low.

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<sup>7</sup> Prior to the start of construction works of the Project, a traffic study was conducted through the economic analysis by the consultant, while, for travel speeds and road surface indicators, estimated values were used. In addition, estimated values were used also for the benefits from agricultural land expansion and productivity improvement. On the other hand, the IDB's economic analysis used estimated values for traffic volume, but measured values for the road surface condition index (IRI) and travel speed.

### 3.3 Effectiveness and Impacts<sup>8</sup> (Rating:③)

#### 3.3.1 Effectiveness

##### 3.3.1.1 Quantitative Effects (Operational and Effectiveness Indicators)

The indicators for the road component of the Project were established as "average annual daily traffic volume," "travel time reduction," and "travel cost reduction." Baseline and target values of these indicators were established by a baseline survey conducted by the consultant after the Project was initiated. Table 3 shows the baseline, planned, and actual values for each indicator.<sup>9</sup>

Table 3: Planned and actual values of the operation and effectiveness indicators

Indicator	Baseline value Year 2014	Target value Year 2020	Actual value Year 2020
Annual Average Daily Traffic (units/day)	87	165	unknown
Average running time (minutes/section)	20	18 (10% improvement)	14 (Achieved)
Average Travel Cost (\$/section/year)	238	215 (10% improvement)	216 (Estimated value: almost achieved)

Source: Prepared from materials provided by JICA and MOPC

#### (1) Annual Average Daily Traffic

The consultant for the Project measured traffic volumes on each of the targeted road section in January 2014, and future projections were made to set the target values. Annual daily traffic in 2014 (Baseline values) of the 23 road sections covered by the ODA loan was 87 units per day, and it was assumed to be nearly doubled as 165 units per day in 2020. MOPC does not conduct regular traffic volume surveys on rural roads, so actual data is not available. According to the qualitative survey conducted during the ex-post evaluation<sup>10</sup>, the use of motorcycles and cars as modes of transportation by residents along the route increased significantly, as did the frequency of visits to the town for a variety of reasons. In addition, the population along the route is believed to have increased due to housing construction and other factors, which suggests that traffic has indeed increased after the Project (see Impact).

<sup>8</sup> Sub-rating for Effectiveness is to be put with consideration of Impacts.

<sup>9</sup> Ex-post evaluation usually checks the degree of target achievement two years after project completion (2022 for the Project), but considering that actual values for 2022 are not available and that each road section was actually completed between 2018 and 2020, target and actual values for 2020 were used in this ex-post evaluation.

<sup>10</sup> As the qualitative survey, 80 households (41 males and 39 females; purposive sampling focusing on the households further away from the town which are considered to have more benefited from the road improvements) were interviewed in the 10 target road sections through local consultants. The external evaluator also interviewed the mayors of the four cities.

## (2) Reduction of travel time

The baseline values were estimated values set by the Project's consultants based on MOPC data for each pavement type, and the goal was to reduce these values by 10%. The actual values were calculated based on the results of a survey conducted in 2020 by the consultant commissioned with IDB funds, which covered 17 road sections, including 8 sections improved by the Project. The actual value was 70% of the base value, and the goal of a 10% reduction was achieved.<sup>11</sup>

## (3) Reduced travel cost

Both the base and actual values for travel cost are estimated values set by the Project's consultant during the economic analysis process based on MOPC data and according to the pavement types before and after the Project. As shown in Table 3, the goal of a 10% reduction was almost achieved, while it is based on estimated values. Note that the travel costs include vehicle operation and maintenance costs and passenger time costs.

### 3.3.1.2 Qualitative Effects (Other Effects)

#### (1) Year-round traffic availability

Although the main objective of the Project was to solve the problem of "roads being cut off by rainfall" (see "Relevance and Consistency with Development Needs"), the site visit and qualitative survey showed that both the bridge and road remained passable for a variety of vehicles throughout the year at the time of the ex-post evaluation. According to the residents along the road, half of the residents reported that, before the Project, the road was "impassable" for vehicles during the rainy season and the other half reported that it was "very difficult but passable"<sup>12</sup>, while, after the Project, 60% of the residents reported that the road is "passable as usual" during the rainy season and 40% reported that it is "passable while there are places where ruts can be made."

