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IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IBRD-48400 IBRD-80450)

ON A

LOAN

IN THE AMOUNT OF US\$ 370MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

FUJIAN HIGHWAY SECTOR INVESTMENT PROJECT

December 14, 2015

Transport and ICT Global Practice
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective June 30, 2015)

Currency Unit = Renminbi (RMB)
US\$1.00 = RMB6.11

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ADT	Average Daily Traffic	ISP	Institutional Strengthening Program
AF	Additional Financing	M&E	Monitoring and Evaluation
CNEN	China National Expressway Network	NPV	Net Present Value
CPS	Country Partnership Strategy	O&M	Operation and Maintenance
EIA	Environment Impact Assessment	PAD	Project Appraisal Document
EIRR	Economic Internal Rate of Return	PCU	Passenger-Car Units
EMF	Environmental Management Framework	PDO	Project Development Objectives
FEC	Fujian Expressway Cooperation	PMO	Project Management Office
FHSIP	Fujian Highway Sector Investment Project	RAP	Resettlement Action Plan
FIRR	Financial Internal Rate of Return	RPF	Resettlement Policy Framework
FPCD	Fujian Provincial Communications Department	RRIF	Rural Road Implementation Framework
FPECD	Fujian Provincial Expressway Construction Directorate	RRIP	Rural Roads Improvement Program
GDP	Gross Domestic Product	SWAp	Sector Wide Approach
GoC	Government of China	TA	Technical Assistance
HMPP	Highway Maintenance Pilot Program	TPRI	Transport Planning and Research Institute
ICR	Implementation Completion Report	VOC	Vehicle Operating Cost
		YWE	Yong'an – Wuping Expressway

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CHINA
Fujian Highway Sector Investment Project

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A. Basic Information			
Country:	China	Project Name:	Fujian Highway Sector Investment Project
Project ID:	P091020	L/C/TF Number(s):	IBRD-48400,IBRD-80450
ICR Date:	05/05/2015	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	CHINA
Original Total Commitment:	USD 320.00M	Disbursed Amount:	USD 368.88M
Revised Amount:	USD 368.88M		
Environmental Category: A			
Implementing Agencies: Fujian Provincial Communications Department (FPCD)			
Cofinanciers and Other External Partners: NA			

B. Key Dates				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	08/31/2005	Effectiveness:	11/28/2007	11/28/2007
Appraisal:	04/17/2006	Restructuring(s):		05/19/2011
Approval:	10/12/2006	Mid-term Review:		06/21/2010
		Closing:	06/30/2012	06/30/2015

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Satisfactory
Risk to Development Outcome:	Moderate
Bank Performance:	Satisfactory
Borrower Performance:	Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance:	Satisfactory	Overall Borrower Performance:	Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	None
DO rating before Closing/Inactive status:	Satisfactory		

D. Sector and Theme Codes		
	Original	Actual
Sector Code (as % of total Bank financing)		
Rural and Inter-Urban Roads and Highways	99	99
Sub-national government administration	1	1
Theme Code (as % of total Bank financing)		
Infrastructure services for private sector development	50	50
Rural services and infrastructure	50	50

E. Bank Staff		
Positions	At ICR	At Approval
Vice President:	Axel van Trotsenburg	James W. Adams
Country Director:	Bert Hofman	David R. Dollar
Practice Manager/Manager:	Michel Kerf	Jitendra N. Bajpai
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F. Results Framework Analysis

Project Development Objectives (from Loan Agreement)

The project development objective of the Fujian Highway Sector Investment Project is to increase the effective use of the road infrastructure in Fujian Province to support its social and economic development by: (i) enhancing its rural roads network; (ii) reducing transport costs; and (iii) facilitating the interconnection across the coastal provinces.

Revised Project Development Objectives (as approved by original approving authority)

Not Applicable

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Freight rate along Yong'an-Wuping Expressway Corridor (RMB/ton*km and total RMBs) for sample of three products			
Value	RMB0.37 /ton-km RMB89 (total)	RMB0.55 /ton-km RMB130 (total)		RMB0.55 /ton-km RMB130 (total)
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Target achieved. Current freight rates along the Corridor are: cement - RMB0.6 /ton-km; fruit – RMB0.5 /ton-km; and coal – RMB0.55 /ton-km.			
Indicator 2:	Travel times on rural roads rehabilitated under the Rural Road Improvement Program (RRIP, percentage reduction before and 3-months after works completion)			
Value	0	50%		79%
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Target exceeded by 58%.			
Indicator 3:	Direct project beneficiaries			
Value	Not in place		1,250,000	1,309,000
Date achieved	10-Apr-2006		11-April-2011	30-Jun-2015
Comments (incl. % achievement)	Direct project beneficiaries are the villagers living along the rural roads improved by the project. Target exceeded by 5%.			

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Increases in traffic volumes (PCU/day) and passenger services (buses/day) on rehabilitated roads, based on sample of roads, comparison between before and 3 months after.			
Value	0	15% (traffic volumes) 30% (pass. services)		171% (traffic volumes) 133% (pass. services)
Date achieved	10-Apr-2006	30-Jun-2012		30-Jun-2015
Comments (incl. % achievement)	Target exceeded. Results are based on a sample of 20 roads.			
Indicator 2:	Pace of loan disbursements for RRIP component (as percent of loan amount allocated to this component, including additional financing (AF))			
Value	0	100%	100% (AF included)	100% (AF included)
Date achieved	10-Apr-2006	30-Jun-2012	11-April-2011	31-Oct-2015

Comments (incl. % achievement)	Target achieved.			
Indicator 3:	Traffic volumes (PCU/day) on existing highway G205.			
Value	Yong'an-Liancheng: 4,605 Liancheng-Shanghang: 5,925 Shanghan-Yanquian: 7,462	Yong'an-Liancheng: 2,780 Liancheng-Shanghang: 3,630 Shanghan-Yanquian: 4,580		Yong'an-Liancheng: 4,205 Liancheng-Shanghang: 5,369 Shanghan-Yanquian: 6,980
Date achieved	10-Apr-2006	30-Jun-2012		30-Jun-2015
Comments (incl. % achievement)	Traffic volume reductions on the three segments were 22%, 24%, and 17% of he expected reductions. Traffic volume on highway G205 did not divert to the YWE as anticipated because of government new policy of requiring a free G205.			
Indicator 4:	Traffic volumes (PCU/day) on new Yong'an-Wuping Expressway			
Value	Yong'an-Liancheng: 0 Liancheng-Shanghang: 0 Shanghan-Yanquian: 0	Yong'an-Liancheng: 5,440 Liancheng-Shanghang: 10,100 Shanghang-Yanquian: 16,960		Yong'an-Liancheng: 6,033 Liancheng-Shanghang: 8,795 Shanghang-Yanquian: 12,518
Date achieved	10-Apr-2006	30-Jun-2012		30-Jun-2015
Comments (incl. % achievement)	Target partially achieved. Traffic volume on Yong'an – Liancheng is 11% higher than the expected target. Traffic volume on Liancheng-Shanghang and Shanghang-Yanquian were 87% and 74% of the target values due to toll policy change.			
Indicator 5:	Average travel times (hours) between Yong'an and Wuping on existing G205 and on YWE (when construction is completed).			
Value	G205: 6.0 hours YWE: not applicable	G205: 5.7 hours YWE: 2.0 hours		G205: 5.7 hours YWE: 2.0 hours
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Target achieved.			
Indicator 6:	Accident rates (total number of fatalities) on existing Highway G205 and on new YWE (when construction is completed)			
Value	On G205: 22 On YWE: not applicable	On G205: 16 On YWE: 10		On G205: 15 On YWE: 5
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Target exceeded by 6% on G205 and 50% on YWE.			
Indicator 7:	Contract maintenance approaches applied more extensively in Fujian (number of contracts)			
Value	0	6		9
Date achieved	10-Apr-2006	30-Jun-2012		30-Jun-2015

Comments (incl. % achievement)	Target exceeded by 50%.			
Indicator 8:	Percent positive evaluation rate of training and study tour programs (in line with agreed evaluation approach)			
Value	0	70%		95%
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Ratings are based on post-training questionnaires; satisfactory rating exceeded the target by 36%.			
Indicator 9:	Rural roads rehabilitated (kilometers)			
Value	0	3,500 (from AF docs)	5,009	5,402
Date achieved	10-Apr-2006	31-Dec-2010	11-April-2011	30-Jun-2015
Comments (incl. % achievement)	Achievement was 8% over the target.			
Indicator 10:	Number of km completed non-Bank Financed works with substantial compliance with RRIF			
Value	0	1,500	4,244	4,885
Date achieved	10-Apr-2006	30-Jun-2012	11-April-2011	30-Jun-2015
Comments (incl. % achievement)	Target exceeded by 15%.			
Indicator 11:	Analysis of toll rates in the Province.			
Value	Not in place	Recommendations Implemented		Recommendations Implemented
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Target achieved.			
Indicator 12:	Impact analysis/survey adopted as part of RRIP databank.			
Value	Not in place	Adopted		Adopted
Date achieved	10-Apr-2006	30-Jun-2012		31-Dec-2014
Comments (incl. % achievement)	Target achieved. Impact analysis/survey procedures have been adopted as part of RRIP databank.			

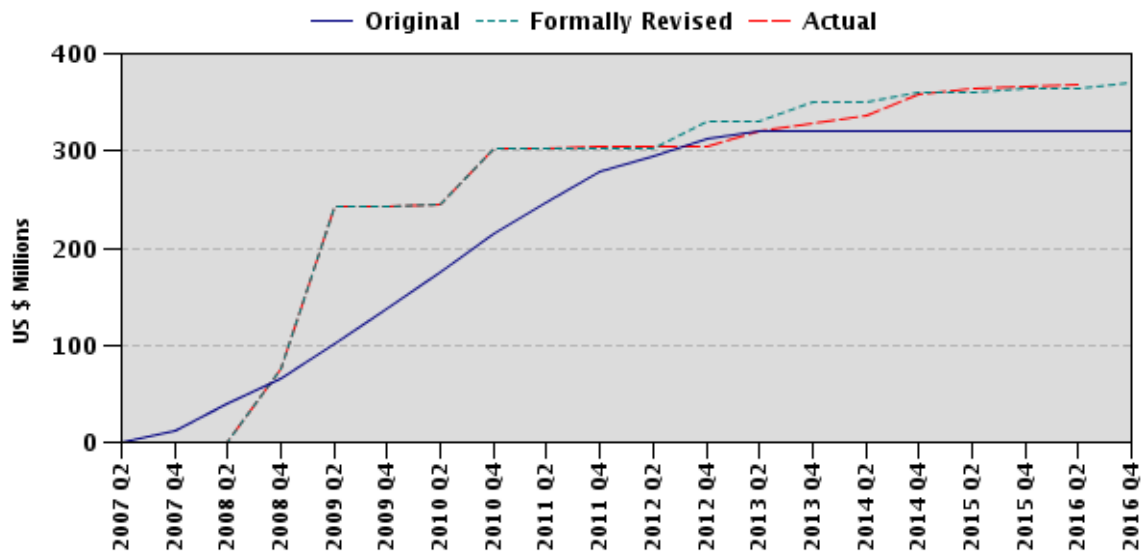
G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	12/08/2006	Satisfactory	Satisfactory	0.00
2	01/08/2008	Satisfactory	Satisfactory	0.00
3	06/28/2008	Satisfactory	Moderately Satisfactory	75.00
4	12/20/2008	Satisfactory	Satisfactory	243.54

5	03/21/2010	Satisfactory	Satisfactory	244.10
6	10/10/2010	Satisfactory	Satisfactory	302.10
7	03/19/2011	Satisfactory	Satisfactory	302.58
8	12/21/2011	Satisfactory	Satisfactory	304.06
9	12/11/2012	Satisfactory	Satisfactory	320.12
10	06/18/2013	Satisfactory	Satisfactory	328.12
11	12/22/2013	Satisfactory	Satisfactory	336.12
12	06/21/2014	Satisfactory	Satisfactory	359.13
13	12/17/2014	Satisfactory	Satisfactory	359.13
14	06/19/2015	Satisfactory	Satisfactory	367.05

H. Restructuring (if any)
Not Applicable

I. Disbursement Profile



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

Country and Sector context

1. **Fujian province's 35 million people live on the Taiwan Strait between Guangdong and Hong Kong SAR, China to the South and Zhejiang and Shanghai to the North.** At appraisal, the province lagged behind the other coastal provinces in transport infrastructure and that affected social and economic progress: GDP per capita was 75% to 85% of the neighboring provinces. The density of higher class roads was less than half of that in Guangdong and Zhejiang, and the percentage of unclassified and lower class roads (81%) was substantially higher. Fujian's higher class roads serve North-South transport in the coastal provinces and provide access to Fujian's deep-water ports at Xiamen and Fuzhou for several inland provinces with a population of over 300 million.

