



# Validation Report

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Reference Number: PVR-332  
Project Number: 32373-013  
Loan Number: 2187  
October 2014\*

## Bhutan: Road Network Project

Independent Evaluation Department  
**Asian Development Bank**

\* Revised May 2015.

## **ABBREVIATIONS**

ADB	–	Asian Development Bank
DOR	–	Department of Roads
EIRR	–	economic internal rate of return
km	–	kilometer
PCR	–	project completion report
PMO	–	project management office
TA	–	technical assistance
VOC	–	vehicle operating cost

## **NOTE**

In this report, “\$” refers to US dollars.

## **Key Words**

adb, asian development bank, bhutan, feeder road, independent evaluation department, national highway, project completion report, road maintenance, road safety, road transport, validation

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## PROJECT BASIC DATA

<b>Project Number:</b>	32373-013	<b>PCR Circulation Date:</b>	Aug 2013	
<b>Loan Number:</b>	2187	<b>PCR Validation Date:</b>	Oct 2014	
<b>Project Name:</b>	Road Network Project			
<b>Country:</b>	Bhutan		<b>Approved</b> (\$ million)	<b>Actual</b> (\$ million)
<b>Sector:</b>	Transport and ICT	<b>Total Project Costs:</b>	34.10	36.29
<b>ADB Financing:</b> (\$ million)	<b>ADF:</b> 27.30	<b>Loan:</b> (SDR equivalent, million)	27.30	29.15
			18.80	18.80
	<b>Borrower:</b>	6.80	7.14	
	<b>OCR:</b> 0.00	<b>Beneficiaries:</b>	0.00	0.00
		<b>Others:</b>	0.00	0.00
<b>Cofinancier:</b>		<b>Total Cofinancing:</b>	0.00	0.00
<b>Approval Date:</b>	30 Sep 2005	<b>Effectiveness Date:</b>	90 days after loan agreement	1 Dec 2005
<b>Signing Date:</b>	19 Oct 2005	<b>Closing Date:</b>	31 Dec 2010	31 Dec 2011
<b>Project Officers:</b>	H. Yamaguchi M. Subroto A. Ahonen S. Lim T. Sakai	<b>Location:</b> ADB headquarters ADB headquarters ADB headquarters ADB headquarters ADB headquarters	<b>From:</b> Sep 2005 Feb 2007 Apr 2008 Mar 2009 Nov 2011	<b>To:</b> Jan 2006 Mar 2008 Feb 2009 Nov 2011 Dec 2011
<b>Validator:</b>	B. Palacios, Consultant	<b>Peer Reviewer:</b>	E. Kwon, Principal Evaluation Specialist, IED2 F. D. De Guzman, Senior Evaluation Officer, IED2	
<b>Quality Reviewer:</b>	B. Nguyen, Senior Evaluation Specialist, IED2	<b>Director:</b>	B. Finlayson, IED2	

ADB = Asian Development Bank; ADF = Asian Development Fund; ICT = information and communication technology; IED2 = Independent Evaluation Department, Division 2; OCR = ordinary capital resources; PCR = project completion report; SDR = special drawing rights.

## I. PROJECT DESCRIPTION

### A. Rationale

1. During the project preparation stage, an efficient and reliable road network was identified as being of strategic importance for Bhutan. Many communities were isolated and dependent on animal transport due to lack of reliable roads and this inaccessibility had kept several farmers dependent on subsistence agriculture. The country's trunk road had very limited coverage and it was unable to meet the growing demands of larger and heavier vehicles. In Bhutan, 20% of the national highways, 53% of the district roads, and 86% of the feeder roads were in poor condition and were difficult to use during extreme weather conditions. The Road Network Project<sup>1</sup> was designed to address the need to improve

<sup>1</sup> ADB. 2005. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant to the Kingdom of Bhutan for the Road Network Project*. Manila.

accessibility of the targeted rural community to socioeconomic activities and meet the requirements of an expanding vehicle traffic.

## **B. Expected Impact**

2. The project's envisaged impact was to improve access to basic infrastructure to achieve economic growth and social development. The impact indicators were increased freight and passenger transport in the country, increased subregional trade with India, and better access to education, health, and other social services for the project areas.