#### (2) Elimination of risks during river crossing

The Project replaced aging wooden bridges with concrete bridges, thereby eliminating the risks in crossing the river. Prior to the Project, many of the wooden bridges were narrow and had no fences, and the wooden members were dangerous because they were damaged or detached and could collapse. The bridges in the Project were designed based on the 100-year probability of flooding, are wide enough for two-way traffic, and have

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<sup>11</sup> According to the study, the average speed on the improved rural roads was 49 km/hr, while the average speed on the unimproved rural roads studied as a comparison was 35 km/hr. Actual measurements during the ex-post evaluation showed speeds of 30-50 km/hr on rubble paved sections and 40-60 km/hr on gravel paved sections.

<sup>12</sup> An economic analysis conducted by the Project's consultant in 2014 estimated 65 days per year of impassable days due to rainfall.



sidewalks and fences. Hence, the previous dangers have been removed.

As described above, the Project has made the road passable throughout the year and removed the risks associated with the wooden bridges. Considering the achievement level of the established indicators, it is judged that the objectives of the Project have been achieved.

### 3.3.2 Impacts

#### 3.3.2.1 Intended Impacts

The development of the road network by the Project was expected to contribute to the economic revitalization of the target area and to the improvement of the living environment for local residents. This section summarizes the economic and social impacts of the Project based on the results of the qualitative survey, taking into account changes in the use and movement of the roads improved by the Project.<sup>13</sup>

#### (1) Changes in road use and mobility by residents

Before the Project, one-third of residents was using motorcycles and 70% was walking or rode horses, but at the time of the ex-post evaluation, more than 30% uses cars, 80% uses motorcycles, and few walks or ride horses (Table 4: multiple responses). Many residents purchased new passenger cars or motorcycles after the road improvements. Note that public transportation (buses) was originally scarce in the area covered by the Project. Since the number of residents who can get around by themselves increased after the Project, public transportation has almost disappeared.

Table 4: Changes in Residents' Means of Transportation

(Percentage of respondents who use it as a means of transportation: multiple responses)

	Before the project	After the project
On foot, horseback, etc.	69%	3%
bicycle	13%	4%
motorcycle	34%	80%
Passenger cars and pickup trucks	0%	36%

Source: Qualitative survey

<sup>13</sup> In the Project, the consultant had conducted a questionnaire survey of roadside residents as a baseline survey. However, based on the related documents provided by JICA for this ex-post evaluation, only two surveyed routes could be identified where road improvement had actually been implemented, and the database of the survey results was incomplete. In addition, the questionnaire used in the baseline survey was not available by the time the qualitative survey was initiated. As a result, there was no prospect of obtaining information that could be compared and analyzed with the baseline survey, so the qualitative survey was conducted in a manner that did not presuppose a comparison with the baseline survey.

The frequency of travel of the residents by purposes along the road changed as shown in Table 5. Many residents indicated that the frequency of visits to towns for shopping, administrative procedures, etc., and to medical institutions (health centers, hospitals, etc.) increased. The frequency of these visits increased by 20-30%. Although not many residents use the roads to ship agricultural and livestock products, the frequency of shipments increased significantly. Cases of increased agricultural production and sales through this process were also identified. About 20% of the residents who work in the town increased the frequency of their visits to work by about 10% because they can go to work without problems even during rainfall.