2. **The developed area of Fujian is on the narrow strip along the coast.** Seventy percent of its land westward is mountainous, with large pockets of poor population. Of the 207 poorest villages, 166 are in the project areas. In these villages the unclassified and lower class roads are often impassable in the rainy season and transport costs are high. Improved rural road network is a key element for the socio-economic development of Fujian province.

3. **Support requested for an expressway in Fujian's interior and rural roads program.** The Government of China (GOC) requested support of the World Bank for the development of a key expressway in the North-South corridor, from the city of Yong'an to the Fujian-Guangdong border city Wuping, inland from the coast, and for an extensive rural roads program to foster rural development in Fujian.

Rationale for Bank Involvement

4. **Support for balanced investment strategy.** The Provincial Government and the Provincial Communications Department (FPCD) have a thoughtful investment strategy to improve the road network to support Fujian's social and economic development. Roads serve a high percentage of passenger (95%) and freight traffic (70%) in Fujian province. The investment strategy is balanced across all classes of roads: (i) doubling of the expressway network by 2010, and tripling it by 2017; (ii) upgrading a network of 8,600 km to Class II or higher standard between cities and counties and integrating them with the expressway network; and (iii) aggressive improvement of about 35,000 km of non-paved Class III and IV rural roads as part Rural Roads Improvement Program (RRIP) in 7,500 administrative villages by 2010.

5. **Value added from the Bank's involvement.** The Bank added value to the existing FPCD programs through improved program delivery, better safeguards and fiduciary arrangements, poverty alleviation, and the application of the Sector Wide Approach (SWAp) and its framework. The ambitious road investment plans also required studies and

institutional strengthening, with Technical Assistance (TA) and training at FPCD in several aspects of road asset management and traffic safety and surveillance. RRIP enabled FPCD to give county agencies technical support in accessibility and network quality management, and improved administration of road assets.

6. **Additional Financing (AF).** On August 30, 2011 the Bank approved an additional US\$50 million loan (Loan No. 8045-CHA) to Fujian Highway Sector Investment Project (FHSIP) (Loan No. 4840-CHN) to the People's Republic of China. The AF was consistent with the original project objective and scaled-up the RRIP and institutional strengthening components.

Relation to Higher Level Objectives

7. **The project sustained national and provincial goals.** The project supported the central government's Eleventh Five-Year Plan (2006-2010), including China's National Expressway Network (CNEN) and the RMB100 billion initiative for rural roads in the same period, and the strengthening of road management capacity at county and local levels. The extensive RRIP is the Provincial Government's flagship program to improve access and mobility in villages. The project and its additional financing supported the provincial government objective for social and economic development of the province.

8. **The original project and AF are aligned with the Country Partnership Strategy (CPS) for 2006-2010,** especially its second pillar, to reduce poverty, inequality and social exclusion, and to improve the competitiveness and investment climate in China's regions. It addressed the needs of disadvantaged groups in underdeveloped regions, promoted balanced urban-rural development, improved rural livelihoods, and expanded access to basic social services.

9. The project incorporates elements of the so-called SWAp in the design of RRIP component. Although the Bank support of RRIP represents only about 20% of the resources required, its design sought to build upon and improve the existing framework through employing better practices in social and environmental safeguards, procurement and fiduciary arrangements, and technical engineering quality among counties, townships, and villages. The disbursement approach and the monitoring and financial reporting procedures were designed to apply innovative mechanisms and can be replicated in similar investment initiatives in China.

1.2 Original Project Development Objectives (PDO) and Key Indicators

10. **Project Development Objectives.** The project development objective of the Fujian Highway Sector Investment Project was to increase the effective use of the road infrastructure in Fujian Province to support its social and economic development by: (i)

enhancing its rural roads network; (ii) reducing transport costs; and (iii) facilitating the interconnection across the coastal provinces.¹

11. **Key indicators to measure PDO achievement are listed in the Data Sheet.** The outcome indicators quantified the reduction in freight rates on Yong'an-Wuping Expressway (YWE), and reduction in travel times on rural roads.

1.3 Revised PDO and Key Indicators, and reasons/justification

12. **The original PDO was not changed by the Additional Financing (AF), but outcome indicators were expanded.** A new outcome indicator on project beneficiaries was added. Three intermediate outcome indicators were also augmented: (i) revision of the km of rehabilitated rural roads (financed by IBRD loan); (ii) pace of loan disbursement under RRIP; and (iii) km of non-Bank financed rural roads compliant with RRIF.

1.4 Main Beneficiaries

13. Direct project beneficiaries are road users in the YWE corridor and residents along the rural roads (1.25 million people). Nearly 70 percent of total YWE benefits will accrue to car users, 25 percent to truckers and 5 percent to bus passengers; of the total 10 percent will go to long distance traffic. A large share of rural residents benefiting from rural roads improvements is likely to be lower income people. Other benefits from the project are an increase in the income of rural farmers in RRIP areas and increased accessibility to schools and hospitals. FPCD benefits from institutional development, studies, and training on tolling, design and management of roads, road safety, and road maintenance. All Fujian residents benefit indirectly from better, safer and well-maintained roads and transport services.

1.5 Original Components

14. The original project had four parts:

A. **Rural Roads Improvement Program (RRIP).** Construction of selected road sections of the Rural Roads Improvement Program, including provision of technical assistance for the supervision thereof.

¹ There is a difference in the description of the PDO between the Loan Agreement (LA) and the Project Appraisal Document (PAD), but the intentions are the same. In the ICRR, project objectives are evaluated with reference to the LA. The PAD elaborates on LA's PDO: "The project aims to increase the effective use of the road infrastructure in Fujian Province to support its social and economic development. This objective seeks to contribute to: (i) improving living conditions in rural areas-particularly those in the areas of the Province where poverty rates are higher-by enhancing the transport accessibility of the rural communities to economic opportunities and social services; (ii) stimulating higher economic growth in Fujian Province by reducing transport costs; and (iii) facilitating the interconnection across the coastal provinces. In this respect, the project will meet both the provincial government objective to improve the transport network to support the social and economic development of the province (especially in the economically lagging counties), and the central government objective to facilitate transport interconnections across Coastal Provinces."

B. **Yong'an-Wuping Expressway (YWE).** Construction of 195 km long four lanes new highway section of the Changchun–Shenzhen expressway between Yong'an (Sanming City) and Yanqian in Wuping (Longyan City), including the acquisition and installation of electrical and mechanical facilities, the construction of buildings and annex areas for service and safety operations, and provision of technical assistance for the supervision thereof.

C. **Highway Maintenance Pilot Program (HMPP).** Development and implementation on a pilot basis of a program for sourcing out periodic and routine highway maintenance in selected sections of Fujian Province highway road networks, including staff training and supervision and provision of technical assistance thereof.

D. **Institutional Strengthening Program (ISP).** Carrying out of an institutional strengthening program for FPCD, including: (i) staff training on activities such as road asset management, operational management of roads and expressways, construction quality control, road safety, and design and operational safety considerations for tunnels; (ii) a comprehensive study on toll rates across Fujian Province to evaluate their influence on traffic demand, maximize the use of the expressway network and optimize its economic value, and on impact evaluation and monitoring to establish a knowledge base of the impacts of the RRIP on rural livelihoods to provide an analytical base for the design of future interventions on those types of roads across Fujian Province; and (iii) provision of technical assistance for the design and implementation of the Highway Maintenance Pilot under Part C of the Project.

1.6 Revised Components

15. In 2011, the project was revised to reflect the additional loan and the re-allocation of the original loan proceeds to scale up the impact of RRIP supported by following components:

Component A. Construction of rural roads selected from the provincial level rural road databank, including provision of technical assistance for their supervision.

Component D. Provision of training activities and study tours for the benefit of the local government agencies in the issues concerning (i) environmental design and construction of rural roads and (ii) rural road maintenance and management.

1.7 Significant changes

16. **The Additional Financing Project increased the original project costs of US\$1,490 million to US\$2045.89 million.** Component A of the project added 3,758 km to road rehabilitation in poor mountainous and coastal regions, with an increase in the number of project beneficiaries. Both were reflected in the revised PDO indicators. The

increased financing in Component D was for technical assistance in environmental design, construction, and maintenance of rural roads, with focused training in the newly added counties.

17. There was a reallocation of US\$13.132 million due to a misprocurement of an YWE contract (para 24) to RRIP. US\$1.12 million was cancelled from foreign study tours in Component D due to a new national policy on government officials' overseas tours.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

18. **Adequacy of Project Concept and Design.** Project design was informed by prior projects in Fujian (Fujian Highway Project 3681-CHA and Second Fujian Highway Project 4502-CHA). Lessons from past experiences were valuable in framing the project components. During the past, highway projects in China focused on expressways, which typically required most financial resources. This project's greater focus was on direct poverty reduction, which affected the balance between expressway and rural road components, combined with a realization that rural areas had great potential for bolstering growth and buttressing macro-economic gains. Hence, the project's structure includes a comparatively large component on rural roads, which are scattered in different counties and villages. It was hard to pre-define all the road segments to be financed by the project at the preparation stage and to supervise each of them during implementation. The implementation framework for RRIP applied SWAp elements (see RRIF in Para. 20) instead of the conventional ex-ante definition of project activities. In addition to the rural roads component, the YWE component was selected among several expressway alignment alternatives in an exceptionally demanding topographical environment, as a link in China's National Expressway Network (CNEN) to attain the full benefits of CNEN connectivity by fostering its integration within the province and with the networks of the neighboring provinces. FPCD's experience with Bank policies and practices (in safeguards, procurement, the environment, financial management, ethnic minorities, and participation), together with the road data collected in the previous project, were useful in the selection of the rural road segments and monitoring of progress, and to the incremental introduction of SWAp for RRIP implementation (para 26).

19. The project concept and design were appropriate to achieve the PDO. It had innovative features in road segment selection, report-based disbursement, and implementation of the entire RRIF (para 20), with over thousand small rural roads scattered in the 7,500 administrative villages in Fujian. The risks were rightly identified and mitigation measures were appropriately proposed. The Bank and the implementing entities had also devised an implementation setup which allowed the Borrower and the Bank to observe implementation closely and respond quickly, if necessary.

20. **Project Preparation.** The Bank formally entered project preparation in January 2006 at the pre-appraisal mission. The project had already been discussed on several earlier occasions over two-three years and at the time of pre-appraisal project content was well

defined. The feasibility study and draft EA were available for the expressway; its technical standards and quality requirements were defined and the key consultants were on board. At pre-appraisal, arrangements for environment, procurement and fiduciary responsibilities were agreed, as were the principal features of supervision, reporting requirements and implementation arrangements. For RRIP, the Environmental Impact Assessment (EIA), Environmental Management Framework (EMP), Resettlement Policy Framework (RPF), Resettlement Action Plan (RAP), and Ethnic Minority issues were brought together under the Rural Roads Implementation Framework (RRIF).² RRIF was meticulously prepared and disclosed, and complied with Chinese laws and Bank policies. Agreements were reached at pre-appraisal on training in all the issues included in the RRIF. All this was much aided by the prior experience of FPCD and the Project Management Office (PMO) with Bank-financed projects, and their hands-on knowledge of Bank policies and processes. The appraisal followed in May 2006, at which time the project was ready for approval and implementation.

