Ex post evaluation – Cambodia

Sector: Road transport (CRS code: 21020)
Programme/Project: Flood damage repair on rural infrastructure (FRRI)
BMZ no. 2011 67 121*
Implementing agency: Ministry of Rural Development (MRD)

Ex post evaluation report: 2020

All figures in EUR million	Planned	Actual
Investment costs (total)	11.00	10.90
Counterpart contribution	3.00	3.02
Funding	8.00	7.88
of which BMZ budget funds	8.00	7.88

*) Random sample 2019

Summary: The FRRI project included the repair of flood damage on rural roads, bridges, inflow and outflow ducts as well as at rural schools. The reason for the project was the high damage to rural infrastructure caused by the exceptionally high flooding of the rainy season in 2011. The FRRI was implemented in the provinces of Kampong Cham, Kampong Chhnang, Siem Reap, Kampong Thom, Kratie and Prey Veng. A total of 117 km of rural roads and seven schools were repaired. The project ran parallel to the long-standing activities of German FC as part of the Rural Infrastructure Programme (RIP), which has been rehabilitating rural roads and social infrastructure in various phases and regions from 2007 to date.

Development objectives: The objective underlying the ex post evaluation at outcome level was use of the restored year-round access to social and economic infrastructure, adapted to climate change, and use of the restored schools. This was to help improve the socio-economic living conditions and the resilience of rural populations in the programme regions with regard to climate change (impact).

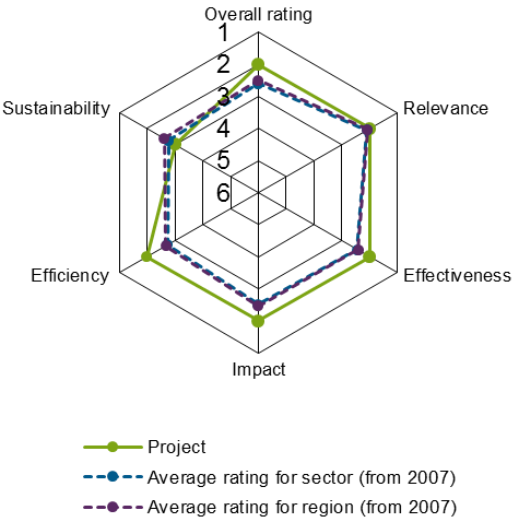
Target group: Residents/households in the catchment area of the programme roads and schools

Overall rating: 2

Rationale: Similar to the RIP projects mentioned above, this project also addressed the same relevant obstacles to development and contributed to socioeconomic development through better marketing of agricultural products and increased use of social infrastructure. The road construction standard also contributed to the population's resilience to climate change. However, after a few years some roads are not in a good condition because the building standard is not appropriate for the volume of traffic, because of possible construction defects and/or the absence of routine maintenance, while the sustainability of the above-mentioned effects is reduced under certain circumstances. German DC has been working intensively with other donors for years to improve the national system of maintenance.

In contrast to the market infrastructure of the RIP projects whose impact is considered critical, positive impacts can be clearly assumed for the rehabilitated schools, even though most of them were not affected by the severe flooding in 2011 and aspects of adaptation to climate change (flood resilience) were largely disregarded in the technical design.

Highlights: The effects, mostly on the volume of traffic and the reduction of driving time and operating costs, are notable. However, these are likely to decrease again if the road conditions continue to deteriorate.



Rating according to DAC criteria

Overall rating: 2

Ratings:

Relevance	2
Effectiveness	2
Efficiency	2
Impact	2
Sustainability	3

Relevance

At the time of the project appraisal (PA) in 2012, one of the central barriers to socio-economic development in rural Cambodia was the poor road network, above all in remote regions. Roads and bridges were inadequate or missing. During the rainy season in particular, many roads were flooded, entire regions were temporarily unavailable and basic mobility needs (access to markets, schools and health facilities) could not be met or could only be met at a high cost. Exceptionally serious flooding in 2011 put additional strain on rural infrastructure. The floods caused by the heavy monsoon rains were considered the worst in over 10 years. The core problem was correctly identified, the impact logic was plausible (improved year-round access to markets, schools and health facilities as well as use of the restored schools leads to multidimensional improvements in living conditions in terms of education, health and income) and the concept of investing in rural transport infrastructure and schools made an appropriate contribution to solving the core problem. The project remains relevant from today's perspective.