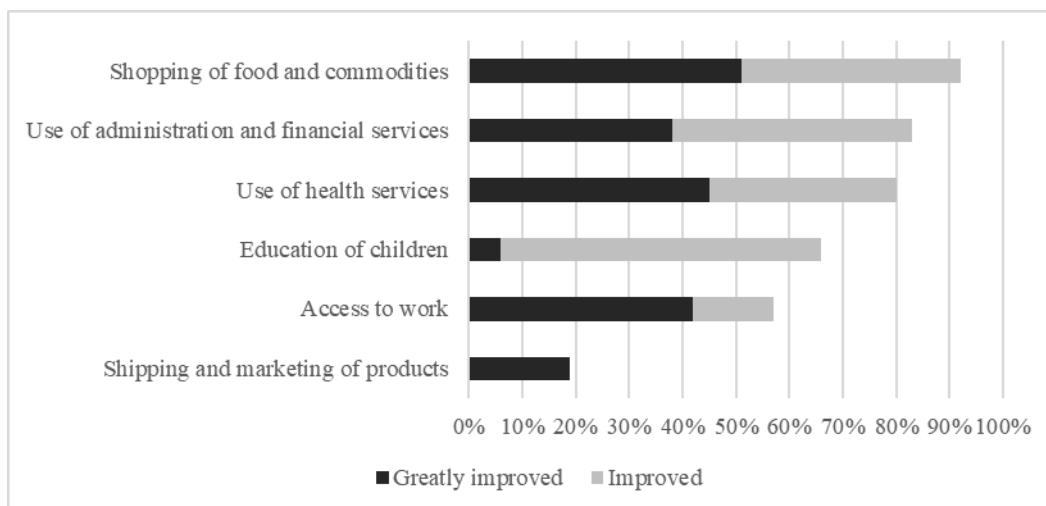
Table 5: Changes in Residents' Mode of Transportation  
(Monthly Frequency of Travel: Multiple Responses)

	Before the Project	After the Project (% increase)	Percentage of Respondents
Visits to Towns (shopping, procedures, etc.)	8.1 times/month	10.6 times/month (31%)	84%
Visits to medical institutions	2.3 times/month	2.8 times/month (22%)	99%
Shipment of agricultural and livestock products	6.1 times/month	8.7 times/month (16%)	11%
Work, attendance at work	25.7 times/month	28.1 times/month (9%)	22%

Source: Qualitative survey

## (2) Life changes at home

Most of the residents reported that the impact of the Project has been that it has made it easier for them to travel to town to get food and daily necessities, to access government and financial services, and to maintain the health of their families through access to health services (Figure 2). Many households also reported improvements in the education of their children and jobs in town. Some households reported improved shipment of products, and about 10% of households cited this as the most important impact (Table 6). From the above, it can be summarized that the road improvements by the Project led to improvements in various aspects of livelihoods for most residents, and for some residents, it also led to an increase in income.



Source: Qualitative survey

Note: For each aspect, the respondents were asked to indicate on a five-point scale whether the situation after the road improvement "worsened significantly" "worsened" "no change" "improved" or "improved significantly."

Figure 2: Changes in various aspects of life

Table 6: Most important impacts for family

(Percentage of respondents who mentioned each item as the most important impact)

Life in general has improved.	25%
Easier to get into town.	16%
Can go out anytime I want.	13%
Easier shipping and marketing of products.	10%
Easier access to food and daily necessities.	9%
Easier access to work.	8%
Easier access to medical services.	8%
Easier for children to commute to school.	5%
Nothing in particular.	6%

Source: Qualitative survey

### (3) Changes in the Neighborhood

Residents of several road sections cited the construction of new housing and population growth as impacting their neighborhoods. They also reported an increase in land prices as a result. In San Juan Bautista municipality, a large residential development took place along one of the road sections after the Project. In Villarrica municipality, several tourist accommodations were established taking advantage of the improved access after the road improvement. Furthermore, in various locations, increases in the number of stores along the road due to the increased traffic, as well as increases in sales at existing stores are

reported. From the above, it can be said that the road improvement through the Project led to an increase in economic activities and investments in the areas along the road.



A family with a new vegetable peddling business

#### (4) Changes in the three target departments

According to statistical data published by the National Institute of Statistics of Paraguay, the three target departments have improved in all the indicators shown

in Table 7. In particular, the access to health services, private vehicle ownership (in Misiones and Guairá Departments), and the poverty rate are better than in the national rural areas. The Project may have contributed to this improvement, but it is difficult to verify it quantitatively. According to MOPC, the total population benefiting from the target road sections of the Project (population living within 1,500 meters of the road, 2014) is about 80,000, which is about 14% of the total population of the three departments of 580,000 (2014).