21. **Adequacy of Risk Assessment.** The risk assessment identified the following important issues: (i) lack of balance between the expressway and rural road components; (ii) sufficiency of built-in incentives in RRIP for institutional changes; (iii) compliance of RRIF documentation with Bank standards; (iv) lack of interest in contract maintenance among local contractors of FPCD; (v) increased costs or delays in YWE construction; (vi) shortfall in expected demand for YWE use; and (vii) deficient application of social and economic safeguards in YWE construction and in RRIP. Risk avoidance and mitigation measures were responsive to the issues, many had experiential basis from prior projects and were implementable (and were implemented). Other measures dealt with implementation responsibilities and incentives for increased cost-sharing of eligible projects; advance training and testing of proposed risk mitigation for their fine-tuning and early response with follow-up mechanisms in RRIP projects; and use of foreign technical assistance when no prior experience existed in Fujian (in design reviews and the maintenance pilot). There was only one risk where advance risk mitigation was unsuccessful: forecast traffic volume on YWE at opening (rated a low risk). Toll-road traffic forecasts are notoriously uncertain, but do not portend long-run sustainability. The ex-ante mitigations – toll rate study, access and connections to the expressway— were appropriate.

22. **Overall Quality at Entry.** Quality at Entry was very good. The project supported the objectives of the Central Government, the Province and the Bank. Project investments added value to the Province and to beneficiaries. Rural roads were chosen carefully for their development impact, using the data bank on rural roads. Risks were identified and mitigation measures were proposed. Training was started early before the contracts commenced. Technical Assistance was forward-looking and built on the previous institutional capacity for data collection, asset management, traffic safety, and overall

² The RRIF was the integrated framework for Procurement, Environment, Resettlement, Ethnic Minority, and Financial Management. It included reporting and evaluation of progress with preset, defined formats, and the technical and quality control specifications for the rehabilitation of the rural roads, including the implementation arrangements. Training on all these issues was started early, before the loan approval.

structure of FPCD organization, and responded to the Province's institutional needs. Engineering design of YWE was prepared by a recognized Chinese design institute in compliance with China's new design standards and material specifications, and was reviewed by international consultants. Safeguard implications of the expressway and its alignment, especially resettlement and possible effects on nature preserves (though 20-30 kilometers away), were recognized and taken into account. Affected interests were identified, informed and consulted. Risk assessments and mitigation measures were consistent with Bank practices, although in retrospect ex-post mitigation measures could have contemplated the risk of lower than estimated traffic on YWE. Even so, there was good preparation on all aspects and issues that could be envisaged in the implementation of such a complex project were identified and addressed. The approved retroactive financing of sub-projects was discussed early and these sub-projects were well-prepared. No exceptions from Bank policies were needed.

2.2 Implementation

23. **Implementation arrangements were complex, decentralized and appropriate.** The PMO for World Bank Project at FPCD was responsible for the overall coordination and monitoring of implementing agencies, and served as the counterpart to the Bank. Responsibility for procurement and implementation of the YWE component rested under the Fujian Provincial Expressway Construction Directorate (FPECD), and the Longyan YWE Company and Sanming YWE Company established with capital from FPECD and the two municipalities. The two municipalities were in charge of resettlement implementation. This was a mammoth project: an expressway in a challenging topographical environment with 117 bridges (36 km), 32 tunnels (29 km), constituting 34% of its length. Overall responsibility for implementation and monitoring of RRIP rested with the Planning and Construction Division of FPCD, but the works were decentralized to the County Communications Bureaus, de-concentrated branches of the FPCD. An intermediate level entity of the City Communications Bureaus coordinated the monitoring and flow of funds from the provincial level to the counties. The County Communications Bureaus supported and monitored the Township and Village (local) road agencies, which managed the local road networks and implemented roads in RRIP under their jurisdiction. Technical assistance was divided between different directorates at FPCD as needed.³ For RRIP, every road's quality was inspected by FPCD and local Communications and Highway Bureaus at completion, and only roads that met the standards could receive provincial subsidy. For those roads eligible for reimbursement from the Bank loan, FPCD provided the review report for construction quality and compliance with RRIF. The Bank sampled roads and verified compliance with RRIF.

24. **Implementation Progress.** Given the meticulous preparation, the construction of the complex and costly Expressway was managed well and opened three months ahead of schedule. Three hiccups merit mention: 1) a 7 month closure of a 300 meter stretch on one lane in YWE for safety reasons, because the parallel G205 was in danger of a landslide in

³ The complex institutional framework for implementation is described in detail in PAD Annex 6.

a deep slope cut and a counterweight had to be placed on an YWE lane to stabilize the slope and to allow consolidation of the G205 embankment; 2) financial difficulties of the two expressway companies, as the two cities (Longyan and Sanming) paid their share of funds late, resulting in delayed payments to contractors; and 3) a 30% shortfall in expected toll revenue due to lower than expected traffic volume on YWE, as a result of the central government's policy change to remove all tolls on Class II highways⁴. One sub-grade contract of YWE component was misprocured, because it started without the Bank's 'no objection'⁵. The canceled funds, US\$13.132 million, were transferred to the Rural Roads component⁶. Implementation of the RRIP was largely uneventful thanks to good preparation, forward-looking risk mitigation and decentralized supervision of works. Ninety-five percent of the affected citizens were satisfied with the project (Annex 5). Implementation of technical assistance and the maintenance pilots were also problem-free.

25. **Additional Financing.** Activities under the AF were implemented satisfactorily without any problems.

26. **SWAp.** The SWAp (the first of its kind in China) was implemented successfully for the RRIP component. RRIP roads were selected from rural roads databank, withdrawal applications were made by batches after construction was completed, and audit and inspections were carried out regularly and certified by the implementation agency for eligibility of Bank financing. This approach was supported by RRIF, supplementary technical documents, and training for the construction of rural roads. RRIP results confirm that SWAp, supported by technical training, improved works quality and accelerated progress, and simplified Bank review and disbursement procedures.

27. **Training was key to successful implementation.** Important international training addressed project management and toll road operations, financing, tunneling, supervision and new pavement technologies; however, some planned international study tours had to be canceled because of a change in national policy on overseas study tours. There were also domestic trainings on cement pavement maintenance technology for rural roads, bridge maintenance technology and management, and management of rural road construction. Training enhanced the technical capacity of local road maintenance staff, and played an important part in sustaining the long term impact of the project. On average, 95% of participants rated training as satisfactory.

⁴ Fujian is one of the first provinces piloting the national guidance on removing tolls on class II roads in 2009, as guided by State Council Directives (2008)[37] and (2009)[10], which resulted that the G205 in parallel became a free alternative road to YWE.

⁵ FPECD awarded the civil works contract to the second lowest bidder without fully responding to the Bank's additional clarification requests and the lowest-priced bidder's complaints in this regard.

⁶ The reallocation was authorized in a letter by the Country Director to the Ministry of Finance in July 2010, which also declares the misprocurement decision.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

28. **M&E design.** The M&E design included outcome indicators and intermediate indicators to measure each aspect of the PDO:

- *To enhance the rural roads network* is measured by reduced travel times on rehabilitated roads and the number of direct beneficiaries, buttressed by intermediate indicators of kilometers rehabilitated, increase in traffic volume, and completion of TA and training.
- *Reduction in transport costs* is measured by freight rates on key commodities⁷, buttressed by intermediate indicators on accident reduction, traffic volume, travel time, and TA on optimization of toll rates.
- *Facilitation of the interconnection across coastal provinces* is measured by the completion of YWE, a missing link in the national inter-province expressway network (CNEN), as well as several intermediate outcome indicators for travel times on YWE, accidents, training, toll rates study and contract maintenance approaches.

29. Taken together, M&E indicators helped to monitor implementation progress, pinpoint problems should they develop, and evaluate the results of the completed project. The decentralized M&E implementation arrangements were a project design for effective implementation and risk management (para 23.)

30. **M&E implementation and utilization.** Fujian PMO and the implementing agencies carried out frequent monitoring of indicators and updated them regularly in progress reports. M&E data was collected and reported on time and helped the PMO to propose appropriate interventions during implementation. One of the identified risks materialized: lower than predicted traffic volume on YWE. The mitigation plan included a toll rate study, which was carried out and put into effect. More traffic could possibly be attracted to the Expressway by building more interchanges for more frequent access points, but that remedy was already applied at the design stage. Longyan and Sanming Expressway Companies responded rationally to the lower traffic counts with effective cost control and reduced their operating costs by 30 percent.

2.4 Safeguard and Fiduciary Compliance

31. **The safeguard issues and compliance were well managed.** As Category A project, three safeguard policies were triggered, namely, OP4.01 Environmental Assessment, OP4.12 Involuntary Resettlement, and OP4.10 Indigenous Peoples. Issues that arose with environmental protection, resettlement and compensation, Ethnic Minorities, and others were addressed promptly. This was possible because of the

⁷ The average freight rate per ton for a shipment from Yong'an to Wuping was forecasted based on a sample of three products (coal, cement and fruits). The freight rate without project interventions was expected to increase to 0.57/ton-km or RMB 137 in total in Year 4. With the open of YWE, average freight rate reduced to 0.55/ton-km and RMB 130 in total. This target was achieved.

integrated RRIF (including EMF, RPF, Ethnic Minority Policy Framework) for the RRIP component, well prepared EMP, EIA and RAP for YWE, and prior experience and capability of the implementing agencies, the PMO and its safeguard staffs, as well as training on the safeguards before appraisal. An Ethnic Minority Development Plan was prepared and implemented for the She Minority Group in Shangshui Village, Ningde City, in accordance with the Ethnic Minority Policy Framework, when implementing a township-level road in this village. Distributed sub-project management in numerous scattered locations was able to provide hands-on assistance. Timely training was provided when minor shortcomings were observed either by the PMO or Bank missions.

32. **Fiduciary management of the project was in compliance with Bank policy except for a misprocurement in YWE.** Financial management was carried out diligently during implementation. The audits were timely and unqualified. The report-based disbursement for RRIP was implemented well in general. Procurement of the rural roads and YWE was generally done well; however a YWE earthwork contract was declared misprocured as it was awarded to the second lowest bidder prior to fully responding to the Bank's request for additional clarification on the lowest bidder's complaint (para 24). The corresponding loan amount of US\$13 million) was transferred to RRIP and FPCD used its own funds to complete the contract on schedule. Minor shortcomings in procuring the over thousand rural road projects (incomplete or inaccurate bids, contracts inconsistent with the bid, missing security deposits, incomplete reporting, and technical capacity deficiencies) were addressed diligently. For local administrative offices with no prior experience in Bank-supported projects, and for contractors inexperienced with making bids, arranging security deposits and complying with the other policies governing the rural roads program, procurement training played an important role to remedy the various shortcomings.

2.5 Post-completion Operation/Next Phase

33. **Fujian has well-functioning maintenance operations.** Cities (or Municipalities) manage maintenance of the national and provincial roads in their jurisdictions (about 8,000 km by the nine Highway Bureaus). Periodic and rehabilitation maintenance works (by segment not area) are mostly carried out by competitive contracting and routine maintenance by force account. Competitive pilot maintenance contracts were executed and accumulated experience for a likely transitioning path. Counties' Communication Bureaus, responsible for the county network (about 7,000 km) in their jurisdictions, receive technical assistance from the cities' Highway Bureaus. The large rural roads network (about 70,000 km) is maintained by the County Communication Bureaus' sub-divisional maintenance stations. Random checks on a sample of rural roads three years after completion showed that the maintenance organizations functioned well and the roads were in sound condition.

34. **The present project brought five new things into maintenance practices.** First, transition to post-completion operation is occurring smoothly because there was extensive training for managing low volume roads during project implementation for involved professionals and firms (para 27). Second, technical assistance and pilot contracts in maintenance using the Pavement Management System (developed in the previous Bank operation) provided a good base for improving maintenance management. Third, increased

maintenance funding through central government and province subsidy programs to supplement township and village funds for maintenance and road safety provided incentives to maintain the newly improved roads well. Fourth, the pilot programs on (area wide) contract maintenance, both routine and periodic, are being expanded to cover an increasing share of the network. Finally, active participation of residents in project selection, funding, and supervision of maintenance will ensure sustainability. What has been accomplished in the project is to lay a knowledge base for good practices in contract maintenance.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

35. ***Relevance of objectives – High.*** The project’s development objectives were clear and concise, and supported the central government strategies of CNEN and rural road initiatives, the provincial government’s investment strategy, and the Bank’s CPS in 2006 (para 7-9) for improving competitiveness of China’s various regions and reducing poverty, inequality and social exclusion through the financing of infrastructure in key corridors, particularly those serving poorer regions and communities. They remained relevant and consistent with the development priorities of the national government’s 12th FYP (2011-2015) for: (i) the expansion of road network in the country; (ii) provision of all-weather roads and passenger services to villages; and (iii) establishment of a modern logistic system at low cost and high efficiency. At the provincial level the project sustained Fujian’s intention to build 3,000 km of highways and 20,000 km of rural roads during 12th FYP period; there is also a strong focus on rural road safety improvement via its “three-year action” program. The project’s PDO with its additional financing supported the Bank Group’s CPS (2013-2016) for China and in particular its strategic theme of promoting more inclusive development, through improving transport connectivity for more balanced regional development. The PDO was aligned with the country’s road expansion plans and transport improvement programs for villages, including Fujian’s “action program” for rural roads and their safety.

