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PROJECT PERFORMANCE ASSESSMENT REPORT



NICARAGUA

Fourth Roads Rehabilitation and Maintenance Project and Rural Roads Infrastructure Improvement Project

Report No. 151099

AUGUST 17, 2020

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Washington DC 20433
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Internet: www.worldbank.org

Attribution—Please cite the work as follows:
World Bank. 2020. Nicaragua—Fourth Roads Rehabilitation and Maintenance Project and Rural Roads Infrastructure Improvement Project. Independent Evaluation Group, Project Performance Assessment Report 151099. Washington, DC: World Bank.

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PROJECT PERFORMANCE ASSESSMENT REPORT

NICARAGUA

**FOURTH ROADS REHABILITATION AND MAINTENANCE PROJECT
(CREDITS NO. IDA-41850 AND IDA-47360, GRANT NO. IDA-H5710)**

**RURAL ROADS INFRASTRUCTURE IMPROVEMENT PROJECT
(CREDITS NO. IDA-5028 AND IDA-5533,
GRANTS NO. IDA-H7440 AND IDA-H983-0)**

August 17, 2020

Financial, Private Sector, and Sustainable Development

Independent Evaluation Group

Abbreviations

FOMAV	Road Maintenance Fund
ICR	Implementation Completion and Results Report
IDA	International Development Association
IEG	Independent Evaluation Group
MTI	Ministry of Transport and Infrastructure
PAD	Project Appraisal Document
PPAR	Project Performance Assessment Report

All dollar amounts are US dollars unless otherwise indicated.

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Data

This is a Project Performance Assessment Report (PPAR) by the Independent Evaluation Group (IEG) of the World Bank Group on the Fourth Roads Rehabilitation and Maintenance Project (P083952) and Rural Roads Infrastructure Improvement Project (P123447). This instrument and the methodology for this evaluation are discussed in appendix C. Following standard IEG procedure, copies of the draft PPAR were shared with relevant government officials for their review and comment.

Fourth Roads Rehabilitation and Maintenance Project (P083952)

Basic Data

Country	Nicaragua	World Bank financing commitment	SDR 67.10 million (\$99.30 million)
Global Practice	Transport	Actual project cost	\$123.11 million
Project name	Fourth Roads Rehabilitation and Maintenance Project	Estimated project cost	\$115.34 million
Project ID	P083952	Actual amount disbursed	SDR 65.27 million (\$101.03 million)
Financing instrument	IPF	Environmental assessment category	B
Financing source	IDA		

Dates

Event	Original Date	Actual Date
Concept review	02/26/2004	11/03/2005
Negotiations	n.a.	05/02/2006
Board approval	07/07/2005	06/08/2006
Signing	n.a.	06/22/2006
Effectiveness	n.a.	01/09/2007
Closing date	12/31/2011	09/30/2014

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Rural Roads Infrastructure Improvement Project (P123447)

Basic Data

Country	Nicaragua	World Bank financing commitment	SDR 59.30 million (\$91.89 million)
Global Practice	Transport	Actual project cost	\$100.24 million
Project name	Rural Roads Infrastructure Improvement Project	Estimated project cost	\$105.97 million
Project ID	P123447	Actual amount disbursed	\$84.81 million
Financing instrument	IPF	Environmental assessment category	B
Financing source	IDA		

Dates

Event	Original	Actual
Concept review	12/2/2010	05/11/2011
Negotiations	n.a.	11/03/2011
Board approval	09/27/2011	12/13/2011
Signing	n.a.	12/19/2011
Effectiveness	03/16/2012	03/12/2012
Closing date	11/30/2016	11/30/2017

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Summary

Project Background and Description

At appraisal of the projects in this assessment, Nicaragua had—and still largely has—poor and insufficient roads that restrict mobility, increase transport costs and productivity losses, and preclude economic opportunities, especially for the rural poor. The country also continues to have high unemployment and a large informal sector.

The World Bank has supported the road sector in Nicaragua since early 1990. It has helped remove road infrastructure bottlenecks, introduced innovations in road work delivery and maintenance, and strengthened capacity and institutions in the sector. In the course of this three-decade collaboration, cooperative-based road maintenance enterprises, concrete block roads, and concrete block surfacing through community-based surfacing units have become salient features of the World Bank's engagement in the sector.

Both projects in this assessment, the Fourth Roads Rehabilitation and Maintenance Project and the Rural Roads Infrastructure Improvement Project, approved in 2006 and 2011, respectively, were preceded by the original Rehabilitation and Maintenance Project and the Second and Third Road Rehabilitation and Maintenance Projects. These projects were approved by the World Bank between 1996 and 2001. They were followed by the ongoing Urban Access Improvement Project, which was approved in 2017.

This Project Performance Assessment Report finds that the two projects have had significant achievements, including improvements in road maintenance, but this has not been enough to prevent the road assets from slowly deteriorating. Strong design features have helped develop the road agencies' planning capacity and adopt data-driven investment and asset management decisions. However, design or preparation shortcomings also explain why some technical assistance activities were not carried out or had little impact. Similarly, strong implementation and supervision likely contributed to project achievements, but implementation weaknesses also limited the use of certain project studies.

Results

The concrete block roads constructed under both projects improved access for rural communities and producers. The selection of the roads to be improved was adequate. Rural community members in the projects' influence areas emphasized improved access and other benefits, such as greater product variety, increased tourism and businesses, enhanced marketing possibilities for agricultural products, and the elimination of dust.

Producers also mentioned access improvements among the new project roads' benefits. These access improvements and other benefits identified by IEG were confirmed by other sources.

Concrete block roads in Nicaragua have advantages over other road pavements, mainly because of their durability. Despite significant cost increases for concrete block surfacing in recent years, largely explained by improved technical specifications, this pavement type also seems superior in terms of life cycle costs compared with asphalt primarily because of construction and maintenance cost advantages.

Nicaragua has sound road maintenance arrangements, spends a major portion of its budget on maintenance, and has been providing regular maintenance to large parts of its core road network, which are significant achievements for a lower-middle-income country. The country has a road fund with a dedicated fuel surcharge, and the road maintenance responsibility is shared between the Road Maintenance Fund (Fondo de Mantenimiento Vial; FOMAV) and the Ministry of Transport and Infrastructure (MTI). FOMAV regularly maintains the most important roads in the country, including the project roads, and the Independent Evaluation Group (IEG) finds that it uses its available resources efficiently. MTI's maintenance budget has steadily increased, and most national resources of the road sector budget are used to maintain roads. Nicaragua spends 33 percent of the total road budget on maintenance.

Nicaragua has been relatively successful in using a cooperative-based maintenance microenterprise model to deliver basic routine maintenance and provide social benefits to cooperative members. The main weaknesses include the large amount of guidance and oversight required, limited female participation, and largely an autorenewal of contracts.

Despite the significant road maintenance achievements, Nicaragua has not been able to prevent the road assets from slowly deteriorating because the maintenance resources have not kept up with the growth of the core network.

Design and Preparation

By insisting on data-based selection of road works and including in the project's activities to support planning systems and data collection, the World Bank helped MTI and FOMAV develop their planning capacity and adopt data-driven approaches to investment and road asset management decisions. Although data collection still has challenges, the application of data-driven decision making is an achievement for many developing countries. It is also enabling FOMAV to use its scarce resources efficiently.

Design or preparation shortcomings explain why several technical assistance activities envisioned in the two projects were not carried out or had little impact. This was the case for the proposed support to the partial decentralization of the road network to municipalities. It was also the case for the axle load control and road safety activities.

Implementation and Supervision

Strong implementation and supervision contributed at least partially to the project results. However, weaknesses in the selection of the participants in the community-based concrete block surfacing units seems to have prevented these units from achieving their short-term employment creation goal. The university graduates and young professionals leading these units also had difficulty transferring their newly acquired skills to stable jobs in their field. Insufficient data preclude meaningful conclusions on the lasting cost advantages of using community-based concrete block surfacing units over other delivery models for concrete block roads.

FOMAV has not been able to fully take advantage of performance-based routine maintenance contracts mainly because of weaknesses in the design of performance standards and incentives, a limited understanding of the latter by some microenterprises, and no strict enforcement. Insufficient outreach and consultation with broader stakeholder groups during study design and implementation are likely the origin of the limited use of project-financed studies on FOMAV's financial sustainability and institutional strengthening and the rural roads program for productive areas.

IEG project ratings are described in appendix A. The evaluation methodology and evidence sources are described in appendix C.

Lessons

This assessment offers the following lessons:

- **Rigor in the selection of roads to be financed and continued support for road planning can help countries use resources effectively and create a planning culture.** Under both projects, roads were selected to improve access based on technical, economic, and social criteria. The requirement for rigor from all donors (which provided a substantial amount of the road budget) in road selection combined with sustained technical assistance over time helped establish a system and culture of planning in the country. This achievement was facilitated by limited staff turnover at technical levels in the road departments.
- **Contract features and strict enforcement appear critical to taking full advantage of performance-based routine maintenance contracts.** In Nicaragua,

weaknesses in performance standards and incentives, limited understanding of the latter by some microenterprises, and no strict enforcement, among other factors, prevented the contract type from delivering its full potential. The experience showed that contractual requirements need to be set realistically based on available capacity and resources and strictly enforced.

- **Upgrading rural roads to all-weather access needs to be comprehensive.** Under these projects, bridges and major drainage elements were not included as part of the civil works due to restrictions in the use of funds by the community-based concrete block surfacing units. Therefore, weaknesses in bridges and drainage elements still prevented people from traveling after heavy rains.
- **Providing limited technical assistance support in many areas with little up-front preparation might restrict project results.** In both projects, several of the technical assistance activities were not comprehensive and were vaguely defined and prepared. Instead of tackling many issues only superficially, it might have been better to concentrate on a few critical areas with strong governmental buy-in or potential for buy-in. In such cases, support could have been more substantial and more thoroughly prepared.
- **Close stakeholder involvement and post-completion outreach strategies might increase the usefulness of project-financed studies.** In this case, the outcomes of several critical studies have only been partially used. This is a risk for all technical assistance activities; however, for studies that impact or require actions from parties other than the direct contractual counterparts, a close involvement of these parties in study design and implementation and a strategy to implement the proposed recommendations might have increased use of some studies.
- **A strong results framework is likely to facilitate results measurement.** These projects (i) lacked definitions of concepts, such as access and mobility; (ii) had different indicators in different parts of the Project Appraisal Document, including some without baselines and targets, so no information was collected for several; (iii) used core indicators to measure outcomes not fully attributable to the projects; (iv) lacked intermediate indicators to capture results of technical assistance activities; (v) included baselines and targets to be defined during project implementation; and (vi) had several inadequate outcome indicators. This made results measurement unnecessarily complicated.

José C. Carbajo
Director, Financial, Private Sector, and Sustainable Development
Independent Evaluation Group

1. Background, Context, and Design

1.1 The key findings of this Project Performance Assessment Report (PPAR) are that the Fourth Roads Rehabilitation and Maintenance Project and the Rural Roads Infrastructure Improvement Project (i) improved rural access efficiently by using concrete blocks, but the predominant delivery model through community-based concrete block paving units warrants a more thorough analysis; (ii) helped set up sound road maintenance arrangements, with Nicaragua spending considerable resources on regular maintenance, although these efforts have not been sufficient to prevent the road assets from slowly deteriorating and the country is not yet fully taking advantage of performance-based maintenance contracts; (iii) contributed to creating a planning system and culture; and (iv) achieved limited results for certain technical assistance activities owing to design and implementation weaknesses.

1.2 In Nicaragua, poor and insufficient roads have long restricted mobility, caused high transport costs and productivity losses, and precluded economic opportunities, especially for the rural poor. In 2005, the poverty rate in rural areas was 70.3 percent, and only 34.2 percent of rural people had access to an all-weather road. Rural poverty decreased to 50.1 percent by 2014,¹ and the rural population with access to an all-weather road increased to 37.9 in 2019. The country also has high unemployment—7.8 percent in 2010, which reduced to 6.5 percent in 2018—and large informal sector participation.²

Background and Context

1.3 The World Bank has supported the road sector in Nicaragua since early 1990. It helped remove road infrastructure bottlenecks, introduced innovations in road work delivery and maintenance, and strengthened capacity and institutions in the sector. The two projects assessed in this document were preceded by the original Road Rehabilitation and Maintenance Project and the Second and Third Road Rehabilitation and Maintenance Projects.

1.4 The original Road Rehabilitation and Maintenance Project and the Second Road Rehabilitation and Maintenance Project focused on trunk road rehabilitation, contractual maintenance, technical assistance, and institutional development. During the implementation of the Second Road Rehabilitation and Maintenance Project, Hurricane Mitch devastated the road infrastructure in northern Nicaragua, and the project was restructured to restore important transport links. Concrete block surfacing carried out by community-based surfacing units (*modulos comunitarios de adoquinado*) was introduced because concrete block roads withstood the hurricane best and local communities had been able to quickly restore access.

1.5 The community-based concrete block surfacing units are temporary entities formed under the leadership of mayors to upgrade and pave rural roads. The community-based surfacing units have boards of directors who manage the road surfacing, with strong support from the Ministry of Transport and Infrastructure (MTI) and under the oversight of the mayor. The community-based surfacing units are a labor-intensive way to surface dirt roads. This model combines road surfacing and public works social protection in one program. Alternative delivery models for surfacing dirt roads are the use of private contractors or force account.

1.6 After Hurricane Mitch, concrete block surfacing of rural roads and community-based surfacing units became a salient feature of the World Bank's road sector engagement in the country. The Third Road Rehabilitation and Maintenance Project shifted its focus to concrete block surfacing of rural roads, using community-based surfacing units, small private contractors, and force account. The project also included trunk road rehabilitation, contractual maintenance, technical assistance, and institutional development.

1.7 The Fourth Roads Rehabilitation and Maintenance Project and the Rural Roads Infrastructure Improvement Project described below were followed by the ongoing Urban and Urban Access Improvement Project, which features the traditional combination of trunk roads improvement, rural roads surfacing by concrete block surfacing units, maintenance microenterprises, technical assistance, and institutional support. The scope was expanded to include climate change considerations and a greater focus on road safety.

Objectives, Design, and Financing

1.8 The project development objective of the Fourth Roads Rehabilitation and Maintenance Project was to (i) improve the recipient's transport infrastructure along selected main road corridors, (ii) improve access to productive zones and rural communities, and (iii) ensure the sustainability of the road improvements carried out under the project.

1.9 The project was structured around four components:

- **Component 1: Road rehabilitation and improvement** rehabilitated and improved two trunk road sections.
- **Component 2: Rural transport improvement** financed a concrete block surfacing program of secondary and rural roads, the targets of which were reduced with the March 2010 restructuring because of international commodity price increases and increased again with the April 2010 additional financing (World Bank 2010).

- **Component 3: Road maintenance** financed periodic maintenance by contract and routine maintenance through microenterprises, and these targets were also increased with the April 2010 additional financing.
- **Component 4: Studies, goods, technical assistance, training, and consultancy** supported (i) project monitoring, supervision, financial audits, feasibility studies, and preparation and updating of engineering designs; (ii) training and institutional strengthening for MTI and the Road Maintenance Fund (Fondo de Mantenimiento Vial; FOMAV); (iii) scales for axle load control; (iv) planning and programming improvements; (v) sector reviews; and (vi) environmental and social management.

1.10 The Independent Evaluation Group (IEG) reconstructed the project's theory of change from the Project Appraisal Document (PAD) because the PAD and Implementation Completion and Results Report (ICR) did not include an explicit theory of change because of the age of the project (figure 1.1).

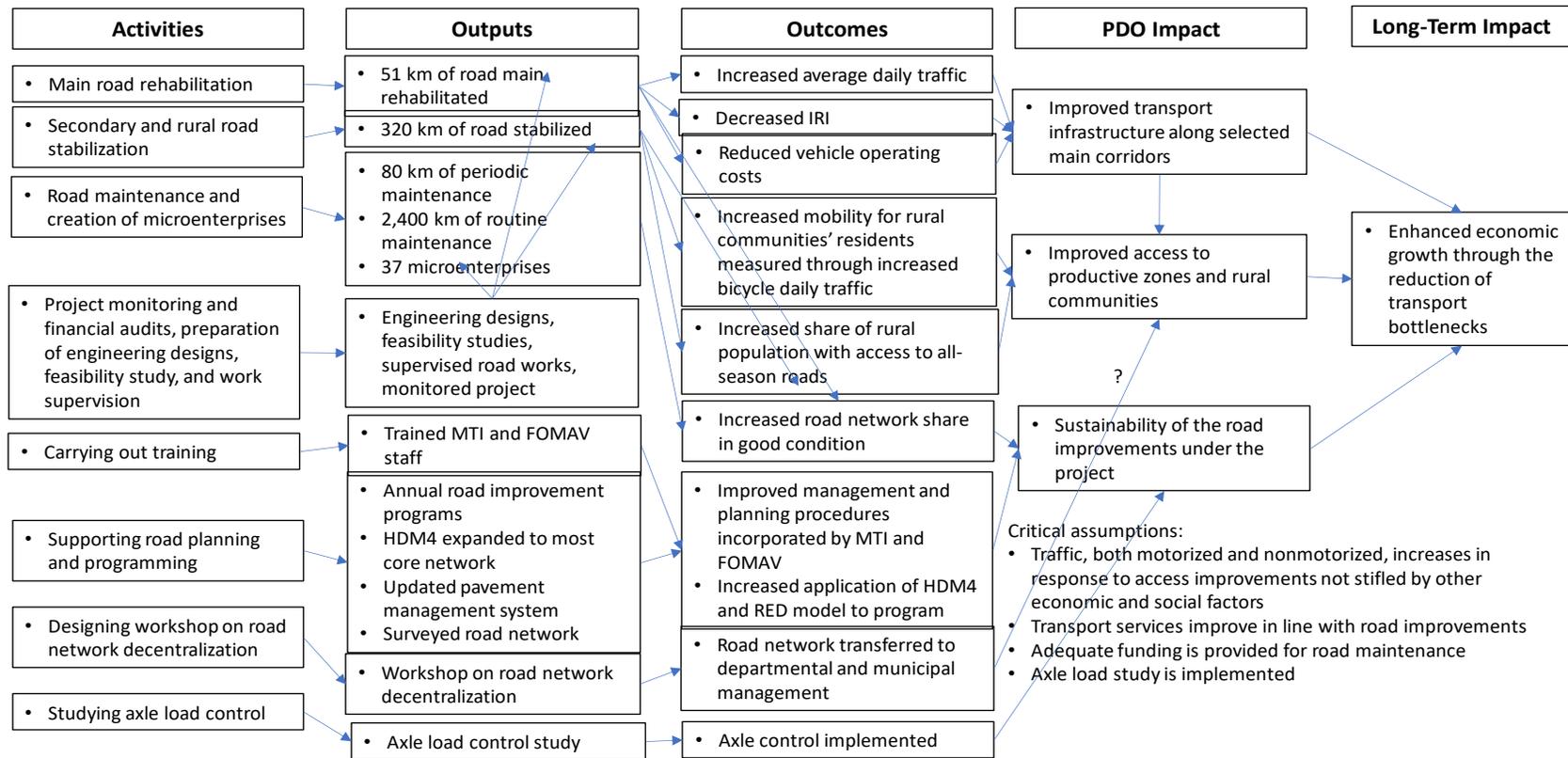
1.11 The project was to be financed by an original International Development Association (IDA) credit of special drawing rights (SDR) 41.1 million, equivalent to \$60 million. The additional financing added an IDA credit of SDR 5.0 million, equivalent to \$7.5 million, and an IDA grant of SDR 21.0 million, equivalent to \$31.8 million (World Bank 2010). The original estimated project cost was \$69.9 million, the estimated project cost with the additional financing was \$115.3 million, and the actual project cost was \$123.1 million.