Table 7: Changes Observed in Socioeconomic Indicators in Rural Areas of the Three Target Departments

		Before Project 2004	After Project 2017
Average duration of schooling (years) of population aged 10 years and older (year)	Misiones	6.8	8.6
	Paraguari	6.2	7.5
	Guairá	6.2	7.6
	Whole country	6.1*	7.0
Access to health services (%)	Misiones	51.0	80.1
	Paraguari	51.5	75.0
	Guairá	51.7	71.5
	Whole country	65.4*	68.4
Percentage of households with private vehicles (including motorcycles) (%)	Misiones	26.2	76.3
	Paraguari	20.8	65.7
	Guairá	30.0	85.8
	Whole country	50.7*	75.3
Poverty Rate (%)	Misiones	58.6	27.5
	Paraguari	61.5	35.8
	Guairá	56.4	33.9
	Whole country	55.6*	36.2

Note: \* Before-project data for Whole country are as of 2009.

Source: National Institute of Statistics (Condiciones de Vida 2009-2018)

### 3.3.2.2 Other Positive and Negative Impacts

#### (1) Environmental Impact

The Project was determined to fall under Category B, as it does not fall under the large-scale one in the road sector as listed in the "JBIC Guidelines for Confirmation of Environmental and Social Considerations" (April 2002), its undesirable impacts on the environment were judged to be not significant, and it does not have any sensitive characteristics and sensitive target areas stipulated in the Guidelines.

In accordance with Paraguay's environmental legal system, an initial environmental impact assessment was conducted by the consultants, during which an environmental management plan was prepared and an environmental impact declaration (equivalent to an environmental permit) was obtained from the Ministry of Environment and Sustainable Development. For the civil works, each contractor prepared a social and environmental action plan in accordance with the MOPC's environmental technical specifications. The implementation was monitored by the consultant's environmental engineer, and the plans were properly implemented. No significant impacts on the natural environment due to the civil works of the Project have been identified.

#### (2) Resettlement and site acquisition

No land acquisition or resettlement was planned or implemented under the Project. No significant social impacts from the civil works of the Project have been identified, including in the indigenous residential areas where some road sections are close.

#### (3) Other positive and negative impacts

Some residents noted that the increased speed of motorcycles and vehicles increased the risk of accidents. However, no serious accidents causing personal injuries were reported.

For many of the residents of villages where access had been restricted during rainfall, the improved access by the Project led to an increase in the frequency of visits to the town, which is considered to have led to equitable social participation. In addition, residents' satisfaction with easier access to food and daily necessities and improved access to health care services was high, which was considered to be an impact related to people's well-being. No notable impacts on gender, social systems and norms, or human rights were identified.

The above results indicate that the Project has achieved its objectives, and its effectiveness and impacts are high.

### 3.4 Sustainability (Rating:②)

#### 3.4.1 Policies and System

As mentioned in the "Relevance" section, improvement of rural road is a priority in the National Development Plan: Paraguay 2030, and the MOPC's Transportation Master Plan clearly states the plan to improve unpaved roads to rubble / gravel pavement, maintain the improved roads, and gradually upgrade them to asphalt pavement. Therefore, there are no specific policy or institutional issues regarding the sustainability of the Project.

#### 3.4.2 Institutional / Organizational Aspect

##### (1) Maintenance of rural roads

Maintenance of rural roads is carried out by MOPC's direct management, in cooperation with local governments, etc. The roads in the Project will basically be maintained under the direct management of MOPC, but depending on the situation, collaboration with local governments may be undertaken.

##### a. Maintenance under direct management of MOPC

District offices established in each department by the MOPC Rural Roads Direction will be responsible for the maintenance of rural roads through direct management. The roads in the Project are handled by District 4 (Guairá), District 8 (Misiones), and District 9 (Paraguari). The Rural Roads Direction has a Road Maintenance Coordination Section that allocates resources to the district offices and monitors their activities.

Table 8: Number of District Office Staff and Heavy Equipment Available for Operation

	District 4	District 8	District 9
Number of staff: 2021	67 persons	75 persons	55 persons
2023	40 persons	60 persons	26 persons
motor grader	3	1	3
wheel loader	2	3	2
dump truck	7	5	5
Other Heavy Machinery		1 hydraulic excavator 1 bulldozer	

Source: Prepared based on materials provided by MOPC and interviews at district offices.