36. ***Relevance of design and implementation – High.*** Project design (comprising four components) and implementation supported the achievement of the PDO, as discussed below. As discussed in Section 2.3, the Results Framework (including Outcome Indicators and Intermediate Outcome Indicators) was appropriately designed to measure achievement of the PDO:

- a. RRIP supports the achievement of the “enhancing rural roads network” element of the PDO through upgrading rural roads. It is intended to provide better accessibility and mobility in the interior, mountainous region of Fujian. RRIP is also to contribute to reduction of transport costs through travel time saving, and improved road condition and safety, as well as to poverty reduction, social inclusion, and broad distribution of benefits in rural areas.

- b. YWE, the 195 km long missing link in CNEN, is to improve transport connection among the coastal provinces and enhance more balanced regional development. YWE is also designed to contribute to reduction of transport costs by travel time savings and improved road condition and safety.
- c. HMPP follows important international trends in maintenance delivery. Benefits from contract maintenance include increased competition in maintenance, reduced costs, uniform quality of roads by technical classes, and innovation in maintenance technology. Because contract maintenance is a complex and lengthy process, its introduction through piloting would enable several institutional and technical issues to be addressed.
- d. ISP's four parts (staff training, a study of toll rates, RRIP impact evaluation, and design and implementation of HMPP) were designed to contribute to enhancing Fujian's overall capacity for developing and managing its road network, improving management efficiency, and reducing transport costs.

3.2 Achievement of Project Development Objectives

Achievement of PDO - Substantial

37. **The Project Development Objectives were achieved.** The PDO had three explicit objectives: (i) enhancing its rural roads network; (ii) reducing transport costs; and (iii) facilitating the interconnection across the coastal provinces. The values of the PDO indicators and the intermediate outcome indicators, detailed in the Data sheet, support the claim of achievement of the PDO.

- a. *Enhancing Rural Roads Network.* The project exceeded its output targets for rural roads rehabilitated (5,402 km achieved against a target of 5,009 km); in addition, the target for rural roads completed without Bank financing in substantial compliance with RRIF was also exceeded (4,885 km achieved against a target of 4,244 km). In addition, travel time reductions on RRIP declined by 79%, exceeding the target of 50%. The target for direct project beneficiaries of rural roads was also exceeded by 5%. Increases in traffic volumes and passenger services in a sample of 20 rehabilitated roads exceed targets by factors in excess of 10 and 4 respectively.
- b. *Reducing Transport Costs.* The 195 km long Yong'an - Wuping Expressway (YWE) radically reduced travel times and transport costs in Fujian's interior: PDO Indicator 1 targets on freight rates on YWE were met; travel time targets on YWE and G205 have been met (Indicator 5). Transport improvements in YWE corridor capture the dimension of 'effective use' of road infrastructure in Fujian, reflected in the preamble to PDO and in the PAD, and reduced freight rates, travel times and accidents not only on YWE but also on the surrounding rural areas benefiting from access to YWE using roads rehabilitated in the RRIP. In addition, travel time reduction targets on rural roads were significantly exceeded (Indicator 2).

- c. *Facilitating the interconnection across coastal provinces.* The completion of YWE addressed the missing link in the national expressway network (CNEN) in connecting the coastal provinces. Towns and villages in the YWE area of influence also benefited from the better accessibility and interconnections in Fujian. YWE met its target of reducing average travel time between Yong’an and Wuping; travel time on the existing G205 also reduced as envisaged. The target for reducing accident rates on YWE was exceeded by 50%, while the target for accident rate reduction on G205 was exceeded by 6%.

3.3 Efficiency

Rating: Substantial

38. Ex-post benefit-cost analysis was conducted at project completion using the appraisal methodology for YWE and RRIP. (Details in Annex 3)

39. *YWE.* Three kinds of economic benefits were calculated for YWE and compared “with” and “without” project cases: (i) vehicle operation cost (VOC) savings, (ii) time cost savings (VOT), and (iii) reductions in the accident costs. The Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) are summarized below. The lower EIRR at completion was the direct result from the lower than forecast traffic volume on YWE and increased project costs. Traffic in the Yong-an to Liancheng segment has reached the estimated traffic volume in the last year, but traffic on the other two segments’ is still 21% lower than forecast at appraisal.⁸

	Estimated at Appraisal		Estimated at Completion	
	EIRR (%)	NPV (12% RMB million)	EIRR (%)	NPV (12% RMB million)
YWE	16.6	3210.2	14.7%	5,745.9

40. *RRIP Ex-post Evaluation.* The re-evaluation covered roads rehabilitated with World Bank loan--1,299 rural roads with a total length of 5,402 km; 137 county roads (553 km) and 1,162 township/village roads (4,852 km) located in Fujian’s coastal and mountainous areas. The per-km costs in coastal areas were 7% lower for county roads and 47% lower for town/village roads than projected at appraisal. The per-km costs in the mountainous areas were 115% higher for county roads and 83% higher for town/village roads than projected. Economic benefits were calculated for “with” and “without” project cases for VOC and VOT savings (see footnote 8). Benefits from reduced accidents are not included, although accident rates have declined (about 73% reduction). The aggregate

⁸ Reasons for the large change from the ex-ante economic analysis are in the input values. Briefly, traffic in the early years was much lower than that projected at appraisal, but has been increasing faster. It is now estimated that the range of traffic increase would be 6.3% -9.3% in 2016-2020, when the appraisal estimate was 5.3%-6.3%. The benefits in ex-post evaluation are higher than that estimated at appraisal. The hour-value of travel time savings ranged RMB26.2-31.8 in 2015 based on Fujian’s GDP in 2014. At appraisal, the value was only RMB1.5. The unit VOC are 30% less than at appraisal. The value and cost of life and accidents are also higher now than at appraisal. Details are in Annex 3.

EIRR of 25.9%, for all the rural roads (not counting the accident benefits) is somewhat lower than 34.7% at appraisal. Nonetheless, all rural road projects are economically viable.

41. *An ex-post financial evaluation of YWE.* The recalculated financial internal rate of return (FIRR) of YWE is 8.5% before taxes and 6.2% after taxes; the ex-post FIRR is higher than estimated at appraisal. While profit margin is low in the early years of YWE operation, toll revenues provide enough liquidity for loan repayment, and operation and maintenance in the first years of YWE operation.

42. *Administrative Efficiency.* Project implementation was efficient, benefiting from the PMO's experiences with previous Bank projects and the application of SWAp in RRIP. Future efficiency gains can be expected from contract maintenance, as well as from other road management and institutional strengthening activities carried out under the project. Efficiency improvements and cost cutting in the two expressway companies, construction of a demanding expressway in a difficult topography, and completion of small rural roads in scattered locations (and over 2000 RRIF certified projects, including Fujian financed roads outside the project) are concrete proofs of high administrative efficiency. Administrative efficiency had spillover effects in terms of increased rural incomes detailed in the impact study and in Annex 3. Administrative efficiency would have benefitted from ex-ante consideration of local governments' ability to take on loan burden.

3.4 Justification of Overall Outcome Rating

Rating: Satisfactory

43. Taking into account the ratings of high for relevance of objectives and relevance of design, as well the substantial ratings for achievement of objectives and efficiency, project outcome is rated satisfactory.

3.5 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

44. **The YWE is an important link in China's expressway network (CNEN).** YWE provides a vastly improved facility across Fujian for the coastal provinces, and dependable access to the cities, towns and settlements in Fujian's mountain region. YWE has enabled the transport of agriculture products to markets and delivery of construction materials, fertilizers and other agricultural supplies to centers of economic growth. It provides an easy entrance to tourist areas along YWE and other attractions in Fujian and adjacent provinces; tourist volumes have increased, e.g. in Longyan City annual tourist volume has increased 20% since YWE opened, and annual tourism revenue has increased 15%.

45. **RRIP has improved rural access, mobility and gender fairness.** Rural roads upgraded under the project provide much improved and lower cost access to markets for both agricultural products and inputs necessary in contemporary farming. Better transport access and mobility have contributed to modernizing industries in towns and villages, increased agriculture productivity, and attracted investment and trading. Non-agricultural female employment has increased significantly to 48.5%, one half of female population in surveyed villages have changed from heavy farm work to non-agriculture jobs. RRIP has

also improved accessibility to health care by reducing the time for going to hospitals. (Annex 5)

46. **Upgraded roads have provided income earning employment and reduced the costs of construction materials.** Construction of rural roads provided tangible local employment opportunities, e.g., more than 160 villagers were hired full-time or part-time for the construction of Bijia-Gaoling road. Increased incomes have improved the quality of life, e.g., along one RRIP segment about 60% of the housing stock was newly-built or partially renovated because increased income and reduced cost of construction materials. Better road conditions and installation of safety measures have improved travel quality and safety and extended public transport access to more villages. From 2011 to 2014, the number of traffic accidents on rural roads decreased by 15% annually. (Annex 5 has more details.)

(b) Institutional Change/Strengthening

47. Institutional change occurs slowly, but some changes are already observable. Traffic safety has improved. The study on toll road rates will help optimize revenues from Fujian toll roads. Foreign study tours on project management, quality control, tunneling, safeguard management, and telematics in traffic safety in tunnels has had observable effect. Training programs on road management to project staff, contractors and supervising engineers in several Fujian counties will have long lasting benefits. Environment protection and citizen participation have gained importance (Annex 5 and Annex 7). The two successful pilot programs on contract maintenance provide a good start; one county has already entered into a maintenance contract. Network wide transfer to contract maintenance will, however, take years as indicated by experience from the developed countries.

(c) Other Unintended Outcomes and Impacts (positive or negative)

48. Unintended positive impacts, highlighted by the social impact surveys, include: restructuring of rural industries; labor force changes; population shifts; and unforeseen but significant ways in which beneficiaries take advantage of the project.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

49. Social impact surveys conducted among beneficiaries of the RRIP component identified the following positive impacts to villages (see also Annex 5):

- a. *Transport Impacts.* Improved rural road conditions resulted in faster, cheaper, and safer trips. Rural households experienced significant travel time reductions: 27% for work travel; 42% to access health services and markets in towns; and 40% for student trips to middle schools. Cost of travel by motorcycles and private vehicles reduced more than 50%. Rural passenger services are now available to more than 80% of Fujian villages, and public transport ridership has increased 24%. Accident rates dropped from 7.5 accidents per year before the project to 2 accidents per year after works were completed.

- b. *Economic Benefits.* GDP growth in RRIP villages was 64%, while in villages without RRIP GDP grew 42%. Profits from agriculture increased 46% in RRIP villages; whereas the increase in non-RRIP villages was 30%. Non-agricultural proportion of GDP in RRIP villages increased 4% over non-RRIP villages. The average household income in RRIP villages increased 81.5%, while in non-RRIP villages the increase was 74.9%.
- c. *Social Impacts.* RRIP created numerous work opportunities in agricultural and non-agricultural job, and in road works. Access to and use of social and health services improved, and quality of life in general became better in the rural areas. Many farmers who had been working outside the villages have come back to farm or work in local factories, or started their own businesses. Non-agricultural female employment also increased significantly to 48.5%; one half of female villagers surveyed moved from heavy farm labor to non-agricultural jobs.

