

Ex post evaluation – Guatemala

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Sector: Road transport (CRS Code: 2102000)
Programme/Project: Rehabilitation of the road between San Pedro Carchá and Fray Bartolomé de las Casas (BMZ No. 1996 65 506)*
Implementing agency: Ministerio de Comunicaciones, Infraestructura y Vivienda (MICIVI)

Ex post evaluation report: 2016

		Project A (Planned)	Project A (Actual)
Investment costs (total)	EUR million	12.78	23.72
Counterpart contribution	EUR million	2.55	10.89
Funding	EUR million	10.23	12.83
of which BMZ budget funds	EUR million	10.23	12.83

*) Random sample 2015



Summary: At the time of the project appraisal in 1996 it was planned to turn the national route between Carchá and Fray Bartolomé de las Casas into a rural gravel road, 97 km long and 5.5 m wide, half of which being asphalted. After planning changes in 1997 and 2000, a higher construction standard was chosen with full-scale asphaltting and a wider roadway, and the project was split into three sub-projects: 1) 41 km from San Pedro Carchá to Pajal, financed from FC and counterpart funds, completed in 2005; 2) 7 km from Pajal to Campur, also financed from FC and counterpart funds, 72% completed by March 2016; 3) 49 km from Campur to Fray Bartolomé de las Casas, financed by the Central American Development Bank (BCIE), 70% completed by March 2016.

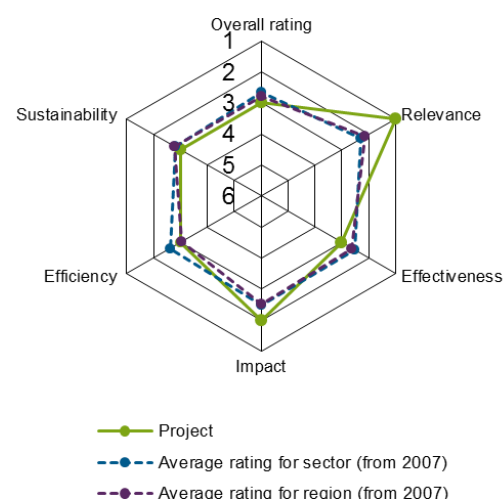
Objectives: The aim of the project was to ensure the economically efficient handling of road traffic. The overarching development objective was to make a contribution to economic and social development in the project region.

Target group: The direct target group of the project was road transport users, e.g. hauliers, retailers and agricultural companies, and indirectly small farmers without their own vehicles along with the inhabitants of villages in the catchment area of the road.

Overall rating: 3

Rationale: The effectiveness of the project can be considered satisfactory, even though the project has not yet been completed. Significant traffic development has been observed on the completed road sections. Substantial delays and cost increases in construction had a highly negative influence on production efficiency, while the allocation efficiency is very encouraging, mainly due to the sharp increase in traffic. The good developmental impacts are shown by the improved accessibility, the lower transportation costs and the associated increase in agricultural producer prices. Sustainability is deemed to be just satisfactory in light of the acceptable condition of the road over long sections, and in spite of the much higher traffic volume, the problems surrounding road maintenance and the de facto absence of axle load checks. All told, the result is satisfactory with a good impact.

Highlights: The significant delays and cost overruns could have been reduced considerably with better planning and communication in the initial phase. Design failings initially led to the plan of a gravel road that fell short of requirements, and was later upgraded to a wider asphalted road. The lack of studies meant the level of detail reached was insufficient to make cost estimates.



Rating according to DAC criteria

Overall rating: 3

Relevance

The project stands out by its great importance at national level for the interconnection and development of central areas of the country, and at the regional level for its support for poverty reduction efforts in one of Guatemala's poorest regions, in alignment with the goals of the Guatemalan government and the German Federal Ministry for Economic Cooperation and Development (BMZ).