## **C. Objectives or Expected Outcomes**

3. The project intended to achieve four outcomes. The first outcome was to provide efficient and safe movement of freight and people along the national highway network. The performance indicators were: (i) a 10% reduction in vehicle operating costs (VOCs) from Nu10.6 per vehicle-kilometer (km) for trucks, (ii) travel time savings of 20% from 7 hours on the project national highway, and (iii) 10% reduction of road accidents from 0.6 deaths and 3.8 injuries per year. The second expected outcome was provision of better access to social services, markets, and other economic opportunities for the rural population. The corresponding outcome indicator was a 50% reduction of walking time (from 2–3 days) to the nearest motorable road for communities around project feeder roads.

4. The third envisaged outcome was an enhanced asset management capacity of the Department of Roads (DOR). The target indicators were: (i) capability to finance all of the routine and periodic maintenance requirements from domestic funds; and (ii) reduction of the deferred maintenance backlog of the total network length from 30% to 20% by 2007, 7% by 2010, and 0% by 2012. The fourth expected outcome was enhanced private sector's capacity. The performance indicators were: (i) increased share in the DOR budget due to increased works of domestic contractors from 45% to more than 50% by 2007, and (ii) 50% decrease in the delay obtaining quarry sites clearance (from 8 months).

## **D. Outputs**

5. The project comprised five outputs. The first output consisted of the upgrading of the national highway, covering 140 km of the 244 km Gelephu–Trongsa national highway. The upgrade included 16 km of road realignment between the Mangdichu and Wangdigang bridges, provision of single carriageways, and replacement of two temporary bridges with permanent structures. The project road would provide another subregional link to India in addition to the existing link via the Thimphu–Phuentsholing road. It was forecast that the road outputs would be completed in 2009.

6. The second output was the construction of four feeder roads and single-lane carriageways. The feeder roads were designed to have a total length of 103 km—Mirchimbongo (17.5 km) and Tekizam-Bjena (6.5 km) in the west region, and Garbagtang-Autsho (51 km) and Khardungla-Kangpara (28 km) in the east region. These roads were forecast to be constructed by 2010.

7. The third output pertained to enhancement of the road asset system. This output consisted of improvements in the road asset information system to include 100% data

coverage of road inventory, road conditions, and traffic on the national highway network. The fourth output concerned road safety capacity improvements in the DOR and the Road Safety and Transport Authority through the development of audit manuals and tools on road safety. The last output pertained to the engagement of domestic contractors for works on project roads. This output was expected to enhance the private sector's capacity by providing opportunities to gain experience in large-scale construction projects.

## **E. Provision of Inputs**

8. The total project cost approved was \$34.10 million, but the actual cost increased to \$36.29 million. The difference in cost was largely attributed to higher global material prices and cost underestimates during the feasibility study stage. Most inputs were utilized for design, land acquisition, civil works for the national highway and feeder roads, and supervision.

9. Asian Development Bank (ADB) agreed to provide a loan of \$27.30 million (80% of the project cost) from its Special Funds resources. The Government of Bhutan agreed to finance \$6.80 million of project costs. At completion, ADB financed \$29.15 million and the government contributed \$7.14 million. The loan was approved on 30 September 2005 and it became effective on 1 December 2005. The direct payment procedure was applied for consulting services. The disbursement process was slow in 2008 due to a delay in the civil works procurement process.

10. Disbursement started to catch up in 2009 along with the progress made on civil works. Loan closing was extended twice to accommodate start-up delays and an investigation by the Bhutan Anti-Corruption Commission that involved two of the subcontractors in the construction supervision consultant team and one of the civil works contractors (para. 13). The loan account was closed on 31 December 2011. In total, \$29.15 million was disbursed, leaving only SDR61 as the remaining balance. The project completion report (PCR)<sup>2</sup> indicated this remaining balance was due to the exchange rate fluctuation between SDR and the US dollar. Thus, in effect, the full amount was utilized.