4. Assessment of Risk to Development Outcome

Rating: Moderate

50. **Risk to Development Outcome is Moderate.** YWE is managed by two expressway companies, which have lowered their cost structure and will be able to fulfill their road management and financial responsibilities. YWE is part of CNEN, and central and provincial governments will provide support in the event of the toll-free G205 eroding YWE toll revenues. Random checks on a sample of rural roads three years after completion showed that the roads were in sound condition. A well-established management system for rural roads is in place, and extension service on technical matters from the cities' Highway Bureaus is available when needed. Project institutional strengthening programs are already being utilized and their benefits are observable. Because of the magnitude and geographic coverage of RRIP and possible inadequate maintenance of rural roads in mountainous areas, risk to development outcome is rated moderate.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Satisfactory

51. Bank Performance is rated Satisfactory. Design of this complex project (with rural roads spread over a large geographic area and an expressway in a challenging topography) was comprehensive and ambitious (paras 23-24). Engineering design, safeguard policy frameworks, procurement and fiduciary procedures were established in detail. Training on all aspects of implementation started after pre-appraisal. Separate and independent supervision consultants were to be engaged for technical engineering works and for safeguard compliance. Impact assessment and monitoring systems were included in the project to create a data base for tracking project progress, performance and social assessments. Quality at Entry contributed to the overall success of project implementation,

its completion on time, and expressions of satisfaction from beneficiaries. The lack of analysis of the loan's financial burden on local governments (para 59) was addressed by the expressway companies reducing operating costs. There is an inconsistency in the wording of the PDO between the LA and the PAD, although not in substance (footnote 1).

(b) Quality of Supervision

Rating: Satisfactory

52. Quality of supervision is rated Satisfactory. The Bank worked effectively with the implementing agencies to deliver a complex project with many innovative features on time and to good quality. Because many procurement staff, supervisors and contractors, especially for rural roads, had no prior experience with Bank projects, the Bank provided considerable on-going implementation supports on all aspects of project implementation, including engineering and compliance with safeguard and fiduciary policies. The Bank addressed the misprocurement issue appropriately and reallocated relevant loan amount to the RRIP component. The Bank was diligent in training the implementing agencies in the effective use of RRIF and SWAp. Bank missions were carried out in a regular and timely manner, with the appropriate mix of skills represented in missions. Implementation issues were assessed and resolved in a timely manner and reporting and ratings were candid. An oversight in supervision was not taking the opportunity of AF preparation to evaluate the toll policy change's impact to YWE traffic forecast and adjust target value accordingly.

(c) Justification of Rating for Overall Bank Performance

Rating: Satisfactory

53. Based on the satisfactory ratings for Bank Performance in Ensuring Quality at Entry and Quality of Supervision, overall Bank performance is rated Satisfactory.

5.2 Borrower Performance

(a) Government Performance

Rating: Satisfactory

54. Government Performance is rated Satisfactory. Governments at all levels showed strong ownership of the project and provided the requisite leadership and guidance for project implementation, especially on compliance with safeguard policies. A Central Government policy to remove tolls on parallel Class II road (G205) made it temporarily difficult for the lower level governments and the Expressway Companies to fulfill their financial obligations. A Government policy also reduced foreign study tours, resulting in a US\$1.12 million cancelation from the loan.

(b) Implementing Agency or Agencies Performance

Rating: Satisfactory

55. The consolidated performance of the implementing agencies is rated as Satisfactory, based on the assessment of the performance of the implementing agencies of the project components, as summarized below:

- a. FPECD, Longyan Expressway Company and Sanming Expressway Company, which were the implementing agencies for YWE, completed construction of the 195 km expressway in a timely manner, to good quality, and in compliance with safeguards requirements, despite the challenging topographical environment. Procurement of the contracts (by FPECD) was, however, marred by a misprocurement and the delayed counterpart funding. The rating for YWE implementing agencies is Moderately Satisfactory.
- b. RRIP was implemented by many implementing entities under the guidance of FPCD and PMO. The decentralized implementing agencies had a learning curve, but were dedicated and produced good results, as detailed earlier and also in Annex 2. The performance of RRIP implementing agencies is rated Highly Satisfactory.
- c. FPCD implemented the institutional strengthening component. Training programs, highway maintenance pilots, as well as toll-road and impact studies were completed as planned. The training programs contributed to the timely completion of a complex and innovative project on time and to high quality. The successful implementation of the contract maintenance pilots have resulted in contract maintenance being applied in Fujian for periodical maintenance and rehabilitation of highways, as well as for routine maintenance of rural roads. The toll rate study has proved useful province wide. The Impact Evaluation and Monitoring of the rural roads program has installed a useful data base to track and observe the condition and performance of the rural road network. FPCD's performance in implementing the project's institutional strengthening activities is rated Highly Satisfactory.

(C) Justification of Rating for Overall Borrower Performance

Rating: Satisfactory

56. Based on the above ratings for government performance and implementing agencies' performance, overall Borrower performance is rated Satisfactory.

6. Lessons Learned

57. *Early recognition of all project requirements and World Bank and Government regulations and risks are essential for successful and efficient project implementation.* This was the case in this project and is the most important lesson from this project. The institutional structure and responsibilities were clearly laid out and the comprehensive policy framework, RRIF, contained all important parts: EMF, RPF, Financial Management, Procurement, and Ethnic Minorities. Training on all these issues was started before loan

approval. When the loan became effective, everything in this immense, difficult and complex project was ready to go.

58. *Early recognition of risks needs to be reflected in mitigation measures.* Save one issue (lower than expected traffic volume on YWE, as a result of a government policy change) this good rule was observed throughout this project (see paras 24). While a non-tolled alternative is required in most developed countries, it is debatable if the government policy change requiring the availability of a non-tolled road as an alternative, could have been anticipated. Perhaps the most important and effective means for ensuring traffic diversion from G205 would have been enforcement of vehicle weights on G205 (but no overloading risk was identified in PAD). Truck overloading control requires joint intergovernmental efforts from multiple entities and needs a solution beyond FPCD. Even so, the demand deficit on YWE is temporary and causes no risk to development outcome.

59. *Financial burden of loans on local governments.* Government fiscal policy evolved over time. At project preparation, no evaluation of the fiscal capacity of the participating municipalities was made. However, both YWE cities (Longyan and Sanming) had difficulty in meeting their counterpart fund obligations in a timely manner. Bank appraisal should include an evaluation of the project's fiscal burden on local governments, and mitigation measures should be included in project design. This is particularly important in the context in China of the revised *Budget Law* issued in 2015, requiring accountability and financial transparency at all levels of government.

60. *Contract maintenance is a long term endeavor.* The pilot maintenance contracts were carried out with positive results. Experience from developing countries shows that institutionalization and network wide application of maintenance contracting is a complex undertaking and its adoption requires a long time, much longer than a typical loan period. The issues are not only technical, but include institutional reform, labor training and relocation, job security, budget processes, performance indicators for different road classes and their enforcement, supervision of contractors, and payment procedures. The pilot applications in maintenance contracting could be followed up to ascertain if their geographic and possibly technical scope could be expanded, negative technical aspects are corrected, and the labor, procurement, and supervision issues are dealt with.

61. *Utilize past lessons in institutional strengthening.* In Fujian advances were made in previous projects in road data collection, road management, traffic safety, and identification of staff training needs. This project's outcomes are proof of their usefulness. The road data bank was used to select rural roads for rehabilitation; traffic safety has been embedded in the provinces' own "action program" in design and safety audits; and training programs, international and domestic, on various aspects of road management (tunneling, tolling, project management, safeguard issues) have been effective to ensure continuity in institutional development.

62. *The SWAp method of project execution is beneficial.* SWAp was welcomed by both the Borrower and the Bank. It stimulated stronger counterpart ownership and leadership of the project, and achieved more rational and efficient resource allocation. By focusing on the large program and applying common fiduciary/safeguards standards, SWAp could

scale up benefits, strengthen local capacity and reduce duplicative reporting. For the Bank SWAp allows results-driven rather than process-focused implementation oversight. Practices that are not consistent with Bank policies and procedures can be identified in advance during project preparation. The SWAp experience in this project is an encouraging sign for its application in other Bank-supported projects.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

63. Summary of the Borrower's ICR is in Annex 7.

(b) Cofinanciers

Not Applicable.

(c) Other partners and stakeholders

Not Applicable

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)			Original Project and Additional Financing Estimate (USD millions)			Total Actual/Latest Estimate (USD millions)			Percentage of Additional Financing Estimate
	Non-Bank Financed	Bank Financed	Total	Non-Bank Financed	Bank Financed	Total	Non-Bank Financed	Bank Financed	Total	
Rural Roads Improvement Program (RRIP)	403.79	98.26	502.05	850.88	160.77	1,011.65	926.42	160.97	1,086.60	107%
Yong'an Wuping Expressway (YWE)	515.31	218.55	733.86	528.44	204.62	733.06	960.44	204.21	1,164.65	159%
Highway Maintenance Pilot Program (HMPP)	0.48	0.18	0.66	0.48	0.18	0.66	1.12	0.22	1.34	203%
Institutional Strengthening Program (ISP)	0.11	3.01	3.12	0.11	3.51	3.62	0.11	2.55	2.66	71%
Land Acquisition and Resettlement (only YWE)	106.30	-	106.30	106.30	-	106.30	113.66	-	113.66	107%
Total Baseline Cost	1,025.99	320.00	1,345.99	1,486.21	369.08	1,855.28	2,001.76	367.95	2,368.91	128%
Contingencies	144.01	-	144.01	189.68	-	189.68	26.02	-	26.02	14%
Total Project Costs	1,170.00	320.00	1,490.00	1,675.89	369.08	2,044.97	2,027.78	367.95	2,394.93	117%
Front-end fee	-	-	-	-	0.93	0.93	-	0.93	0.93	100%
Total Financing Required	1,170.00	320.00	1,490.00	1,675.89	370.00	2,045.89	2,027.78	368.88	2,395.86	117%

Data Source and Exchange rate: Appraisal Estimate - PAD (at 1:8.05 exchange rate, May 4, 2006); Additional Financing Estimate: AF Project Paper (at 1:6.62 exchange rate - January 10, 2011); Actual/Latest Estimates – FPCD (Actual Project Cost calculated at 1:8.05, the same exchange rate as PAD)

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (AF) (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Borrower		1,675.89	2,027.78	121.00%
International Bank for Reconstruction and Development		370.00	368.88	100%

Annex 2. Outputs by Component

Appraisal Plan-Fujian Highway Sector Investment Project (FHSIP)	Additional Financing	Actual Accomplishments at ICR and Any Variances
<i>Component A. Rural Roads Improvement Program (RRIP)</i>		
<p>The RRIP component under FHSIP was designed to improve conditions of the lower class of roads that connect administrative villages to the main provincial road network. The Bank loan supported the overall program and financed rural road investments using the rural roads implementation framework (RRIF) agreed upon with FPCD. The Bank loan aimed to support a subset of at least 3,500 km out of the 10,000 km of local road sections already identified based on the demand of counties, townships and villages that are part of the 35,000 km provincial rural roads 2004-2010 program.</p>	<p>The AF provided US\$49.38 million to financing more activities under RRIP component. It was designed to support the construction of rural roads, including provision of technical assistance for their supervision. It will rehabilitate or rebuild at least additional 1,000 km of rural roads in the 61 counties/districts of 8 cities in Fujian province to a standard of Class III/IV all-weather roads.</p>	<p>The planned activities for FHSIP were completed in 2008, three years ahead of project closing date. The project constructed 1,802 rural roads totaling 7,967 km. The IBRD loan (US\$111.53 million) served to support the construction of 973 rural roads totaling 4,223 km. These roads also includes the 114 rural roads (totaling 413km) supported by the reallocation of US\$13.132 million from YWE component to RRIP component in 2011. Fujian and its local municipalities constructed another 829 rural roads totaling 3,744 km. The total mileage of rural roads constructed was 7,967 km.</p> <p>The planned activities of AF were completed. Within the three year implementation period, 326 rural roads (1,182 km in total) were completed with IBRD loan support. 529 rural roads totaling 1,141 km were completed with counterpart funding.</p> <p>Combining the original project and the AF, 2,657 roads (totaling 10,290 km) were constructed/rehabilitated in Fujian with the support of RRIP component (See Table A2.1 below). The final cost of RRIP is 7% higher than the estimated total project cost with additional financing, mainly because much more mileage of rural roads were</p>

		constructed by counterpart funds than the targeted value at appraisal.
Component B. Yong'an - Wuping Expressway (YWE)		
<p>This component supported the construction of 195 km long four-lane new highway section of the Changchun–Shenzhen expressway between Yong'an (Sanming City) and Yanqian in Wuping (Longyan City), including the acquisition and installation of electrical and mechanical facilities, the construction of buildings and annex areas for service and safety operations, and provision of technical assistance for the supervision.</p>		<p>The construction of YWE was carried out successfully. The full expressway totaling 195 km (39.86 km in Sanming City and 155.09 km in Longyan City) was completed and opened to traffic on June 28, 2010. IBRD loan financed 33% of the subgrade and pavement of YWE except for procurement package A9 (which was misprocured and the Bank loan savings were reallocated to RRIP project). The total cost of YWE is US\$ 1,565.87 million (including land acquisition).</p> <p>Construction of YWE involved 11 sub-grade contracts and five pavement contracts (including traffic engineering). All these contract packages were large with the highest contract value of RMB 892.71 million (A5). These attracted big qualified construction companies to bid and therefore the implementation progress and work quality were ensured.</p> <p>Five domestic supervision firms were procured and each supervision firm set up one resident engineer's office with responsibility for one pavement contract and the corresponding sub-grade contracts. The total numbers of supervision engineers/inspectors for the expressway reached 420. A joint foreign/ local supervision office was set up in Liancheng city. The office consisted of five</p>

