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Dao, Nga and McGrath, Tim and Nguyen, Cuong

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Impact of Provincial Rural Roads on Inclusive Development: Evidence from Vietnam

Nga Dao
Tim McGrath
Cuong Nguyen¹

Abstract

Rural roads are very important for economic development, especially in rural areas. This study provides an impact assessment of a rural road project in Northern Mountain of Vietnam using both quantitative and qualitative methods. The most visible evidence of economic benefit identified by all respondents was the reduction of transportation cost of goods and products, and the reduction in the time and cost for traveling. This was significantly important in areas of intensive agriculture production and remote areas in Northern Mountains.

Keywords: Rural roads, impact evaluation, household welfare, household survey, Vietnam.

JEL: O12, O22, R20

¹ Contact author: Nguyen Viet Cuong, National Economic University, Hanoi, Vietnam.
Email: c_nguyenviet@yahoo.com

1. Introduction

Rural roads are very important for economic development, especially in rural areas (World Bank, 1994; Jalan and Ravallion, 2001; Lipton and Ravallion, 2005). Through rural roads household income, both farm and non-farm income, can be increased through increased agricultural productivity, lowered transportation costs, increased access to advanced technology, capital and labor outside the local areas.

Vietnam is a developing country with high poverty rate in rural areas. Infrastructures including roads have been constructed and improved by the government and international agencies. According to Donnges et al. (2007), Vietnam has the rural road network of around 175,000 km in 2007. Van de Walle and Cratty (2002) examine the effect of rural road rehabilitation projects on household welfares using data collected from a road project of the World Bank in Vietnam, and they find that rural roads improve transportation and local markets.

The Provincial Rural Roads Improvement Project (PRIP) was implemented during 1998-2004 by the Ministry of Agriculture and Rural Development of Vietnam with funding from ADB. This project aims to improve provincial roads in 18 provinces in northern Viet Nam to allow better access for the rural poor and to connect districts and communes to the provincial cities and the national highway network, contributing to poverty reduction, and development of an effective national road network, and continued reforms in the road sector.

The 18 provinces in the program were in three regions including; the Northern Mountains & Midland, North Central and Red River Delta. These regions had differing socio-economic characteristics with 15 of the 16 provinces in the North Mountain and Midland region being the larger part of the project area and had the lowest per capita income, and among the lowest household incomes, in the country. Within the project area there are large differences between the provinces' access to physical and social resources such as roads, electricity and education and the proportion and distribution of poor households.

The PRIP included the following components (i) a program including an investment plan and policy framework to improve about 1,600 kilometers (km) of provincial roads in the 18 northern provinces; (ii) assistance to project management unit No. 5 (PMU-5) and the Department of Transport (DoTs) to strengthen their capacity to prepare and implement improvements to and maintenance of provincial roads; (iii) development and introduction of an action plan to implement a road fund scheme; (iv) assistance to introduce new regulation and further institutional strengthening of Vietnam Road Administration; (v) assistance to implement and monitor resettlement and ethnic minority development plans; and (vi) consulting services for preparation, implementation, and supervision of civil works; preparation of additional subprojects.

This study has the objective to present findings and analyse on the PRIP's contribution to 'Inclusive Development'. Inclusive Development involves creating and expanding economic opportunities, and broadening access to these opportunities. It bridges development gaps between the rich and the poor. Dimensions of inclusive development include economic, social, environmental and political. For the purposes of this evaluation, it is expected that Inclusive Development should provide evidence of improvements to the following:

- (i) Opportunities for the poor and Ethnic Minority groups to access gainful employment and improve their quality of life
- (ii) The ability of poor and Ethnic Minority households to take advantage of the opportunities
- (iii) Access to adequate services, including health and education, particularly for the low-income and Ethnic Minority households
- (iv) Access to participation in decision-making for poor and Ethnic Minority households

The key focus of this evaluation study was to assess the inclusion of the different groups within the community in the various activities and processes before and after the investment project, and any changes in the roles these groups played. It examined the processes that assisted upgrading products within the market chain - involving aspects such as improving quality and product design which allows producers to gain higher

value, or diversification in the products created. It also examined the backward and forward linkages that facilitated access to, and utilization of, economic and social services for women, poor and other socially disadvantaged groups.

2. Methods and Approach

At the commencement of this evaluation, it was apparent that that the existing data may not allow a full and comprehensive evaluation. The evaluation team felt that there was not enough reliable data and information collected from previous fieldwork and from national and provincial level reporting that could be used to identify and measure the impact on inclusive development from project intervention and distinguish impact from other interventions. Therefore the evaluation team decided to supplement existing data and information with the collection of additional information through a combination of a qualitative case study approach and the use of the qualitative and quantitative data gained from a household survey. The reports, studies and data sets provided by ADB were supplemented with further research conducted by the consultant team. This allowed a more rigorous comparison of the local situation before the investment and the impact of the investment after the project intervention.

A review of the literature on various aspects of rural infrastructure development, mapping the value chain, rural development effectiveness, sustainability and inclusive development issues was conducted. From this, a number of the methodological tools (particularly the Household Survey and the Value Chain Analysis) and critical questions were developed.