11. The project was classified by ADB as a Category A environmental project. The environmental impact assessment pointed out that a few adverse significant impacts could occur during the construction phase. However, most of these impacts could be reversed and managed through engineering solutions incorporated into the project design and reflected in the environmental management plan. The PCR indicated an environment-friendly approach to road construction was adopted during implementation, such as controlled blasting and limited use of bulldozers, among other measures. Four ADB project review missions noted a generally satisfactory implementation of the environmental loan covenants and environmental management plan. Another review mission in 2010 concluded that mitigation measures were being implemented in accordance with the ADB environment policy and the loan covenants.

12. At appraisal, no land acquisition and resettlement impacts were expected for the national highway. However, for the feeder roads, it was expected during the detailed design that minor land acquisition would be needed. The actual land acquired for the project was 30.38 acres, with 104 households and four structures affected (PCR, para. 40). A resettlement framework was prepared in line with ADB and the government's guidelines. All affected households were fully compensated through cash or a land-for-land scheme. Compensation included cash payments for 18.06 acres, 8.5 acres for land-to-land substitution, and 3.82 acres

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<sup>2</sup> ADB. 2013. *Completion Report: Road Network Project in the Kingdom of Bhutan*. Manila.

through adjustments with excess land. The compensation cost totaled to Nu4,471,299.32. Households with affected structures moved to new houses with assistance from the DOR. There were no complaints or grievances received from the affected households.

13. About 582.01 person-months of consulting services were provided, comprising 110.66 person-months of international consulting services and 471.35 person-months of national consulting services (PCR, para. 25). The PCR assessed the consultants' performance to be generally satisfactory. It noted the investigation of the civil works contractor was completed without finding evidence of wrongdoing although the matter had been submitted to the court (PCR, para. 27).

14. A technical assistance (TA) grant of \$300,000 was provided in conjunction with the project loan<sup>3</sup>. The TA grant aimed to strengthen the DOR's capacity in road asset management, and to develop its capacity in road safety audit. The TA completion report assessed the TA grant *successful*. However, the Highway Development Management Model software that was purchased under the TA grant was found unsuitable for Bhutan due to the software's data requirements and lack of adequate training.

## **F. Implementation Arrangements**

15. The DOR was the executing agency. A project management office (PMO) was responsible for the day-to-day operations of project implementation. The PCR indicated that adequate technical and administrative staffs were provided. As envisaged, the PMO was based in Thimphu during the design and procurement stages and moved to Trongsa after civil works contracts were awarded. Two regional offices with deputy project managers were established in Mirchim and Garbagtang to manage the construction of the feeder roads. The project manager and deputy project managers met on a quarterly basis. The project accounts and financial statements were audited on a yearly basis by the government auditor and were acceptable to ADB. This validation finds the government's implementation arrangements appropriate.

16. The PCR indicated that 20 of the 21 loan covenants were complied with. These concerned implementation arrangements, project management, reporting requirements, environmental issues, road safety, land acquisition and resettlement, project review, and a project performance management system. The covenant pertaining to allocation of funds for periodic maintenance was partially complied with (PCR, Appendix 8, Covenant 7).

## **II. EVALUATION OF PERFORMANCE AND RATINGS**

### **A. Relevance of Design and Formulation**

17. The PCR rated the project *highly relevant* to the government's objectives for the road sector and to ADB's program of support for Bhutan, which focused on increasing connectivity and reducing isolation by providing a more sustainable transport network. The validation considers the project's strategic importance was well established. The project was consistent with the government's development priorities and with the ADB country strategy for Bhutan.

18. The validation notes that during implementation three out of eight contract packages for feeder roads construction were dropped from the project due to cost overruns. The PCR

<sup>3</sup> ADB. 2005. *Technical Assistance to Bhutan for Capacity Building in Road Safety Audit and Road Asset*. Manila.

indicated the detailed design put the cost for civil works at about 35% higher than the original estimate at appraisal. During implementation, the actual cost rose by another 15%, including 6.7% for extra works and 8.2% for price escalation in construction materials. As a result, the project could only cover the cost of about two thirds of the target feeder road outputs. At completion, a total of 66 km feeder road were constructed compared to the target of 103 km. Such a significant reduction in project scope due to the underestimation of costs and insufficient provision in the contingencies budget indicated shortcomings in project preparation and the target scope was too ambitious at appraisal. Therefore, the validation finds a *highly relevant* rating not justified and assesses the project *relevant*.