		<p>foreign supervision engineers from TROW International Ltd, two representatives: one from Sanming City, one from Longyan City, and five chief supervision engineers from each supervision firm.</p> <p>The actual project cost of YWE component (including land acquisition, resettlement, environment protection, supervision and capacity building) is 32% higher than the estimates at appraisal, mainly due to the cost overrun of civil works caused by design changes. The quantity of earthworks increased 102%, length of bridges constructed increased 54%, length of tunnels increased 6.6%. The inflation of construction materials also contributed to cost overrun – unit cost of steel increased rapidly and the maximum variation (with procurement baseline) reached 168.8% during procurement period.</p>
<i>Component C. Highways Maintenance Pilot Program (HMPP)</i>		
<p>This component supported the implementation on a pilot basis of a program for outsourcing periodic and routine maintenance in selected sections of the Fujian Province highway road network.</p>		<p>Contract for periodic maintenance of S203 (from 17k+500 to 20k+500, 3 km long) commenced on May 27, 2010 and was completed on September 23, 2010 with a two year liability period. The road section for the routine maintenance contract was 28.66 km on S201 (K236+945-K265+606). The contract period was from October 1, 2011 to September 30, 2012. It has improved current maintenance design and work planning, and increased contractor responsibility. Linkage between contractor performance and contract payment became clearer.</p>
<i>Component D. Institutional Strengthening Program (ISP)</i>		

<p>This component supported studies and training activities as part of an institutional strengthening program for FPCD, including (i) a study on toll rates, (ii) the impact evaluation and monitoring for the RRIP, (iii) the technical assistance for the HMPP, and (iv) training for staff of the agencies and institutions involved in the project.</p>	<p>The Additional Financing provided another US\$ 0.5 million for the RRIP components to support training activities concerning: (i) environmental design and construction of rural roads and (ii) rural road maintenance and management.</p>	<p>(i) Study on Toll Rates. The study was completed in August 2008. The study reviewed status of toll rate in Fujian and policy environment in China and in Fujian province, conducted alternative analysis and financial evaluation of toll rate charging options, and arrived at policy recommendations which contributed to the setting of toll road rates standard in the province.</p> <p>(ii) The impact evaluation and monitoring for the RRIP was completed in January 2011. The study had collected data and conducted surveys of the RRIP program of FHSIP, analysis the data and summarized the survey results and social-economic impacts.</p> <p>(iii) The technical assistance on HMPP was completed in 2011. The study has reviewed the institutional setup of road maintenance and provided recommendations for Fujian’s consideration of applying highway maintenance by contract.</p> <p>(iv) To enhance the capacity of rural road maintenance, 37 oversea study tours had been carried out, 18 domestic training events have been provided to more than 1,400 technical staff of highway and road maintenance.</p>
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Table A2.1 Activities Completed under the RRIP Component

City	Original Project			AF			Non-Bank Financed			Total at Completion		
	# of Roads	Mileage (KM)	Cost (RMB Million)	# of Roads	Mileage (KM)	Cost (RMB Million)	# of Roads	Mileage (KM)	Cost (RMB Million)	# of Roads	Mileage (KM)	Cost (RMB Million)
Fuzhou	121	489.44	307.18	61	243.29	283.29	253	1,024.68	1,032.42	435	1,757.41	1,622.89
Zhangzhou	154	566.95	656.21	45	100.24	140.93	172	579.34	531.41	371	1,246.53	1,328.55
Longyan	313	1,421.22	1,046.25	52	149.83	111.55	273	816.39	714.75	638	2,387.44	1,872.56
Sanming	104	574.08	441.63	52	214.70	186.61	252	834.56	721.10	408	1,623.34	1,349.35
Nanping	144	671.13	458.18	42	168.67	101.78	159	618.77	526.89	345	1,458.57	1,086.86
Ningde	80	265.63	191.21	50	221.82	220.03	197	806.17	714.55	327	1,293.62	1,125.80
Putian	57	234.18	196.76	3	12.35	8.50	19	72.62	66.36	79	319.15	271.62
Quanzhou				21	71.05	78.18	33	132.84	152.56	54	203.89	230.74
Total	973	4,222.63	3,297.43	326	1,181.94	1,130.88	1358	4,885.37	4,460.04	2657	10,289.94	8,888.36

Annex 3. Economic and Financial Analysis

1. Economic and financial re-evaluations of the Project were carried out at the ICR stage using similar methodology as that at appraisal. Actual traffic for both the Yong'an – Wuping Expressway (YWE) and the rural roads were collected and analyzed. Accordingly, the traffic forecast was adjusted according to the actual traffic and the socioeconomic development in the project areas. Before the Project, the transport condition of the G205 (existing parallel roads to the YWE) and the rural roads were very poor. Upon completion and operation of the Project, the vehicles on the YWE and the rural roads could drive at faster speeds with lower operating costs and less travel time. Economic benefits were calculated by comparing the “with” and “without” project cases. Economic internal rate of return (EIRR) was calculated and assessed for the YWE and the rural roads separately. As the YWE has provision of toll revenue, financial internal rate of return (FIRR) was also recalculated.

Economic Re-evaluation of the YWE

2. The YWE is a fully controlled 194.95 km long 4-lane expressway. The project implementation started in April 2007 and was completed in May 2010. The YWE has 4 service areas and 12 toll plazas (11 entry/exit toll plazas and 1 on road toll plaza at the Fujian and Guangdong border).

3. *Traffic Analysis and Forecast for the YWE.* According to the traffic surveys, the daily traffic on the YWE averaged 5,882 PCUs in 2010, and increased an average 7.7% per year and reached 8,530 PCUs per day in 2015 (Table 1). Most of this traffic was diverted from the parallel local road (G205). Compared to the forecast traffic at appraisal, the actual traffic level was about 40% lower in 2011–2015, but “catching up” the projections. Accordingly, the traffic growth rates for future years have been adjusted to average 7.8% per year in 2016–2020 and 4.3% per year in 2021–2030.⁹ The traffic forecast results are in Table 2.

Table 1. Actual Traffic on the YWE (PCU per day)

section	2010	2011	2012	2013	2014	2015
Yong'an-Liancheng	3,340	4,083	4,502	4,905	5,387	6,033
Liancheng-Shanghang	6,510	7,185	7,085	7,320	7,996	8,795
Shanghang-Yanqian	9,220	10,216	10,103	10,415	11,298	12,518
Average	5,882	6,649	6,741	7,055	7,701	8,530

PCU = passenger car unit; Source: Fujian PMO

⁹ At appraisal, the traffic growth rates were projected to be annually average 8.0% in 2005–2011, 6.0% in 2011–2020, and 4.3% in 2020 – 2030.

Table 2. Traffic Forecast for the YWE (Vehicles, AADT)

year	Total	Car	Bus	M-Truck	L-Truck
2016	6,562	3,299	666	1,943	654
2017	7,068	3,573	728	2,065	701
2018	7,614	3,870	796	2,196	753
2019	8,202	4,191	870	2,334	808
2020	8,837	4,539	950	2,481	867
2021	9,217	4,734	991	2,588	904
2022	9,613	4,937	1,034	2,699	943
2023	10,026	5,150	1,078	2,815	983
2024	10,457	5,371	1,125	2,936	1,026
2025	10,907	5,602	1,173	3,062	1,070
2026	11,376	5,843	1,224	3,194	1,116
2027	11,865	6,094	1,276	3,331	1,164
2028	12,375	6,356	1,331	3,474	1,214
2029	12,908	6,630	1,388	3,624	1,266
2030	13,463	6,915	1,448	3,780	1,320

AADT = annual average daily traffic

Source: Fujian PMO.

4. *Project Costs of the YWE.* Upon completion, the total project cost was RMB10,511.95 million, which includes the costs for civil works, equipment, land acquisition and resettlement, construction supervision, and related capacity building programs. Compared to the appraisal estimate, the project costs were about 32% higher, caused mainly by additional earth works, price escalations for labor and construction materials, and extra amount of land acquisition and resettlement. The major construction activities were implemented in 2007–2010, which was faster than anticipated at appraisal. The actual costs for the operation and current maintenance (O&M) of the YWE was about RMB 0.26 million per km in 2010, comprising about 60% for operation and 40% for routine maintenance. It was assumed that such O&M costs would increase by 3% per year along with the traffic growth and service improvement. The periodic maintenance was estimated at RMB1.06 million per km for medium-term rehabilitations and RMB2.12 million per km for major rehabilitation. It was scheduled that the rehabilitations of the YWE would take place in every 7 years at the costs of RMB205.87 million for 2016 and 2017, and RMB411.74 million for 2023 and 2014. All of these capital and O&M costs were converted to economic costs by applying an average factor of 0.84 as at appraisal.

5. *Benefit Estimation for the YWE.* As at appraisal, three types of economic benefits were calculated for “with” and “without” project cases: (i) vehicle operation cost (VOC) saving, (ii) passenger time cost saving, and (iii) accident cost reductions. In the “without” project case, most of the road traffic in the corridor would use the existing parallel highway

of G205 with slower speed, longer distance, and higher accident rate.¹⁰ In “with” project case, the vehicle speeds on the YWE are 80/100 km per hour and on G205 40/50 km per hour. Substantial VOC and passenger time costs savings accrue. Using the unit VOC at appraisal with inflation adjustment, the VOC savings were estimated at per vehicle-km RMB0.27 for cars, RMB1.80 for buses, RMB0.51 for medium trucks, and RMB0.70 for large trucks. The passenger traveling time costs were estimated using GDP per capita of Fujian Province with considerations of working days and hours per year, average car and bus occupancy, percentage of work trips, and time savings by using the YWE or the G205¹¹. The accident cost reduction was estimated using the accidents rates at appraisal, but with higher unit cost of RMB12, 000 per accident due to improved economy. In the economic benefit calculations, 90% of the total YWE traffic was considered as diverted traffic from the G205.

6. *Economic Internal Rate of Return.* Based on above assumptions and the estimations on the economic costs and benefits, the economic internal rate of return (EIRR) was recalculated at 14.7% for the YWE, which is lower than the appraisal figure of 16.6%. The lower EIRR is mainly caused by higher project investment cost and lower traffic in the early years of operation. However, the recalculated EIRR is still higher than the World Bank recommended opportunity cost of capital (12%). Therefore, the YWE continues to be economic and viable. The sensitivity tests showed that the EIRR is sensitive to the changes in benefits. Therefore, the YWE operators need to keep the expressway in good condition and improve its services to attract more traffic and facilitate the efficient traffic flow.