According to interviews with the three district offices mentioned above, the number of heavy equipment is inadequate compared to the length of the road to maintain. Many of the heavy equipment was purchased in the 1980s and is aging, and although it is being used while being repaired, some of it is no longer usable. According to the Road Maintenance Coordination Section, due to budget constraints, no new heavy equipment has been procured since 2018. In the opinion of the district offices, at least double the

current amount of heavy equipment is needed for proper maintenance. In addition, the number of staff at the district offices is declining as staff members are retiring while few new staff members are replacing them, while the staffing level to operate the current heavy equipment has been maintained.

No budget to purchase materials (*ripio*) to maintain the gravel paved roads has been allocated to the district office.<sup>14</sup> Therefore, repair work is mainly done by molding the road surface with a motor grader. Local governments and residents along the road sometimes provide materials, but quality materials are expensive and hard to obtain.<sup>15</sup> Even if materials can be obtained, they are quickly washed away by rainfall due to the lack of heavy equipment for compaction at the three district offices. Thus, it is difficult to conduct effective repairs in the current situation.

The district office receives numerous requests for road maintenance from mayors and residents. Based on these requests, each district office prepares a weekly maintenance plan, using the on-site knowledge of its staff as a guide. According to the district offices, it sometimes takes two to three months to implement maintenance after receiving a request, but all requests are attended by elaborating an efficient plan that takes into account the location of heavy equipment. However, preventive action in advance of the rainy season and early action after rainfall before expanding the damage (e.g., muddy conditions) are not always taken.

#### b. Maintenance in collaboration with local governments

The IDB's co-financing project for the Project included the maintenance of the rural roads which had been improved in the IDB's previous project, as well as the improvement of rural roads similar to those in the Project. Part of the maintenance was implemented through establishing Road Management Association (AGV: *Asociaciones de Gestion Vial*) through agreements among MOPC, municipalities and departments, and technical support and capacity building were carried out for this. According to MOPC, so far, road maintenance associations have been established in four departments (Departments of Alto Paraná, Itapúa, Canindeyú, and Caazapá, which are not included in the Project) with the participation of some municipalities and local governments (56 municipalities and 3 departmental governments) have contributed about 10-45% of the total cost and heavy equipment cost to ensure proper maintenance in a planned manner. This mechanism was highly appreciated not only by MOPC but also by local governments, as it enables planned

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<sup>14</sup> While Paraguay generally requires greater transparency in the management of funds and materials to prevent corruption, it is difficult to identify the whereabouts of materials, which are often spilled due to rainfall. The difficulty in properly managing materials may be one of the reasons why budgets for the purchase of materials are not allocated to district offices.

<sup>15</sup> According to MOPC, the increase in the price of *ripio* is due to Paraguay's environmental legal system, which has restricted the mining of *ripio*.

and appropriate maintenance and promotes decentralization of road maintenance by increasing the participation and commitment of local governments. It functioned while the road maintenance budget was secured through the IDB project, but subsequently ceased to function, with the exception of a few cities, due to the lack of sufficient financial resources<sup>16</sup>. Since this was a framework that could function if financial resources could be secured, MOPC intends to expand a similar mechanism in the future and is looking for adequate financial sources from the national and local governments while discussing with the fiscal authorities.

Apart from the above, the district offices may also work jointly with the municipality and departmental governments to maintain roads. In this case, the district office provides the heavy equipment and operators, while the municipality and departmental governments provide spare parts and consumable items for the heavy equipment, and so on, sharing the necessary inputs according to their respective capabilities. While MOPC has agreements with some municipalities for road maintenance, this type of collaboration is done with or without such agreements. In addition, some municipality may perform their own road maintenance using municipal budgets, either by using heavy equipment owned or outsourced by the municipality.

#### c. Outsourced maintenance

Since 2006, MOPC, through a World Bank loan program, has begun outsourcing road maintenance, mainly on national roads, called "Administration and Management of Roads Based on Level of Service" (GMANS). Approximately 1,900 km, corresponds to about one-third of the paved national roads as of 2016, have been maintained in this way under six contracts. Furthermore, based on the above experience, MOPC has introduced a new road maintenance method called the "Contract for Rehabilitation and Maintenance of Paved Roads Oriented to the Level of Service (CREMA)". This is to rehabilitate the road in about two years and maintain it for another five years. About 60% of national and rural roads with asphalt pavement (about 3,200 km as of 2016) are maintained using the above two methods.