## **B. Effectiveness in Achieving Project Outcome and Outputs**

19. The PCR rated the project *effective* in achieving its outcomes. It indicated the 136.38 km of national highway was strengthened and 66.07 km of feeder roads constructed have facilitated movement of freight and people. Better road conditions have allowed vehicles to move faster at an average speed of 30–40 km per hour compared to 15–20 km per hour before the project. The PCR indicated the VOC was lower by 18%, travel time was reduced by 23%, and accidents on the national highway were reduced by 61%. Likewise, walking distance for the villagers along the project feeder roads was reduced from 3.26 km to 1.27 km. The backlog in deferred maintenance was reduced to 13% during 2010–2012 from the 2008–2009 figures. The PCR did not provide the 2008–2009 figures to show the magnitude of this reduction. All contractors under the project were domestic construction companies, which helped enhance the capacity of the private sector.

20. The validation notes a shortfall of around 4 km upon completion of the national highway strengthening component. Also, only 66 km of feeder roads were constructed out of the 103 km planned at appraisal since three contract packages were cancelled due to cost overruns. The government decided to finance these three feeder road packages using its own resources (PCR, paras. 13 and 24). On the whole, the validation notes the envisaged outputs and outcomes were generally met and assesses the project *effective*.

## **C. Efficiency of Resource Use in Achieving Outcome and Outputs**

21. The PCR rated the project *efficient*. It indicated project implementation experienced start-up delays and late mobilization of consultants. The PCR presented various reasons including insufficient resources of contractors, weather-related problems, technical difficulties, and weak on-site construction management. Compared to the appraisal schedule, the consultants for detailed design were selected and mobilized 9 months late; the procurement of civil works contractors started in February 2007 against mid-2006 estimated, and the first civil works contract was awarded 4 months late. Civil works for the national highway were completed 18 months later than envisaged. The feeder roads were completed 12 months later than scheduled. Overall, implementation was extended twice and completion closing was delayed by one year (Target: December 2010; Actual: December 2011). In addition, the PCR indicated that compared to the appraisal estimates, the actual unit cost of civil works was 98% higher for the national highway and 44% higher for the feeder roads (PCR, Appendix 11, para. 4).

22. The PCR recalculated the economic internal rates of return (EIRRs) for the project national highway and feeder roads using the methodology similar to that used at appraisal. The PCR reported EIRR of 24.3% for the national highway (at appraisal: 17.4%) and 17.8% for the project feeder roads (at appraisal: EIRRs for the four feeder roads ranged from 12.6% to

17.6%). The PCR attributed the higher EIRRs to the higher traffic volume. The PCR indicated the traffic on the highway was higher than appraisal forecast by 33% in 2011 and by 89% in 2012 (PCR, Appendix 11, para. 2).

23. The validation finds that the recalculated EIRRs are over-estimated and an unreliable source to determine the project's economic viability. First, they were erroneously reported. Using the data presented in the PCR (Appendix 11, Table A11.6 and Table A11.7), the recalculated EIRRs would be lower than those reported in the PCR. Second, the validation notes 10% was added to the VOC and time savings as other potential benefits, such as accident cost reduction, agricultural development, and maintenance cost savings. The PCR also included a salvage value of 50% of the investment costs for both the national highway and feeder roads. The validation considers the additional 10% benefits arbitrary without supporting data and the 50% salvage value too large after 25 years of operation. This too would further reduce the EIRR. Because of these flaws in the EIRR, the validation assesses the project efficiency based on the available information on the implementation process and costs. As noted in para. 21 above, the project incurred multiple implementation delays and significant cost overruns for both the national highway and feeder roads. On these bases, the validation assesses the project *less than efficient*.<sup>4</sup>

#### **D. Preliminary Assessment of Sustainability**

24. The PCR rated the project *likely sustainable*. However, the validation notes several issues that put serious doubts on the sustainability of the project outputs and outcomes. Firstly, the PCR noted that the road asset management system that was funded through an ADB TA grant was not used properly due to data collection problems. The PCR indicated that the government was planning to establish a simple and workable road asset management system to keep the road network in proper condition. However, no specific details were provided regarding the implementation timeline and level of resources required and committed.