Table 3. Sensitivity Test for the YWE

Scenarios	Test	EIRR (%)	ENPV @12% RMB million
Base Case		14.7%	5,745.9
O&M Cost	+10%	14.7	5,623.9
	+20%	14.6	5,501.8
	-10%	14.8	5,868.0
	-20%	14.9	5,990.0
	Benefits	+10%	15.8
	+20%	16.8	10,689.1
	-10%	13.6	3,274.3
	-20%	12.4	802.7
O&M Cost Higher & Benefits Lower	+10%, -10%	13.6	3,152.3
	+20%, -20%	12.3	558.6

EIRR = economic internal rate of return, ENPV = economic net present value

Source: the World Bank ICR team.

¹⁰ The parallel highway G205 is a Class II road with traffic capacity of 7,000 medium trucks per day.

¹¹ The hour-value of travel time savings ranged RMB26.2-31.8 in 2015 based on Fujian’s GDP. At appraisal, the value was only RMB1.5. The unit VOC are 30% less than at appraisal.

Ex-post Economic Evaluation of the Rural Roads

7. Under the project, the World Bank loan supported rehabilitation of 1,299 rural roads with total length of 5,405 km, including 137 county roads with total 553 km and 1,162 township/village roads with total 4,852 km. These rural roads are located in the coastal areas and mountainous areas of Fujian Province. The rehabilitated county roads are in Class III have the width of 6.5 meter. The town/village roads are in Class III or IV have the width of 3.5—5.0 meters.

8. *Traffic Analysis and Forecast for the Rural Roads.* During implementation, traffic counts on a sample of roads were carried out. In 2014 (the first full year of operation), the average daily traffic was 2,832 vehicles on the county roads, and 558 vehicles on the town/village roads in the coastal areas. In the mountainous areas the respective numbers were 1,910 vehicles and 379 vehicles. Comparing to the forecasts at appraisal, the actual traffic was much higher, about 77% for the county roads and 127% for the town/village roads. Considering the actual traffic and socioeconomic development in the project areas, the traffic growth rates for future years were adjusted to 5.0–8.0% per year in 2016–2020 and 4.0–5.0% in 2021–2030.¹²

Table 4. Actual Traffic on the Rural Roads (AADT, vehicle)

year	Costal		Mountain	
	County	Town/village	County	Town/village
2008	1,997	393	1,347	267
2009	2,116	417	1,427	284
2010	2,243	442	1,513	301
2011	2,378	468	1,604	319
2012	2,521	496	1,700	338
2013	2,672	526	1,802	358
2014	2,832	558	1,910	379
2015	3,002	591	2,025	402

AADT = annual average daily traffic
Source: Fujian PMO.

Project Costs of the Rural Roads.

9. The actual project costs for the rural roads were RMB4,428.32 million, comprising RMB317.84 million for the county roads and RMB1,764.46 million for the town/village roads in the coastal areas, and RMB158.08 million for the county roads and RMB2,187.94 million for the town/village roads in the mountainous areas. Compared to the estimates at appraisal, the actual unit costs per km are different: (i) the unit costs in coastal areas are

¹² At appraisal, the traffic growth rates were estimated at 5% per year in 2005–2010, 4.5% in 2011–2015, and 4% in 2016–2020.

about 7% for the county roads and 47% for the town/village roads lower; and (ii) the unit costs in mountainous areas are about 115% for the county roads and 83% for the town/village roads higher. The routine maintenance costs were estimated at RMB7, 000 per km for the county roads and RMB6, 000 per km for the town/village roads. The periodic maintenance was scheduled in every 7 years at the costs of RMB0.35 million per km for the county roads and RMB0.30 million per km for the town/village roads. All above capital and maintenance costs were converted into economic costs by using the factor of 0.84 as at appraisal.

Economic Benefit Estimations for the Rural Roads.

10. Two types of economic benefits were captured for the rural roads by comparing “with” and “without” project cases: (i) vehicle operation cost (VOC) saving, and (ii) passenger time cost saving. Before the project, the rural roads were in poor condition, the average vehicle speeds were only 30–40 km per hour on the county roads and 20–30 km per hour on the town/village roads. With the project, the vehicles speeds are averaging 40–50 km per hour on the county roads and 30–40 km per hour on the town/village roads. Substantial VOC and passenger time costs are accrued. Table 5 shows the unit VOC at appraisal with adjustment of inflation. It was estimated that the VOC savings were at least 10% for the county roads and 15% for the town/village roads. The passenger travel time costs were estimated using GDP per capita of Fujian Province with considerations of working days and hours per year, user groups, average car and bus occupancy, percentage of work trips, and time savings of before and after the project.

Table 5: Unit Vehicle Operation Cost (RMB per vehicle-km)

Vehicle type	Coastal Area		Mountain Area	
	County	Town	County	Town
car	1.71	1.87	1.87	2.02
Medium bus	3.21	3.50	3.50	3.80
Large bus	6.70	7.31	7.31	7.92
Small truck	2.81	3.07	3.07	3.32
Medium truck	3.49	3.80	3.80	4.12
Large truck	4.95	5.40	5.40	5.85
Tractor	7.25	7.91	7.91	8.57

Source: the project PAD

Economic Internal Rate of Returns.

11. For the rural roads, the EIRRs were recalculated as at appraisal for the project roads in coastal and mountainous areas separately for county roads and town/village roads. Compared to the appraisal figures¹³ the EIRR for the county roads in the coastal areas is

¹³ The EIRRs was 37.6% for the county roads and 44.7% for the town/village roads in the coastal areas; and 21.8% for the county roads and 31.9% for the town/village roads in the mountainous areas.

almost the same as at appraisal, and the EIRR for the county roads in the mountainous areas is much higher mainly due to higher traffic. The EIRRs for the town/village roads in both coastal and mountainous areas are lower due to lower traffic and higher investment cost than expected. Overall, the aggregate EIRR for all the rural roads was 25.7%, which is lower than that at appraisal of 34.7%. Nevertheless, all of the EIRRs are higher than the World Bank recommended economic cost of capital of 12%. Therefore, all of the rural road projects are still economic and viable. Table 6 is the summary of the EIRRs and the comparison with appraisal estimates.

Table 6. Summary of the EIRRs for the Rural Roads

	County Roads		Town/village Roads		Average	
	Completion	Appraisal	Completion	Appraisal	Completion	Appraisal
Coastal Area	36.8%	21.8%	26.7%	20.3%- 26.2%		
Mountain Area	41.1%	37.6%	<u>23.3%</u>	37.2%- 51.4%		
Average					<u>25.9%</u>	34.7%

Source: Fujian PMO

Ex-post Financial Evaluation of the YWE

12. The YWE has provision of toll revenue and financial re-evaluation was carried out. Currently, the YWE is operated 24/7 by Sanming Expressway Management Company and Longyang Expressway Management Company, which are sub-companies of Fujian Expressway Corporation (FEC). Toll scheme was proposed by FEC and approved by Fujian Provincial Price Bureau. Following table is the current toll level and future potential adjustment.

Table 7. Toll Scheme and Plans (RMB per vehicle-km)

period	Small Passenger Vehicle	Small Freight Vehicle	Medium Freight and Bus	Large Freight Vehicle	Heavy Freight Vehicle
2010-2015	0.55	1.10	1.54	1.65	1.925
2016-2020	0.60	1.20	1.68	1.80	2.100
2021-2025	0.65	1.30	1.82	1.95	2.275
2026-2029	0.75	1.50	2.10	2.25	2.625

Source: Fujian PMO

13. In the financial re-evaluation: (i) PAD's financial investment costs of project and estimated O&M cost were used; (ii) the toll revenues were calculated using the actual traffic in 2010–2015 and with a new traffic forecast for future years; (iii) non-toll revenue was estimated at 5% of the toll revenue, mainly from advertisements and expressway

services¹⁴; and (iv) business tax rate 3.5% of the revenue and corporative income tax rate 25% of net profit were applied. The cash flows cover 24 years, including 4 years for construction and 20 years for operation.

According to above assumptions and estimations, the financial internal rate of return (FIRR) of the YWE was recalculated at 8.5% before tax and 6.2% after tax. Such FIRR is higher than the rate of 1.0% (at the discount rate of 5.02 percent) estimated at appraisal, and higher than the average lending rate in China (6%). Thus, the YWE project is financially viable and has sufficient revenues to cover its O&M costs as well as to pay back the loans.

¹⁴ The YWE has 4 pairs of service areas along the expressway, which have the facilities of restaurants, shops, garages, hotels, and fuel stations.

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Michel Bellier	Lead Transport Specialist	MNSTI - HIS	
Wenling Chen	Consultant	AFTTR - HIS	
Yi Dong	Sr Financial Management Specialist	GGODR	
Carlos Ricardo Escudero	Consultant	LEGLA - HIS	
Boping Gao	Consultant	EASIN - HIS	
Imogene B. Jensen	Consultant	GSURR	
Maria Luisa G. Juico	Program Assistant	GTIDR	
Andres Liebenthal	Consultant	IEGCC	
Aurelio Menendez	Practice Manager	GTIDR	
Aymeric-Albin Meyer	Operations Adviser	OPSPQ	
Hiroshi Ono	Sr Environmental Spec.	EASRE - HIS	
Wen Pan	Consultant	EASTE - HIS	
Jinan Shi	Senior Procurement Specialist	GGODR	
Supee Teravaninthorn	Practice Manager	GTIDR	
Jacques M. Tollie	Consultant	EAPDE	
Naoya Tsukamoto	Sr Environmental Engr.	EASEN - HIS	
Peishen Wang	Consultant	GENDR	
Dawei Yang	Consultant	EASTS - HIS	
Han-Kang Yen	Research Analyst	EASTE - HIS	
Chaohua Zhang	Lead Social Development Specialist	GSURR	
Youlan Zou	Consultant	EASCS - HIS	
Supervision/ICR			
Wenling Chen	Consultant	AFTTR - HIS	
Junxue Chu	Senior Finance Officer	WFALN	
Yi Dong	Sr Financial Management Specialist	GGODR	
Boping Gao	Consultant	EASIN - HIS	
Yi Geng	Sr Financial Management Specialist	GGODR	
Petrus Benjamin Gericke	Lead Transport Specialist	GTIDR	
Aurelio Menendez	Practice Manager	GTIDR	
Juan D. Quintero	Consultant	OPSOR	
Yunqing Tian	Program Assistant	EACCF	
Jacques M. Tollie	Consultant	EAPDE	

Peishen Wang	Consultant	GENDR	
Dawei Yang	Consultant	EASTS - HIS	
Songling Yao	Senior Social Development Specialist	GSURR	
Han-Kang Yen	Research Analyst	EASTE - HIS	
Chaohua Zhang	Lead Social Development Specialist	GSURR	
Antti Talvitie	Consultant	GTIDR	
Shuai Ren	E T Consultant	GTIDR	

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
Lending		
FY05	11.8	78.31
FY06	40.86	208.92
FY07	14.54	92.86
Total:	67.2	380.09
Supervision/ICR		
FY08	14.54	91.22
FY09	8.77	80.68
FY10	7.17	68.20
FY11	6.82	35.15
FY12	9.04	58.41
FY13	5.9	22.29
FY14	7.95	41.40
FY15	8.02	45.91
FY16	0.1	301.12
Total:	68.31	744.38

Annex 5. Beneficiary Survey Results

1. The FHSIP project financed a technical assistance study on evaluating the impact of RRIP component. The surveys were carried out in 2008 and 2009. In 2015, another set of impact surveys were carried out for rural roads financed by the AF. The results of these impact evaluations show that construction of rural roads improved investment environment and living conditions for villagers, created more energetic and competitive environment for development, and increased the farmers' income and accelerated balanced development of rural economy in Fujian.

RRIP Impact Survey for FHSIP

2. The first impact survey was conducted on the treatment (with RRIP) and comparison groups (without RRIP) in 2008 and 2009. A total number of 2,336 questionnaires in 72 villages were collected, including the baseline data and results after construction. Of the 72 villages, 38 were in the treatment group with RRIP projects, and 34 in the comparison group where roads were not being scheduled for rehabilitation. Four types of impact are studied in detail, including transport impacts, rural economy benefits, social impacts and environment impacts. The results are summarized below.