1.12 The original project development objective of the Rural Roads Infrastructure Improvement Project was to (i) improve the access of the rural population living in the project areas to markets and social and administrative services by improving the recipient's road infrastructure and the strengthening of the MTI's institutional capacity for asset and disaster risk management; and (ii) support the generation of short-term employment opportunities for the rural population living in the project areas.

1.13 The June 2014 additional financing (World Bank 2014) added the following immediate response mechanism subobjective: (iii) to improve the recipient's capacity to respond promptly and effectively to an eligible emergency.³

Figure 1.1. Simplified Theory of Change

PDO: To (i) improve the recipient’s transport infrastructure along selected main road corridors, (ii) improve access to productive zones and rural communities, and (iii) ensure the sustainability of the road improvements carried out under the project



Source: Independent Evaluation Group elaboration based on the Project Appraisal Document.

Note: FOMAV = Road Maintenance Fund; HDM4 = Highway Development and Maintenance model; IRI = International Roughness Index; MTI = Ministry of Transport and Infrastructure; PDO = project development objective; RED = Road Economic Decision Model.

1.14 The project was structured around three components.

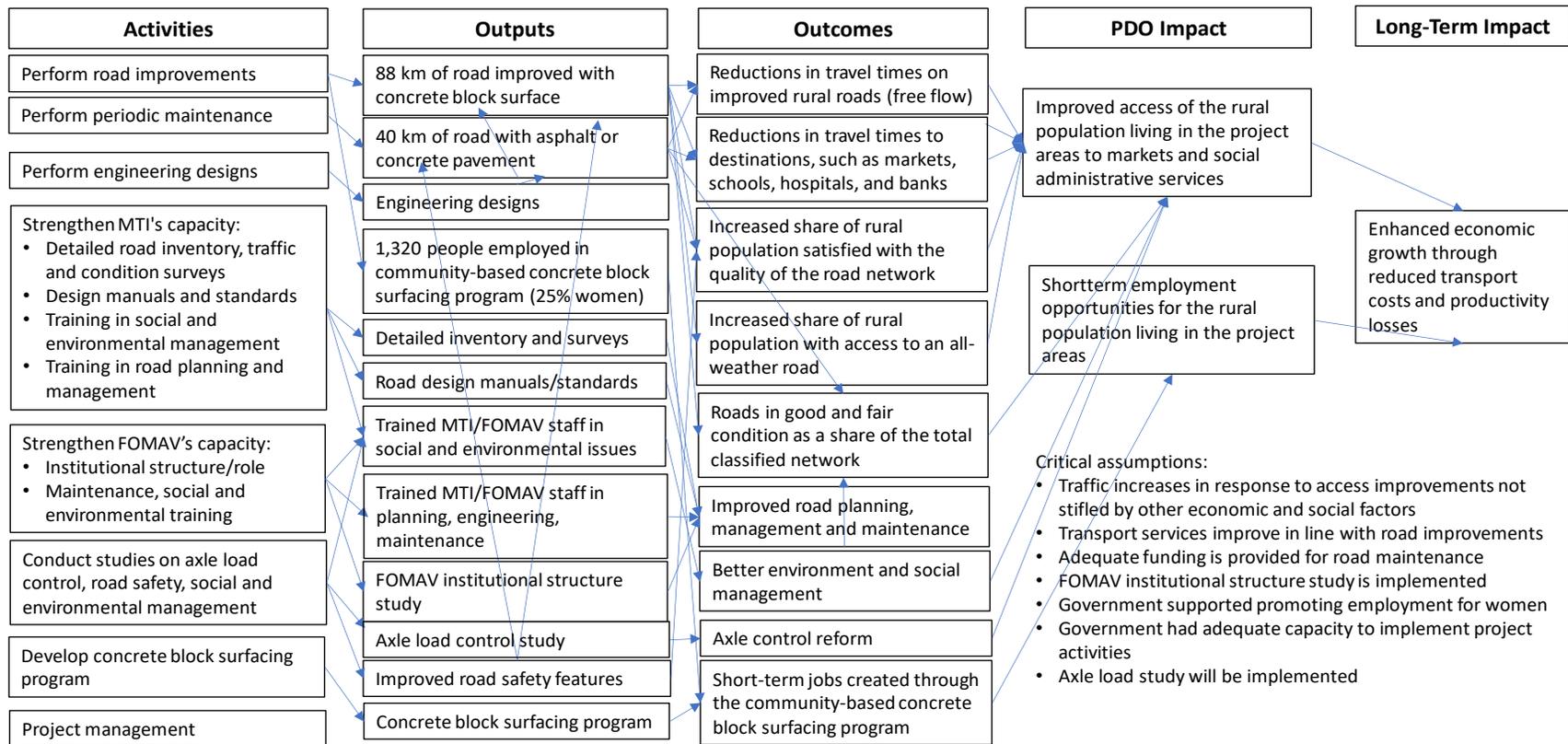
- **Component 1: Rural road improvements and maintenance** (i) surfaced priority roads in rural areas with concrete blocks or any other viable surface replacement option and (ii) performed periodic maintenance. The June 2014 additional financing increased the number of roads to be surfaced and intervened through periodic maintenance, and (iii) added two pilots for results-based routine maintenance through microenterprises.
- **Component 2: Institutional development** financed MTI's and FOMAV's institutional capacity strengthening, engineering studies and designs, axle load control system reform, a road safety management capacity review, and other selected studies.
- **Component 3: Project management** provided project implementation and supervision support and strengthen MTI's capacity to monitor project performance.

1.15 The June 2014 additional financing added a new immediate response mechanism component to be activated in case of an eligible emergency, such as a natural disaster.

1.16 The project's original and revised theories of change were slightly readapted by IEG from a single theory of change in the ICR (figures 1.2 and 1.3).

Figure 1.2. Original Simplified Theory of Change

Original PDO: To (i) improve the access of the rural population living in the project areas to markets and social and administrative services through the carrying out of improvements in the recipient's road infrastructure and the strengthening of the MTI's institutional capacity for asset and disaster risk management and (ii) support the generation of short-term employment opportunities for the rural population living in the project areas

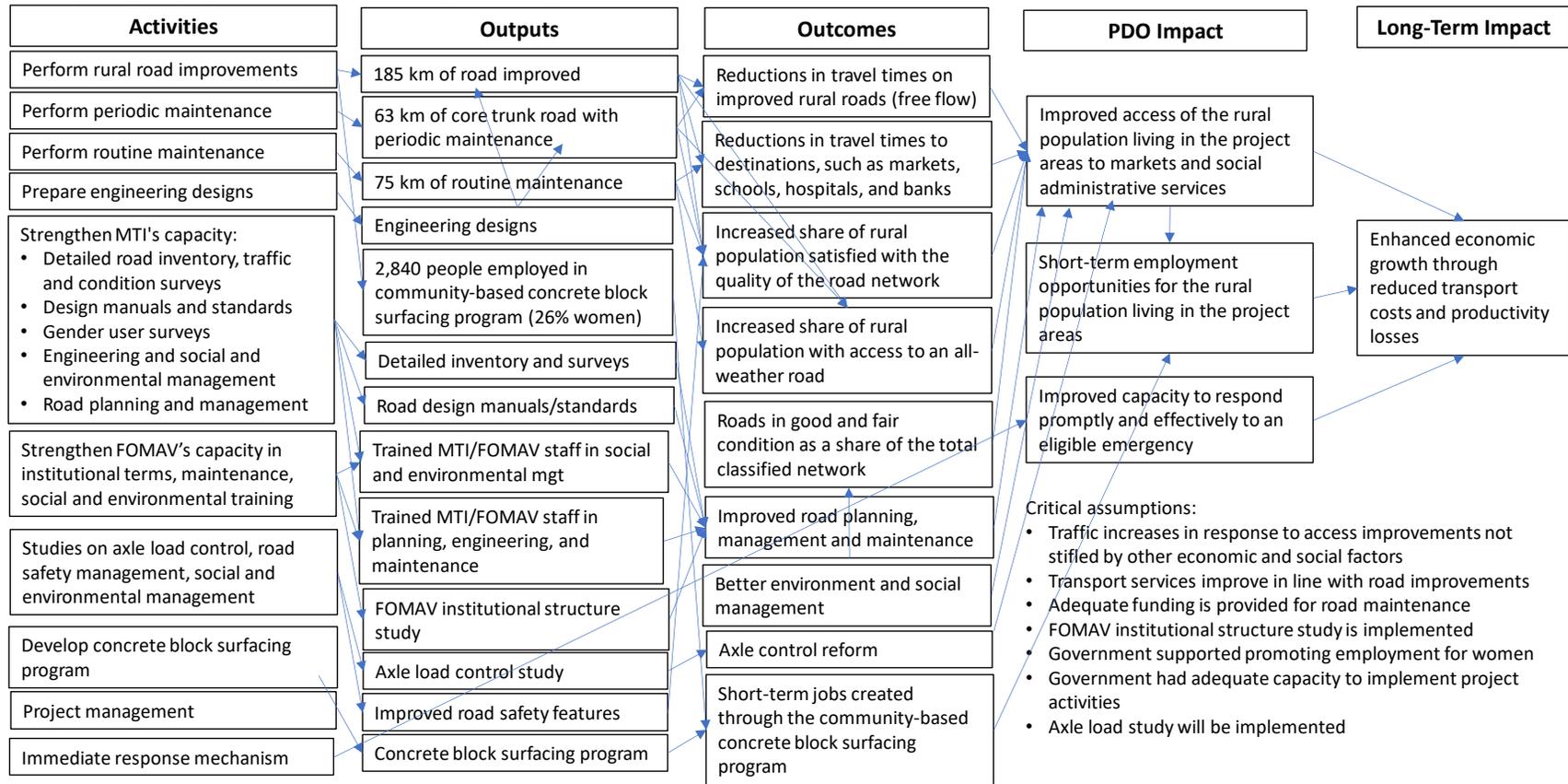


Source: Independent Evaluation Group elaboration based on the Project Appraisal Document and Implementation Completion and Results Report.

Note: FOMAV = Road Maintenance Fund; MTI = Ministry of Transport and Infrastructure; PDO = project development objective.

Figure 1.3. Revised Simplified Theory of Change

Revised PDO: To (i) improve the access of the rural population living in the project areas to markets and social administrative services through the carrying out of improvements in the recipient's market infrastructure and strengthening of the MTI's and the FOMAV's institutional capacity for road asset and disaster risk management, (ii) support the generation of short-term opportunities for the rural population living in the project areas, and (iii) improve the recipient's capacity to respond promptly and effectively to an eligible emergency



Source: Independent Evaluation Group elaboration based on the Project Appraisal Document and Implementation Completion and Results Report.

Note: FOMAV = Road Maintenance Fund; MTI = Ministry of Transport and Infrastructure; PDO = project development objective.

1.17 The project was to be financed by two IDA grants of SDR 18.6 million and SDR 34.9 million, equivalent to \$29.0 million and \$54.1 million, respectively, and two IDA credits of SDR 3.9 million and SDR 1.9 million, equivalent to \$6.0 million and \$2.9 million. The original estimated project cost was \$39.5 million, the estimated project cost with the June 2014 additional financing was \$105.97 million, and the actual project cost was \$100.24 million.

2. What Worked, What Didn't Work, and Why?

Results: What Worked?

2.1 **The concrete block roads constructed under both projects improved access to rural communities and agricultural producers.**

2.2 **The road selection in both projects was adequate to achieve improved access for rural communities and agricultural producers.**⁴ IEG found that both projects had sound criteria to select the project roads, and these criteria improved over time. The 19 concrete block roads visited by IEG directly or indirectly connected villages to department (administrative subdivision) capitals and larger cities or were in agricultural areas (except for two small road sections in more urbanized settings). One, a shorter route to a tourist port, seemed to benefit mainly the people living along this road. The other section was to connect a tourist area with famous beaches, but it stopped in a high-end tourist housing area. This extension of the road to the beaches has not yet taken place.

2.3 **The rural community members in the area of influence for the project roads had improved access and other benefits.** IEG's interviews with 36 community members showed that interviewees experienced reduced travel times, which in some cases are significant. Most reported improved passenger and freight transport services, which was because of the increased availability of public transport services after the road surfacing. Public transport services also improved in reliability, comfort, and safety. A significant number of interviewee responses cited enhanced access to schools and health facilities and several referred to improved access to shops and services and access in general. Other benefits were also mentioned by interviewees (box 2.1).

Box 2.1. Results of Semistructured Interviews with Community Members

The Independent Evaluation Group (IEG) interviewed 36 community members encountered along the project roads, including 18 women and 18 men. All interviewees reported multiple benefits from road surfacing for themselves and their villages. Only one person cited a drawback, which was an increased inflow of people from other places, which was said to reduce security.

IEG found that surfacing of project roads improved access. The responses to the question about before-and-after road surfacing travel times showed that all people interviewed experienced travel time reductions of as much as an hour or more in the rainy season for 11 of them. Thirteen interviewees also mentioned quicker travel or time savings when discussing the benefits and drawbacks of the new roads.

Fourteen interviewees reported no difference in current travel times between the dry and rainy seasons. Therefore, the roads are effectively all-weather roads. For 22 others, travel times during the rainy season were only slightly longer, explained by more careful driving. The 3 remaining interviewees could still have substantially longer travel times on days with heavy rain because of inadequate bridge and drainage system elements (which were not part of the project works).

Twenty-six interviewees cited improved transport services, mainly because of the availability or increased availability of public transport services, including taxis. One person mentioned lower fares for taxis because of increased competition, and a few also referred to more services for freight, such as milk and cattle transport. From the responses on the different transport modes used before and after, IEG found that 13 interviewees switched to a more comfortable or convenient transport mode, such as from a truck transporting people in the back to a bus, from a bus to a motorcycle, or from walking or hitchhiking to school to a bus service. The others continued to use the same transport mode as before. Five interviewees cited more comfort, safety, and security among the roads' benefits, referencing how uncomfortable the transport trucks are. Finally, five interviewees mentioned increased reliability, such as scheduled buses, no delays, and roads that are always passible.

Five interviewees also stated that overall access and access to services and shops improved; nine cited quicker transport of people to health facilities as a main benefit of the new roads.

The other benefits of road surfacing included (i) improved road conditions, especially because of the absence of mud; (ii) less damage to vehicles; (iii) more distributors, vendors and shops; more products and product variety; and, in some cases, lower prices; (iv) more people, vehicles, tourism, and businesses; (v) enhanced marketing possibilities for agricultural products and the possibility to sell homemade products, such as bread, in a larger market; and (vi) the elimination of dust, which is known to cause respiratory or stomach problems.

Some interviewees mentioned that the roads led to the availability of more construction materials, better-quality buildings, and more progress and development in their village. An interviewee explained that the arrival of electricity in their village was facilitated by the road surfacing because it had created the right-of-way for the electricity line to pass.

Source: Independent Evaluation Group.

2.4 Access improvements were mentioned among the new project roads' benefits by agricultural producers in the projects' influence area. IEG's interviews with 16 farmers (mainly cattle and grain farmers) along the project roads found that before the roads were surfaced trucks had fewer problems traveling during the rainy season than passenger vehicles. All producer interviewees reported that access improvements were mainly from decreased travel times. This is critical for milk because it is not refrigerated, and its quality starts to deteriorate within two hours, reducing the price. Seven interviewees mentioned enhanced access to markets, with more intermediaries visiting them, or the ability to sell their produce in other places at higher prices. Five interviewees referred to easier access to inputs, such as fertilizers. In the case of cattle transport, IEG learned that better roads reduce hematomas, which decrease the quality and price of meat. A representative of the cattle farmers federation confirmed the benefits of good roads for milk and cattle transport.

2.5 Two farmers interviewed explained that the value of their farms increased. Many producer interviewees repeated the access improvements that were indicated by community members, such as less vehicle damage, more and better public transport—which small farmers often use to transport the harvest—and improved access to health facilities and schools.

2.6 Several other sources pointed to the previously mentioned access improvements and other benefits of the project roads. IEG's interviews with three mayors in the project area highlighted travel time savings, increased road use, enhanced public transport, increase in retail sales, and new businesses, among other benefits. Two mayors explained that electricity arrived in their villages because of the right-of-ways of the roads. The 2017 road users' survey for the Rural Roads Infrastructure Improvement Project showed that the drivers interviewed had significant travel time reductions to markets, schools, hospitals, banks, and other family members (RegioPlan 2017).⁵ For producers, the survey found important travel time savings to markets, with more than half mentioning additional project roads' benefits, such as the ability to sell products in markets outside their community. The survey found important access-related benefits specific to women, such as quicker travel with greater safety and comfort. The impact assessment of the Fourth Roads Rehabilitation and Maintenance Project found that travel times on the supported project roads decreased by 49.8 percent, and vehicle operation costs decreased by 32.8 percent (Roughton International Limited 2013).⁶ Finally, a study exploring the balance between job creation in public works programs and infrastructure priorities found that the Fourth Roads Rehabilitation and Maintenance Project increased the likelihood that households in targeted municipalities have access to a paved road by 16.4 percent (Garza and Perova 2020).⁷

2.7 Concrete block roads in Nicaragua have advantages over other roads with other pavements, such as their durability. They also are likely to be more cost-efficient than asphalt pavement over time.

2.8 Concrete block surfacing combines durability with other benefits. The 19 concrete block roads visited by IEG were completed between 2009 and 2016 and had annual average daily traffic volumes of between 250 and 1,800 vehicles.⁸ Overall, these roads were structurally sound. With the exception of a few isolated and localized deformations, they had no signs of rutting or other structural problems, even if the roads were in agricultural areas with heavy truck traffic. The pavement surfaces were mostly in good condition, with small problems of transversal beams cracking and wear and tear of concrete blocks. This finding is in line with the Nicaragua-specific study on concrete block pavements, which concluded that concrete block pavements are more durable and resistant to the action of weather and traffic than other road surfacing alternatives (Muzira and Hernandez de Diaz 2014).⁹ Other advantages pointed out in this study and other publications are the conduciveness to labor-intensive construction and community involvement, the manual nature of maintenance (Faiz 2012; World Bank 2019), the fact that pavement surfaces can easily be restored to their original condition, road safety benefits because these roads are less conducive to higher speeds, the facility for utility installation, and more eco-friendly compared with gravel and asphalt.