According to the PA, school infrastructure across the country was also particularly affected by the flooding, and required interventions. According to the Ministry of Education, Youth and Sports (MoEYS), 476 schools were damaged nationwide at the time and 110 needed to be rebuilt. In the six provinces in which the FC was involved at the time of the PA, MoEYS identified 44 school buildings that needed to be completely rebuilt due to flood damage.

The project was embedded in Cambodia's national strategy: development barriers were reflected in the Cambodian government's timely national development plan, which addressed explicit objectives regarding climate resilience as well as targeting the climate-resilient expansion of rural roads and investment in school infrastructure. Another key objective of the rural development plan was the commercialisation and diversification of agriculture.

At the time of the PA, German DC had practically been the only donor with multi-phase projects in the area of rural rehabilitation for a good 10 years. The project followed this up and thus aligned with the goals of German DC. The “Flood damage repair on rural infrastructure” project (FRRI) was also assigned to the DC priority sector of Rural Development. In addition to FC, at the time of the project appraisal the Asian Development Bank (ADB) and the World Bank were primarily active in the rural roads sector. Donor activity was coordinated with them. The lack of donor coordination criticised in the preliminary phases of the project when setting up a monitoring system was taken into account by FC, which temporarily suspended establishing a monitoring system – so as not to continue operating parallel structures to the ADB system.

Given the correct identification of the core problem and the high relevance of the investments, the relevance is rated as good.

Relevance rating: 2

Effectiveness

The objective underlying the ex post evaluation (EPE) at the outcome level was the use of the restored social and economic infrastructure, adapted to climate change and with year-round access, as well as the use of the restored schools. The target achievement is assessed using the following indicators:

Indicator	Status PA (2012)	PA target value	Ex post evaluation
(1) Traffic volumes on the roads covered by the programme after the end of the project:			
- Avg. number of vehicles per day	839	> / = Status PA%	1,360 (2014): +62% 1,211 (2019): +44%
- Avg. number of passenger cars per day	399	> / = Status PA%	530 (2014): +33% 977 (2019): +145%
(2) Year-round passability after project end	No	Yes	Yes (2019)
(3) Year-round usability of rehabilitated school buildings after the end of the project	Majority Yes	Yes	Majority yes (2019)

The increase in traffic volumes on the programme roads is significantly above the target value and clearly shows that the roads are usable and actually used. The technical design ensures year-round passability. According to the final inspection, the technical design took aspects of climate adaptation into account so that the roads can still be driven on, even in extreme floods (most importantly by raising dams more than 1 m above the flood level, with drainage and erosion control). The significance of the construction standard for year-round passability was confirmed by an external impact assessment conducted in 2019. It remains unclear as to how this standard is to be evaluated for roads in the context of the long-term climate projections for Cambodia.

With regard to schools, unlike the intention at the PA (see Relevance), only a very small number of the school buildings taken into account in the project were actually affected by the flood. It was ultimately school buildings in particular that were rehabilitated, whose poor standard or condition was not due to flooding. However, some schools were damaged due to heavy rain. This suggests insufficient information or weaknesses in the selection process, as the long list should only have contained schools damaged by the flood – in line with the project's objective.

Due to the lack of baseline data, usability is applied as a proxy indicator for assessing the use of schools. Five of the seven rehabilitated schools were visited as part of the aforementioned external impact assessment. It was found that four of the five schools visited were usable and used all year round, even before the rehabilitation. They were in poor condition, but not affected by floods (see above) and were used all year round. The fifth school affected by flooding was rehabilitated, but it was improved to a limited extent in terms of resilience to new floods. The photo documentation provided by the implementation consultant and the above-mentioned external impact assessment suggest that the school was rebuilt in the same place and only raised by about half a metre, which would not be sufficient in the event of a new flood of up to one metre. This was also confirmed by the author of the impact assessment. In terms of the other two schools not visited as part of the external impact assessment, it can be concluded from the consultant's photo documentation that at least one school was placed on pillars to be better protected against flooding.

Although the goal of using the schools was definitely achieved, one criticism is that flood resilience was not taken into sufficient account in the technical design of the school rehabilitation. Therefore, the

refurbishment of the schools did not predominantly increase their flood resilience. Instead – and only to a limited extent – it increased general climate resilience as a result of weathering-resistant building materials.

In view of the very good effectiveness of investments in road infrastructure and the fact that schools accounted for only a small proportion of the investments and are being used, the overall effectiveness is still rated as good, despite the unsatisfactory selection and limited climate adaptation of schools.