25. Secondly, the validation is not convinced that the project roads could be adequately maintained because of the absence of a sustainable source of long-term O&M funding. Project road O&M is dependent on government's funds. The International Monetary Fund reported that Bhutan has a long term trend of fiscal deficit. This problem worsened in 2013 and is projected to continue.<sup>5</sup> The validation notes the loan covenant on road maintenance was partially complied with (PCR, Appendix 8, Covenant 7). The covenant required that sufficient budget be made available for both routine and periodic maintenance of the entire road network. The PCR indicated funds for routine maintenance were allocated from the central government in a timely and adequate manner. However, funds for periodic maintenance were sometimes delayed. The covenant also required the amount of deferred maintenance be reduced to a maximum 20% of the national highway network by June 2007 and further reduced to a maximum 7% of the total network length by June 2010 and to 0% by 2012 (PCR, Appendix 1). The PCR reported the backlog of deferred maintenance was 13% during the period 2010–2012. Given these observations, this validation assesses the project *less than likely sustainable*.<sup>6</sup>

<sup>4</sup> The regional department disagrees with the downgrade of the PCR rating.

<sup>5</sup> International Monetary Fund. 2014. Bhutan. 2014. Article IV. Staff Report. Washington D.C.

<sup>6</sup> The regional department disagrees with the downgrade of the PCR rating.



## **E. Impact**

26. The PCR did not provide baseline figures that could have facilitated comparison with the achieved impact indicators. However, it indicated the following major findings, based on monitoring and evaluation activity conducted at project completion: (i) actual traffic on the national highway was 562 vehicles in 2012 or 1.5 times higher than in 2011, and for the feeder roads, the average traffic was 73 vehicles in 2012; (ii) trade with India registered a 20% increase; (iii) the percentage of rural population not consulting health providers due to lack of transport dropped from 30.7% in 2007 to 0.4% in 2012; and (iv) the percentage of rural children not attending remote schools decreased from 8.7% in 2007 to 3.1% in 2012.

27. The PCR mission also observed newly opened roadside businesses that provided various products and services to transporters and local residents. It indicated these roadside businesses provided more working opportunities, especially to women. Based on these discussions and findings, this validation assesses the project impact *significant*.

## **III. OTHER PERFORMANCE ASSESSMENTS**

### **A. Performance of the Borrower and Executing Agency**

28. The PCR rated the performance of the borrower and executing agency *satisfactory*. The borrower was Government of Bhutan, and the executing agency was DOR. DOR closely coordinated and regularly monitored implementation progress. The PMO, with assistance from the consultants, prepared the required monthly and quarterly reports. The required action for land acquisition and resettlement and the environment mitigation measures were implemented in a timely manner. The validation views the performance of the borrower and executing agency *satisfactory*.

### **B. Performance of the Asian Development Bank**

29. The PCR rated the performance of ADB *satisfactory*. The project was administered and supervised from ADB headquarters. A total of 10 review and two administration missions were fielded, excluding the inception mission. These missions facilitated close coordination and the provision of substantial guidance and support to the government and PMO in all aspects of the project's implementation. The PCR indicated ADB missions' support, in terms of providing timely advice on project implementation and technical issues, was well recognized by the Government of Bhutan. This validation considers the performance of ADB *satisfactory*.

## **IV. OVERALL ASSESSMENT, LESSONS, AND RECOMMENDATIONS**

### **A. Overall Assessment and Ratings**

30. The PCR rated the project *successful*. This validation assesses the project *less than successful* on account of lower ratings on project relevance, efficiency, and sustainability. On relevance, the reduction in about one third of target feeder roads during implementation due to cost escalations indicated poor preparation and overly ambitious project scope target at appraisal. On efficiency, the PCR recalculated EIRR are overestimated and an unreliable source in determining the project's economic viability. The validation, therefore, assesses the project efficiency based on the implementation process. The project encountered several delays in the mobilization of design consultants and completion of civil works that resulted in the project completion delay by one year. The unit costs of both project highway and feeder

roads were significantly higher than estimated (98% and 44%, respectively). On sustainability, the project lacked a sustainable long-term funding mechanism for O&M. Funds for periodic maintenance were not provided adequately and some periodic maintenance did not take place on a timely basis. The backlog of deferred maintenance remained 13% by 2012 compared to the target of 0%. The road asset management system supported by the project is not functional and there is no evidence the government will implement a proper maintenance plan for the road network.