2.9 Concrete block surfacing in Nicaragua was evaluated to be the cheapest paving option in terms of life cycle costs mainly because of the construction and maintenance cost advantages. A study showed that concrete block roads in Nicaragua were more cost-effective than asphalt, concrete, and gravel roads on a life cycle basis for secondary rural roads with opening year traffic volumes 150 to 800 vehicles per day (Muzira and Hernandez de Diaz 2014). This is largely because the concrete block option in the analysis had more attractive construction costs and slightly less demanding maintenance needs. For cost versus benefits, the study's economic evaluation showed that the concrete block option was preferred for all traffic ranges based on the economic internal rate of return, but asphalt pavements were a close second.

2.10 Significant cost increases for concrete block surfacing in recent years are largely explained by improved technical specifications. IEG found that the cost per kilometer of a concrete block road was, on average, \$529,405 in 2018–19. This is an 84 percent increase compared with the 2012 average of \$288,294, which is significant because the 2012 cost per kilometer adjusted by inflation would be \$406,199 in 2019, or 30 percent lower. Former MTI staff explained that since 2012 the technical specifications for concrete block roads improved substantially through stronger substructures, broader road width, better drainage, strict quality control, and external supervision.

2.11 The cost of asphalt pavements, the closest competitor to concrete block roads in Nicaragua, also increased. Therefore, the economic superiority of concrete block pavements still seems valid. The construction cost of asphalt pavements used for the life cycle and economic analyses in the previously mentioned study (Muzira and Hernandez de Diaz 2014) was 11 percent higher than the cost of concrete block surfacing. IEG was not able to obtain recent average costs for asphalt pavements from MTI. For one asphalt pavement contract implemented in 2019, the cost per kilometer was \$1,135,940. This is particularly high owing to the contract's scope and road location. A similar recent concrete block surfacing contract had a cost \$721,366 per kilometer, which is 57 percent less. The Inter-American Development Bank pointed out that their average cost for new asphalt payments was approximately \$600,000 per kilometer, which is 13 percent more than the recent average cost per kilometer for concrete block pavements.

2.12 Nicaragua has sound maintenance arrangements, spends a substantial part of its budget on maintenance, and has been providing regular maintenance to large parts of its core road network, which are significant achievements for a lower-middle-income country.

2.13 FOMAV and MTI share responsibility for maintaining Nicaragua's 8,640-kilometer core road network.¹⁰ FOMAV was created in 2000 with the support of previous World Bank projects. In 2005, it received a dedicated fuel surcharge, which gradually increased to reach 16 cents per gallon on fuel in 2009. This meant that FOMAV was no longer dependent on annual budget allocations for road maintenance. In 2019, FOMAV maintained 4,121 kilometers and MTI maintained 2,074 kilometers of the 7,198 maintainable kilometers of Nicaragua's core road network.¹¹ FOMAV primarily maintains paved roads, whereas MTI is largely responsible for unpaved roads.

2.14 FOMAV regularly maintains the roads under its responsibility, including the project roads, and IEG found that it uses its available resources efficiently. FOMAV has been providing routine maintenance to all roads and periodic maintenance to approximately 20 percent of its roads, which is adequate. As discussed, FOMAV contracts out its maintenance activities and uses a maintenance management system to prioritize the interventions because of its budget constraints. IEG's field visits to 24 project roads constructed between 2009 and 2016 showed that road maintenance was carried out to optimize resources and maximize smooth passage, such as regular patching and short, localized overlays.

2.15 MTI's maintenance budget has steadily increased, and most of the road budget's national resources are used to maintain roads; therefore, a high proportion of road expenditures in Nicaragua is spent on maintenance. MTI's maintenance budget

increased by 7 percent annually between 2012 and 2019. In this period, maintenance, on average, was 86 percent of MTI's budget from national resources and 23 percent of its total budget. If the 2019 FOMAV's and MTI's total budgets are considered jointly, Nicaragua's maintenance expenditures are 33 percent of its total road sector expenditures, which is considerable.

2.16 A cooperative-based maintenance microenterprise model has been relatively successful in Nicaragua for a long time.

2.17 The cooperative-based microenterprise model for routine maintenance has a long history. In 1997, the World Bank supported MTI in introducing a microenterprise-based maintenance model based on Colombia's experience to ensure regular maintenance and provide employment opportunities to people close to the roads to be maintained. In 2006, when FOMAV was fully operational, it took over MTI's 36 microenterprise contracts and helped create new ones. At the time of IEG's mission, FOMAV employed 75 microenterprises, which are cooperatives. FOMAV uses direct contracting to hire them and provides two-year contracts. Contracts are generally renewed, but FOMAV cited instances without renewal.

2.18 The model has been used relatively successfully to deliver basic road maintenance and social benefits to its members. IEG's field visits showed generally adequate basic routine maintenance. Minor maintenance weaknesses included trash removal, especially in urban areas, and cleaning of dirt and vegetation between pavements and shoulders. Through interviews with 16 microenterprise members and workers, IEG found that (i) many microenterprises had been operating for extensive periods; (ii) the cooperative membership had been stable, and people left because they found better employment opportunities or passed the membership to a family member; and (iii) they appreciated the stability of a formal job with a regular salary, which changed their lives by improving housing and the providing the opportunity to potentially save and study or even set up a side business.

2.19 IEG's analysis indicated several factors that might have influenced the sustainability of the community-based model. First, FOMAV can, by law, directly contract microenterprises. The fact that microenterprises had to be contracted using competitive bidding was one of the factors that led to the deterioration of the community-based maintenance model in Peru, where it was mostly replaced it with small companies.¹² Second, for most roads, the routine maintenance does not include pavement surface maintenance, such as patching, overlays or the replacement of concrete block. This type of maintenance is done by private companies because it requires more equipment and financial capacity. Third, because FOMAV has its own resources, they have no delays in paying the microenterprises. Fourth, Nicaragua has a

strong culture of cooperatives, with a specific ministry in charge of family, community, cooperative, and associative economy. This ministry supports the construction of cooperatives and provides them with basic training. Fifth, FOMAV has supervision consultants, which provide strong guidance, support and oversight in the field. Finally, the microenterprises maintain a network under FOMAV's direct responsibility. Conversely, in Peru, for example, the Ministry of Transport and Communications supported the creation of microenterprises for the network under the responsibility of regions and municipalities.

2.20 IEG's interviews and document review revealed some weaknesses in the model. First, the model is heavy in management and support. Second, although FOMAV asks microenterprises to include female members or workers, IEG found that female participation was low (two or three per microenterprise, consisting of around 15 members) or nonexistent. Male members still considered road work a job for men and frequently emphasized that only "light" activities, such as cleaning, were appropriate for women. Interviews with consultants and female workers revealed that women are keen to work in maintenance and that they have generally performed well. Third, IEG also found that (i) the members of two of seven microenterprises interviewed did not live near the roads to be maintained, which increases transport costs; (ii) the microenterprises might hire more workers than desirable in a model, where the works should be predominantly carried out by microenterprise members; (iii) the contract for only basic routine maintenance, which applies to the majority of microenterprises, does not specify how the microenterprises' performance is evaluated for payment purposes; and (iv) there are no clear criteria for contract renewal, and contracts are normally automatically renewed.

Results: What Didn't Work?

2.21 Despite significant achievements, Nicaragua's maintenance efforts are not enough to avoid the slow deterioration of road assets.

2.22 FOMAV's maintenance effort has not been enough to avoid the aging of pavements. IEG's field visits showed that the ease of transit on the project roads was good—only a few had isolated and localized structural issues—and essential maintenance activities, such as patching, replacement of concrete blocks, cleaning of drainage systems, vegetation control, and the replacement of road signage, had occurred. However, most asphalt pavements had cracks. In addition, their upper layers often had signs of wear and tear, which can be expected given their age. Similarly, concrete block roads showed some cracking of transversal beams, and some places had concrete blocks that were worn out but not loose. Maintenance activities that help

extend the life of the roads, such as sand sealing of concrete block joints and sealing of cracks, were minimized or neglected.

2.23 This seems to be explained by the fact that FOMAV's maintenance resources have not kept up with the growth of the maintainable core network. FOMAV's annual resources for road maintenance increased from approximately \$2 million before the introduction of the dedicated fuel surcharge to \$46 million in 2014. These resources only increased by 2 percent to reach \$47 million in 2019, whereas the kilometers of roads under the responsibility of FOMAV increased by 36 percent from 2013 to 2019. Between 2014 and 2019, Nicaragua's total maintainable core network increased by 97 percent. In interviews, FOMAV staff stated that "with the increase in the 'maintainable' network, it can only carry out corrective but not preventive maintenance and periodic maintenance is not optimal." This is confirmed in a project-financed study, which reported that "FOMAV's backlog is increasing because, due to limited available resources, the contractual maintenance has mainly been corrective and not with the necessary rigor nor on 100 percent of the network as required. This puts the road network in a critical state because it might collapse in the medium term without adequate maintenance" (MC² Group 2014).

2.24 The insufficiency of FOMAV's resources is also reflected in the decrease of maintenance intensity. A closer look into FOMAV's unit costs for maintenance shows, for instance, the average cost to maintain asphalt roads was \$43,435 in 2016. This gradually reduced to \$31,779 in 2019. FOMAV staff pointed out that this was due to the prioritization of intervention types and roads to maintain. Similar decreases happened for periodic maintenance of the other pavement types. In addition, the kilometers of road annually covered with periodic maintenance reduced drastically from 1,311 kilometers in 2015 to 689 kilometers in 2019.

2.25 Similarly, MTI's maintenance efforts are not sufficient. The kilometers maintained by MTI increased from an annual average of 1,185 kilometers between 2012 and 2018 to 2,074 in 2019. However, this near-doubling was accompanied by only a 50 percent increase in resources. This likely indicates that their maintenance was not intensive (IEG did not visit roads maintained by MTI). In addition, MTI's maintenance budget in 2019 left 14 percent of less important and unpaved roads of Nicaragua's maintainable core network of 7,198 kilometers unattended.

Design and Preparation: What Worked?

2.26 By insisting on a data-based selection of road works and supporting planning systems and data collection, the World Bank helped MTI and FOMAV develop their

planning capacity and adopt data-driven approaches to investment and road asset management decisions.

2.27 **With the support of the World Bank and other donors,¹³ MTI and FOMAV set up separate planning systems, which emerged at different times and have different purposes.** MTI's pavement management system originated in the late 1990s and uses the Highway Design and Maintenance and Road Economic Decision models to make decisions on new investments. FOMAV acquired the SIGMAVIAL (*sistema integrado de gestión de mantenimiento de redes viales*) system much later and uses the Highway Design and Maintenance and Road Economic Decision models for maintenance decisions. MTI's system, although still operational, is technically outdated and not compatible with FOMAV's more recent system. Both institutions stated that they shared data via Microsoft Excel on request. Two separate systems are justified, given both institutions' independence and different functions. However, the noncompatibility of databases is a missed opportunity, likely resulting in duplications of efforts and errors.

2.28 **Although their data collection has challenges, MTI and FOMAV largely apply data-driven approaches to decision making, which is an achievement for many developing countries.** Data collected only for the core network includes traffic,¹⁴ deflection, roughness, and road conditions. The regularity with which these data are collected was not clear to IEG. Data collection is carried out in-house or included in work supervision contracts. FOMAV is still finalizing the data collection for the network under their responsibility. As discussed in the Implementation and Supervision: What Did Not Work? section and in appendix A under Quality at Entry, MTI has increased its rigor and sophistication over time in selecting road works for World Bank financing. The MTI regularly develops five-year investment plans and translates them into annual investment plans based on available resources. MTI also uses the data collected for planning to prepare statistics on the road network and transit in the country. FOMAV uses its planning capacity and system to make maintenance decisions in a budget-constrained environment even if its database is not yet complete.

2.29 **IEG's assessment indicates several reasons why Nicaragua's road institutions were able to develop their planning capacity and use a data-driven approach to planning in the road sectors.** First, and probably most important, most of Nicaragua's investment budget in the sector comes from international financing intuitions and donors, which according to MTI staff interviewed, "require rigor in the selection of projects." Second, the Ministry of Finance requires prefeasibility studies for all proposed investments, and MTI cannot hire consultants to perform these studies. Third, in the case of FOMAV, limited resources require them to be as efficient as possible. Finally, capacity and training efforts have been sustained in both institutions by limited staff turnover.

Design and Preparation: What Didn't Work?

2.30 Several technical assistance activities may not have been carried out because of design or preparation shortcomings.

2.31 IEG found little information on a proposed partial decentralization of the road network to municipalities and the planned World Bank support did not take place.

The PAD explains that (i) Nicaragua's National Development Plan 2005–09 envisaged a national decentralization strategy to enhance the provision of public services and (ii) MTI planned to gradually transfer 12,065 kilometers of roads to municipalities (World Bank 2006a). The World Bank was to support this effort through workshops on national and international road decentralization experiences, which would lead to an increase in the decentralized share of the road network. IEG interviews found that nobody at MTI—not even staff who worked in the institution when the project was designed and implemented—or the mayor knew about an effort to partially decentralize the road network. These people also did not recall workshops on decentralization, and aide-mémoire and Implementation Status and Results Reports do not mention the topic. In its comments to the draft version of this report, MTI pointed out that the planned workshops did not take place because it was not part of their infrastructure strategy.

2.32 This could indicate that it was premature to support the decentralization effort even though this support could have been valuable. The National Development Plan was issued at approximately the same time as the project was prepared, and the PAD includes no discussion of the status of the government's decentralization effort. This could mean that it was too early to design a meaningful support strategy. However, had the decentralization taken place, the World Bank's support could have been valuable because experience from other countries shows that decentralizing road networks is complex and requires adequate capacity and resources in the municipalities.

2.33 IEG was also not able to find conclusive evidence that the activities on axle load control were carried out. Neither MTI staff responsible for axle load control nor World Bank staff interviewed recalled World Bank-supported activities on axle load control. From the references in the Implementation Status and Results Reports (World Bank 2006–14 and World Bank 2012–17), it is also not clear what type of support was planned and if it materialized. The ICR of the Rural Roads Infrastructure Improvement Project only mentions "study to reform the axle load control system" among the key outputs by component (World Bank 2018b).

2.34 If the goal was for the project to significantly help MTI improve its axle load control system, the project should have provided more substantial support. Axle load control is essential to avoid vehicle overloading and premature road damage, which helps efficiently sustain the investments. Axle load control is complex because of weak

enforcement in many countries and powerful trucking lobbies, which was recognized in the PAD (World Bank 2016). Nevertheless, World Bank support was vaguely defined and limited. The project also had no indicator to measure success. Therefore, if MTI was committed to tackling this problem (which is not clear) a better defined and more substantial support might have made a difference.

2.35 Similarly, IEG's assessment indicated that both projects could have been more ambitious in terms of road safety. According to current and former MTI staff and other interviewees, Nicaragua's road safety record has worsened, the road safety responsibilities are fragmented, and the National Road Safety Council created in 2004 is not active. Consequently, a focus on road safety in both projects was important. However, support was weak because road safety improvements were mainly through rehabilitating roads in such bad condition that they constituted a road safety hazard and through adequate road design features. The Rural Roads Infrastructure Improvement Project was also meant to review Nicaragua's road safety management capacity. Both projects did not have road safety indicators to measure success.

Implementation and Supervision: What Worked?

2.36 Many of the preceding achievements owe at least part of their success to strong implementation and supervision. According to former MTI staff, this includes consistent improvements over time, such as strict quality control for concrete block surfacing.

Implementation and Supervision: What Didn't Work?

2.37 Insufficient and inconclusive evidence on the advantages of community-based concrete block surfacing units over other concrete block delivery models calls for a more thorough evaluation of this model.

2.38 Community-based concrete block surfacing units that combine road infrastructure delivery with short-term employment generation and other goals have become the predominant delivery model for concrete block roads in Nicaragua. This delivery model combines road construction with the social protection features of public works. According to MTI staff and mayors, the model is meant to build roads more quickly and at a lower cost, provide short-term employment to community members and experience to university graduates and young professional in rural areas, involve women, create ownership for road works at the local level, and establish a municipal road management capacity. The surfacing units function with a board of five young professionals and an accountant, who procure the necessary labor and resources and manage the road works awarded by MTI through direct contracting. These surfacing units were initially complementary to private sector contracting; however, over time,

they have become the prominent way to build concrete block roads, followed by force account construction, carried out by a government-owned entity and paid according to the actual cost of labor, materials, and equipment, with an additional percentage for overheads and a mark-up for profit.

2.39 The concrete block surfacing units model seems to have achieved its infrastructure delivery goal. As discussed in the Results: What Worked? section, the concrete block roads visited by IEG were well built and, although some were already 10 years old, were mostly in good condition. In addition, several sources point to the conclusion that these roads enhance access and achieve their objective of improving road infrastructure.

2.40 In terms of short-term employment creation, the evidence is inconclusive, and the model might have weaknesses in the selection of participants. The two projects employed 11,392 people in total, with approximately 80 percent in manual labor and 20 percent as board members. These people had a formal job for an average of six months. However, a recent study did not find strong evidence that the concrete block surfacing units in the Fourth Road Rehabilitation and Maintenance Project generated short-term employment (Garza and Perova 2020). Specifically, the study did not find significant changes in employment associated with the presence of concrete block surfacing units in a municipality, although it found an association with an increase in likelihood of working as a laborer. According to the study, this result suggests that recruitment in concrete block surfacing units might have constrained the effectiveness of targeting the short-term jobs to unemployed people.¹⁵ This seems in line with IEG's impression that the selection of participants in surfacing units might not have been fully open and transparent. In fact, on asking 17 former surfacing units' board members and one laborer how they joined the surfacing units, most interviewees pointed out that they heard about this opportunity from friends or family members and, in one case, because they were related to the mayor.

2.41 IEG has no information on the previous employment status of manual laborers of concrete block surfacing units; hence, it is not clear if these units created employment opportunities for unemployed people or simply attracted people from other jobs, such as farming. Evidence from IEG's limited interviews with road maintenance microenterprise members and workers, which is a similar sector, indicates that many previously worked on farms, in tourism, or as housewives, but it is unclear if they were unemployed just before joining the microenterprises.

2.42 University graduates and young professionals had difficulties transferring their newly acquired skills to stable jobs in their field. IEG's interviews with former members of boards of directors of surfacing units, convoked by mayors,¹⁶ showed that

they appreciated the learning and experience. Several pointed out that they particularly enjoyed the level of responsibility and the self-confidence they gained. They cited other benefits, such as the opportunity to improve their homes, eat better food, and save money. However, after their work in the surfacing units, most interviewees and their colleagues found short-term jobs, remained unemployed, emigrated, or participated in subsequent concrete block surfacing units. The latter explains why nearly one-third of the interviewees had worked in several concrete block surfacing units. This is not in line with the original idea of providing working experience to as many people as possible. Similarly, IEG noticed that only two-thirds lived locally and one-third were age 30 or older; therefore, they were not part of the target population for board members.¹⁷

2.43 Insufficient data preclude meaningful conclusions on the lasting cost advantages of the concrete block surfacing units over other delivery models.