Effectiveness rating: 2

Efficiency

The total costs of the project amounted to EUR 10.9 million, just below the estimated total of EUR 11 million. The cost of rehabilitating both roads and schools was higher than planned. The specific investment cost per kilometre of rehabilitated road was EUR 76,000/km1 (USD 100,000/km), approximately 23% higher than the engineer's initial estimate. Ultimately only 117 km were rehabilitated instead of the 130 km originally planned at the PA.

At a total of EUR 758,000, the total investment costs for the school buildings were slightly above the planned total of EUR 700,000, and accounted for a good 8% of the construction costs. However, instead of the 10 schools estimated in the PA, only 7 schools were rehabilitated. At EUR 108,000, the specific costs per school are therefore significantly higher than planned. However, the impact assessment stated that brick and concrete construction was by far the most efficient alternative to achieve the goal of sustainably improving schools.

The cost increases were partly caused by damage to the construction sites due to heavy rainfall and the financing of additional measures (additional flood gates, another three km of road, including culverts). According to the final inspection, however, shortages and thus an increase in the number of workers in Cambodia due to labour migration to neighbouring countries also played a role. Given an inflation rate of around 6% over the period of the project, the cost increases also seem justifiable. The relatively high specific costs for roads, also compared to previous projects, were attributable to the climate-adapted and thus high building standard with many bridges and culverts, as well as higher road embankments and erosion control. This argumentation appears plausible.

However, the meaningfulness of the indicator (specific costs per km) is limited in terms of the efficiency of the project: the characteristics of the road sections are very different (bitumen surface due to high use or the need for several bridges) and it is precisely these characteristics that significantly drive costs up. When comparing the investment costs per rehabilitated road section, it becomes apparent that the overall length of roads in particular correlates negatively with the investment costs per km. This could indicate that the fixed costs per road section are high, and that it might have been more efficient to rehabilitate fewer but longer road sections. The proportion of bituminous sections correlates very positively with the investment costs per km. The number of culverts or bridges in the FRRI does not correlate clearly with higher investment costs. When comparing the determinants of the investment costs under the FRRI with those under the successor project, the Rural Infrastructure Programme (RIP III), it was bridge construction in particular that correlated with higher investment costs in the RIP III, not the bitumen surfacing of roads. In an ADB project from 2010-2015, road construction investments with 100% bituminous surfacing achieved average specific costs of well under USD 100,000/km. However, due to a lack of details for calculating these figures, they are only suitable for comparison to a limited extent.

The increase in the specific costs compared to the engineer's estimate at the start of the project is reasonable in light of the above explanations, and was also deemed appropriate by the final inspection and the impact assessment. Given the nature of the explanations above, the overall production efficiency is still considered good.

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[1] Average exchange rate over the project term: USD 1.3206 = EUR 1. This value is used to calculate both the estimated costs and the final investment costs. The final inspection calculates the investment costs per kilometre to be EUR 72,000/km. However, this is due to a transcription error.

Allocation efficiency with regard to rehabilitated roads is considered very good due to the greatly increased use and reduced travel times and costs (see the chapters on “Effectiveness” and “Impact”). The use of roads led to lower transaction costs in the marketing of local agricultural products, as well as in the provision and use of services, which in turn should have favoured economic impulses, school attendance and the use of health infrastructure (see chapter on “Impact”). Furthermore, the construction standard contributes to year-round passability in the current climate. Given the 15-year useful life of the road, it can be assumed that this will also contribute to the rural population's resilience to climate change during this period (see also “Effectiveness”). The selection process was clearly able to ensure in the project that only road sections with the highest overall social benefit were actually selected, as argued in the PP. In terms of schools, the selection process failed to achieve its objective. Since the schools were mostly unaffected by flooding, and after the project were not significantly more resilient to new flooding – although certainly more climate-resilient than before, to a limited extent – the allocation efficiency of the schools is rated satisfactory.

Despite the aforementioned shortcomings in the selection and in the allocation efficiency of schools, the efficiency is considered good overall given the very good allocation efficiency of the roads.

Efficiency rating: 2

Impact

The EPE's underlying objective at impact level was to contribute to improving the socio-economic living conditions and resilience of the rural population in the programme regions in terms of climate change. Reports from the implementation consultant and an external impact assessment are primarily used to determine the target achievement as part of the evaluation. However, these studies do not contain any valid data to estimate the comparative situation that would have happened without the intervention. Particularly in a country like Cambodia, where the average income of the rural population has more than doubled since 2012, it is extremely difficult to make a final assessment without comparing it to a similar region that has no rehabilitated roads.