The project is integrated into the government's strategy to connect central areas of the country by means of high-quality roads, for which two east-west axes are planned: the Franja Transversal del Norte¹, financed by the Central American development bank BCIE, connects to the project road in the north; and the RN7, financed by the Japan International Cooperation Agency (JICA), extends east to west, south of the RN5². Between these two axes, six north-south connecting segments are planned or have already been built; the project road is one of these. Coordination with donors active in the roads sector was very good; in addition, the BCIE handled the financing of sub-project 3 from Campur to Fray Bartolomé de las Casas.

The economically efficient handling of road traffic had the potential to make a significant contribution to poverty reduction efforts in the project region; the causal chain was a coherent one. The Departamento Alta Verapaz is one of the poorest regions in the country, with indigenous groups making up a large percentage of the population. The "Municipio" (community) of San Pedro Carchá was also one of the epicentres of the civil war that raged in Guatemala from 1954 to 1996. The low level of development in the region is largely a reflection of its isolation and years of neglect by the state. The old gravel road led through rough, mountainous terrain and varied between 2.5 and 5 m in width, with steep inclines, narrow passing points and sharp turns. Depending on the type of vehicle, the average driving speed was between 4 and 24 km/h. In addition, the road presented a significant risk of accidents. Nevertheless, this road was and is the only connection to the outside world for many residents of Municipio San Pedro Carchá. Rural isolation represented a major bottleneck for the economic and social development of the region, and the great (cross-) regional importance of the road is reflected in local development in the region..

Relevance rating: 1

Effectiveness

The following project objective was set at the project appraisal: "Economically efficient handling of traffic on the 97 km-long National Route 5 in Departamento Alta Verapaz." The indicators listed below are to be evaluated in light of the original plans for a gravel road. After the higher construction standards were agreed upon, with complete asphaltting, a wider roadway and division of the project into three sections, the target values (which were now set too low) were not updated.

Indicator	Status PA	Ex post evaluation
(1) Average yearly traffic increase	3.5% annual increase within 3 years of completion	Rate of traffic increase on the San Pedro Carchá - Pajal segment: Before completion 1994-2005: 7.6% p.a. After completion 2005-2014: 17.6% p.a.

¹ From Chocon on the border with Belize, through Fray Bartolomé de las Casas, and on to Finca Gracias a Dios on the Mexican border.

² From Rio Dulce through San Christobal Verapaz and on to Huehuetenango.

(2) Decrease in average drive time for an all-wheel-drive passenger vehicle*	Sections 1+2+3: 6-8 hours Sections 1+ 2: 4 hours Section 1 only: 2 hours Section 2 only: 20 minutes	Sections 1+2+3 (partly under construction): 2.5 - 3 hours Sections 1+2: 1.5 hours** Section 1: 70 minutes** Section 2 (under construction): 15-20 minutes
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*) all-wheel-drive passenger vehicle, because the road was originally planned as a relatively narrow gravel road; **) while respecting the posted speed limit of 40 km/h

After the change of plans, the road design was based on a standard cross section with a 6 m wide asphalted roadway. The construction measures included dirt and rock removal for widening and straightening of the route, roadway construction consisting of a subbase at least 15 cm thick, 30 cm-thick base course layers made of crushed rock aggregate, double bituminous surface treatment (5 cm wearing course) and the addition of surface drainage with the required structures and other measures for the safety of the road and road users (e.g. slope stabilisation, barriers and road signs).

At the time of the ex post evaluation, the progress of the project was as follows:

- Sub-project 1 was completed in 2005.
- Sub-project 2 was not completed as of March 2016. To date, the extension of the cross section and the necessary subbase work have largely been carried out, but no base or surface course has been applied. The FC funds are used up, and the sub-project could be fully completed within 6 months if the necessary funds were provided from the Guatemalan side.
- Sub-project 3 was not completed in March 2016 either. Only 25 km were paved; the remaining 24 km of this segment were under construction or still in the old condition, which was heavily degraded due to inadequate maintenance.