As for the rural road with rubble / gravel pavement, a 2 to 2.5 year maintenance period was included in the construction contract for the 49 km road sections in the departments of Guairá and Misiones, which was included the scope of the Project and financed by other donor's fund but not covered by the ODA loan, and their maintenance is being conducted by outsourcing. On the other hand, maintenance was included in the scope of

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<sup>16</sup> The municipality of Naranjal, which participated in a road maintenance association in the Department of Alto Parana, continued road maintenance for two years starting in 2021 by paying half of the costs, based on an agreement with MOPC. This is one example of how active participation by local governments can lead to the continuation of collaborative road maintenance without relying on external funding.



the IDB co-financing project for the Project, and similarly, in subsequent IDB projects, maintenance of gravel and gravel-paved rural roads for about 3 years was included in the contract. Among the target departments of the Project, 35 km of roads is being maintained by contract in Guairá<sup>17</sup>. According to the MOPC District Offices, there are a total of approximately 1,600 km of gravel and gravel-paved rural roads in the three target departments of the Project, and the total of 84 km of rural roads maintained by outsourced contractors in the three department is equivalent to about 5% of the total.

## (2) Maintenance of bridges

The Bridge and Ancillary Facilities Maintenance Division under the MOPC Rural Road Direction is responsible for the maintenance of concrete and steel bridges on national and rural roads nationwide. As of April 2023, there were eight engineers and about 100 staff members, but there is no room for regular inspections of the many bridges scattered throughout the country. Each time a district office reports a need for repair, the current condition is checked, and if the need is urgent, repair work is performed. However, the district office indicated that even if they report a problem and the department's engineers check the site, it is rare that the problem is actually addressed.

According to the Division, the main issue with the bridges is scour of the piers and abutments. Older bridges in particular are prone to problems due to lack of adequate revetment, but recent bridges, including the bridges in the Project, are reported to have no major concerns.

It should be noted that MOPC is considering to promote collaboration with local governments on bridge maintenance as well.

Based on the above, the maintenance system by MOPC and MOPC district offices for roads and bridges of the Project is not sufficient. MOPC intends to actively promote maintenance in collaboration with local governments, but has not yet decided on a clear direction for securing financial resources for this purpose. Therefore, there are some issues regarding the institutional / organization aspects of the sustainability of the Project.

### 3.4.3 Technical Aspect

The pavement used in the Project has a long track record in Paraguay, and there are no technical challenges in its maintenance. The staff of the district office is maintaining the pavement based on their many-years of experience, despite the constraints in terms of human

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<sup>17</sup> The road sections covered by the ODA Loan are not included in the maintenance coverage of the Guairá Department. The department of Misiones and Paraguari are not included in the maintenance coverage of the IDB project.

resources and equipment.

Since the District Office staff does not have the knowledge to diagnose concrete bridges, if they recognize any visual damage, they will report it with photographs to the Bridge and Ancillary Facilities Maintenance Division. The Division will dispatch an engineer to conduct a detailed investigation if necessary. According to the Division, there is room for strengthening the capabilities of the Division’s engineers in diagnosing bridge integrity, but to date, no maintenance problems requiring technical response have occurred on any of the Project's bridges, and no technical obstacles have been encountered.

Based on the above, there are no particular technical issues regarding the sustainability of the Project.

#### 3.4.4 Financial Aspect

The overall MOPC budget, the MOPC rural road maintenance program budget, and the district office operating budget are shown in Table 9. According to interviews with MOPC headquarters and district offices, the budget, personnel, and equipment allocated to the district offices and the bridge division that perform maintenance and management of the Project are all limited, which is due to general budget constraints. In particular, the budget allocated to the MOPC has been further reduced in recent years due to the COVID pandemic. It should be noted that in Paraguay, independent funding of road maintenance through a gasoline tax or tolls has been considered, but no conclusion has been reached.