To promote consistency across the different countries undertaking SES, where possible, the methods, tools and questions developed in Nepal were also used for the evaluation in Vietnam. During the preparation of the household survey and the value chain analysis in Vietnam, the methods, tools and questionnaires developed in Nepal for the Special Evaluation Study (SES) on ADB's "Contribution to Inclusive Development through Assistance for Rural Roads" were reviewed. However, there are special conditions in Vietnam relating to the available data and information, and data collection

and in response, methods, tools and questionnaires were further developed reflecting these special conditions.

2.1. Data Collection – Quantitative and Qualitative

Overall, the evaluation analyzed: existing data and/or reports, ‘official’ government reports and data, results of the household survey, field work observations and interviews, group discussions and the value chain analysis.

Data and information about the prevailing situation **before** the construction of the investment infrastructure was collected from the following sources:

- Baseline surveys and participatory rural appraisals (PRAs) carried out under the PPTA; Explain PPTA
- National surveys such as the Vietnam Household Living Standards Survey (VHLSS) and National Census
- Provincial data and information collected from departments such as Department of Agriculture and Rural Development (DARD), Department of Labour Invalids and Social Affairs (DoLISA) and Department of Ethnic Minorities and Mountainous Areas (DEMA)
- Surveys, PRAs and other information collection undertaken during sub-project identification;
- Benefit monitoring and evaluation studies carried out during implementation;
- Other studies undertaken in the area serviced by the project components.
- Interviews with local leaders and officials and households during the field work

Data and information to assess the impact towards inclusive development **after** construction was collected from the following sources:

- National surveys such as the VHLSS and National Consensus

- Provincial data and information collected by departments such as DARD, DoLISA and DEMA
- Survey of 200 households with targeted questions specifically on rural roads; 50 households per province were surveyed in the sub-project area at the head, middle and tail of rural road investments. The following programmes were used to process the data. We estimate the effect of the ADB road on household welfare. The effect was estimated by comparing the current household welfare with their counterfactual welfare in the absence of the road. Information on this counterfactual welfare was collected using the questionnaires.
- Interviews with key informants (e.g. provincial, district and commune leaders and civil servants, extension officer, village leaders, community based organizations and health workers)
- Focused group discussions with groups such as ethnic minorities, women and the poor
- Mapping of the value chain outlining the relationship between economic, institutional, environmental and social aspects and analysis of these relationships. Based on the value chain mapping, some local businesses were surveyed. In addition, the different impacts from new construction and rehabilitated roads were assessed. The value chain analysis was limited to rural roads and two key commodities produced in each of the study areas. The value chain process mapped out key actors in value chain associated with backward and forward linkages due to rural roads.

Reliable quantitative data and information was gathered where possible and where applicable: using constant or real prices, for example, the costs of inputs and value of outputs (by volume/weight) before and after the investment to assess the impact on constant prices. This information was verified through triangulation as much as possible. The sustainability of the investments was assessed, especially the issue of ongoing operations and maintenance. This involved evaluating local contribution mechanisms and measures for the inclusion of all groups within the community.

2.2. The Use of the Value Chain Analysis

The evaluation process used a Value Chain Analysis (VCA) methodology to map and analyse production of goods and services. In doing so, the evaluation examined and mapped typical VCA components such as: core processes, actors involved, product flows, information flows, geographical flows, changing values, interrelationships between actors, services inputs, key constraints etc.

However, during this evaluation, the approach used to map the value chain, particularly focused on the inclusion and interrelationships throughout the value chain. Specifically, it looked at the complex range of activities carried out by local people, private sector organizations (primary producers, commodity processors, traders at different levels and service providers) and the public sector to bring the produce to the final consumers. In doing so, the value chain analysis examined:

- the key actors in the chain
- the interrelationships amongst these actors
- the reasons for the persistence of this interrelationship
- how these actors share and use information
- how the relationships amongst these actors was coordinated and maintained.

Hence, the key focus of the study was the inclusion of the different groups within the community in processes before and after the sub-project, and any changes in the roles these people played. The approach used determined a profile of these aspects **before** the intervention and how they evolved **after** the construction of the intervention. The value chain analysis was also used as a framework from which to draw conclusions and develop recommendations on the inclusion of the poor, ethnic minorities and other disadvantaged groups in sub-projects.

As all PRIP sub-projects are in rural areas, in most cases the key entry point for the value chain analysis was agricultural producers. Our examination showed that the

value chain most typically started from the production system in the villages and moved through a series of linkages with enterprises engaged in activities such as processing and trading. It mapped the local power relationships and the enabling environment established by local authorities. The evaluation mapped backward linkages such as: increases in farm productivity, reduction in unit production costs, increases in employment in the local community especially disadvantages group due to expansion in production and construction, better quality of life for all groups in the community and local procurement of production inputs. The evaluation also involved the examination of any forward linkages including: market development, increased local and regional trade, produce processing, new infrastructure development, broader inclusion of the community (especially poor, ethnic minority and disadvantaged groups) in accessing business opportunities, off-farm employment and income opportunities, increased use of service providers and increased community based organizations.

The value chain analysis utilized in Vietnam, used a framework that emphasized two key aspects².