At the time of the ex post evaluation, an average driving speed of 35-40 km/h was possible due to the partially degraded state of the first sub-project. Along the 7 km segment between Pajal and Campur (sub-project 2), the average speed was 25 km/h. The average drive time for segments 1 and 2 is about 1½ hours if the posted speed limit of 40 km/h is observed; if the speed limit is exceeded, as often occurs, this segment can be driven in an hour. Before the road improvement, the drive time for this same segment was close to five hours.

In 1994, before the project began, 161 vehicles were counted per day on the segment from San Pedro Carchá to Pajal (segment 1). Before construction began, the volume of traffic grew to 310 vehicles in the year 2000 and 362 in 2005, which represents an average annual increase by 7.6%. After completion, traffic increased significantly faster – by 17.2% per year, eventually reaching 1,773 vehicles per day³. This sharp increase can only be explained by assuming that the improved road has induced significant traffic volumes estimated at some 1,000 vehicles per day. With the full improvement of the remaining segments 2 and 3, substantial volumes of traffic, especially in the northern part of the country to and from Petén, will use the project road. Due to the poor road conditions on segment 3, through-traffic from Petén and Fray Bartolomé de las Casas still avoids the project road to this day, and switches to the paved RN9 through Chisec instead. These drivers are willing to accept a 23-km detour and winding mountain roads in exchange.

Effectiveness rating: 3

Efficiency

Substantial delays and cost increases in construction had a highly negative influence on the project's **production efficiency**. These were primarily caused by design changes which became necessary due to an underestimation of future traffic volumes at the time of the project appraisal. This led to additional inter-

³ Traffic counts were conducted by MICIVI on a single day, not over the course of a week as usual. Nevertheless, this traffic volume appears plausible, according to the construction company working on-site.

governmental negotiations, modifications of the contracts, and therewith associated delays. These planning difficulties could have been avoided through more efficient communication with the partner.

Furthermore, the feasibility and design studies were faulty in that they systematically underestimated costs. This led to a situation in which the Ministry of Transport could not prepare adequate budgets, resulting in defaulted payments, which in turn led to a temporary stop in construction work, thereby worsening the delays and cost increases.

Significant weaknesses in the partner's administration also contributed to the problematic situation. These included liquidity shortfalls and failures in allocating funds due to the changing political priority of the project and lengthy administrative procedures. In addition, general political crises that shook the whole country had a negative impact on the project.

The **allocation efficiency** was evaluated by way of a macroeconomic cost/benefit analysis in which the utility values are geared towards the reduced and easily quantifiable vehicle operating costs. For this purpose, calculations were prepared with MICIVI's HDM3 model for two different scenarios. The internal interest rate varies between 36% for 10 years of economic life and 40% for 20 years. A further increase in efficiency is to be expected from the increase in through-traffic after full completion of the overall project.

For the overall efficiency evaluation, both the poor production efficiency and the very good allocation efficiency are taken into account. As a whole, the project's efficiency can therefore be evaluated as marginally satisfactory.

Efficiency rating: 3

Impact

Representatives of Municipio San Pedro Carchá named traffic safety as the most important impact. Conditions on the old road were labelled "potentially deadly", since the road was not only steep and narrow, but also had few passing points, which forced drivers to manoeuvre whilst backing up. There were reports of a "vehicle graveyard" where many lorries and buses plunged hundreds of meters down a precipice. There were also reports of burning tank lorries. The wider road bed and paving on the new road have eliminated these problems; this also confirms the great importance of the design changes that were made. Accident statistics are not available, however.

Yet, the design of the road does have a partially negative impact on traffic safety as well, as it leaves very little room for non-motorised road users. In light of the fact that many pedestrians use the road, and that 50% of road accident victims worldwide are non-motorised, safety precautions should have been required at least near populated areas.

The impacts of the considerable reduction in driving time and the improved road quality were confirmed by many sources. Transport operators in Campur reported a drop in transportation costs and an ability to operate larger vehicles after the road was completed. Calculations from models in the HDM3 software tool determined that transportation costs have dropped by 40% for buses, 50% for heavy lorries, and even 60% for pickups. In 2015 alone, the costs of vehicle operation and maintenance on segment 1 were reduced by some USD 13.5 million at current traffic volumes, savings which ultimately benefit the users of the road.