According to the study on concrete block roads in Nicaragua, in the early 2010s, concrete block surfacing units delivered concrete block roads for 47 percent less than private contractors and 17 percent less than force accounts (Muzira and Hernandez de Diaz 2014). Former and current MTI staff mentioned that surfacing units frequently did not spend all their allocated resources, and they used the remainder to pave a few additional kilometers. During 2018 and 2019, delivery through concrete block surfacing units was 21 percent more expensive than through force accounts. According to MTI staff, this is because the cost figures for force account are calculated differently and do not reflect the real market price. In addition, drainage is not included under force accounts, which was approximately 5 percent of the price in a recent concrete block surfacing unit contract. As for delivery through private contractors, MTI has not recently used this model for concrete block pavements. However, by updating the price of an earlier contract for concrete block surfacing by a private contractor with current unit prices, IEG found that it would have been 3 percent cheaper than the cost of a similar 2019 contract of a concrete block surfacing unit.

2.44 IEG also found that the concrete block surfacing units delivery model has challenges. First, based on the interviews with MTI staff and participants in the concrete block surfacing units, the model constitutes a planning challenge because the amount and type of work each unit can carry out depends on the direct contracting limit of \$600,000. Therefore, for one road section, MTI can easily have 10 small contracts with different scopes, such as one contract for part of the earthworks and part of the concrete block laying, another for drainage and part of concrete block laying and so on. Second, this requires a lot of coordination because the activities are sequential and some are procured by MTI for all units, such as the earthworks and the supply of concrete blocks. Third, each new surfacing unit can be composed of new people to maximize the number of youth exposed to professional experience. This makes the model training intensive

and requires extensive guidance, support, and oversight during implementation to obtain the required quality. Fourth, the model is also labor-intensive in terms of supervision, monitoring, and evaluation. In addition to normal technical and safeguard performance supervision, MTI must also control all small contracts and purchases of the surfacing units.

2.45 FOMAV has not been able to take full advantage of the performance-based maintenance contracts.

2.46 FOMAV experimented with innovative maintenance contracting models. In 2016, with the support of the World Bank, FOMAV piloted two performance-based maintenance contracts with microenterprises that combined basic routine and periodic maintenance for concrete block roads. The pilots were also expected to engage the labor force of the concrete block surfacing units to carry out the maintenance to achieve sustainability and take advantage of their technical expertise and knowledge of the road. After the two-year pilots, FOMAV recontracted the microenterprises with their own resources. In the ongoing Rural and Urban Access Improvement Project, FOMAV awarded five new performance-based routine and periodic maintenance contracts.

2.47 Although the supervision consultants indicated that the pilot contracts worked well, IEG found that the performance-based routine maintenance contracts had shortcomings in design and implementation. In terms of design, the contracts (i) provided no incentive for the microenterprises to reach more than the minimum overall service level because the full monthly payment was due when this minimum was reached and a higher service level made no difference; (ii) included service standards related to periodic maintenance, such as the absence of deformations or broken concrete blocks, but the quantities for periodic maintenance works were limited and had to be programmed by the supervision consultant; (iii) combined rural and urban roads, which have different characteristics in terms of trash removal, for example, that were not fully reflected in the service levels; (iv) had more than 20 performance standards, which are complex to monitor and might not all be necessary; and (v) reduced the minimum overall service level from 85 to 75 percent in the case of local financing to compensate for the financial resources shortage instead of adjusting the contract scope. This prevented the performance-based maintenance contract from reaching its full potential.

2.48 Contract implementation also showed potential weaknesses. Based on its interviews, IEG found that (i) microenterprise members in one of the pilot contracts had not previously worked in the community-based concrete block surfacing units, which the supervision consultant explained was because of the time that had elapsed between the end of the road surfacing and the issuing of the maintenance contract;¹⁸ (ii) many microenterprise members and workers had little previous construction experience and

received limited technical training; (iii) the supervision consultants provided substantial guidance, support and oversight even for routine maintenance, whereas this contract type should have incentivized the microenterprises to become more independent and reduce the amount of supervision; (iv) some microenterprise members and even supervision consultants did not fully understand the service levels to comply with or the procedures to measure compliance and calculate payments;¹⁹ and (v) the performance-based contract might not have been strictly applied because supervision consultant and microenterprise members pointed out that there is flexibility in the performance assessment and none of the interviewed microenterprises had ever had deductions or fines.

2.49 Several technical assistance activities lacked broad stakeholder participation and outreach activities, which might have increased the use of the recommendations and products of project-financed studies.

2.50 The most critical recommendations of the study on financial sustainability and institutional strengthening of FOMAV have not been implemented,²⁰ and the outputs of consulting services for a rural roads program for productive areas for 2016–34 have only been partially used. FOMAV staff pointed out that several organizational, technical, and human resource–related recommendations of this study, such as FOMAV’s reorganization, the preparation of manuals, and capacity strengthening, have taken place. More controversial but critical recommendations, such as ensuring FOMAV’s financial sustainability or taking over the responsibility for axle load control, have not received follow up. The rural roads program was expected to address the infrastructure backlog in the road sector and required financing of \$2.9 billion. This was to be leveraged from international financial institutions. The program was part of the study on a comprehensive road improvement program in productive areas, which also updated MTI’s road investment decisions multicriteria analysis and developed a web-based tool to rate projects by strategic, social, poverty-related, technical, and environmental factors. Staff from MTI’s planning department confirmed that they regularly use the multicriteria matrix tool in their decision making and are working on a similar matrix for paved roads. However, they had only vague knowledge of the rural roads program, which they believed was used to select the roads in the ongoing World Bank project.

2.51 Neither study involved a broader group of stakeholders, which could have improved the outcomes and facilitated their implementation. The study reports do not mention any type of outreach or consultation during study implementation, and planning department staff of FOMAV and MTI confirmed that study preparation only involved their direct counterparts. Staff of the Inter-American Development Bank were not aware of the existence of the rural roads program for productive areas, and a

representative of the Cattle Farmers Federation lamented the lack of consultation in road selection. Although increasing the share of the dedicated fuel surcharge or creating new dedicated fees or taxes are difficult measures to implement, IEG believes that the close involvement of all parties with a stake in such measures could have helped identify more realistic options (although oil prices were so low in 2014 that an increase in the fuel surcharge might have been plausible) and facilitate their implementation. The project-financed studies could also have benefited from a detailed outreach strategy to follow up on the products and recommendations, without which the studies' impact was limited.

3. Lessons

3.1 Rigor in the selection of roads to be financed and continued support for road planning can help countries use resources effectively and create a planning culture.

Under both projects, roads were selected to improve access based on technical, economic, and social criteria. The requirement for rigor from all donors (which provided a substantial amount of the road budget) in road selection combined with sustained technical assistance over time helped establish a system and culture of planning in the country. This achievement was facilitated by limited staff turnover at technical levels in the road departments.

3.2 Contract features and strict enforcement appear critical to taking full advantage of performance-based routine maintenance contracts. In Nicaragua, weaknesses in performance standards and incentives, limited understanding of the latter by some microenterprises, and no strict enforcement, among other factors, prevented the contract type from delivering its full potential. The experience showed that contractual requirements need to be set realistically based on available capacity and resources, and strictly enforced.

3.3 Upgrading rural roads to all-weather access needs to be comprehensive. Under these projects, bridges and major drainage elements were not included as part of the civil works due to restrictions in the use of funds by the community-based concrete block surfacing units. Therefore, weaknesses in bridges and drainage elements still prevented people from traveling after heavy rains.

3.4 Providing limited technical assistance support in many areas with little up-front preparation might restrict project results. In both projects, several of the technical assistance activities were not comprehensive and were vaguely defined and prepared. Instead of tackling many issues only superficially, it might have been better to concentrate on a few critical areas with strong governmental buy-in or potential for buy-

in. In such cases, support could have been more substantial and more thoroughly prepared.

3.5 Close stakeholder involvement and post-completion outreach strategies might increase the usefulness of project-financed studies. In this case, the outcomes of several critical studies have only been partially used. This is a risk for all technical assistance activities; however, for studies that impact or require actions from parties other than the direct contractual counterparts, a close involvement of these parties in study design and implementation and a strategy to implement the proposed recommendations might have increased use of some studies.

3.6 A strong results framework is likely to facilitate results measurement. These projects (i) lacked definitions of concepts, such as access and mobility; (ii) had different indicators in different parts of the Project Appraisal Document, including some without baselines and targets, so no information was collected for several; (iii) used core indicators to measure outcomes not fully attributable to the projects; (iv) lacked intermediate indicators to capture results of technical assistance activities; (v) included baselines and targets to be defined during project implementation; and (vi) had several inadequate outcome indicators. This made results measurement unnecessarily complicated.

¹ This is the most recent data available on rural poverty. Overall, poverty went down from 29.6 percent in 2014 to 24.9 percent in 2016 (INIDE 2016). This report does not distinguish between urban and rural poverty; according to World Bank staff, the 2016 data have compatibility issues with the 2014 data. Cuesta and Chagalj (2019) point out that poverty fell annually from 2014 to 2017 as a result of positive real per capita growth and declining unemployment rates. For 2018, after a contraction in gross domestic product, rising unemployment, and declining affiliation to social security, the simulations show that the poverty rate went up by 4.8 percent, equaling approximately 300,000 more Nicaraguans in poverty.

² In 2010, labor force participation was 76.2 percent of the working age population and the employment rate was 92.2 percent of the labor force. In 2018, labor force participation went down to 74.6 percent, but the employment rate slightly increased to 93.5 percent (Castro-Leal and Porras-Mendoza 2019). The 2018 crisis might have worsened unemployment (see endnote 1).

³ The additional financing agreement defines “eligible emergency” as an event that has caused, or is likely to imminently cause, a major adverse economic or social impact to the recipient, associated with a natural or manmade crisis or disaster.

⁴ Understood by IEG as an enhanced ability to get to or from rural communities and producers.

⁵ The road users survey surveyed 1,670 people, including 490 drivers, 542 pedestrians, 213 producers, and 425 households, in the influence area of four project road sections after their completion. It was not a before-and-after study because of the lack of a baseline.

⁶ This study uses a before-and-after methodology in communities that were part of the Fourth Roads Rehabilitation and Maintenance Project.

⁷ According to the study, “the presence of a community-based cobblestone paving project in one’s municipality increases the likelihood of having one’s principal access point paved by 16.4 percentage points. The finding is robust to inclusion of a rich set of controls, including indicators for presence of other telephone and electric grid infrastructure. Notably, the magnitude of the estimate barely changes after we include these controls. The significance of the ‘Empresa’ indicator, a dummy indicator for municipalities that had roadbuilding projects constructed by contractors with heavy machinery and not cobblestone surfacing units, is not robust to the inclusion of control variables.”

⁸ This is based on the 2018 Ministry of Transport and Infrastructure (MTI) traffic counts and “back of the envelop counts” by IEG during the mission.

⁹ The study argued that because of their stiffness, concrete blocks, if laid over well-stabilized bases, are better suited to carry heavier loads without rutting, which is common for asphalt pavements with heavy traffic. The study compared the deterioration patterns of different pavements and concluded that, with only routine maintenance, an asphalt road would hold steady for approximately 12 years and then begin an accelerated deterioration; whereas, concrete block roads would hold in steady condition for 15 years and then deteriorate slowly. Their design life is 30 to 40 years compared with 20 years for asphalt pavements.

¹⁰ The core road network is the network that carries most of the traffic. Nicaragua has a total road network of 24,769 kilometers. The maintenance of the noncore network is the responsibility of the municipalities, which receive 20 percent of the fuel surcharge from the Road Maintenance Fund (Fondo de Mantenimiento Vial; FOMAV). IEG did not ascertain if these resources are adequate to maintain the noncore network because this was not part of the project scope. However, two of the three mayors interviewed by IEG mentioned that they used these resources to surface roads, which is a likely indication that they neglect maintenance.

¹¹ The maintainable part of the core network are the roads in excellent, good, and regular condition, which in 2019 consisted of 7,198 kilometers. The remaining roads of the core network cannot be brought up to a regular condition through maintenance and need a different type of intervention.

¹² When Peru shifted to competitive bidding for rural roads maintenance and reduced support to community-based microenterprises, the latter started to disappear and were mainly replaced with small companies. This is likely because the community-based microenterprises were not sufficiently entrepreneurial to participate in biddings or not competitive enough to win bids. Although a switch from community-based maintenance microenterprises to small companies a priori is not a bad and requires less support from the road agency, Peru’s road agency staff at the national and municipal levels mentioned that the maintenance quality of small companies was

inferior to microenterprises because (i) they do not have the same care for the roads as microenterprise members living along a road on which they depend for access, and (ii) companies need to make profit. In addition, the social spirit of the model of providing people along the road with opportunities to earn money and acquire some entrepreneurial skills was lost.

¹³ The World Bank helped establish pavement and bridge management systems and create a planning capacity and culture in Nicaragua since the late 1990s. Through the two projects that are the subject of this Project Performance Assessment Report, the World Bank provided financing to (i) update the Highway Design and Maintenance database; (ii) carry out road inventory and condition surveys; (iii) create an economic prioritization tool, consisting of a multicriteria matrix for data-based ratings of road projects in productive areas based on strategic, social, economic, poverty-related, technical, and environmental factors; (iv) acquire data collection equipment; and (v) for training.

¹⁴ MTT's road inventory in ArcGIS is for the total national network, not only the core network.

¹⁵ The study also mentions that the lack of evidence on short-term employment creation might be partially explained by imperfect survey harmonization across survey rounds.

¹⁶ The selection of the interviewees might have been biased toward people without stable jobs because the latter might be more interested or have time to follow the municipalities' invitations.

¹⁷ The operations manual for the community-based concrete block surfacing units does not include age limits for board members, but the requirements are mainly designed to target recently graduated university with no or limited experience.

¹⁸ The supervision consultant also pointed out that the equipment of the concrete block surfacing units had been transferred to the municipalities, so the microenterprises had to start from zero. Therefore, if the purpose is to give continuity to the concrete block surfacing units, a way should be found to enable them to keep this equipment, possibly by renting or leasing it out.

¹⁹ This finding applies to the first days of the field visits, when IEG noticed a lack of understanding of the service standards and their evaluation for payment purposes. After commenting on this fact to FOMAV officials, IEG found that the supervision consultants and most microenterprise members interviewed subsequently dominated well the service standards and evaluation procedures.

²⁰ The study on financial sustainability and institutional strengthening of FOMAV assessed the technical, financial, organizational, and institutional capacity of FOMAV; assessed its legal framework; prepared a priority five-year maintenance plan; and proposed recommendations with the necessary legal changes to implement them. This was important considering that FOMAV had only recently been fully operationalized and its financial resources were limited.

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Appendix A. Project Ratings

Fourth Roads Rehabilitation and Maintenance Project (P083952)

Table A.1. Fourth Roads Rehabilitation and Maintenance Project

Indicator	ICR	ICR Review	PPAR
Outcome	Highly satisfactory	Satisfactory	Satisfactory
Risk to development outcome	Moderate	Moderate	Moderate
Bank performance	Satisfactory	Satisfactory	Satisfactory
Borrower performance	Satisfactory	Satisfactory	Satisfactory

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. PPAR = Project Performance Assessment Report.

1. Relevance of the Objectives and Design

Objectives

The project development objective (PDO) of the Fourth Roads Rehabilitation and Maintenance Project was to (i) improve the recipient's transport infrastructure along selected main road corridors, (ii) improve access to productive zones and rural communities, and (iii) ensure the sustainability of the road improvements carried out under the project.

The project received additional financing mainly to cover cost overruns caused by significant construction material and oil price increases. The additional financing did not alter the PDO, but it changed the targets of two outcome indicators. It also added a new outcome indicator to improve the results measurement. The target of one outcome indicator, the increase in the average annual daily traffic, was increased to account for a longer project implementation period. The target of the other outcome indicator, the increase in daily bicycle use, was revised downward to correct for a design shortcoming.¹ In addition, this outcome indicator is not fully adequate to measure the achievement of the PDO. Therefore, the level of ambition of the project did not change, and no split rating is carried out.

Relevance of the Objectives

By appraisal in 2005, poverty in Nicaragua's rural areas was very high (see the Background, Context, and Design section of the main document). Inadequate road infrastructure, with most of the country's road network in poor condition, was the main bottleneck in the transport sector, hindering mobility, private sector investment, and

economic growth. This, in turn, jeopardized poverty reduction. Rural people also lacked access to all-weather roads. Although by project close in 2014, poverty in rural areas went down, the road network improved, and the share of rural people with access to an all-weather road increased, these improvements were still not sufficient. Therefore, “improving transport infrastructure on main corridors,” “enhancing access to production areas and rural communities,” and “ensuring the sustainability of road investments carried out under the project” (World Bank 2006a) were and remained highly relevant.

The PDO was fully in line with the Productive and Social Public Infrastructure area of the fiscal year (FY)2003–05 World Bank Country Assistance Strategy, which included targets related to sustainable maintenance and improving rural access. It was also fully consistent with the FY06–07 World Bank Interim Strategy Note, which put greater emphasis on economic growth for poverty reduction.

The PDO remained fully aligned with the first three of the following four pillars of the FY08–12 World Bank Country Partnership Strategy (CPS; World Bank 2007), which include (i) reactivating the economy and stimulating productivity; (ii) infrastructure and sustainable development; (iii) governance and accountability by modernizing the state institutions; and (iv) promoting citizen participation and human capital development by improving social equity and opportunity. It remained fully consistent with the two strategic objectives of the FY13–17 World Bank CPS of “raising welfare by improving access to quality basic services, in particular for the rural poor households” and “raising incomes by improving productivity, competitiveness, and diversification.” Under this strategy, the World Bank was to (i) continue to support the rural roads sector; (ii) improve the road management framework; (iii) increase the share of roads in good condition; and (iv) make full use of immediate response mechanism of the International Development Association (IDA) while supporting the continued institutional development of the national disaster risk management system.

The PDO of this project was almost identical to the one of the Third Road Rehabilitation and Maintenance Project. The project activities were also a continuation of the activities under the previous project, but the selection of the road sections for intervention was done with a great level of sophistication, and the institutional support included new areas, such as axle load control and road network decentralization. Therefore, although the PDO was and remained highly relevant in the light of the country’s strategy, considering that this project was part of a continued engagement in the road sector, the PDO could have been more challenging; therefore, the relevance of the objectives is rated **substantial**.

Relevance of the Design

The design approach was relatively simple and straightforward. Except for the workshop on road network decentralization, which lacked a logical link to the PDO, the project's theory of change was clear.

Rehabilitating and improving trunk roads on main corridors were expected to decrease the International Roughness Index (IRI) on these roads, reduce vehicle operating costs, and increase the traffic. This, in turn, was an indication that the transport infrastructure on these corridors had improved (first subobjective).