1. Systematically mapping the actors participating in the production, distribution, marketing, and sales of a particular produce. This mapping assesses the characteristics of actors, profit and cost structures, flows of goods throughout the chain, employment characteristics, and the destination and volumes of domestic and foreign sales.
2. Most importantly in Vietnam – identifying the enabling role of governance institutions and practices. In Vietnam, political structures pervade all aspects of organizational and social activity, and affect the establishment and maintenance of an enabling environment for the development of value chains through regulations, entry barriers, standards and government subsidies. The structure of interrelationships and coordination mechanisms that exist between actors in the value-chain was identified. Institutional arrangements were also

² This section draws on ADB resources on Making Value Chains Work Better for the Poor.

examined to assess capabilities in, and affect on the value-chain and distributional distortions.

Site selection: Sites for fieldwork were selected based on a substantial road development investment. The road must have been completed at least 2 years ago to ensure that impact of road has been materialized.

The fieldwork for the study was conducted in four provinces. In each province, two or three rural roads were selected. The number of communes visited for the fieldwork varied according to the length of the road. However, communes, villages and households were visited at the head, middle and tail of the road.

The evaluation was conducted in the following provinces:

- Vinh Phuc
- Bac Giang
- Yen Bai
- Tuyen Quang

3. Evaluation Findings

The following section details the findings in relation to impact of the rural roads interventions of PRIP. The quantitative assessment of the impact of the PRIP was based on a household survey of 200 households in 4 provinces Vinh Phuc, Bac Giang, Tuyen Quang and Yen Bai. Among 200 surveyed households, there were 145 Kinh/Chinese³ households and 55 ethnic minority households. The number of households with male and female heads was 168 and 32, respectively. The basic characteristics of the surveyed households are presented in the Appendices.

³ Ethnic categorization is based on the standard differentiation used by both donors and Government in Vietnam; i.e. Kinh/Chinese or Ethnic Minority

Table 1 presents the poverty status of the surveyed households by different poverty definitions. For comparison, both expenditure and income poverty lines were used to estimate the poverty incidence. The expenditure poverty line was developed by the General Statistical Office of Vietnam/World Bank in 2006. It was 2560 thousand VND/person/year in 2006, and the evaluation team adjusted it to June 2008 (using CPI) with the result of a poverty line of 3312 thousand VND. The income poverty line used by the Ministry of Labor, Invalid and Social Affairs in 2008 is 3600 and 4680 thousand VND for the rural and urban, respectively. In addition, the poverty rate based on the poverty classification by commune authorities (identified as the MOLISA rate) is presented.

Table 1. Poverty status of the surveyed households

Groups	Poor by expenditure poverty line	Poor by income poverty line	Commune authority poverty rate in 2008	Commune authority poverty rate in 2002
<u>Ethnicity</u>				
Kinh/Chinese	30.34	15.17	3.45	11.03
Ethnic minorities	50.91	36.36	14.55	23.64
<u>Household Head-</u>				
<u>Gender</u>				
Female head	40.63	21.88	9.38	15.63
Male head	35.12	20.83	5.95	14.29

The results show that the poverty incidence is 36% and 21% based on expenditure and income poverty lines, respectively. The poverty rate based on the commune authority classification was very low, at 6.5%. The ethnic minority households have much higher poverty than the Kinh/Chinese households regardless of poverty line definition. The households with female heads had higher poverty rates than the households headed by men.

3.1. Inclusion in economic opportunities

Impact on income & consumption expenditure

Table 2 presents the income per capita from different sources. Income from agriculture and livestock/aquaculture in 2008 was 1417 thousand VND. The average wage was very

low at 655 thousand VND. However, non-farm income was 2479 thousand VND, accounting for about 36% of the total income. The income from remittances and transfers was 410 thousand VND.

As expected, Kinh/Chinese households had lower farm income but higher non-farm income than ethnic minority households. Income of the non-poor was remarkably higher than income of the poor. In the following tables, households were classified as the poor if their per capita expenditure was below the expenditure poverty line.

In all tables, the statistics for different groups were presented, including Kinh/Chinese and ethnic minority, households with male and female heads, non-poor and poor households.

Table 2. Income per capita (thousand VND)

Groups	Agricultural income per capita	Livestock/aquaculture income per capita	Wage income per capita	Non-farm income per capita	Remittances and transfers per capita
<u>Ethnicity</u>					
Kinh/Chinese	1785.0	1424.4	762.4	3135.0	413.3
Ethnic minorities	2600.9	1397.3	371.6	749.9	401.1
<u>Household Head-Gender</u>					
Female head	1523.6	945.8	129.9	3811.8	869.3
Male head	2101.9	1506.7	754.9	2225.2	322.4
<u>Poverty status</u>					
Non-Poor	2209.3	1535.8	876.9	3415.9	518.8
Poor	1654.0	1205.6	260.4	813.7	216.4
Total	2009.4	1416.9	654.9	2479.1	409.9

The evaluation was particularly keen to examine the impact of the road interventions on inclusive development. In order to do so, the surveyed households were asked about their assessment on the role of the road in increasing their living standards. Table 3 presents the findings from the assessment of households on the reported contribution of the road to increase wages and non-farm income, respectively. However, only 32% of households mentioned the positive role of road in increasing remittances and transfers. In general, ethnic minority households were more likely to acknowledge the positive role of the road.