These cost reductions brought an increase in available transport services, and contributed to increased competition in the transport sector. This, in turn, meant that service providers could no longer demand monopoly prices, leading to further reductions in transportation costs. Small farmers were able to benefit from this as well, as it led to increased producer prices, and thus to increased revenue⁴. Many farmers took advantage of the newly available option to market their farm products directly, which yields higher profits. For example, purchase prices paid on the farm for cardamom, a variety of ginger, are only half as high as sales prices in Cobán.

A causal connection can be drawn between improved accessibility and the strong growth of tourism in the city of Lanquin, which can be reached from Pajal via a 14-km gravel road. The tourist attractions of Semuc

⁴ As reported by target group representatives; no data could be collected on this point.

Champay and Grutas de Lanquin are visited by about 150 and 75 tourists per day, respectively. Four travel agencies offer tours, which are mainly booked by foreigners. Since the completion of the road, the number of tourists has increased rapidly. Previously, there were only three hotels in Lanquin, but now the number has risen to 20 hotels, which are often fully booked at weekends. The total number of beds can be estimated at 400 to 600. Assuming an average occupancy of just 50%, annual revenues would be around GTQ 5-8 million (EUR 0.6 - 0.9 million).

In the period from 1994 to 2015, the population of Alta Verapaz grew by 4.5% per year, which represents a more than two-fold growth.⁵ Overall, the road contributed to dynamic development in Municipio Campur that is characterised by improved education, an enormous increase in traffic, and a reduction in poverty. The Municipio now aims to acquire the status of a Municipalidad.

Municipio San Pedro Carchá is one of Guatemala's poorest regions: 88% of the population are classified as poor, and 43% as extremely poor⁶. In the Municipios of Lanquín and Fray Bartolomé de las Casas, which lie in the road's catchment area, these percentages are even higher. According to the World Bank, the percentage of Guatemala's population classified as poor increased from 51% in 2006 to 59% in 2014; and in Alta Verapaz as well, the percentage increased from 78% to 83%. This was likely due to the country's poor economic development during this period. According to representatives from local authorities, the trend in Municipio San Pedro Carchá was in the opposite direction: poverty here dropped by 7 percentage points⁷.

Positive changes have been observed in the the health care domain. Transportation of patients to the nearest hospital in San Pedro Carchá is now faster and significantly smoother and safer for patients. Since the road was constructed, a 50% decline in mortality has been reported among pregnant women⁸, who can now reach the hospital much more quickly.

Widening the road in segment 2 required that about 35 families with 8 members each be resettled, primarily from the indigenous population. The resettlement is being done with great care. No comprehensive environmental and social sustainability study was performed as part of the planning for the relatively narrow gravel road in 1996; however, this should have been required after the redesign in 2000, especially in light of the ecologically sensitive karst landscape.

In principle, Municipio San Pedro could be covered with a dense tropical rainforest. However, the only primary tropical rainforest remaining in the region is on a handful of mountaintops. High population pressure has led to widespread conversion of the existing natural forests into agricultural areas. Maps on forest loss since the year 2000 clearly indicate widespread, piecemeal deforestation that has evidently been caused by small farmers and not by forestry operations. Although significant reforestation is indeed taking place, the trees being planted are monocultures or ecologically problematic eucalyptus trees. The road has had no apparent impact on the primary tropical forest.

With traffic volumes far beyond expectations, strong macroeconomic returns, and the very positive overall socio-economic effects on the regional population, the positive impacts compensate for the negative aspects of accidents, resettlements and disruption to the ecosystem, and lead to a good overall rating of the project's effectiveness in terms of development policy.