Paving secondary and rural roads in productive zones and areas with rural communities was to improve the road surface, and an improved road surface was to increase the mobility of rural people to be measured by an increased bicycle use. Although increased mobility of rural people, understood by the Independent Evaluation Group (IEG) as the ease of movement by road, is a likely outcome of paving rural roads, it does not necessarily mean that access to productive zones and rural communities, interpreted by IEG as the ability to get to or from productive zones and rural communities, was improved (second subobjective). Paving secondary and rural roads was also to increase the share of the rural population with access to all-weather roads, which in turn was to improve the ability of people to get to or from productive zones and rural communities all year round.

Road maintenance was to increase the kilometers of roads regularly maintained and ensure sustainability of the road improvements under the project (third subobjective). Training of Ministry of Transport and Infrastructure (MTI) and Road Maintenance Fund (Fondo de Mantenimiento Vial; FOMAV) staff and support for road planning was to improve the planning capacity of MTI and FOMAV to sustain the road improvements under the project. Finally, the axle load control study was to reduce vehicle overloading, which was also expected to ensure the sustainability of the road improvements under the project.

However, the PDO was formulated differently in the main part of the Project Appraisal Document (PAD), appendix 3 of the PAD, and the financing agreement (World Bank 2006b). This led to inconsistencies in the monitoring and evaluation (M&E) framework, with indicators being different in the main text and the PAD's appendix 3. It also made it difficult to assess the project outcomes and the achievement of the PDO, especially for the subobjective of improving access to productive zones and rural communities (see Efficacy section, subobjective 1, below).

The project design relied on assumptions, such as the availability of sufficient funds for maintenance and the implementation of axle load control, for which risks were not

adequately identified, and mitigation measures were not devised. As presented subsequently, the project had weaknesses in terms of the results framework.

Because of this, the relevance of the design is rated **substantial**.

2. Efficacy

Subobjective 1: Improve the Recipient's Transport Infrastructure Along Selected Main Road Corridors

The rehabilitation of the Diriamba–La Boquita–Casares and the La Virgen–San Juan del Sur sections improved the transport infrastructure on these roads. By project end in 2014, the average IRI of both sections had decreased from 8.0 at appraisal to 2.6, exceeding the target of 3.5. The average IRI remained low; in 2019, it was 2.67. The IRI data are in line with IEG's field visit findings, which showed that the La Virgen–San Juan del Sur section recently received periodic maintenance and was in very good to good condition. The Diriamba–La Boquita–Casares section was in good to fair condition and showed signs of aging. Basic maintenance had been carried out.

The annual average daily traffic on these roads increased from 380 vehicles at appraisal to 480 vehicles by project end, exceeding the original target of 460 vehicles and meeting the revised target of 480 vehicles. In 2019, the annual average daily traffic for Diriamba–La Boquita–Casares, was 691 vehicles.² For La Virgen–San Juan del Sur, the annual average daily traffic was 3,362 vehicles in 2018.³ Due to fluctuations in MTI's traffic data, IEG compared them with its vehicle counts during the field visit and extrapolated them to 12 hours. This showed average daily traffic of 1,479 vehicles for Diriamba–La Boquita–Casares and 3,800 vehicles on the La Virgen–San Juan del Sur section. Although the approach used by IEG is not rigorous, it largely confirmed the order of magnitude of MTI's figures and showed that the traffic had further increased.

In one part of appendix 3 of the PAD, a 15 percent vehicle operating costs reduction on these sections was also envisaged. However, this indicator was not shown in the table with the baselines and target values (for details, see the Quality of Monitoring and Evaluation section). Therefore, during project implementation, no baseline and project-end values were collected, and IEG was not able to obtain data on vehicle operating costs reductions. However, because vehicle operating costs depend on the IRI and traffic levels, among other things, IEG estimates that the previously mentioned target was achieved.

Considering that traffic levels on both road sections increased substantially, the roads have been maintained, and the IRI continues below the target value, the efficacy of this subobjective is rated **substantial**.

Subobjective 2: Improve Access to Productive Zones and Rural Communities

The surfacing of 361 kilometers of rural roads with concrete blocks (13 percent more than the original and final targets of 320 kilometers) provided all-weather access to rural communities and producers in the influence areas of these roads. The share of the rural population living within 2 kilometers from a paved road increased from 34.23 percent in 2005 to 37.28 percent in 2018 and 37.90 percent in 2019 (the project had no project-end target).⁴ This achievement, however, can only be partially attributed to the project roads because the indicator refers to the entire country. Nevertheless, as discussed in the Results: What Worked? section of the main document, different sources point to the conclusion that the project improved the ability to get to or from productive zones and rural communities.

With respect to bicycle use, which was to measure the increase in mobility of rural community residents, IEG found that it is likely lower than mentioned in the Implementation Completion and Results Report (ICR; World Bank 2015). According to the latter, the daily bicycle traffic increased from almost 0 in 2006 to over 320 bicycles by project end, exceeding the revised target of 300 bicycles but significantly lower than the original target of 500 bicycles. IEG found that no statistics on bicycle use exist and, therefore, was not able to verify if the project-end value of 320 bicycles was an estimate or came from actual bicycle counts.

IEG's bicycle count on 23 road sections, extrapolated to a 12-hour average, showed a daily simple average traffic of 155 bicycles and a weighted average traffic of 165 bicycles. Despite the methodological shortcomings, the bicycle counts confirmed IEG's impression that Nicaragua has relatively little bicycle use and that it is concentrated in the central-western and southwestern parts of the country.

Several sources indicated that the ability to get to or from productive zones and rural communities improved and, as mentioned in the Relevance of the Design section, increased bicycle use might indicate enhanced mobility. However, this does not necessarily mean that access to productive zones and rural communities improved. Therefore, overall, the efficacy of this subobjective is rated **substantial**.

Subobjective 3: Ensure the Sustainability of the Road Improvements Carried Out under the Project

By project end in 2014, FOMAV had carried out routine maintenance on 3,200 kilometers of roads, exceeding the original target of 2,400 kilometers and the revised target of 2,700 kilometers. This included routine maintenance on the 413 kilometers of roads surfaced and rehabilitated under the project. FOMAV also carried out periodic maintenance on 95 kilometers of roads, exceeding the target of 80 kilometers. In 2019,

FOMAV carried out basic routine maintenance on 4,121 kilometers and periodic maintenance on 689 kilometers, including all project roads. These efforts contributed to increase the share of the total road network in good and fair condition from 20.0 percent at appraisal to 23.3 percent by project end. However, the figures, reported in the ICR, are not in line with the 2011–19 figures provided by MTI to the IEG mission (World Bank 2015). According to the latter, in 2014, the share of roads in good and fair condition was 15.1 percent, and it was 29.0 percent in 2019.

As discussed in the Results: What Worked? section of the main document, Nicaragua managed to put in place sound maintenance arrangements. During project implementation, FOMAV successfully took over the routine maintenance activities from MTI and, by project end, managed and supervised 52 routine maintenance microenterprises. This meant that FOMAV had created 19 new microenterprises, far exceeding the target of four. FOMAV currently employs 75 microenterprises and has created, on average, 3.5 microenterprises per year since 2012.

Furthermore, IEG found that the country spends a significant share of its budget on road maintenance, FOMAV seems to use the available resources efficiently, and the project roads driven on during IEG's field visit were in good and good to fair condition (see the Results: What Worked? section of the main document). However, this has not been enough to avoid the slow deterioration of road assets.

In addition, IEG did not find evidence that the planned support on axles load control has materialized (see the Results: What Didn't Work? section of the main document). IEG also did not find conclusive evidence that the country's axle load control system functions satisfactorily. MTI staff pointed out that their axle load control system is successful because there are no overloaded vehicles in circulation. During seven days of the field visits, IEG did not come across any axle load control station or checkpoint. IEG also did not notice many obviously overloaded trucks.

Partially with the support of this and other World Bank projects, Nicaragua significantly progressed in sustaining its road assets, including the project roads. This is a great achievement compared with many other countries. On balance, even if Nicaragua's efforts have not been fully sufficient, the efficacy of this subobjective is rated **substantial**.

3. Efficiency

Economic Analysis

At appraisal, an economic analysis was carried out for the two trunk roads to be rehabilitated using the Highway Development and Maintenance model, version 3, and a

discount rate of 12 percent. The assumptions provided in the PAD appear reasonable. The analysis showed an economic internal rate of return (EIRR) of 36 percent and a net present value (NPV) of \$7.67 million for the Diriamba–La Boquita section⁵ and an EIRR of 61 percent and a NPV of \$10.05 million for the La Virgen–San Juan del Sur section.⁶ The sensitivity analysis considered a decrease in benefits by 20 percent and an increase in investment costs by 20 percent. This yielded EIRRs of 29.8 and 28.6 percent, respectively, for the first section, and of 51.4 and 49.5 percent, respectively, for the second section.

For the secondary and rural roads, two economic analyses were carried out, one for the concrete block–surfaced roads to be implemented by private contractors and one for those to be implemented by community-based concrete block surfacing units. The economic analysis for the works to be carried out by private contractors included 14 road sections, with a length of 280 kilometers, using the Road Economic Decision (RED) model and a discount rate of 12 percent. This analysis yielded an aggregated EIRR of 30 percent and an aggregated NPV of \$40.87 million. The sensitivity analysis considered a decrease in benefits by 20 percent and an increase in investment costs by 20 percent. This yielded EIRRs of 26 and 27 percent, respectively.

The economic analysis for the works to be carried out by the community-based surfacing units included 11 road sections, totaling approximately 40 kilometers. This analysis also used the RED model and a discount rate of 12 percent. It showed an aggregated EIRR of 58 percent and an aggregated NPV of \$7.23 million. The sensitivity analysis considered a decrease in benefits by 20 percent and an increase in investment costs by 20 percent. This yielded EIRRs of 46 and 48 percent, respectively.

The additional financing economic analysis used the RED model and followed the appraisal methodology. It covered 11 road sections for about 144 kilometers. This included the update of the economic analysis of the road works to be carried out by the community-based surfacing units envisaged under the original project but to be financed through the additional financing. The analysis showed an aggregated EIRR of 20 percent and an aggregated NPV of \$18.66 million. The additional financing project paper does not mention a sensitivity analysis.

By project close, the economic analyses were repeated following the appraisal and additional financing methodologies. With respect to the two trunk roads, for the Diriamba–La Boquita section, the ex post analysis showed an EIRR of 27.8 percent and an NPV of \$9.10 million. The lower EIRR, compared with the appraisal EIRR of 36 percent, was mainly attributed to inferior traffic growth than anticipated. For the La Virgen–San Juan del Sur section, the analysis showed an EIRR of 46.4 percent and an NPV of \$18.18 million. In this case, the lower EIRR, compared with the appraisal EIRR of

61 percent, was mainly thought to be owing to higher construction costs than anticipated.

For the secondary and rural roads, the ex post economic analysis for 198 kilometers of roads financed with funds of the original project yielded an EIRR of 54 percent and an NPV of \$129.21 million. Despite large cost increases, the ex post EIRR is significantly higher than the appraisal weighted average EIRR of 34 percent from both economic analyses for the 320 kilometers of secondary and rural roads, which may be caused by significant increases in traffic.

For the 163 kilometers of roads financed with resources of the additional financing, the ex post EIRR was 34 percent, and the NPV was \$53.4 million. This is significantly higher than the estimated ex ante EIRR of 20 percent and the NPV of 18.66 million. Due to a lack of information in the additional financing project paper, IEG was not able to explain this difference.

Administrative and Operational Efficiency

As mentioned, the project had significant cost overruns owing to increases in the price of oil products and other construction materials, which required the additional financing. Between 2004 and 2009, all key inputs for concrete block surfacing suffered major increases, such as 99 percent for cement, 50 percent for concrete blocks, and 150 percent for transport costs. The overall project cost was 76 percent higher than the appraisal estimate and 7 percent higher than the additional financing estimate.

The project was extended three times for a total of two years and nine months. These extensions were necessary to implement a limited number of new activities introduced with the additional financing and because of the procurement delays mentioned in appendix B. This required additional resources for recipient project implementation and World Bank supervision resources.

Although the project suffered from significant cost and time overruns, the ex post economic analyses showed robust rates of returns. Overall, the efficiency of the project is rated **substantial**.

4. Outcome

The relevance of the project objective and design are rated substantial. The efficacy rating for each of the three subobjectives is substantial. The project improved the recipient's transport infrastructure along selected main road corridors, improved access to rural communities and producers, and made substantial progress toward ensuring the sustainability of the road improvements carried out under the project. The project's

efficiency is substantial, as it was implemented largely efficiently despite significant cost and time increases. Therefore, the outcome of the project is rated **satisfactory**.

5. Risk to Development Outcome

The project's main risks relate to the following areas:

Road maintenance capacity: The risk that FOMAV's road maintenance capacity will not be sustained is low. In the course of this project, FOMAV has developed the necessary capacity to manage and supervise road maintenance works, including the project roads, and it has been using the available resources efficiently.

Road maintenance resources: Although FOMAV is no longer dependent on budgetary allocations for road maintenance, its resources from the dedicated fuel surcharge are not enough to prevent the road assets from deteriorating. Similarly, and despite increasing annual maintenance budgets, MTI also does not have the necessary resources to provide maintenance to all the maintainable core network. This is a significant concern because the maintainable core network is increasing.

Axle load control: A well-functioning axle load control system is essential to sustain the roads investment in an efficient manner. However, as mentioned in the efficacy section, IEG did not find evidence that the project contributed to improve the axle load control system. IEG also did not find conclusive evidence that the country's axle load control system functions satisfactorily. Because axle load control is complex, this risk is considered substantial.

Planning and programming capacity and systems: FOMAV and MTI continued to strengthen their planning and programming capacity since project completion, and there is little staff turnover in the respective planning departments. FOMAV has also significantly improved its planning system. However, MTI uses an outdated system. Therefore, the risk that FOMAV's planning capacity and system will not be sustained is low, but MTI's system requires an overhaul.

Access improvements: The project's access improvements materialized and have so far been sustained through largely adequate maintenance. These improvements could be endangered if maintenance is largely neglected in the long run.

Based on the above, the risk to the development outcome is rated **moderate**.

6. Bank Performance

Quality at Entry

The World Bank team helped design the project based on the previous successful road rehabilitation and maintenance projects. They continued with the same focus on investments to improve and expand the trunk and rural road networks, the use of concrete block pavements and community-based concrete block surfacing units, the strengthening of routine maintenance microenterprises, ensuring funding and sustainability of maintenance, and strengthening of the sector's capacity and organizational arrangements. New elements included the approach to the rural roads selection and the focus on new areas for institutional support, such as axle load control. Although the inclusion of new areas of support is commendable, in hindsight, some activities could have benefited from more preparation, as mentioned in the Results: What Didn't Work? section of the main document.

The World Bank team supported MTI in devising a system for the selection of rural roads to be improved. The team also ensured that the incorporation of lessons from previous operations, such as the need for a balanced project that combines infrastructure with institutional strengthening and sustainability concerns. The World Bank team used the same implementation arrangements as in the Third Roads Rehabilitation and Maintenance Project, which were satisfactory. The team adequately identified the safeguard issues and ensured the preparation of the safeguard documents required at appraisal. The team also adequately assessed the project's fiduciary aspects.

The World Bank team rated most identified risks as substantial or modest and suggested largely adequate mitigation measures. However, not all potential risks were identified. For instance, the allocation by the recipient of insufficient funds for road maintenance and a reluctance of MTI to implement axle load control were not flagged, and no mitigation measures were identified. As noted subsequently, the M&E design had shortcomings.

Looking at the big picture, the quality at entry shortcomings were minor; hence, **the World Bank's performance at entry is rated satisfactory.**

Quality of Supervision

The World Bank team continuously supported MTI and FOMAV in project implementation. The team carried out multiple safeguard and fiduciary workshops. In particular, the team provided extensive institutional strengthening on environmental management and the implementation of environmental safeguards to MTI and FOMAV staff and at the municipal level. The team also helped improve the procurement

arrangements for community-based concrete block surfacing units and adapt the respective bidding and evaluation documents, provided extensive procurement training, and closely supervised their procurement activities.

The World Bank team was proactive in restructuring the project and preparing the additional financing to respond promptly to changed circumstances, such as the increase in construction costs. The additional financing project paper is comprehensive and thoroughly done. It includes detailed appendixes that help clarify and justify the project changes, such as the detailed analysis of the cost increases and the table with differences of the PDO and project description in the PAD and the financing agreement.

The World Bank team provided proactive and useful suggestions to the implementation agency, such as how to prepare a manual for the community concrete block surfacing program and compare the costs of concrete block surfacing through different contracting models. The team also supported a master decree in transport and shorter specializations and trainings.

The World Bank team met with project consultants and provided constructive feedback to their work. The team used the project to carry out a strong sector dialogue, reaching out and providing advice to different departments in MTI. The team also strongly focused on improving the microenterprise maintenance model. Based on this, **the quality of supervision is rated satisfactory.**

Overall, World Bank performance is rated **satisfactory.**

7. Borrower Performance

Government Performance

The government was strongly committed to concrete block surfacing, the community-based surfacing units, and the microenterprises. IEG visited the “concrete block meter” on the MTI premises, which was used to monitor the achievement of the targets for concrete block surfacing. The government provided adequate counterpart funds to the project. The actual government contribution was \$16.13 million compared with the appraisal commitment of \$9.91 million. The government also ensured a regular flow of funds to FOMAV for road maintenance.

The mayors in the areas where the concrete block roads were implemented showed a strong commitment to the project. IEG met with three mayors, who were enthusiastic about the concrete block roads and the community-based surfacing units. Therefore, **the government performance is rated satisfactory.**

Implementation Agency Performance

The implementation agencies at MTI and FOMAV consisted mainly of staff, and the MTI's project coordination unit was supported by a limited number of consultants. The unit had gained considerable implementation experience through previous road projects and had a high technical, project management, and coordination capacity. The unit quickly solved procurement and financial management issues and adequately carried out these functions with the support of the respective units in the MTI. It effectively handled the relationships internally within MTI and with FOMAV and the municipalities. A weakness was the collection of regular data for certain indicators.

MTI's project coordination unit's performance was particularly strong in the support, coordination, and monitoring of the concrete block surfacing program, which involved many different municipalities and community-based concrete block surfacing units. The unit played a critical role in providing technical advice and sharing knowledge with the municipalities and community-based concrete block surfacing units. The unit supported them in safeguard matters, financial management, and procurement and adequately monitored the large number of agreements, small contracts, and financial transactions. The unit prepared the concrete block surfacing manual, which included useful guidance on the project cycle and procurement, safeguards, and environmental procedures.

FOMAV also satisfactorily carried out the activities under the project related to road maintenance and acquired a strong road maintenance planning and management capacity over time. Therefore, the implementation agency performance is rated **satisfactory**.

Overall, borrower performance is rated **satisfactory**.

8. Quality of Monitoring and Evaluation

Design

MTI's project coordination unit was to be responsible for project M&E and for the impact evaluation by project end. The data collection for M&E was to be carried out by MTI and FOMAV. The impact assessment was to be carried out by a specialized Nicaraguan agency with experience in impact assessments of transport projects.