Table 3. Percentage of households reporting increase in income due to the road

Groups	Agricultural income	Livestock/aquaculture income	Wage income	Non-farm income	Remittances and transfers
<u>Ethnicity</u>					
Kinh/Chinese	88.89	93.94	80.85	67.68	21.43
Ethnic minorities	92.73	89.58	100.00	87.50	60.00
<u>Household Head-Gender</u>					
Female head	70.83	78.95	83.33	72.00	33.33
Male head	93.24	94.53	87.69	72.64	31.25
<u>Poverty status</u>					
Non-Poor	92.16	93.26	88.10	67.74	34.62
Poor	87.14	91.38	86.21	84.21	25.00
Total	90.12	92.52	87.32	72.52	31.58

Table 4 presents households' assessment of total income. The total income per capita was 6970 thousand VND, and 93% of households believed that this level of income could not be achievable without the road. In addition, these households considered that the road increased their income by around 18%.

Table 4. Income increase due to road

Groups	Income per capita	% households reporting income increase due to the road	Percentage of income increase due to the road
<u>Ethnicity</u>			
Kinh/Chinese	7520.1	90.34	17.63
Ethnic minorities	5520.7	100.00	20.24
<u>Household Head-Gender</u>			
Female head	7280.5	81.25	14.75
Male head	6911.2	95.24	19.03
<u>Poverty status</u>			
Non-Poor	8556.6	90.63	18.13
Poor	4150.0	97.22	18.72
Total	6970.3	93.00	18.35

Tables 5, 6 and 7 present households' expenditures on different items and assessment of the road impact on expenditures. According to Table 7, the average expenditure on consumption was 5094 thousand VND, and 95% of households believed that their expenditure could not be attainable without the road investment. The proportion of households who highly value the road impact was higher in the poor and ethnic minority households. For example, the proportion of households who mentioned the road increased living consumption was 94% and 98% for the Kinh/Chinese and ethnic minority households, respectively. In addition, these households think that the road can increase their expenditure by around 18%.

Table 5. Consumption expenditures per capita (thousand VND)

Groups	Food and foodstuff	Education	Health care	Social events	Purchase of land and house	Improvement of house/land	Productive assets	Non-productive assets	Other non-food items
<u>Ethnicity</u>									
Kinh/Chinese	2850.0	638.5	463.9	294.4	436.1	416.1	764.5	547.9	663.8
Ethnic minorities	2244.8	646.6	389.7	187.5	36.4	392.7	492.8	315.9	347.1
<u>Household Head-</u>									
<u>Gender</u>									
Female head	2582.5	734.6	397.6	264.1	1495.5	182.3	473.3	434.2	519.3
Male head	2702.9	622.8	452.2	265.1	103.4	453.0	731.0	493.6	587.7
<u>Poverty status</u>									
Non-Poor	3415.7	897.6	609.7	346.8	435.4	469.6	812.4	686.4	734.2
Poor	1382.0	184.1	147.9	119.5	131.9	303.1	471.7	124.6	296.9
Total	2683.6	640.7	443.5	265.0	326.2	409.6	689.8	484.1	576.7

Table 6. Percentage of households reporting increase in expenditures due to the road

Groups	Food and foodstuff	Education	Health care	Social events	Purchase of land and house	Improvement of house/land	Productive assets	Non-productive assets	Other non-food items
<u>Ethnicity</u>									
Kinh/Chinese	84.83	46.23	52.03	64.66	66.67	77.78	76.72	75.00	83.22
Ethnic minorities	87.27	63.64	59.62	69.81	100.00	75.00	68.52	61.54	89.09
<u>Household Head-</u>									
<u>Gender</u>									
Female head	78.13	29.17	25.00	54.84	50.00	57.14	64.00	70.00	90.00
Male head	86.90	55.56	59.86	68.39	80.00	81.08	75.86	72.73	83.93
<u>Poverty status</u>									
Non-Poor	84.38	50.51	54.39	65.83	60.00	83.33	73.58	73.91	83.59
Poor	87.50	52.94	54.10	66.67	100.00	70.00	75.00	68.42	87.14
Total	85.50	51.33	54.29	66.13	71.43	77.27	74.12	72.31	84.85

Table 7. Consumption expenditure increase due to road

Groups	Living consumption per capita (thousand VND)	% households reporting expenditure increase due to the road	Percentage of expenditure increase due to the road
<u>Ethnicity</u>			
Kinh/Chinese	5458.5	93.79	17.97
Ethnic minorities	4131.6	98.18	18.49
<u>Household Head-Gender</u>			
Female head	4932.4	84.38	12.94
Male head	5124.3	97.02	19.10
<u>Poverty status</u>			
Non-Poor	6690.3	94.53	18.99
Poor	2255.1	95.83	16.54
Total	5093.6	95.00	18.11

Impact on household production

Tables from 8,9,10 and 11 examine the production of households, and investigate within the surveyed households as to whether the road contributed to increased local production. Households producing rice and vegetables/other annual crops accounted for 45% and 37% respectively. The proportion of households producing fruits and perennial crops was 23% and 18%, respectively. There were a large proportion of households with livestock, at 69%. However, few households were involved in forestry and producing aquaculture products, at 9.5% and 6.5%, respectively. 21% of households had non-farm production. Almost all households considered that the road investment can help them increase the production of both farm and non-farm products.