Table 9: MOPC Budget Amounts

(Unit: million guaranies)

	FY2020	FY2021	FY2022
Entire MOPC	8,157,769	9,207,011	8,946,865
Rural Road Maintenance Program	1,409,183	1,131,571	891,924
District Office Operation	unknown	160,546	200,782

Source: Prepared from materials provided by MOPC

The road maintenance costs for the Project are paid from the district office operating budget, but as mentioned earlier, budget constraints are the main constraint on the district office's maintenance system. In addition, no new financial resources have been secured to expand maintenance through collaboration with local governments and outsourcing without relying on external funding. Therefore, there are issues with the financial sustainability of the Project.

### 3.4.5 Environmental and Social Aspect, Preventative Measures to Risks

Regarding environmental and social considerations and response to natural disasters and other risks, the MOPC district offices are in charge of the initial response, and the MOPC Rural Road Direction provides support as needed. No particular issues have been identified.



Maintenance work by MOPC



Gravel pavement section with water in the ruts



Trees growing on bridge revetment



Damage to bridge fence

### 3.4.6 Status of Operation and Maintenance

The site inspection of 12 of the 23 road sections of the Project confirmed that they are generally in good conditions and can be used for year-round traffic. All rubble pavement sections were in good conditions. Some sections of the gravel pavement sections remain rutted, and some sections have almost lost gravel, but they are passable throughout the year, and the extension of such sections is only about 10% of the total gravel pavement. All roads in the Project are subject to MOPC's direct maintenance, while for some gravel pavement sections the municipality provided repair materials, and some sections were partially maintained by the departmental government.

According to the site inspection of 14 of the 27 bridges in the Project, there were no bridges structures in need of repair, and all were in good conditions. However, there were

two bridges where the revetments or fences were in need of repair, and one bridge where scouring had begun at the bridge piers and should be monitored. In addition, there were several bridges where the vegetation on the revetment was not managed and trees were growing, which could damage the revetment if left in place.

Based on the above, the status of operation and maintenance of the Project is judged to be good overall, although there are minor issues.

From the above, it can be concluded that the operation and maintenance of the Project has some problems in institutional / organizational and financial aspects, and that the prospects for improvement and resolution are low. Therefore, the sustainability of the effects of the Project is moderately low.

## **4. Conclusions, Recommendations and Lessons Learned**

### **4.1 Conclusion**

The Project was implemented to build a road network in the eastern region of Paraguay by paving unpaved rural roads with gravel / rubble and replacing aged wooden bridges, thereby contributing to the economic revitalization of the country and the improvement of the living environment for local residents. The Project was consistent with Paraguay's development plans and needs at both the time of planning and ex-post evaluation, and with Japan's ODA policy at the time of planning. As active coordination and collaboration with other donors were also observed, the Project's relevance and consistency are high. The output was less than planned, and the project cost and project period were larger than planned, thus the efficiency of the Project is low. All the target roads are now open to vehicular traffic year-round, and the hazards posed by the aging wooden bridges have been eliminated. Since the Project also realized an increase in traffic volume, a decrease in travel time, and a decrease in travel costs, it is judged that the objectives of the Project were achieved. After the implementation of the Project, many residents along the road began to use vehicles to travel, and it was observed that the travel time to the town was significantly reduced, and the frequency of visits to medical institutions and shipments of agricultural products increased. Therefore, it is considered that the road improvement by the Project has led to improvements in various aspects of their lives, and for some residents, it has also led to an increase in their income. Based on the above, the effectiveness and impact of the Project are high. There are no particular policy, institutional, or technical issues regarding the sustainability of the Project. The operation and maintenance conditions of roads and bridges of the Project are generally good. However, due to financial constraints, the road maintenance directly managed by MOPC is not sufficient, and a clear direction for financing road maintenance in collaboration with local governments has not been decided. Therefore,

the sustainability of the Project is moderately low. Based on the above, the Project is evaluated to be partially satisfactory.

## **4.2 Recommendations**

### **4.2.1 Recommendations to the Executing Agency**

- The bridges of the Project were constructed 4 to 5 years ago and are due for their first periodic inspection. Although no structural problems were found during the on-site inspection at the time of the ex-post evaluation, there were some bridges that should be monitored for scour at the pier, and others that appeared to need repair of revetments and fences. Therefore, the MOPC should conduct a periodic inspection of all bridges constructed by the Project and consider necessary repairs based on the results.
- MOPC needs to improve the maintenance of rural roads throughout the country, including road sections of the Project. To this end, it is necessary to fully examine the advantages and disadvantages of maintenance through direct management, maintenance in collaboration with the local governments, and maintenance by outsourcing, and to develop a strategy for efficient maintenance of rural roads according to the type of pavement. For the financial resources, sustainable methods should be considered for the future, such as reducing dependence on donor funds and using taxes collected by the national or local governments. In addition, the daily maintenance regime for concrete bridges on rural roads, including cleaning and vegetation management, should be clearly defined.