The M&E design included outcome indicators, which were aligned with the subobjectives. The outcome indicators included in the annex 3 of the PAD on Results Framework and Monitoring generally had adequate and baselines and targets (except for the bicycle use increase target). However, the outcome indicators were insufficient,

especially to measure improved access to productive zones and rural communities, and some had shortcomings.

“Improvements in transport infrastructure along selected main corridors” were to be measured through the “increase in traffic volumes” and the “reduction in vehicle operating costs.” However, in the table with the arrangements for results monitoring, the baseline and target for the outcome indicator of “reduction in vehicle operating costs” referred to the average IRI instead of vehicle operating costs. Although reduced vehicle operating costs and a reduced IRI both indicate that the road infrastructure improved, they do not measure the same. A lower IRI means that the smoothness of the road surface improved; however, reduced vehicle operating costs not only depend on the IRI but also on the vehicle fleet’s characteristics and related costs, the road profile and geometry, the road type, traffic, and vehicle speeds.

“Improvements in access to productive zones and rural communities” was to be measured through “increased mobility for residents of rural communities,” shown by the increased number of people using bicycles. If rural people who had previously walked were able to use bicycles because of the road improvements, their mobility increased. However, the PAD and ICR do not provide details on the mobility habits of rural communities. In addition, the subobjective is about *access* and not *mobility*, which are different concepts and for which no definitions were provided.

The PAD, in the main text, included two indicators suitable to measure improved access, consisting of “time savings along the road corridors linking to productive zones” and “number of rural communities provided with improved road access.” Because these indicators were not included in annex 3 of the PAD, they had no baselines and target values and were not monitored.

The additional financing added the outcome indicator of “share of rural population with access to an all-weather road.” This is a core indicator required for all IDA operations. It refers to the number of people living within 2 kilometers of an all-season paved road, and an increase in this share is an indication of improved access. However, the indicator refers to the whole country, hence has attribution issues. It also had no target value. The baseline for the indicator was taken from the 2000 Living Standards Measurement Household Survey for the entire country, and it took nearly until project end to confirm the baseline.

“The sustainability of the road improvements under the project” was to be measured through the “increased share of the road network in good condition” and the “incorporation of improved management and planning procedures by the MTI and the FOMAV.” The latter was to be shown through “increased use of the HDM4 [Highway

Development and Maintenance Model] and RED models for the affected program.” However, this indicator also refers to the overall network, so the attribution to the project is not clear. A better indicator would have been to measure the improved condition of the road network only for the part of the network improved under the project.

Again, the PAD’s main text included two additional and pertinent indicators of “share of budget allocated to road maintenance” and “participation of private sector in road rehabilitation and maintenance programs” for which no baselines and targets were established, and which were not monitored.

The project had adequate output indicators with baselines and targets, such as (i) kilometers of main (trunk) roads improved each year, (ii) kilometers of rural roads stabilized each year, and (iii) number of MTI and FOMAV staff trained in planning and management courses.

Implementation

The staff in MTI’s planning division was in charge of collecting, analyzing, and reporting the data related to most project indicators. This division regularly monitored and collected data for only some of the indicators included in annex 3 of the PAD. For the others, and one of the new indicators introduced with the additional financing, including the annual daily bicycle traffic, IRI, traffic, and rural access, the figures reported to the World Bank were mostly estimates. Staff of the project coordination unit pointed out that certain indicators, especially the one related to bicycle use, were difficult and onerous to measure. The additional indicators mentioned in the main text of the PAD were not monitored at all.

The recipient carried out an impact assessment of the project investment on income and school enrollment, which showed that the rural road improvements had a strong positive impact on the total average income of women in the intervened municipalities. For men, the impact on their monthly income was unclear. The study did not find evidence that the project had a positive impact on school enrollment. Although this kind of study is important, a direct link with the project’s PDO was missing.

As mentioned, during the additional financing, an IDA core indicator was added to the M&E framework. In addition, some output indicators were revised, and one output indicator was dropped. The targets for some of the output indicators were also revised. This was done to improve results monitoring and adopt the project to some changes in the field.

Use

The project counterparts and the World Bank team used the M&E data collected to monitor the project implementation progress, to restructure the project, and for the additional financing.

Overall, M&E performance of the project is rated **modest**.

Rural Roads Infrastructure Improvement Project (P123447)

Table A.2. Rural Roads Infrastructure Improvement Project

Indicator	ICR	ICR Review	PPAR
Outcome	Satisfactory	Satisfactory	Satisfactory
Overall efficacy	Substantial	Substantial	Substantial
Bank performance	Satisfactory	Satisfactory	Satisfactory
Quality of monitoring and evaluation	High	Substantial	Substantial

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. PPAR = Project Performance Assessment Report.

1. Relevance of Objectives and Design

Objectives

The original PDO was to (i) improve the access of the rural population living in the project areas to markets and social and administrative services through the carrying out of improvements in the recipient's road infrastructure and the strengthening of MTI's institutional capacity for asset and disaster risk management and (ii) support the generation of short-term employment opportunities for the rural population living in the project areas. The July 2014 additional financing added the following immediate response mechanism subobjective to the PDO: (iii) to improve the recipient's capacity to respond promptly and effectively to an eligible emergency.

Despite an additional financing, which in addition to covering a financing gap, scaled up successful project activities and added a new subobjective, and the lowering of the project's ambitions for one outcome indicator with the restructuring in 2017, no split rating is proposed for the following reasons. First, the new subobjective was linked to the introduction of a zero-cost immediate response mechanism to be activated in case of an eligible emergency. No eligible emergency occurred during project implementation; hence, the need to implement the subobjective did not materialize. Second, the expansion in the scope of the project was accompanied by an increase in the level of ambition in the indicator targets. Third, although the level of ambition for the outcome

indicator of “increasing short-term employment opportunities” was reduced from 2,840 to 2,470 kilometers, the 2017 restructuring took place when 99.22 percent of the World Bank financing⁷ was disbursed. Therefore, a split rating would not make a material difference.

Relevance of the Objectives

As for the Fourth Roads Rehabilitation and Maintenance Project, at appraisal in 2011, the subobjective to “improve the access of the rural population to markets and social and administrative services” was highly relevant because road sector deficiencies restricted mobility, caused high transport costs and productivity losses, and precluded economic opportunities for the rural poor. Due to a lack of economic opportunities in rural areas and high unemployment and a large informal sector, the subobjective to “create short-term opportunities for the rural population living in the project areas” was also highly relevant. Although Nicaragua reduced rural poverty, increased the share of the rural population with access to an all-weather road, and decreased unemployment, both subobjectives remain highly relevant.

With respect to the subobjective added with the additional financing to “improve the recipient’s capacity to respond promptly and effectively to an eligible emergency,” Nicaragua was and still is highly prone to natural disasters. Therefore, this subobjective was and is highly relevant.

The PDO was fully aligned with Nicaragua’s 2009–11 Updated Human Development Plan, which among others focused on (i) the development of road infrastructure in productive zones of the country; (ii) the integration of South Atlantic Autonomous Region; and (iii) vulnerability to environmental impacts and natural disasters. The PDO was fully consistent with all four pillars of the FY08–12 World Bank CPS and remained fully in line with the two strategic objectives of the FY13–17 World Bank CPS, described in the Relevance of the Objectives section of the Fourth Roads Rehabilitation and Maintenance Project.

The PDO of this project set itself apart from the previous project because of its focus on employment creation through the community-based concrete block surfacing units and disaster risk management. However, except for the performance-based maintenance pilots introduced with the additional financing, the project scope remained largely the same, with the project activities being a continuation of the previous project. The project had greater focus on M&E and was slightly more ambitious in terms of road safety. Although the PDO was and remained highly relevant in the light of the country’s strategy, and the focus of the PDO changed, the project’s level of ambition was largely identical to the previous project. On balance, the relevance of the objectives is rated **substantial**.

2. Efficacy

Subobjective 1: Improve the Access of the Rural Population Living in the Project Areas to Markets and Social and Administrative Services

The theories of change for this objective, as graphically shown in figures 1.2 and 1.3 of the main document, were that paving roads with concrete blocks, carrying out periodic maintenance, providing routine maintenance, and strengthening the capacity of MTI and FOMAV would lead to improved roads. The improved roads were expected to (i) increase Nicaragua's share of roads in good and fair condition; (ii) increase the share of the rural population with access to all-weather roads; (iii) reduce travel times under free-flow conditions and to frequent destinations; and (iv) increase the rural population satisfied with the quality of the road network. Shorter travel times to markets, schools, and hospitals and better road quality, in turn, were considered indications that access to markets and social and administrative services increased.

The project activities helped improve the road quality in Nicaragua. The project upgraded 169.52 kilometers of rural roads to all-weather roads, including 138.54 kilometers with concrete block surface. This is slightly more than the target of 167.95 kilometers revised in 2017, but it is lower than the additional financing target of 185 kilometers. The project also provided periodic maintenance to 63 kilometers of rural roads, in line with the additional financing target, and results-based routine maintenance to 67.98 kilometers of rural roads, slightly less than the additional financing target of 75 kilometers. As seen in the Design and Preparation: What Worked? section of the main document, among others, the project helped improve MTI's and FOMAV's planning capacity, which is essential to use scarce resources efficiently. However, on other aspects, which have an impact on the quality of the road network in the longer term, such as axle load control⁸ and disaster risk management,⁹ the project's footprint is not clear.

Based on the data provided by MTI during the IEG mission, the share of the road network in good and fair condition in 2011 was 14 percent, calculated using the 2011 network length of 23,647 kilometers.¹⁰ By project close in 2017, this share increased to 28 percent based on the network length of 24,335 kilometers,¹¹ and in 2019, it was 29 percent based on the network length of 24,769 kilometers. These figures are different from those reported in the ICR, and this difference means that during the project implementation period, a much larger part of the network was upgraded to a good and fair condition than indicated in the ICR (World Bank 2018b). However, this indicator measures the increase at the national level, and the results are only partially attributable to the project.

The share of the rural population with access to an all-weather road increased from 34.23 percent in 2005 to 37.28 percent in 2018 and 37.90 percent in 2019. Again, these figures provided by MTI to the IEG mission do not match with 2017 project-end achievement of 40.62 percent reported in the ICR, and it means that the project target of an 11 percent increase during the project implementation period was not achieved. However, as pointed out under subobjective 2 of the Efficacy and Quality of M&E sections of the Fourth Roads Rehabilitation and Maintenance Project, this indicator is not fully suitable to measure the achievement of this objective because it has attribution issues.

The average travel time for project roads under a free-flow condition decreased from a baseline of 2.9 hours to 1.5 hours by project close in line with the original target. IEG was not able to obtain current average travel time data in free flow. However, the roads visited were in good and good to fair condition, and the IEG mission could travel at speed limits. This makes a significant worsening of the project-end travel times unlikely.

The 2017 road users survey showed that the average travel time for drivers from home to frequent destinations, such as markets, schools, hospitals, banks, and family members, decreased from 3.14 hours to 1.34 hours during the dry season (57 percent) and from 4.33 hours to 1.34 hours during the rainy season (69 percent; RegioPlan 2017).¹² For pedestrians, it decreased from 2.07 hours to 0.46 hours during the dry season (78 percent) and from 2.69 hours to 0.45 hours during the rainy season (83 percent). In addition to significant travel time reductions after the project, these figures also show that the project provided all-weather roads because the after-project travel times are nearly identical during the dry and rainy seasons.¹³

The road user survey also showed that the travel time to markets was reduced by 42 minutes in the dry season and by 54 minutes in the rainy season. Of households surveyed, 99 percent and 98 percent reported improved access to health centers and schools, respectively, because of the project roads.

With respect to access to markets, the producers surveyed stated travel time savings of 42 minutes during the dry season and 54 minutes during the rainy season. More than half of the producers also mentioned that an additional benefit of the project roads was that they were able to sell their products in markets outside their community.

Finally, 84.40 percent of the rural population indicated satisfaction with the quality of the road network after the project, as compared with a baseline of 13.50 percent and a target of 70 percent.

The important travel time reductions for people, including producers, living along the project roads, which are likely to be sustained because the roads continue in good

condition, showed that the project improved their access to markets and social and administrative services. Hence, the efficacy of this subobjective is rated **substantial**.

Subobjective 2: Support the Generation of Short-Term Employment Opportunities for the Rural Population Living in the Project Areas

The theory of change was that carrying out road improvements through the community-based concrete block surfacing units would lead to the generation of short-term employment opportunities for the rural population living in the project areas.

During project implementation, 103 community-based concrete block surfacing units paved 138.54 kilometers of rural roads. This directly created 2,470 short-term, direct-employment opportunities of six months on average, which is in line with the final revised target but lower than the additional financing target of 2,840 kilometers.

According to the 2017 road users survey (RegioPlan 2017), the concrete block surfacing units also created indirect employment, for instance, for people selling food to workers or taking care of their children. The percentage of women employed increased from a baseline of 19 percent to 46 percent by project end, which exceeds the additional financing target of 26 percent.

In March 2020, MTI employed 77 community-based concrete block surfacing units, which is an indication of the continuity of this effort to create short-term employment.

However, as mentioned in Design and Preparation: What Didn't Work? section of the main document, employing people does not necessarily mean employment generation if these people were not previously unemployed. For the Fourth Roads Rehabilitation and Maintenance Project, recent research found that the community-based concrete block units did not appear to have significantly increased employment.

The original and the additional financing targets in terms of people employed on a short-term basis were likely achieved if the indirect employments are also considered. Notwithstanding the previously mentioned research carried out for the Fourth Roads Rehabilitation and Maintenance Project, the achievement of this subobjective is rated **substantial**.

Subobjective 3: Improve the Recipient's Capacity to Respond Promptly and Effectively to an Eligible Emergency

The theory of change for this subobjective was that including an immediate response mechanism in the project with an initial zero allocation, which could be quickly activated to finance eligible expenditures in case of a natural disaster, would enable the government to quickly receive project funds for an eligible emergency. This, in turn, was

to enhance the recipient's capacity to respond promptly and effectively to such an emergency. The achievement of this subobjective was to be measured by the time taken to disburse project funds requested by the government for an eligible emergency.

The immediate response mechanism under the project was not activated because no eligible emergency took place during project implementation. Therefore, the achievement of this subobjective is not rated.

Overall Efficacy

With the two first subobjectives substantially achieved, and the third subobjective not rated, the overall efficacy is rated **substantial**.

3. Efficiency

Economic Analysis

A cost-benefit analysis was conducted for rural roads improvements at appraisal, at the additional financing stage, and by project end using the RED model. The project benefits were assumed to come from savings in vehicle operating costs owing to an improved road surface and travel time savings for road users owing to improved driving conditions. The costs included the initial investment costs of road construction and subsequent road maintenance costs. The analysis was carried out using a discount rate of 12 percent and an analysis period of 20 years.

At appraisal, the cost-benefit analysis looked at seven road sections, totaling 88 kilometers. The analysis showed an aggregated NPV of \$21.7 million and an EIRR of 24 percent. The sensitivity analysis confirmed that the investments were economically justified even with the doubling of the construction costs.

At the additional financing stage, a cost-benefit analysis was carried out for five road sections, totaling 60 kilometers. This analysis showed EIRRs between 13 and 19 percent and NPVs ranging from \$0.91 million to \$8.57 million for the four rural roads sections to be improved, and an EIRR of 37.5 percent and an NPV of \$3.35 million for the section subject to periodic maintenance. The additional financing project paper does not mention a sensitivity analysis.

By project close, the cost-benefit analysis was repeated for all road sections improved under the project, which totaled to 169.52 kilometers and represented 85 percent of the project costs. The analysis showed an aggregate NPV of \$80.86 million and an aggregate EIRR of 27 percent. This is comparable to the aggregate ex ante NPV of \$79.77 million, and an aggregate EIRR of 28 percent for the appraisal and additional financing road improvement works.

Administrative and Operational Efficiency

The original project suffered a cost overrun, which was covered through the additional financing. The cost overrun was caused by replacing the concrete block pavement solution of the Rio Blanco–Mulukuku road section with a concrete pavement because of traffic and climate resilience considerations. It was also caused by a cost increase for the periodic maintenance on the Boaco–Muy Muy road section.

All project activities were completed on time, except for a pilot of results-based routine maintenance, which was completed with local funds after the project closing date. The one-year project closing date extension was necessary to implement the additional financing activities.

Overall, the project's funds were used efficiently. The ex post and ex ante EIRRs were nearly identical, and significantly above the 12 percent discount rate, and the cost overruns were justified in part by the superior technical solutions used. There was a minor implementation delay for one activity only. Therefore, the efficiency of the project is rated **substantial**.

4. Outcome

The relevance of the PDO is rated substantial. Two of the subobjectives were substantially achieved. The third subobjective was not rated. Project funds were used efficiently. On that basis, **the outcome is rated satisfactory**.

5. Risk to Development Outcome

In addition to the risks in the areas of road maintenance capacity, road maintenance resources, axle load control, planning and programming capacity and systems, and access improvements described in the Risk to Development Outcome section of the Fourth Roads Rehabilitation and Maintenance Project, an additional risk under this project relates to short-term employment generation. Although MTI made the community-based concrete block surfacing units the main delivery model for concrete block roads, and has continued to employ a significant amount of people on a short-time basis to surface these roads, there is a potential risk that this might not have led and would not lead to the expected employment creation for unemployed people (see subobjective 2 in the Efficacy section).

6. Bank Performance

Quality at Entry

The World Bank team helped the government design a straightforward project with a good balance between physical works and institutional and capacity-building activities. As with the Fourth Roads Rehabilitation and Maintenance Project, in hindsight, some technical assistance activities would have benefited from more preparation.

This is the fifth World Bank–financed road sector project in Nicaragua; therefore, the World Bank team based the design and preparation on lessons from previous projects. These lessons included among others (i) the use of locally produced concrete blocks as road paving option for rural roads because of their cost-effectiveness; (ii) the reliance on community-based concrete block surfacing units because of their expected social benefits; and (iii) the promotion of women’s participation. The team improved the M&E framework compared with the previous project and specifically allocated project funds for project evaluation from the outset.

The World Bank team helped MTI to further enhance the road selection method, including socioeconomic factors and disaster vulnerability, and carefully identified the project roads to improve access to the country’s most productive regions.

The team largely maintained the implementation arrangements of the previous projects, which were considered adequate. The team also satisfactorily assessed the recipient’s fiduciary and safeguard capacity and ensured that the necessary safeguard documents were prepared and disclosed at appraisal.

The World Bank team identified the main risks, including the risk related to natural disasters, which had proven destructive in the roads sector in the past, and the possibility of cost overruns. The team did not identify the risks related to certain institutional activities, such as the axle load control. The project included largely adequate mitigation measures. With respect to disaster risk management, however, the PAD contained an inconsistency discussed in footnote 28 below.

For a limited number of roads, the World Bank team also did not anticipate the need for more expensive pavement solutions, which caused cost overruns that had to be partially covered through the additional financing. Because the quality at entry shortcomings were minor, the World Bank’s quality at entry is rated **satisfactory**.