Table 8. The production of rice, vegetables, and annual crops

Groups	Rice			Vegetables and other annual crops		
	% households growing rice	Percentage of sold value to total production value	% households reporting increase in sale due to the road	% households growing vegetables and other annual crops	Percentage of sold value to total production value	% households reporting increase in sale due to the road
<u>Ethnicity</u>						
Kinh/Chinese	40.69	24.69	96.61	36.55	46.96	98.11
Ethnic minorities	56.36	24.45	100.00	38.18	51.81	100.00
<u>Household Head-Gender</u>						
Female head	34.38	30.91	90.91	31.25	59.50	100.00

Groups	Rice			Vegetables and other annual crops		
	% households growing rice	Percentage of sold value to total production value	% households reporting increase in sale due to the road	% households growing vegetables and other annual crops	Percentage of sold value to total production value	% households reporting increase in sale due to the road
Male head	47.02	23.73	98.73	38.10	46.59	98.44
<u>Poverty status</u>						
Non-Poor	41.41	22.26	98.11	35.16	42.13	97.78
Poor	51.39	27.97	97.30	40.28	57.97	100.00
Total	45.00	24.61	97.78	37.00	48.34	98.65

Table 9. The production of fruits and perennial crops

Groups	Fruits			Perennial crops		
	% households growing fruits	Percentage of sold value to total production value	% households reporting increase in sale due to the road	% households growing perennial crops	Percentage of sold value to total production value	% households reporting increase in sale due to the road
<u>Ethnicity</u>						
Kinh/Chinese	24.83	64.08	100.00	14.48	68.10	100.00
Ethnic minorities	16.36	76.11	100.00	27.27	55.67	100.00
<u>Household Head-Gender</u>						
Female head	15.63	72.00	100.00	18.75	91.67	100.00
Male head	23.81	65.80	100.00	17.86	57.17	100.00
<u>Poverty status</u>						
Non-Poor	23.44	64.23	100.00	15.63	63.25	100.00
Poor	20.83	71.00	100.00	22.22	62.50	100.00
Total	22.50	66.49	100.00	18.00	62.92	100.00

Table 10. The production of livestock and forestry

Groups	Livestock			Forestry		
	% households producing livestock	Percentage of sold value to total production value	% households reporting increase in sale due to the road	% households producing forestry products	Percentage of sold value to total production value	% households reporting increase in sale due to the road
<u>Ethnicity</u>						
Kinh/Chinese	66.90	81.04	98.97	8.28	58.33	100.00
Ethnic minorities	74.55	80.39	100.00	12.73	51.57	100.00
<u>Household Head-Gender</u>						
Female head	50.00	75.63	93.75	0.00		
Male head	72.62	81.53	100.00	11.31	55.84	100.00
<u>Poverty status</u>						
Non-Poor	68.75	82.60	100.00	11.72	53.40	100.00

Poor	69.44	77.76	98.00	5.56	65.00	100.00
Total	69.00	80.85	99.28	9.50	55.84	100.00

Table 11. The production of aquaculture and non-farm products

Groups	Aquaculture			Non-farm products		
	% households producing aquaculture products	Percentage of sold value to total production value	% households reporting increase in sale due to the road	% households producing non-farm products	Percentage of sold value to total production value	% households reporting increase in sale due to the road
<u>Ethnicity</u>						
Kinh/Chinese	4.14	69.17	100.00	23.45	88.24	100.00
Ethnic minorities	12.73	53.00	100.00	14.55	56.38	100.00
<u>Household Head-Gender</u>						
Female head	9.38	91.67	100.00	21.88	92.86	100.00
Male head	5.95	51.10	100.00	20.83	80.03	100.00
<u>Poverty status</u>						
Non-Poor	8.59	60.55	100.00	26.56	82.68	100.00
Poor	2.78	60.00	100.00	11.11	80.00	100.00
Total	6.50	60.46	100.00	21.00	82.17	100.00

Product sale and market

Tables from 12, 13, 14 and 15 present the analysis of household's access to market for product sale. 76% of households sell their products mainly at their house or farm gate. 24% of households sell their products in their communes or neighbouring communes. For households who sell their products at houses/farms, 99% responded that traders come to their location using the ADB road. 100% of the households travel to markets using the ADB road.

To evaluate the road impact, the surveyed households were asked about the counterfactual of potential sales in the absence of the road (Table 15). 1.7% of households indicated that they could not sell their products without the road. 33% of households considered that they would sell less products if the road did not exist. 65% of households responded that their sales would be unchanged, but traveling to markets would be more difficult. Only 1% of households felt that the road did not have any effect on their product sale.