The following indicators are applied for the purpose of evaluating the target achievement:

Indicator	Status PA (2006)	PA target value	Ex post evaluation
1) Average journey times on the programme roads after the end of the project (min/km with motorcycle)	5.4	-20%	2.36 (2019): -56%
2) Average vehicle operating costs on the programme roads after project completion (KHR/km)	320	-20%	160 (2014): -50% 209 (2019): -35%
3) Household income in catchment areas after the end of the project (in thousands of KHR)	1,151	Increase	1,626 (2014): +41%
4) Percentage of poor population after end of project (in accordance with national poverty threshold)	22.3%	Reduction	18.1% (2018): -19%

5) Relative attendance at secondary schools after end of project	35%	Increase above province average	52% (2017): +48% Avg. increase in province (2012-2017): 14.8%
6) Ex-farm price for rice in road catchment area following end of project (KHR/kg)	670	Increase	901 (2017): +34%*

* In comparison, the rate of inflation was 15% between 2012 and 2017.

In the simple before/after comparison, the above indicators can be used to determine that the project consistently achieves the target values. Roads that can be driven year-round have not only facilitated access to economic and social facilities and thus made a multidimensional contribution to improving living conditions, they have also increased the resilience of the rural population in terms of climate change (see chapters on “Effectiveness” and “Efficiency”).

Improvements in average driving times and average vehicle operating costs are clearly attributable to the project. In this respect, the project exceeded its goals. However, the average vehicle operating costs on all roads had already deteriorated again at the time of the external impact assessment (2019) compared to the condition immediately after the rehabilitation (2014). It remains unclear whether the target achievement can be maintained in the long term (see “Sustainability”).

The increase in household income in the road catchment area of more than 40% in just two years after the start of the project was documented by the implementation consultant in 2014 and is remarkable. However, this increase reflects the national trend in average household income throughout Cambodia's rural area, which increased by 42% in 2012–2014. However, as there is no information on comparative roads, it is difficult to assess within the EPE whether the catchment areas would also have developed according to the average rural growth rate without rehabilitating the roads. Even if the net income effects of the project cannot be quantified for lack of a reference group, the positive contribution by the project seems plausible based on the explanations below.

The qualitative surveys of the external impact assessment illustrate that there have been three ways of increasing income. Firstly, thanks to the increased volume of traffic the target group was able to generate income with new services, such as motorcycle workshops or small shops. Secondly, access to paid work in factories has improved. Thirdly, the number of rice merchants directly visiting the villages has increased significantly over the project period. Ex-farm prices for rice also increased significantly (see below). Revenue from the first two channels in turn also boosted investment and productivity in local agriculture. Wage income was reinvested in local agriculture, resulting in increased mechanisation of processes and increased use of agricultural production resources. Given the basic labour shortage in rural Cambodia, and in particular the pull factor that better roads also encourage young people to work outside their village, the greater use of capital in agriculture seems positive.

The external impact assessment also attributed the increases in the ex-farm prices for rice (see Indicator 6) to the FRRI project. This is plausible partly because better access makes it easier for merchants to visit the villages. Another factor is that the national rice sector has also changed a lot throughout the country since the end of the 2000s. Thanks to positive export conditions, national promotional programmes as well as rising world market prices, national rice production and above all rice exports have grown substantially. This could also have prompted merchants to step up their efforts to buy rice directly from small producers. As there is no data on ex-farm prices for rice in other rural regions of Cambodia, it is not clear whether the increase in prices is actually due to the FRRI. However, improved access to the villages is likely to have contributed significantly to the project's catchment areas benefiting from positive national and international market developments.

For some sections of road, other investments were also made in the region parallel to the road rehabilitation. For example, a large cashew plantation opened up on one road. Yet because this information was

not collected systematically, it is not possible to analyse the extent to which complementary investments are responsible for some of the impacts.

The target values for secondary school attendance were achieved. This is also supported by anecdotal evidence from the impact assessment, which indicates that the safer use of roads as well as shorter travel times made an important contribution to teaching at secondary schools – especially for girls on many roads. The qualitative surveys of the external impact assessment also suggest an increase in the use of healthcare facilities, in particular by women.

Although the school investments largely made no contribution to climate change adaptation (because their design was not aligned with climate change adaptation), they contribute to improving socio-economic living conditions by restoring or maintaining usability.

Overall, the external impact assessment clearly rated the impact positively and also underpins this with qualitative surveys. The EPE considers this to be plausible. Satellite imagery showing the settlement structure and farmland also suggests that the region has developed positively over the timeframe of the project. The overarching developmental impact is therefore rated good.