Quality of Supervision

The World Bank team was proactive in assessing the need for additional financing. The early identification of this need ensured continuity in project implementation, reduced

the length of the closing date extension period, and helped meet the project targets. Given Nicaragua's vulnerability to natural disasters, the additional financing included an emergency response mechanism and subobjective. The team also introduced a pilot for results-based routine maintenance to be carried out by previous community-based concrete block surfacing units. This was expected to provide continuity to the community-based concrete block surfacing units. The team helped fine-tune and improve the microenterprise maintenance model.

The World Bank team supported MTI in revisiting the design approach for the Bluefields–San Francisco section after the 2016 climate events seriously damaged an adjacent road section financed by the Inter-American Development Bank. The World Bank team provided safeguards and fiduciary training and ensured compliance. The team also strongly supported the recipient in project performance M&E. Therefore, the quality of supervision is rated **satisfactory**.

Because the quality at entry and supervision are rated satisfactory, overall World Bank performance is also rated **satisfactory**.

7. Quality of Monitoring and Evaluation

Design

As in the Fourth Roads Rehabilitation and Maintenance Project, MTI's project coordination unit was to be responsible for preparing the project progress report. To collect the necessary information, the project coordination unit was to coordinate with the relevant departments at MTI and FOMAV.

The project indicators devised at appraisal and, during the additional financing, were straightforward and largely adequate to measure the implementation progress and the achievement of the PDO. The project explicitly set aside resources for M&E and evaluation studies.

Nevertheless, the M&E framework had weaknesses. First, some indicators, such as the "increase in opportunities for short-term employments and empowerment" and the "reduction in travel times on the improved roads," were considered as intermediate results indicators even though they directly measured the achievement of the PDO. Second, several baselines and one target value were to be determined within the first three months of project implementation because the necessary data were not available at appraisal. The determination of these values through the project-financed road network inventory suffered delays, but this did not significantly impact the M&E. Third, as mentioned in the Efficacy section, the indicators on the "share of the road network in

good and fair condition” and the “share of the rural population with access to an all-weather road” had attribution issues.

Implementation

The project coordination unit, with the support of the staff in MTI’s planning division and FOMAV, collected the data on the M&E results and reported it in the project progress reports. Several indicators were fine-tuned during project implementation to enhance results measurement. For instance, the indicators of “increase in opportunities for short-term employment and empowerment” as measured through the additional number of people employed in community-based concrete block surfacing units and the percentage of women employed in community-based concrete block surfacing units, was moved to the outcome level and revised to “additional number of short-term jobs generated in community-based concrete block surfacing” with the 2017 restructuring. There was, however, an error in the calculation of total length of roads made at the time of additional financing preparation. In addition, some of the indicator end values are not in line with the information provided by MTI to IEG.

The project financed a road users survey with a gender focus. This consisted of a travel survey to observe the project impact in terms of access to health, education, financial services, and markets. The survey results complemented the project indicators for the first subobjective. It provided quantitative and qualitative evidence on the reduction of travel times to hospitals, schools, and banks and feedback from market users on their satisfaction with the quality of the improved roads.

The project financed the creation of a baseline for an impact assessment of the road financed by the additional financing in terms of access to markets. For that purpose, MTI set up an impact evaluation committee, whose members participated in impact evaluation workshops in Brazil and Portugal. The ex post impact evaluation was expected to be carried out in 2019 for the impacts to materialize after the road construction, but the respective study is still in the contracting phase. Finally, the project also supported the calculation of the rural accessibility index.

Use

MTI, FOMAV, and the World Bank used the M&E information to monitor the project performance and carry out the restructurings and additional financing. MTI set up a database to evaluate the nationwide access to all-weather roads and has since regularly calculated the rural accessibility index.

Overall, M&E performance of the project is rated **substantial**.

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¹ The Project Appraisal Document (PAD) does not specify how the original target was obtained. The revised target consisted of a forecast based on the bicycle use increase in a sample of newly concrete block-surfaced roads (World Bank 2006a).

² In 2017 (2018 data not collected), the annual average daily traffic was 608 vehicles. In 2014, it was 1,482 vehicles. In 2011, it was 2,694 vehicles; in 2010, it was 1,058 vehicles. The Ministry of Transport and Infrastructure (MTI) clarified that the variations are owing to the touristic nature of the destination and vehicles counts carried out in different times of the year.

³ In 2018, the traffic was 6,067 vehicles. In 2014, it was 3,112 vehicles. In 2011 it was 1,614 vehicles; in 2010, it was 1,832. The very high traffic in 2018 is because the counts were carried out during the peak tourist season to assess this type of traffic.

⁴ The data provided to the Independent Evaluation Group (IEG) by MTI in 2020 are largely in line with the Implementation Completion and Results Report (ICR) data, which reported that the share of the rural population living within 2 kilometers from an all-weather paved road increased from a baseline of 35 percent to 38 percent by project completion (World Bank 2015). The additional funding project paper, which introduced this core indicator, had a tentative baseline of 28 percent based on the 2000 Living Standards Measurement Household Survey.

⁵ According to the PAD, the net present value (NPV) of this section was \$10.05 million; however, based on all other documents, including the borrower contribution to the ICR, it was \$7.67 million (World Bank 2006a, 62).

⁶ According to the PAD, the NPV of this section was \$7.67 million (World Bank 2006a, 62).

⁷ This refers to the finally disbursed World Bank financing and not the overall World Bank financing.

⁸ See the Design and Preparation: What Worked? section of the main document.

⁹ The narrative in the PAD of this project strongly focused on disaster risk management and the PDO to “improve access” was to be achieved, among others, through strengthening the institutional capacity for asset and disaster risk management (World Bank 2011). However, the emphasis on disaster risk management is not reflected in the project activities since the PAD only refers to the hiring of a disaster risk expert to ensure the inclusion of disaster risk considerations and mitigation measures in engineering designs in the Implementation Support Plan. MTI staff was not able to confirm if this expert was employed or if any other disaster risk-related activity took place.

¹⁰ This is much lower than the baseline of 29 percent based on the same network length given in the ICR (the PAD has no base and target value for this indicator; World Bank 2018b).

¹¹ The ICR mentions 32.42 percent based on the same network length (World Bank 2018b).

¹² The road users survey surveyed 1,670 people, including 490 drivers, 542 pedestrians, 213 producers, and 425 households, in the influence area of four project road sections after their completion. It was not a before-and-after study because of lack of baseline (RegioPlan 2017).

¹³ The all-weather access is particularly significant in the case of the 26.5 kilometer Bluefield–San Francisco section in the South Caribbean Coast Autonomous Region, which was part of the only land connection from the South Atlantic Autonomous Region to the Pacific. This region, before the road construction, could only be reached by air during most of the year owing to heavy rains and impassable infrastructure (the rainy season lasts nine months in that region).

Appendix B. Fiduciary, Environmental, and Social Aspects

Financial Management

Under the Fourth Roads Rehabilitation and Maintenance Project, the Ministry of Transport and Infrastructure's (MTI) financial and administration directorate satisfactorily managed the financial management and disbursement aspects. The directorate applied sound financial management practices throughout project implementation. This included largely adequate internal controls and the use of integrated financial management system modules to reconcile accounts, track transfers, control the performance of the community-based concrete block surfacing units, and provide timely information for monitoring purposes to the World Bank. The directorate had qualified and experienced operational staff and adequate processes and procedures. The directorate generally submitted interim financial reports on time. They provided annual external project audits, which showed the adequacy of the directorate's accounting system and internal controls. Financial audit reports were unqualified but identified internal control weaknesses, which the project coordination unit addressed. Staff of the project coordination unit mentioned that at a certain point during project implementation, the special account limit was too low, and they only partially paid the contractors. This was later corrected through the semesterly expenditure forecasts and the related advances. The last Implementation Status and Results Report (ISR) rated the financial management performance as satisfactory (World Bank 2006–14). The project had no issues with counterpart funding.

MTI's financial and administration directorate also satisfactorily carried out the financial management under the Rural Roads Infrastructure Improvement Project. As under the previous project, the directorate submitted ISRs on time, and the financial audits were unqualified. The last ISR rated financial management as moderately satisfactory, whereas in the previous ISRs, it was satisfactory (World Bank 2012–17). The ISRs and aide-mémoire do not mention the reason for downgrading, and the staff of the project coordination unit and the World Bank (the financial management specialist left the World Bank) did not recall any problem by project end, except possible delays in reporting of final disbursement. The counterpart funding was also satisfactory.

Procurement

Procurement under the Fourth Roads Rehabilitation and Maintenance Project was carried out by MTI and FOMAV. The project experienced minor procurement issues and delays. The procurement under the community-based concrete block surfacing units

suffered from delays owing to, for example, the change in the procurement method. Originally, earthworks, concrete blocks, and the transport of concrete blocks to the project sites were procured through shopping by groups of surfacing units. However, there was a lack of competition, and obtaining three valid quotations was almost impossible in several cases. In addition, the project had many small bidding processes, which amounted to several million dollars overall. Therefore, in the course of project implementation, shopping was replaced with competitive bidding. The project coordination unit, with the support of the World Bank team, prepared simplified bidding documents, including a contract sample and an evaluation report form, and implemented a training strategy. According to World Bank staff, although this increased the duration of the procurement processes, it led to more competition, efficiency, and better results in the field. The project suffered from delays in procuring the works for the Nueva Guinea–Naciones Unidas road section because it had to be carried out with international competitive bidding. The project had an Integrity Vice Presidency investigation in 2008 because of irregularities in a bid for construction works. As a follow-up of this investigation, the World Bank carried out an institutional review and an independent procurement review. The recommendations of these reviews were addressed (World Bank 2011). The last ISR rated procurement as satisfactory (World Bank 2006–14).

The Rural Roads Infrastructure Improvement Project used the same procurement arrangements as the previous project. This project continued to improve the procurement arrangements for the community concrete block surfacing units and encountered no major procurement issues during implementation. The last ISRs rated procurement as satisfactory (World Bank 2012–17).

Environmental and Social Safeguards

The Fourth Roads Rehabilitation and Maintenance Project was classified as category B for environmental assessment purposes. The road improvements were to be carried out within the existing right-of-ways, and no major earthwork, land acquisition, or resettlements were expected. The following two safeguard policies were triggered at appraisal: Environmental Assessment (Operational Policy [OP] / Bank Procedure [BP] 4.01) and Physical Cultural Resources (OP 4.11). The additional financing did not change the project's classification, nor did it trigger additional safeguard policies.

At appraisal, MTI's environmental management division carried out the project's environmental screening and assessment in accordance with the environmental manual developed under previous road projects. During project implementation, the project had no serious environmental or social issues. However, there were shortcomings in the application of the project-specific environmental management plans, tree cutting and

reforestation, road safety education, and base camp management. The project documents do not report any social issues. The last ISR rated the project's safeguard performance as satisfactory (World Bank 2006–14).

The Rural Roads Infrastructure Improvement Project was also classified as category B for environmental assessment purposes, and the type of works and the anticipated impacts were similar to those in the Fourth Roads Rehabilitation and Maintenance Project. At appraisal, the following three safeguard policies were triggered: Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), and Physical Cultural Resources (OP/BP 4.11).

At appraisal, MTI carried out the necessary environmental and social assessment within the areas of influence of the project roads. This included environmental management plans with details on the mitigation measures, monitoring, responsibilities, and specific procedures, such as for waste management and base camp plans. The safeguard policies associated with natural habitats and physical cultural resources were triggered on a precautionary basis because the project activities were not expected to cause any significant loss to natural habitats and the road improvements were expected to take place within the existing right-of-ways, hence no impacts to physical or cultural resources were anticipated.

The additional financing triggered the following two additional safeguard policies also on a precautionary basis: Indigenous Peoples (OP 4.10) and Involuntary Resettlement (OP 4.12).

The project had no major environmental or social safeguard issues and complied with the safeguard policies. In environmental terms, the project experienced shortcomings mainly in terms of base camp management, temporary traffic safety signage, and slope stabilization. In social safeguard terms, two road sections required resettlement action plans. For the Bluefield–San Francisco section, the project had delays in preparing and updating the resettlement action plan because MTI lacked experience with the World Bank's social safeguard policies. Six homes were impacted and required resettlement. In addition, 130 people donated land to the project. On the El Portillo–El Cua section, the project affected four homes partially and one completely. The Bluefield–San Francisco section also passed through indigenous peoples' land, so an indigenous peoples' plan was implemented. The project's involuntary resettlement and environmental performance was rated satisfactory in the last ISR (World Bank 2012–17).

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World Bank. 2006–14. "Nicaragua—Fourth Roads Rehabilitation and Maintenance Project." Implementation Status and Results Reports, World Bank, Washington, DC.

World Bank. 2011. "Nicaragua—Fourth Roads Rehabilitation and Maintenance Project."
Restructuring Paper 61700-NI, World Bank, Washington, DC.

World Bank. 2012–17. "Nicaragua—Rural Roads Infrastructure Improvement Project."
Implementation Status and Results Reports, World Bank, Washington, DC.

Appendix C. Methods and Evidence

This report is a Project Performance Assessment Report (PPAR). This instrument and its methodology are described at <https://ieg.worldbankgroup.org/methodology/PPAR>.

Overview

The Independent Evaluation Group (IEG) based this assessment on evidence obtained through (i) reviews of the project documents of the two assessed projects; (ii) reviews of project documents of previous and successive road projects in Nicaragua; (iii) key informants' interviews with current and former World Bank staff, current and former project coordination unit staff, Road Maintenance Fund (Fondo de Mantenimiento Vial; FOMAV) staff, line ministries' staff, representatives of local authorities, microenterprise members, members of community-based concrete block surfacing units, maintenance supervision consultants, and representatives of development partners active in the road sector and the cattle farmers federation (the list of interviewed people is at the end of appendix C); (iv) semistructured interviews with community members and producers; (v) literature reviews on technical topics to triangulate findings; (vi) quantitative data on traffic and road conditions; and (vii) traffic counts and observations on road conditions during field visits.

Sample Selection for Field Visits

IEG's field visits aimed at assessing (i) the quality and condition of the roads surfaced, rehabilitated, and paved under the two projects subject to this PPAR; (ii) the impacts of concrete block surfacing on rural access; and (iii) the functioning and benefits and drawbacks of concrete block surfacing units and maintenance microenterprises.

Selection of Road Sections to be Visited

The criteria to select the field visit areas and roads to be visited included the following:

- Focus on areas in the vicinity of the country's 13 productive zones to be able to fill the evidence gap for the subobjective "to improve access to productive zones and rural communities" under the Fourth Road Rehabilitation and Maintenance Project.
- Select the productive zones with the highest number of road interventions under the Fourth Road Rehabilitation and Maintenance Project to fill the previously mentioned evidence gap and because this project financed more than the double of the kilometers compared with the Rural Roads Infrastructure Improvement

Project. This led to the selection of the productive zones of Rivas, Leon, Matagalpa, Boaco, and Juigalpa.

- Based on a field visit duration of seven days, limit the areas to be visited to three productive zones to have enough time to talk to people at a local level, and prioritize the productive zones with the maximum number of roads to be visited. This left the productive zones of Rivas, Matagalpa, and Boaco.
- Include rehabilitation and periodic maintenance works in the vicinity of the three selected productive zones in the field visit sample.

These criteria led to the selection of the following 24 road sections:

1. Diriamba–Casares–La Boquita
2. Empalme Casares–Huehueté
3. La Virgen–San Juan del Sur
4. Juigalpa–Santo Tomás (from kilometer 134 to 145)
5. Boaco–Muy Muy (Sección El Paraíso–Puente Olama)
6. Quebrada Honda–San Francisco Libre–las Delicias
7. Quebrada Honda–San Francisco Libre
8. Empalme La Mora–Las Carpas
9. Esquipulas–Empalme San Dionisio
10. Teustepe–San José de los Remates–Empalme San Diego
11. Teustepe–San José de los Remates Tramo II
12. Rancho Rojo–Empalme Murra–La Calamidad
13. Santa Lucía, Boaco
14. Santa Lucía, Boaco
15. La Subasta–Camoapa, La Subasta–El Cambio
16. La Subasta–Camoapa–sección San Benito
17. Granada–Malacatoya

18. San Jorge–Empalme Buenos Aires–Popoyuapa
19. Rivas–Veracruz
20. Nacascolo–Talanguera
21. Las Flor–Moyogalpa
22. Santa Cruz–Balgue
23. El Quino–Santa Cruz–Merida
24. Cardenas–Colon

Selection of Community Members, Producers, and Maintenance Microenterprise Members to be Interviewed

IEG interviewed community members, producers, and microenterprise members of workers encountered along the roads of the Fourth Road Rehabilitation and Maintenance Project. The number of people interviewed on each road section depended on the time available.

Selection of Concrete Block Surfacing Unit’s Members

Board members of former and one ongoing concrete block surfacing units were invited by mayors in the areas to be visited.

Other Data Collection Methods

Traffic Counts

During the field visits, IEG counted the number of vehicles by type on project roads and extrapolated these counts to 12 hours to get a sense of the current traffic, including bicycle traffic.

Other Field Observations

During the field visits, IEG recorded information on road conditions, road safety features, and other aspects of the project roads in a predefined form.

Main Evaluation Questions

The assessment focused on the following main evaluation questions:

- Did the Fourth Roads Rehabilitation and Maintenance Project improve access to productive zones and rural communities, and how?

- Did bicycle use increase under the Fourth Roads Rehabilitation and Maintenance Project, was it caused by the concrete block surfacing, and how did it impact access?
- Did the Fourth Roads Rehabilitation and Maintenance Project support the transfer of local roads or not, why, and how?
- Have Nicaragua’s roads, including the roads improved under both projects, been maintained or not, and is the maintenance model sustainable?
- Has road planning and programming improved under both projects, how, and why?
- Did the two World Bank projects help improve road safety or not, how, and why?
- Has the concrete block surfacing units model been successful, how and why?