Table 12. Place to sell products

Groups	At households' home/farm	At another place in households' commune	In other communes	Total
<u>Ethnicity</u>				
Kinh/Chinese	72.66	25.00	2.34	100
Ethnic minorities	86.00	8.00	6.00	100
<u>Household Head-</u>				
<u>Gender</u>				
Female head	72.00	24.00	4.00	100
Male head	77.12	19.61	3.27	100
<u>Poverty status</u>				
Non-Poor	77.88	19.47	2.65	100
Poor	73.85	21.54	4.62	100
Total	76.40	20.22	3.37	100

Table 13. Transport means to sale points (market)

Groups	On foot	Bicycle	Motorbike	Car/Bus	Others	Total
<u>Ethnicity</u>						
Kinh/Chinese	10.81	43.24	43.24	0.00	2.70	100
Ethnic minorities	0.00	42.86	57.14	0.00	0.00	100
<u>Household Head-</u>						
<u>Gender</u>						
Female head	0.00	25.00	62.50	0.00	12.50	100
Male head	11.11	47.22	41.67	0.00	0.00	100
<u>Poverty status</u>						
Non-Poor	3.85	38.46	53.85	0.00	3.85	100
Poor	16.67	50.00	33.33	0.00	0.00	100
Total	9.09	43.18	45.45	0.00	2.27	100

Table 14. Use the road to sale points

Groups	Distance to home (km)	Traveling time to the selling place (hour)	% households using the road	Number of selling products per month	Traveling cost (thousand VND)	% traders (buyers) using the road
<u>Ethnicity</u>						
Kinh/Chinese	6.68	0.86	100.00	13.30	7.79	99.22
Ethnic minorities	5.00	0.43	100.00	11.86	5.05	100.00
<u>Household Head-</u>						
<u>Gender</u>						
Female head	2.19	0.83	100.00	13.50	4.88	100.00
Male head	7.35	0.79	100.00	12.97	7.45	99.35
<u>Poverty status</u>						
Non-Poor	8.00	0.96	100.00	14.38	8.15	100.00
Poor	4.12	0.56	100.00	11.17	5.06	99.35
Total	6.41	0.80	100.00	13.07	7.04	99.44

Table 15. The counterfactual of sale in the absence of the road

Groups	Cannot sell products	Smaller amount of sale	The sale unchanged but more difficult travel to sale points	The sale and travel to sale point unchanged	Total
<u>Ethnicity</u>					
Kinh/Chinese	1.56	30.47	66.41	1.56	100
Ethnic minorities	2.00	38.00	60.00	0.00	100
<u>Household Head-Gender</u>					
Female head	0.00	32.00	68.00	0.00	100
Male head	1.96	32.68	64.05	1.31	100
<u>Poverty status</u>					
Non-Poor	1.77	33.63	62.83	1.77	100
Poor	1.54	30.77	67.69	0.00	100
Total	1.69	32.58	64.61	1.12	100

Production inputs

Tables 16, 17, 18 and 19 present the analysis of household's access to production inputs. 33% of households purchase production inputs mainly at their house or farm. 67% of households buy inputs from other places either in their communes or other communes. For households who buy inputs at houses/farms, 97% said that the input traders came to their location using the ADB road. Similarly, 97% of the households traveled to other locations to buy production inputs on the ADB road.

To evaluate the road impact, the survey households were asked about the counterfactual of production inputs in the absence of the road (Table 19). No households indicated they cannot buy inputs without the road. 18% of households responded that they would be able to buy less production inputs if the road was not constructed. 81% of households considered that access to production inputs would be unchanged, but traveling to purchase inputs would be more difficult. Less than 1% of households thought that the road did not have any effect on their production inputs.

Table 16. Point of Purchase for Inputs

Groups	At households' home/farm	At another place in households' commune	In other communes	Total
<u>Ethnicity</u>				
Kinh/Chinese	32.81	50.00	17.19	100
Ethnic minorities	34.00	60.00	6.00	100
<u>Household Head-Gender</u>				
Female head	36.00	52.00	12.00	100
Male head	32.68	52.94	14.38	100
<u>Poverty status</u>				
Non-Poor	31.86	53.10	15.04	100
Poor	35.38	52.31	12.31	100
Total	33.15	52.81	14.04	100

Table 17. Means of Transport to Suppliers of Production Input

Groups	On foot	Bicycle	Motorbike	Car/Bus	Others	Total
<u>Ethnicity</u>						
Kinh/Chinese	0.00	25.58	68.60	5.81	0.00	100
Ethnic minorities	0.00	27.27	72.73	0.00	0.00	100
<u>Household Head-Gender</u>						
Female head	0.00	12.50	87.50	0.00	0.00	100
Male head	0.00	28.16	66.99	4.85	0.00	100
<u>Poverty status</u>						
Non-Poor	0.00	15.58	77.92	6.49	0.00	100
Poor	0.00	45.24	54.76	0.00	0.00	100
Total	0.00	26.05	69.75	4.20	0.00	100

Table 18. Use the Road to Travel to the Suppliers of Production Inputs

Groups	Distance to home (km)	Traveling time to the input place (hour)	% households using the road	Number of buying production input per month	Traveling cost (thousand VND)	% traders (input sellers) using the road
<u>Ethnicity</u>						
Kinh/Chinese	4.61	0.47	96.51	8.12	14.89	96.03
Ethnic minorities	2.43	0.42	100.00	3.30	11.85	100.00
<u>Household Head-Gender</u>						
Female head	2.95	0.36	100.00	5.00	13.63	96.00
Male head	4.17	0.47	97.09	7.06	14.14	97.33
<u>Poverty status</u>						
Non-Poor	4.55	0.44	96.10	6.44	14.72	96.43
Poor	3.03	0.49	100.00	7.40	12.88	98.41
Total	3.99	0.46	97.48	6.78	14.06	97.14