### Overall Ratings

Criteria	PCR	IED Review	Reason for Disagreement and/or Comments
Relevance	Highly relevant	Relevant	The reduction by about one third of target feeder roads during implementation due to cost escalations indicated poor preparation and overly ambitious project design scope at appraisal (paras. 17–18).
Effectiveness in achieving project outputs and outcome	Effective	Effective	
Efficiency of resource use in achieving outcome and outputs	Efficient	Less than efficient	The recalculated EIRR is over estimated. Implementation delays and significant cost overruns considered instead (paras. 21–23).
Preliminary assessment of sustainability	Likely sustainable	Less than likely sustainable	Lack of sustainable long-term funding mechanism for O&M. Shortfalls in funds for periodic maintenance and some periodic maintenance did not take place. Backlog of differed maintenance remained 13% by 2012 compared to the target of 0%. The road asset management system is not functional and there is no evidence the government will implement a proper maintenance program (paras. 24–25).
<b>Overall assessment</b>	<b>Successful</b>	<b>Less than successful</b>	
Impact	Not rated	Significant	
Borrower and executing agency	Satisfactory	Satisfactory	
Performance of ADB	Satisfactory	Satisfactory	
Quality of PCR		Less than satisfactory	See para. 34.

ADB = Asian Development Bank, IED = Independent Evaluation Department, PCR = project completion report, O&M = operations and maintenance, EIRR = economic internal rate of return.

Note: From May 2012, IED views the PCR rating terminology of "partly" or "less" as equivalent to "less than" and uses this terminology for its own rating categories to improve clarity.

Source: ADB Independent Evaluation Department.

## B. Lessons

31. The PCR identified a few important lessons. One is the need to provide sufficient contingencies for similar projects in the future to avoid cost overruns. Another lesson is that adequate training on project management and implementation should be provided to

concerned staff as implementation delays were mainly caused by slow and repeated procurement actions. The local competitive bidding adopted in the project provided an opportunity for domestic firms to learn international best practice. This validation offers an additional lesson for future projects. There is a need for realistic estimation of project costs and a more careful assessment of geologic conditions in the project area.

### **C. Recommendations for Follow-Up**

32. The PCR recommended the need to follow up on the institutionalization of the asset management system. It indicated the need for an advanced detailed design to minimize the risk of a cost overrun. The PCR also recommended the adoption of international competitive bidding procedure for road construction in future projects to attract foreign contractors. This could also provide learning opportunities for local companies in the event of joint ventures with foreign firms. This validation finds the recommendations appropriate and has no additional recommendation to offer.

## **V. OTHER CONSIDERATIONS AND FOLLOW-UP**

### **A. Monitoring and Evaluation Design, Implementation, and Utilization**

33. ADB should determine whether the project performance monitoring system is still in operation. The PCR indicated DOR carried out monitoring and evaluation activities based on the project performance management framework that was designed at appraisal. However, it did not indicate whether the project performance monitoring system was still operational. The extent to which the baseline indicators were collected prior to commencement of any construction, as indicated in one of the covenants, was also not indicated.

### **B. Comments on Project Completion Report Quality**

34. The PCR quality is *less than satisfactory*. Adequate explanation on the methodology used for the EIRR reestimation could have been provided, especially in the case of the feeder roads. Also, a financial analysis was not undertaken, which would have helped assess the sustainability of fiscal resources provided to the project. The PCR lacked a substantive discussion on the relevance criterion, given the change in project design and output.

### **C. Data Sources for Validation**

35. Data sources for this validation included the project's report and recommendation of the President; the PCR; reports of selected review missions to Bhutan; the ADB Country and Strategy Program Update, 2005–2006; the ADB Country Strategy Partnership: Bhutan, 2006–2010; and the Summary Environmental Impact Assessment for the Proposed Road Network Project.

### **D. Recommendation for Independent Evaluation Department Follow-Up**

36. The preparation of a project performance evaluation report may be undertaken in 2015 or at a later date. By that time, the project's socioeconomic impacts may be more apparent and can be reasonably assessed.