### **4.2.2 Recommendations to JICA**

JICA needs to monitor the implementation of the above recommendations by MOPC.

## **4.3 Lessons Learned**

### Establishment of indicators and data collection methods in accordance with project objectives

The main objective of the project was to eliminate traffic cut-off on unpaved rural roads with a traffic volume of approximately 100 vehicles per day during rainfall by providing rubble and gravel pavement. However, among the three established indicators (average annual daily traffic, average travel time, and average travel cost), only average travel time was actually measured to assess the level of achievement. Traffic volumes and travel times on rural roads with low traffic were not regularly monitored by the implementing agencies; instead, these measurements were carried out by hiring consultants. Additionally, average

travel costs were not directly measurable, therefore, estimated values were used for both the baseline and actual achievement of them. Furthermore, these indicators did not directly assess the concept of 'year-round trafficability' itself. Hence, in this ex-post evaluation, an analysis of project achievement was made, while taking into account the actual performance of the aforementioned indicators, by verifying whether the targeted road remained blocked during rainfall through interviews with the implementing agencies and residents living along the road.

In light of the above, it is crucial to consider indicators during the project appraisal phase that directly align with the project objectives. Furthermore, specific methods for data collection for both baseline and actual values should be established. It is essential to agree on the timing and allocate the necessary financial resources for data collection in collaboration with the implementing agency. If hiring a consultant is necessary for data collection, it is advisable to engage the same consultant to measure both baseline and actual values within a single contract to ensure consistency in data collection methods and measurement targets.

#### Baseline survey and comparable endline survey

Although this ex-post evaluation intended to conduct a qualitative survey comparable to the baseline survey on socioeconomic impacts conducted by the consultant, the information provided to the external evaluator prior to the field survey was incomplete. As a result, the survey could not be conducted in a manner comparable to the baseline survey. Therefore, if a baseline survey is to be conducted by the consultant, it is recommended that the same consultant conduct the survey up to the endline survey within the same contract.<sup>18</sup> If the baseline survey was conducted with the intention of being utilized in the ex-post evaluation, JICA needs to specifically confirm and preserve beforehand the methodology and scope of the baseline survey, as well as the data collected through the survey. Thereafter, JICA should determine the scope of work for the external evaluator after examining the extent of the survey that can be conducted in the ex-post evaluation.

## **5. Non-Score Criteria**

### **5.1 Performance**

5.1.1 Objective Perspective (none in particular)

5.2 **Additionality** (none in particular)

(End)

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<sup>18</sup> Endline surveys are conducted for the purpose of analyzing project effects (outcomes and impacts) by comparing them with baseline surveys.

### Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
<b>1. Project Outputs</b> <u>Road Improvements</u> Rubble / gravel paving of unpaved roads  <u>Bridge Improvements</u> Replacement of wooden bridge with concrete bridge  <u>Consulting Services</u>	<p style="text-align: center;">Approx. 350 km</p> <p style="text-align: center;">Approx. 1,000m</p> <p style="text-align: center;">Detailed design, bidding assistance, construction management, others</p>	<p>ODA loan: 149 km, 23 sections  Other funds: 49 km, 7 sections  Total : 198 km, 30 sections</p> <p>27 bridges 943m</p> <p style="text-align: center;">As planned</p>
<b>2. Project Period</b>	September 2010- January 2016 (65 months)	September 2010- March 2023 (151 months)
<b>3. Project Cost</b>		
Total amount	5,692 million yen	6,033 million yen
ODA loan	4,822 million yen	4,488 million yen
Exchange rate	1 yen = 52.63 guarani (July 2009)	1 yen = 57.38 guarani (June 2019)
<b>4. Final Disbursement</b>	December 2021	