Table 19. The Counterfactual - Expected Effect on Purchase of Inputs in the Absence of the Road

Groups	Cannot buy production input	Buy smaller amount of production input	The input amount unchanged but more difficult travel to buy input	The input amount and travel to input points unchanged	Total
<u>Ethnicity</u>					
Kinh/Chinese	0.00	14.84	84.38	0.78	100
Ethnic minorities	0.00	26.00	74.00	0.00	100
<u>Household Head-Gender</u>					
Female head	0.00	24.00	76.00	0.00	100
Male head	0.00	16.99	82.35	0.65	100
<u>Poverty status</u>					
Non-Poor	0.00	17.70	81.42	0.88	100
Poor	0.00	18.46	81.54	0.00	100
Total	0.00	17.98	81.46	0.56	100

Product processing

Table 20 presents the percentage of households who need access to processing of their products in other places. 27% of households needed the processing of their products, and 24% of these households had to transport their products to other places for processing. 100% of households transport their products for processing using an ADB road.

Table 20. Production Processing

Groups	% households need production processing	% households have production processing outside their house or farm	Distance to the processing place	% households reporting that the road helps their processing
<u>Ethnicity</u>				
Kinh/Chinese	28.97	32.20	6.07	100
Ethnic minorities	21.82	41.18	2.66	100
<u>Household Head-Gender</u>				
Female head	21.88	35.71	5.10	100
Male head	27.98	33.87	5.16	100
<u>Poverty status</u>				
Non-Poor	30.47	35.19	4.57	100
Poor	20.83	31.82	6.71	100
Total	27.00	34.21	5.15	100

Impact on labour and credit

The results in **Table 21** indicate that the ADB sponsored roads help households have better access to labour and capital. From the survey results, the construction of roads helped households have better access to labour and capital. Survey results indicated that 15% of households hired labour for production. 97% of hired labour used the ADB road to travel to households' house and farm. It should be noted that ethnic minority households did not hire outside labour.

Table 21. Household used of Hired Labour

Groups	% households hiring outside labour	% hired labour using the road
<u>Ethnicity</u>		
Kinh/Chinese	17.24	96.00
Ethnic minorities	9.09	100.00
<u>Household Head-Gender</u>		
Female head	12.50	100.00
Male head	15.48	96.15
<u>Poverty status</u>		
Non-Poor	14.84	94.74
Poor	15.28	100.00
Total	15.00	96.67

To further assess the effect of the road on labour, the expected impact of the absence of such a road on access to hired labour was examined. Table 22 shows that 7% of households considered that without the road they could not hire labour. 21% of households indicated that they could hire a smaller amount of labour. 59% of households responded that they would still hire the same amount of labour, but they would have more difficulty travelling to the house/farm. The remaining households, accounting for 14% said that the road did not have any effect on the hiring of the labour.

Table 22. The Counterfactual - Use of Hired Labour in the Absence of the Road

Groups	Cannot hire labour	Hire a smaller number of labour	Hire the same number of labors, but more difficult travel for labour	Not affected	Total
<u>Ethnicity</u>					
Kinh/Chinese	8.33	20.83	54.17	16.67	100

Groups	Cannot hire labour	Hire a smaller number of labour	Hire the same number of labors, but more difficult travel for labour	Not affected	Total
Ethnic minorities	0.00	20.00	80.00	0.00	100
<u>Household Head-Gender</u>					
Female head	50.00	25.00	25.00	0.00	100
Male head	0.00	20.00	64.00	16.00	100
<u>Poverty status</u>					
Non-Poor	11.11	11.11	55.56	22.22	100
Poor	0.00	36.36	63.64	0.00	100
Total	6.90	20.69	58.62	13.79	100

Table 23 estimates the percentage of households borrowing from different credit sources. Table 24 presents the assessment of the road impact in accessing credit. It shows that 1.9% of households think that without the road they could not obtain loans. 22% of households believed that they are more likely to borrow less if the road was not constructed or rehabilitated. 56% of households considered that they could access the same amount of credit, but they would have more difficulty travelling to lenders. The remaining households, accounting for 19%, indicated that the road did not have any effect on borrowing.