Impact rating: 2

Sustainability

The Ministry of Rural Development (MRD) and its local entities at province level are responsible for the operation and maintenance of the rural road network. After the inventory and budgeting programme (RO-MAPS) introduced by FC in previous phases was suspended by the MRD, a new monitoring and maintenance system (RRAMS) currently being set up and promoted by the ADB is supported in subsequent projects, primarily through (further) training measures.

The annual national financing budget for maintenance increased steadily and notably in recent years: from USD 0.25 million to USD 22.1 million in the period between 2006 and 2019 alone. Despite the significant improvements to the maintenance budget, however, it can still be assumed that - as stated in the PP - the maintenance requirement continues to exceed the available financing, and thus maintenance in line with the requirement is still not guaranteed. This challenge is expected to persist and is likely to reduce the programme's positive impact. Nevertheless, it can be assumed that the roads will continue to fulfil their purpose and are thus likely to have a positive effect.

According to the final inspection, the overall construction quality for roads and schools was very good. The final inspection highlighted the quality of the building material used with regard to the load-bearing capacity of the road and how the road embankment was successfully planted with trees. In terms of the sustainability of the project roads themselves, this can be assessed as positive.

However, since completion (2014) only sporadic maintenance activities have been carried out. According to the authors, by 2019 no maintenance activities had been carried out on the roads covered by the FRRI programme that were evaluated in the external impact assessment (2019). According to the impact assessment, substantial quality deficiencies were identified in all road sections just five years after completion. In some cases, this was attributed to the construction standard being too low. In other cases, the construction standard was appropriate for use, but the roads were still in very poor condition in 2019. This could be due to structural defects. According to the external impact assessment (2019), some roads gradually lost quality due to a lack of routine maintenance. One of the roads assessed according to the MRD was repaired in 2020. According to the MRD, individual maintenance measures were carried out in previous years on roads not evaluated by the impact assessment. Whether the scope and quality were sufficient cannot be assessed due to a lack of data, and no on-site checks can currently be carried out due to the coronavirus pandemic. The evaluation of satellite and Street View images suggests an additional need for maintenance on the roads financed by the programme.

Together with other donors, FC worked hard to improve the outstanding deficits in the areas of inventory, budgeting and maintenance of road infrastructure through support measures: comprehensive (on/off-the-job) training on road construction and maintenance was carried out as part of the FC commitment with the aim of strengthening skills, management and maintenance capacities at both a central and local level as well as strengthening the execution of construction work. This is also to be continued in subsequent

phases, and supplemented by the maintenance of bitumen roads, continued support from a test laboratory as well as maintenance contracts on a pilot-project-like basis. According to FC project management, considerable progress has also been made in recent years with regard to introducing the new RRAMS monitoring and maintenance system, which will soon be put into operation. A system such as this would represent an important step towards creating transparency in budgeting, maintenance and the sustainability of the investment. Any training taking place in the future should be coordinated via the RRAMS.

As in previous projects, the programme was implemented by a central project management unit (PMU) in the MRD and by local project implementation units. As already noted in the evaluation of the previous phases, this led, on the one hand, to efficient implementation and the preservation of generated know-how due to comparatively low staff turnover. Yet on the other hand, since the PMUs are not integrated into MRD processes, the transfer of knowledge to the Ministry is potentially less extensive. This can be counterproductive with regard to the establishment of long-term structures and thus sustainability, unless the PMUs are better integrated into the processes of the Ministry in the future.

The MoEYS is responsible for the operation and maintenance of the schools, where neither formal arrangements for the maintenance of the FRRI schools between the MRD and the MoEYS nor any financial allocations have been made. On a case-by-case basis, the MRD has in the past taken care of eliminating shortcomings in school infrastructure on its own. However, in the absence of formal arrangements between the MRD and MoEYS and given the inadequate MoEYS maintenance budget, the systematic maintenance of schools is not guaranteed. Furthermore, the technical design of school rehabilitation did not sufficiently address aspects of climate change adaptation (see “Effectiveness”). In addition to general deficits in maintenance, this can also affect sustainability in the event of future floods.

The development of rural infrastructure is still a clear focus of the Cambodian government today (see “Relevance”). This focus goes hand in hand with other donors in the sector. The significant increase in the maintenance budget mentioned above and the measures taken in the area of maintenance through further follow-up phases offer the opportunity to work towards further improvements in the area of maintenance.

Given the progress already made in terms of maintenance capacities, the significant increase in the maintenance budget and the continued intensive efforts in the areas of inventory, budgeting and maintenance, sustainability is still considered satisfactory, despite the shortcomings stated above.

Sustainability rating: 3

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).