Impact rating: 2

Sustainability

The most important sustainability criterion is the condition of the road, which is classified as follows for segment 1 after inspection:

⁵ The population of Guatemala grew by 2.3% per year from 1990 to 2015
(<http://databank.worldbank.org/data/reports.aspx?source=2&country=GTM&series=&period=>)

⁶ Estrategia de Reducción de Pobreza, Guate Solidaria Rural 2006.

⁷ No written data is available in this context.

⁸ This figure is supported only by reports, not by data. A causal connection to the road cannot be proven.

Road condition	Roughness (IRI)	Road length
Good	< 3.5	10 km
Average	3.5-4.5	15 km
Bad	4.5-6	5 km

Especially within the first 10 km of this segment, considerable deficiencies in maintenance were observed which lead to a reduction in driving speed. The asphalt pavement was completely eroded over long sections of the road, and at one location, half of the road had even sunk down and one part was broken off along the edge of the hillside. A KfW mission had already pointed out this dangerous spot in 2015. The most likely cause is insufficient drainage, combined with inadequate maintenance. In addition, deep pot-holes can be found over large portions of this segment.

In the period from 2011 to 2015, the MICIVI reported that GTQ 9.4 million (EUR 1.1 million) were invested in the upkeep of segment 1. According to the contractor's calculations, these funds are sufficient to repair the very poor condition of the road along segment 1. Why this did not occur remains an unanswered question.

In Guatemala, COVIAL⁹ is responsible for road maintenance; routine maintenance operations (street cleaning, clearing of ditches) are carried out by external companies on its behalf. COVIAL receives one quetzal per gallon (3 euro cents per litre) from fuel taxes. COVIAL should therefore receive GTQ 1.6 billion (EUR 190 million) per year, which by its own account would be sufficient to maintain the road network.¹⁰ In practice, only a portion of the intended funds are paid to COVIAL by the Ministry of Finance. Especially in the context of the national financial crisis of 2015, which was characterised by a sharp decline in tax revenue, allocations to COVIAL were severely reduced. In 2016 as well, only 56% of the necessary funds can be paid out, of which half must be used for the previous year's debts. In addition, COVIAL's budgets are intermittently burdened by natural events such as earthquakes and heavy rains. The long and arduous tendering procedures lead to a situation in which work must often be carried out during the rainy season, resulting in considerable limitations on productivity. The Ministry of Finance shows little or no awareness of the negative economic impacts of inadequate road maintenance.

Axle load control is also deficient, according to the MICIVI. In Guatemala, weigh stations are only present in the southern part of the country; mobile inspections are rarely performed or are avoided by drivers. According to the MICIVI's estimates, half of all vehicles are overloaded by 15-20%. One haulier confirmed to the evaluation mission that loads on his lorries exceeded the permitted maximum weight by 50%. In light of the low proportion of heavy vehicle traffic on National Route 5, the lack of inspections has so far not had an impact on road quality.

With regard to the road's potential impact on the sensitive ecosystem of the karst landscape, the construction measures on segment 2 can be evaluated as positive, as they maintain the natural flow of water in the karst and therefore also protect the area's many stalactite caverns.

Taken as a whole, the project's sustainability can therefore be evaluated as marginally satisfactory.

Sustainability rating: 3

⁹ COVIAL (Unidad Ejecutora De Conservación Vial) is part of the MICIVI.

¹⁰ The GIZ publications on international fuel taxes document the fact that diesel fuel is subsidised in Guatemala, whereas the tax collected on petrol is low by international standards.

Notes on the methods used to evaluate project success (project rating)

Projects (and programmes) are evaluated on a six-point scale, the criteria being **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's overall developmental efficacy. The scale is as follows:

Level 1	Very good result that clearly exceeds expectations
Level 2	Good result, fully in line with expectations and without any significant shortcomings
Level 3	Satisfactory result – project falls short of expectations but the positive results dominate
Level 4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
Level 5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
Level 6	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability): The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a "successful" project while rating levels 4-6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally "successful" only if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are rated at least "satisfactory" (level 3).