3. **Transport Impact — volume, travel time, and rural transport services.** The RRIP program improves the rural road condition of Fujian Province. All the town, village and community in Fujian Province have got the all-season access roads. The traffic volume on rural roads increases evidently in treatment group, from 107 pcu/day (before the construction rural roads) to 329 pcu/day (after the project); The traffic volume of comparison group roads during the same period only increased 26 pcu/day on average. Travel time of the rural households for all trip purposes reduced significantly, and the level of the transport service radically improved. Daily travel time to the work reduced by 22 minutes; average travel time to the markets, hospitals, and towns reduced 40 minutes; student trips to school also saved 18-32 minutes. Coverage of rural public transport services improved significantly to 80% of all villages in the province.

4. **Transport Impact – freight and traffic safety.** The quality of rural roads has been notably improved, obviously reducing the freight transport times and costs. The travel time of agricultural goods reduced 23 minutes on average, introducing considerable benefit to the farmers because it allowed them to choose and grow products with higher revenue-margin but are normally more difficult to keep fresh. In the treatment group with project, about 54% farmers have to bear more than 30 minutes of travel time when transporting agricultural product; while in the treatment group, the percentage as high as 90%. Better road surface quality also increased the profits from farming by reducing the damage and loss of goods during the transport. Storage costs were less for produce and other farm products that could not be shipped without dependable road network in the harvest season. Traffic safety has improved markedly in the rural areas, and the level of the service reliability of rural roads has improved. Although RRIP has increased the length of rural road network, the frequency of traffic accidents has shown a decreasing trend. In the

treatment group villages a large drop from 7.5 accidents per year to 2 accidents per year was observed.

5. **Economic Impact – agricultural productivity and rural economy.** Productivity of rural areas has increased with RRIP and caused a rapid growth in the rural economy. In the treatment group, the agricultural unit yield increased from RMB 1,147 RMB/Mu to RMB 1,678 RMB/Mu, a growth of 46% while in the comparison group, the growth rate was 30%. In addition to increases in agricultural productivity, rural roads improved many sectors of rural economy, including modernization of industries, expansion of markets for agricultural products, and an increase in the number of the private enterprises (doubled in the treatment group).

6. **Social Impact – social services and employment.** RRIP has greatly improved the rural life not only because of reduced cost of transport. Implementation of RRIP roads in the villages, either new-builds or renewals, improved access and mobility to doctors' offices and social services. Travel expenses for accessing social services declined from RMB 50-60 to RMB 30. Villages with rural road connections can get medical treatment in time, which is particularly important for the patients with emergencies. The proportion of the villagers who want to get the medical services in the hospital or in the clinic reaches 91% in the treatment group, while in the comparison group, only 48% of the residents considered using medical services more frequently. The improvement of the travel condition reduces the commuting time of the teachers and the students significantly, thus promoting the development of education in rural area. RRIP created numerous opportunities for work and increased the number of the local non-agricultural labor force significantly. Surveys showed that the proportion of the non-agricultural employment of farmers in the treatment is 7 percent higher than the proportion in the comparison group. Many farmers who had been working outside the villages have come back to farming or other kinds of work, and even set up their own enterprises. Non-agricultural female employment also increased significantly. Survey results showed that the proportion of non-agricultural female employment reached 48.5%, the interpretation being that half of the women have changed work from heavy farm work to non-agriculture work and jobs.

7. **Environment Impact.** Rural Road Programs improve the living environment of rural areas, which upgrade the satisfaction of the air quality to the public. Air quality satisfaction of villagers of the treatment group rises from 82% (before the program) to 95% (after the program), whereas air quality satisfaction of villagers of the comparison group has been barely changed.

RRIP Social Impact Survey for AF funded rural roads.

8. In 2015, a social impact survey was conducted subsequent to the completion of rural road construction from Additional Financing, covering 64 villages and 768 villagers.

The survey questionnaire focused on transport and economic impact with a before-and-after comparison of the affected villages.

9. **Improved public transport accessibility and safety.** For the 64 villages surveyed, rural passenger service frequency has increased 24%, and the trip time has reduced 54% on average. 91% of responders feels the trip is more comfortable. Though traffic volumes have increased considerably, the accident rate has stayed the same (0.5 accident/year).

10. **Mode Shift.** Improved transport access has also changed the mode of travel. Before the rural roads rehabilitation, about 60% people traveled by bike or walking; after the road and passenger provision services improved, travel in rural passenger buses increased 32% (from 6% to 38%), and travel on private vehicles increased 27% (from 4% to 31%).

11. **Better access to education and social services.** Improved road conditions reduced student's commute time by 26%. 76% fewer students need boarding at school. The travel mode for students going to school also changed. Before, about 58% went to school by bike or walking, and 31% by motorcycles. After rural road improvement, about 50% of students go the school by bus and about 33% by private vehicles. Road condition improvement lead to better access to health care. About 83% of respondents claim that RRIP and AF helped reducing the time cost for going to hospitals and other social services. The travel time to Town level hospitals is on average 25 minutes less, and the travel time to County level hospitals is on average 20 minutes less.

12. **Economic impact and employment.** During project implementation, the average income has increased. In 2010, 61 people were in the low income group, whereas in 2014 the population of low income group had reduced to 34 people (44%) in the 64 villages. The average household income had increased 23% and 26% of respondents claimed they have better jobs after the construction of their rural roads. Overall 95% of the affected people were satisfied with the project.

13. The following cases demonstrate the impacts of RRIP on local villages in details.

14. **Case 1: Reduced travel time for villagers.**

The Yushangang village in QingYuan, Shouning County is one of the highest villages in high altitude. Before the RRIP roads were built, walking was the only way for people to get out of the village. It usually took 3 hours to get to the nearby village and more than 8 hours to get to the county town. All the mountain products had to be shoulder-carried out by villagers across the mountains. After the completion of rural roads in Yushangang, it only takes an hour or less to get from the village to the county town by car.

There is one school for every village in Pucheng County. Attending the school would have been impossible if rural roads had not been built. Because of the difficulty of walking on the mountain roads, the primary and secondary students in Tangkou village had a long difficult path and a long walking time to school before the rural roads were built. Now students can ride the bicycle to school in dozens of

minutes or half an hour at most. All people in Xiaozhang village in the county can now travel more safely and conveniently.

The Guanzhuang village in Nanping city has provided rural health insurance since 2006. All types of vehicles, including fire engines and ambulances, can get into the village within 10 minutes. Previously, it took 3 hours to the doctor's office, and because of inaccessible roads most patients could be rescued only at half way to the village. Now it takes less than half an hour to travel to the doctor's office.

15. Case 2: Reducing travel cost

31 villages in Jiangshan County, Xinluo area, Longyan city gain access to rural roads with RRIP. The cost of transportation for villagers has reduced a lot. Every agricultural vehicle consumes 3 liters of fuel per kilometer before the cement roads had been built. And this fuel consumption can be reduced to 2 liters per kilometer after cement roads have been built. For one village, fuel cost savings per year could be RMB 1,300,000.

Previously, taking the tricycle from Yangli village to the town in Mingqing County takes at least RMB 20. Now the cost is halved at only RMB 10.

For Zhangji village, Sanming city, the implementation of road condition reduced the traveling expenses for seeing a doctor from RMB 50-60 to RMB 30.

16. Case 3: Stimulating the rural economy- Local industry.

The sales of Camellia pomelo, Citrus, and mushrooms grown by Bandong village, Mingqing County, Fuzhou, were limited due to the poor roads. Especially the mushrooms, which are time sensitive and perishable, are difficult to preserve. People had lost confidence in growing them due to poor roads and access. After the rural roads were developed in RRIP the Citrus Industry recovered and a processing plant was set up. Township output reached 11,000 tons, and annual income increased by 2.2 million Yuan.

The Wuzhai village in Linfang, Liancheng County, Longyan City has been growing mushrooms since 1996. Since the traders' vehicles could not access the village, the farmers had to shoulder-carry the farm products to the market. After the roads to the village were constructed and permitted vehicular access of the traders and buyers the revenue increase from selling mushrooms was ca. RMB 100,000 / year. In general, fresh products have better price and the village gained in reputation. Income per capita in the village has risen by more than 30% after roads were built.



A. Before RRIP

B. After RRIP

Rural Road Conditions Before and After RRIP in Fujian Province

Annex 6. Stakeholder Workshop Report and Results

NA

Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR

Introduction

1. The World Bank received the Borrower's Implementation Completion Report (ICR) in August 2015. The borrower's ICR was prepared by FPCD, covering both the Fujian Highway Sector Investment Project (FHSIP) and the Additional Financing of the project. The ICR was prepared in Chinese and generally in good quality. The ICR consist of 80 pages and contains the following contents: (i) project background, (ii) description of project implementation, (iii) evaluation of project implementation, (iv) economic evaluation and financial evaluation, and (v) experience gained and lessons learned. The ICR provided valuable observations from the Borrower's perspective, which are summarized below:

Lessons Learned During Implementation

2. **Top-level design is a pre-requisite for rural road construction.** The project demonstrated that the establishment of a sound, highly efficient institutional framework and regulations, is vital important to ensure the success of rural road construction and management. The project document of Framework of Procurement, EMF, RPF and IPPF of RRIP, and the revised government policies along with the implementation of the project (*Temporary Management Regulation of Fujian Non-expressway Projects, Implementation Specifications of Fujian Rural Road Construction Management, Proposals for Fujian Rural Road Construction Monitoring, Fujian Rural Road Technical Standard, Guidance of Evaluation on Internal Control Policy*), have set an example for other rural road projects. These policy document defined the implementation framework and explicitly regulated the preparation, planning management, implementation, financial management, auditing, check, monitoring, and incentive structure for rural road projects. The guidance of construction policies ensured the rural road implementation according to specifications, avoided low-level and redundant construction practices, improved construction benefits and promoted the adjustment and upgrading of rural road network structure.

3. **Innovative project approach of SWAp increased the efficiency and performance of the project.** This project is the first IBRD loan applying "Sector Wide Approach" in China. Rural road construction is managed in different batches, and the project adopted the innovative management approach: the RRIP component was approved based on a databank with many rural roads and projects were selected from the databank, withdrawal applications were made by batches after construction was completed, and audit and inspections were carried out randomly from time to time. This approach improved the works quality and accelerated progress, as well simplified the WB's prior review and disbursement procedures. SWAp applied in this project fits very well to China's local contexts.

4. **Social participation: openness is the power.** The villagers in project areas participated actively in the project implementation, since the project implementation directly impacted their livelihoods. The villagers met and set up the "council for road

construction", "senior's association" or "association for home construction" voluntarily, and participated in the overall-process management of funding, supervision and construction of "their rural road", which strongly expedited the implementation process. Beneficiary survey shows that, of all villagers, 86% claim that they knew about World Bank project, and 67% knew information about construction. 95% of people who knew of the World Bank project were satisfied with it. About 74% of all villagers had participated in project construction (24%), management (23%), and consultation (27%).

Recommendations

5. **Databank of the potential projects needs be narrowed down to meet certain criteria or targets.** The criteria and targets would allow the scope of implementation be reduced appropriately, with emphasis on the promotion of county-to-town and town-to-town projects. The narrower project scope would help enhance the efficiency and performance of the rural road network.
6. **Further incentivize local level government.** On-lending a portion of the IBRD loan to county-level government can effectively increase the support by the local governments and reduce the self-financing pressures of towns and villages.
7. **Adopt softer policy framework for procurement.** China's domestic market environment has its own characteristics comparing with the international market. Some facts and practices are proven to be the rational and effective methods for competitive procurement, but are not be accepted by World Bank. A broader policy perspective is advised for the Bank to advance cooperation in China's provinces.

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

NA

Annex 9. List of Supporting Documents

1. Hirschman, A. O. 1967 *Development Economics Observed*, Washington, DC: Brookings Institution.
2. ——— 1970 *Exit, Voice and Loyalty: Responses to Decline in Firms, Organizations and States*. Cambridge, MA: Harvard University Press.
3. Project Appraisal Document, September 2006
4. Additional Financing Project Paper, February 2011
5. Loan Agreement, Project Agreement
6. Research Report of *Impact Evaluation for the RRIP in Fujian Province*
7. Project Aide-memoires, Implementation Status & Results Reports (ISRs)
8. Borrower's implementation completion report (ICR), draft version, September 2015.

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