List of People Interviewed

Table C.1. List of People Interviewed

Name	Title	Organization
Rosa Argentina Guadamuz	General Secretary	MTI
Felix Granados	Director General	General Roads Directorate
Benito Aragon	Vice Minister	Ministry of Family, Community, Cooperative, and Associative Economy (MEFCCA)
Armando Morales	Head of Project Coordination Unit	Project Coordination Unit–MTI
Oscar Mendoza	n.a.	Road Management Department–MTI
Manuel Guido	n.a.	Directorate for Policy and Development Planning–MTI
Abel Garache	Director General	Planning Department–MTI
Carlos Silva	Head of FOMAV	FOMAV
German Cruz	Head of Planning Department	Planning Department–FOMAV
Jimmy Perez	Head of Directorate	Directorate for Construction Norms–MTI
Ruben Gutierrez	Head of Area	Office for External Resources–MTI
Pedro Urroz	n.a.	Budget Execution and Promotion of Concrete Block Units–MTI
Carlos Francisco Vellecillo	Head of Area	Weight and Dimension Control Area–MTI
Bismark Gonzales	n.a.	Road Safety Directorate–MTI
Jesica Amador	Legal Adviser	FOMAV
Lubaina Cantarero	Technical Director	FOMAV
Junior Reynoza	n.a.	FOMAV
Tamara Hernandez	Environmental Specialist	PCU–MTI
Ruwayda Tercero	Financial Management Specialist	PCU–MTI

Onan Flores	n.a.	PCU-MTI
Jorge Luis Duarte Centeno	n.a.	Procurement Division-MTI
Gunier Navas	n.a.	Office for Project Monitoring and Control PCU-MTI
Magda Sousa	Former PCU staff	n.a.
Marie Gema Alvarado	n.a.	General Directorate for Workshop and Small Businesses-MEFCCA
Tania Gonzales	n.a.	Directorate for Training-MEFCCA
Claudia Tijerino	n.a.	Directorate for Planning-MEFCCA
Gabriela Uiova	n.a.	Office of Vice Minister-MEFCCA
Jose Angel Velasquez	Mayor	Municipality of San Francisco Libre
Freddy Celedon	Mayor	Municipality of San Dionisio
Rodolfo Perez Riviera	Mayor	Municipality of Cardenas
Daniel Torres Garcia	Senior Transport Specialist	Inter-American Development Bank
Rita Sirias	n.a.	Inter-American Development Bank
Leonardo Garcia	Head of Federation	Federation of the Association of Cattle Farmers-FAGANIC
Beatriz Meza Solis	Lawyer	n.a.
Ricardo Arauz	Supervision Consultant	n.a.
Cristhel Francela Guzman Fletes	Former Head of PCU	n.a.
Amadeo Santana	Former Head of PCU	n.a.
Jason Jacques Paiement	Social Development Specialist	IFC
Elizaveta Perova	Senior Economist	World Bank
Dianna Pizarro	Senior Social Protection Specialist	World Bank
Miriam Montenegro	Senior Social Protection Specialist	World Bank
Juan Carlos Parra Osorio	Senior (Poverty) Economist	World Bank
Virginia Maria Henriquez Fernandez	Consultant	World Bank
Sevara Melibaeva		World Bank
Roger Gorham		World Bank
Pablo Valdivia Zelaya		World Bank
Francisco Rodriguez		World Bank
Li Qu		World Bank
Raul Barrios	Senior Operations Officer	World Bank
Emmanuel James	Former TTL	World Bank Retiree

Source: Independent Evaluation Group elaboration.

Note: n.a. = not available.

Appendix D. Borrower Comments

1. **Página vii / Resultados:** En cuarto lugar, Nicaragua ha utilizado con relativo éxito un modelo de microempresa de mantenimiento basado en cooperativas para realizar el mantenimiento rutinario básico y proporcionar beneficios sociales a los miembros de las cooperativas. ~~Entre las principales debilidades figuran la gran cantidad de asideros necesarios, la limitada participación femenina y la renovación en gran medida automática de los contratos, independientemente del rendimiento.~~

Comentario: Solicitamos eliminar esta última oración debido a que previa renovación del contrato se toma en consideración la evaluación del desempeño de cada una de las cooperativas y de esto depende si se renueva o no.

Agregar: Un desafío para el programa de cooperativas es la administración de la gran cantidad de mano de obra requerida y la participación femenina que hasta el momento es un poco limitada.

2. **Página vii/ Diseño y Preparación:** Sin embargo, las deficiencias en el diseño o la preparación explican por qué varias actividades de asistencia técnica previstas en los dos proyectos no se llevaron a cabo o tuvieron poco impacto. ~~Tal fue el caso del apoyo propuesto para la descentralización parcial de la red de carreteras a los municipios. También fue el caso de las actividades de control de la carga por eje y de seguridad vial.~~

Comentario: Fue el caso del apoyo propuesto a la descentralización parcial de la red vial hacia los municipios. También fue el caso de control de carga por eje y las actividades de seguridad vial.

3. **Página vii/ Diseño y Preparación:** ~~El FOMAV no ha podido aprovechar plenamente los contratos de mantenimiento basados en el rendimiento, principalmente debido a las deficiencias en el diseño de las normas e incentivos de rendimiento, su limitada comprensión y una aplicación "ligera". Es probable que la falta de divulgación y consulta con un grupo más amplio de interesados durante el diseño y la ejecución de los estudios sea el origen de la escasa utilización de los estudios financiados por el proyecto sobre la sostenibilidad financiera y el fortalecimiento institucional de la FOMAV y el programa de caminos rurales para las zonas productivas.~~

Comentario: Consideramos que se debería leerse de la siguiente manera: El FOMAV ha venido implementado los modelos de contratos basados en el desempeño según las propuestas que ha realizado el organismo financiero Banco Mundial, a la fecha se cuenta con siete cooperativas bajo esta modalidad las que han obtenido buenas calificaciones durante el desarrollo de sus contratos.

4. **Página vii/ Diseño y Preparación:** El diseño para el acceso en todo tipo de clima debe ser amplio. En esos proyectos, los puentes y los principales elementos de drenaje no formaban parte de las obras de mejora de los caminos rurales para que se conviertan en caminos para todo tipo

de clima. Por lo tanto, las deficiencias de los puentes y los elementos de drenaje seguían impidiendo el paso de las personas tras las fuertes lluvias

Comentario: En el monto de los convenios no estaban consideradas las obras de drenaje mayor como Puentes y Cajas Puentes.

5. **Página 14/ Resultados: Que no Funciono?: 2.17 *El esfuerzo de mantenimiento de la FOMAV no ha sido suficiente para evitar el envejecimiento de los pavimentos.*** Las visitas sobre el terreno del GIE demostraron que la transitabilidad de las carreteras del proyecto era buena, sólo unas pocas tenían problemas estructurales aislados y localizados, y se habían realizado actividades de mantenimiento esenciales, como la colocación de parches, la sustitución de bloques de hormigón, la limpieza de los sistemas de drenaje, el control de la vegetación y la sustitución de la señalización vial. Sin embargo, ~~la mayoría de los pavimentos de asfalto tenían grietas y las capas superiores a menudo presentaban signos de desgaste.~~ Del mismo modo, los caminos de bloques de hormigón mostraban algunas grietas en las vigas transversales y, a veces, bloques de hormigón desgastados pero no sueltos. Se minimizaron o descuidaron las actividades de mantenimiento, que ayudan a prolongar la vida útil de las carreteras, como el sellado con arena de las juntas de los bloques de hormigón y el sellado de las grietas.

Comentario: Reemplazar por: Sin embargo, en ciertos tramos la red tenía fisuras y las capas superiores a menudo presentaban signos de desgaste acorde con la vida útil de la vía

6. **Página 14/ Resultados: Que no Funciono?: 2.18 *Esto parece explicarse por el hecho de que los recursos de mantenimiento de la FOMAV no se han mantenido al ritmo del crecimiento de la red central "mantenible".*** Los recursos anuales de la FOMAV para el mantenimiento de las carreteras aumentaron de unos 2 millones de dólares antes de la introducción del recargo por combustible dedicado a 46 millones de dólares en 2014. Estos recursos sólo aumentaron en un 2 por ciento, para llegar a 47 millones de dólares en 2019, mientras que los kilómetros de carreteras bajo la responsabilidad de la FOMAV aumentaron en un 36 por ciento de 2013 a 2019. Entre 2014 y 2019, el total de la red central "mantenible" de Nicaragua aumentó en un 97 por ciento. El personal de la FOMAV señaló que "con el aumento de la red "mantenible", sólo puede llevar a cabo un mantenimiento correctivo pero no preventivo y el mantenimiento periódico no es óptimo". Esto se confirma en un estudio financiado por el proyecto [Grupo MC2, 2014], en el que se afirma que "el atraso de la FOMAV está aumentando porque, debido a los limitados recursos disponibles, el mantenimiento por contrata ha sido principalmente correctivo y no con el rigor necesario ni en el 100% de la red como se requiere". Esto pone a la red de carreteras en un estado crítico porque podría colapsar a medio plazo sin un mantenimiento adecuado".

Comentario: El Banco Mundial deberá considerar financiar proyectos de mantenimiento periódico en la red vial para evitar el colapso a mediano plazo.

7. **Página 14/ Resultados: Que no Funciono?: 2.19 *La insuficiencia de los recursos de la FOMAV también se refleja en la disminución de la intensidad del mantenimiento.*** Un análisis más detallado de los costos unitarios de mantenimiento de la FOMAV muestra, por ejemplo,

que el costo promedio de mantenimiento de las carreteras de asfalto fue de 43.435 dólares en 2016. Bajó gradualmente a 31.779 dólares en 2019. Disminuciones similares ocurrieron para el mantenimiento periódico de los otros tipos de pavimento. Además, los kilómetros de carretera cubiertos anualmente con el mantenimiento periódico disminuyeron gradual y drásticamente de 1.311 kilómetros en 2015 a 689 kilómetros en 2019.

Comentario: Mejorar redacción de la siguiente manera: “Bajó gradualmente a 31.779 dólares en 2019 debido a la priorización de las intervenciones y tramos a atender”

8. **Página 15/ Resultados: Que no Funciono?: 2.20 *Del mismo modo, los esfuerzos de mantenimiento del MTI no son suficientes.*** Aunque los kilómetros mantenidos por el MTI aumentaron de un promedio anual de 1.136 kilómetros entre 2012 y 2018 a 2.074 en 2019, esta casi duplicación fue acompañada sólo por un aumento del 50 por ciento de los recursos. Esto indica muy probablemente que su mantenimiento no fue intensivo (el GIE no visitó las carreteras mantenidas por el MTI). Además, el presupuesto de mantenimiento del MTI ~~en 2019 dejó sin atender unos 1.000 kilómetros de carreteras menos importantes~~ y sin pavimentar de la "red central mantenible" de Nicaragua, de 7.198 kilómetros.

Comentario: Sustituir por : El MTI dejó sin atender el 13% de la red de caminos sin pavimentar de “la red central mantenible” de Nicaragua, de 7.198 kilómetros.

9. **Página 16/ Diseño y preparación: Que no funcionó: 2.24 *El IEG encontró poca información sobre una propuesta de descentralización parcial de la red de carreteras a los municipios y no hay pruebas de que se haya producido el apoyo previsto del Banco Mundial.*** El PAD [Banco Mundial 2006] explica que (i) el Plan Nacional de Desarrollo de Nicaragua 2005–09 preveía una estrategia nacional de descentralización para mejorar la prestación de servicios públicos y (ii) el MTI planeaba transferir gradualmente 12.065 kilómetros de carreteras a los municipios. El Banco Mundial debía apoyar este esfuerzo mediante talleres sobre experiencias nacionales e internacionales de descentralización vial. Esos cursos prácticos debían conducir a un aumento de la proporción de la red de carreteras descentralizada. IEG encontró que nadie en el MTI, ni siquiera el personal que trabajaba en la institución cuando se diseñó y ejecutó el proyecto, ni el alcalde entrevistado, conocían el esfuerzo de descentralizar parcialmente la red de carreteras. Esas personas tampoco recordaban los talleres sobre descentralización, y las memorias de los ayudantes y los ISR no se exhibían sobre el tema.

Comentario: El equipo del Banco Mundial y el MTI no programaron talleres de apoyo para descentralización de carreteras internacionales y nacionales dado que no estaba en los lineamientos de la estrategia de infraestructura. Sin embargo, el MTI, considera que en la actualidad la mejor manera de brindar mantenimiento es a través del FOMAV y no a través de la descentralización.

10. **Página 18/ Implementación y Supervisión: Que es lo que no funcionó?** Las pruebas insuficientes e inclusivas sobre las ventajas de las unidades de superficie de bloques de concreto de base comunitaria sobre otros modelos de entrega de bloques de concreto exigen una evaluación más exhaustiva de este modelo.

Comentario: Revisar este concepto ya que la información que se presenta de los MCAs es positiva.

11. **Página 18/ Implementación y Supervisión: Que es lo que no funcionó?:** 2.32 En cuanto a la creación de empleo a corto plazo, las pruebas no son concluyentes y el modelo podría tener deficiencias en la selección de los participantes. Los dos proyectos emplearon un total de 11.392 personas, alrededor del 80 por ciento de mano de obra y el 20 por ciento de miembros de la junta. Estas personas tuvieron un trabajo formal durante un promedio de seis meses, pero un estudio reciente [Garza, Seth; Perova, Elizaveta. 2020] no encontró pruebas sólidas de que las unidades de revestimiento de bloques de hormigón del Cuarto Proyecto de Rehabilitación y Mantenimiento de Carreteras generaran empleo a corto plazo. Específicamente, el estudio no encontró cambios significativos en el empleo asociados con la presencia de unidades de revestimiento de bloques de hormigón en un municipio, aunque encontró una asociación con un aumento de la probabilidad de trabajar como obrero. Según el estudio, este resultado sugiere que el reclutamiento en unidades de revestimiento de bloques de hormigón podría haber limitado la eficacia de la orientación de los empleos a corto plazo a personas desempleadas.¹⁴ Esto parece estar en línea con la impresión del IEG de que la selección de participantes en las unidades de revestimiento podría no haber sido totalmente abierta y transparente. De hecho, al preguntar a 17 antiguos miembros de la junta directiva de las unidades de revestimiento y a un obrero cómo se unieron a las unidades de revestimiento, la mayoría de los entrevistados señalaron que se enteraron de esta oportunidad por amigos o familiares y, en un caso, porque la persona era pariente del alcalde.

Comentario: La impresión de IEG, es una valoración subjetiva, la evidencia formal en registros oficiales demuestra que los objetivos de lo MCA's en la generación de empleo han sido alcanzados, por lo que solicitamos revisar este párrafo.

12. **Página 19/ Implementación y Supervisión: Que es lo que no funcionó?:** 2.33 El IEG no tiene información sobre la situación laboral previa de los trabajos manuales de las unidades de revestimiento de bloques de concreto, por lo que no está claro si estas unidades crearon oportunidades de empleo para personas desempleadas o simplemente atrajeron a personas de otros trabajos, como la agricultura. La evidencia de las limitadas entrevistas del IEG con miembros y trabajadores de microempresas de mantenimiento de carreteras, que es un sector similar, parece indicar que muchos de ellos trabajaron anteriormente en granjas, en el turismo o como amas de casa, pero no está claro si estaban desempleados justo antes de unirse a las microempresas.

Comentarios: Todas las personas que colaboraron en los proyectos se encontraban en el desempleo cuando fueron contratadas.

13. **Página 19/ Implementación y Supervisión: Que es lo que no funcionó?:** 2.34 Los graduados universitarios y los jóvenes profesionales tenían dificultades para transferir sus conocimientos recién adquiridos a trabajos estables en su campo. Las entrevistas del IEG con antiguos miembros de las juntas directivas de las unidades de superficie, convocadas por los alcaldes,¹⁵ mostraron que apreciaban el aprendizaje y la experiencia. Varios señalaron que les gustaba especialmente el nivel de responsabilidad y la confianza en sí mismos que habían adquirido. Citaron otros beneficios, como la posibilidad de mejorar sus hogares, comer mejor y poder

ahorrar. Sin embargo, después de su trabajo en las unidades de revestimiento, la mayoría de los entrevistados y sus colegas sólo encontraron trabajos de corta duración, permanecieron desempleados, emigraron o participaron en posteriores unidades de revestimiento de bloques de hormigón. Esto último explica por qué casi un tercio de los entrevistados habían trabajado en varias unidades de revestimiento de bloques de hormigón. Esto no se ajusta a la idea original de proporcionar experiencia laboral al mayor número posible de personas. Del mismo modo, el GIE observó que sólo alrededor de dos tercios eran locales y un tercio tenía 30 años o más, por lo que no formaban parte de la población objetivo de los miembros de la junta.

Comentario: El objetivo de los MCA's es generar empleos locales sin embargo no discrimina rango de edad.

14. **Página 18/ Lecciones:** 3.2 Las características de los contratos y su estricto cumplimiento parecen ser fundamentales para aprovechar plenamente los contratos de mantenimiento basados en el rendimiento. En el caso de Nicaragua, las deficiencias de las normas e incentivos de rendimiento, ~~su escasa comprensión y la aplicación "ligera"~~, entre otras cosas, han impedido que el instrumento desarrolle todo su potencial. La experiencia ha demostrado que los requisitos contractuales deben establecerse de manera realista a la luz de la capacidad y los recursos disponibles y aplicarse estrictamente.

Comentarios: Eliminar: ~~su escasa comprensión y la aplicación "ligera"~~.

El modelo del contrato en las cooperativas fue previamente discutido y aprobado por un equipo técnico el Banco Mundial.

15. **Página 18/ Lecciones:** 3.3 El diseño para el acceso en todo tipo de clima debe ser amplio. En esos proyectos, los puentes y los principales elementos de drenaje no formaban parte de las obras de mejora de los caminos rurales para que se conviertan en caminos para todo tipo de clima. Por lo tanto, las deficiencias de los puentes y los elementos de drenaje seguían impidiendo el paso de las personas tras las fuertes lluvias.

Comentarios: Los montos de convenios no incluyen las reparaciones de puentes y cajas puentes.

16. **Página 30/ Eficacia / Subobjetivo 3:** Además, IEG descubrió que el país gasta una parte significativa de su presupuesto en mantenimiento de carreteras, el FOMAV ~~parece utilizar~~ los recursos disponibles de manera eficiente, y las carreteras del proyecto conducidas durante la visita de campo de IEG estaban en buenas y buenas condiciones (véanse los párrafos 2.11 y 2.12 del documento principal). Sin embargo, como se indica en el párrafo 2.17 del documento principal, esto no ha sido suficiente para evitar el lento deterioro de los activos viales.

Comentario: Eliminar "parece utilizar", ya que el MTI considera que el FOMAV utiliza los recursos disponibles de manera eficiente.

Sustituir por: El FOMAV **utiliza**.

17. **Página 30/ Eficacia / Subobjetivo 3:** Además, IEG no encontró evidencia de que el soporte planificado para el control de carga de los ejes se haya materializado (ver párrafo 2.26 del documento principal). El IEG tampoco encontró evidencia concluyente de que el sistema de control de carga por eje del país funcione satisfactoriamente. El personal de MTI señaló que su sistema de control de carga por eje es bastante exitoso, pero durante los siete días de las visitas de campo, IEG no encontró ninguna estación de control de carga por eje o punto de

control. IEG tampoco notó muchos camiones obviamente sobrecargados. El MTI considera que el éxito del control de carga es que no circulen los vehículos con sobrecarga.

Comentario: El MTI considera que el éxito del control de carga es que no circulen los vehículos con sobrecarga.

18. **Página 33 / Capacidad y sistemas de planificación y programación:** El FOMAV y el MTI continuaron fortaleciendo su capacidad de planificación y programación desde la finalización del proyecto y hay poca rotación de personal en los respectivos departamentos de planificación. El FOMAV tiene también mejoró significativamente su sistema de planificación. El MTI, sin embargo, utiliza sistema ~~anticuado~~ para su planificación. Por lo tanto, el riesgo de que la capacidad de planificación y el sistema del FOMAV no se mantengan es bajo, pero el sistema del MTI requiere una revisión.

Comentario: Eliminar “anticuado”. Consideramos que el sistema que se utiliza es básico y no anticuado.