Table 23. Percentage of households borrowing from different credit sources

Groups	% households borrowing from Vietnam Bank for Social Policies	% households borrowing from other banks	% households borrowing from other credit institutions	% households borrowing from friends, relatives, private lenders
<u>Ethnicity</u>				
Kinh/Chinese	8.33	20.83	54.17	16.67
Ethnic minorities	0.00	20.00	80.00	0.00
<u>Household Head-Gender</u>				
Female head	50.00	25.00	25.00	0.00
Male head	0.00	20.00	64.00	16.00
<u>Poverty status</u>				
Non-Poor	11.11	11.11	55.56	22.22
Poor	0.00	36.36	63.64	0.00
Total	6.90	20.69	58.62	13.79

Table 24. The Counterfactual – Expected Borrowing in the Absence of the Road

Groups	Cannot borrow	Obtain smaller loan	Obtain the same loan amount, but more difficult travel	Not affected	Total
<u>Ethnicity</u>					
Kinh/Chinese	1.49	13.43	65.67	19.40	100
Ethnic minorities	2.78	38.89	38.89	19.44	100
<u>Household Head-Gender</u>					
Female head	14.29	14.29	64.29	7.14	100
Male head	0.00	23.60	55.06	21.35	100
<u>Poverty status</u>					
Non-Poor	2.94	22.06	50.00	25.00	100
Poor	0.00	22.86	68.57	8.57	100
Total	1.94	22.33	56.31	19.42	100

Access to agricultural extension and vocational training

Road construction and rehabilitation also helped households visit more frequently agricultural extension and vocational training centers. Table 25 indicated that 55% of households had members visiting agricultural extension and vocational training center during the past 12 months, and 98% of these members travel to centers using the ADB road. Moreover, 95% of households with members visiting the centers believed that the road helped them access the centers more often. 53% of households reported visits of agricultural extension staff to their houses or farms, and 47% of these households considered the road encouraged staff visit their households more frequently.

Table 25. Households attending Agricultural Extension and Vocational Training

Groups	% households attending agricultural extension and vocational training	% attending households using the road to go to agricultural extension or vocational training centers	% attending households reporting that the road helps households go to the centers more often	% households reporting visits of the staff of agricultural extension centers	% attending households reporting that the road helps the staff of the centers visit their households more often
<u>Ethnicity</u>					
Kinh/Chinese	52.34	98.51	94.03	47.66	39.84
Ethnic minorities	62.00	96.77	96.77	68.00	66.00
<u>Household Head-Gender</u>					

Groups	% households attending agricultural extension and vocational training	% attending households using the road to go to agricultural extension or vocational training centers	% attending households reporting that the road helps households go to the centers more often	% households reporting visits of the staff of agricultural extension centers	% attending households reporting that the road helps the staff of the centers visit their households more often
Female head	64.00	100.00	100.00	44.00	36.00
Male head	53.59	97.56	93.90	54.90	49.02
<u>Poverty status</u>					
Non-Poor	53.10	100.00	98.33	49.56	46.02
Poor	58.46	94.74	89.47	60.00	49.23
Total	55.06	97.96	94.90	53.37	47.19

Impact on land

A common problem in the construction of rural roads is the ensuing landlessness created by land lost to road infrastructure. The survey results indicated that 29% of households reported that the road passed through their land or house. The average area resumed for road construction was 217 m² per household (Table 26). About 70% of households who had land resumed received compensation. The value of compensation was quite small, equal to 5.2 million VND per household. 49% of these households believed that this compensation was below the market price of the land (Table 27). Nevertheless all households receiving compensation reported that they did not know the true value of the land.

Table 26. Impact of Road Construction on Household Land Use

Groups	% households reporting the road pass through their land	The average area lost by the road construction for households with lost land (m ²)	% households receiving compensation	The value of compensation (million VND)
<u>Ethnicity</u>				
Kinh/Chinese	31.03	208.87	75.56	7.03
Ethnic minorities	21.82	248.33	50.00	0.16
<u>Household Head-Gender</u>				
Female head	21.88	123.14	85.71	0.52
Male head	29.76	230.34	68.00	6.14
<u>Poverty status</u>				
Non-Poor	31.25	219.03	65.00	0.43
Poor	23.61	212.82	82.35	13.05
Total	28.50	217.18	70.18	5.19

Table 27. Assessment of the Compensation for Lost Land (in percent), Within affected Households (in percent)

Groups	Below the market price	Equal to the market price	Above the market price	Do not know	Total
<u>Ethnicity</u>					
Kinh/Chinese	54.29	25.71	0	20.00	100
Ethnic minorities	16.67	50.00	0	33.33	100
<u>Household Head-Gender</u>					
Female head	50.00	16.67	0	33.33	100
Male head	48.57	31.43	0	20.00	100
<u>Poverty status</u>					
Non-Poor	55.56	29.63	0	14.81	100
Poor	35.71	28.57	0	35.71	100
Total	48.78	29.27	0	21.95	100

Table 27 examines the assessment of the compensation by the households having lost land, and Table 28 assesses the effect of the reduction in land area. Note: these tables should not be used for reference, since there only a very small number of households out of 200 reported land lost for road construction.

Table 28 presents an assessment of resumed land due to road construction. 56% of households who had land resumed asserted that the decrease in land area did not have any effect on their production. However, 35% and 3.5% of households believed that the land area reduction reduced their production slightly and remarkably, respectively. Importantly, 5.3% of households indicated that the land area reduction caused them to stop production, but they were able to find other jobs.

Table 28. Affect of the Impact of Lost Land (in percent)

Groups	Do not have any effect	Reduce household production slightly	Reduce household production remarkably	Stop the production, and find other jobs	Stop the production, become unemployed	Total
<u>Ethnicity</u>						
Kinh/Chinese	57.78	35.56	4.44	2.22	0	100
Ethnic minorities	50.00	33.33	0.00	16.67	0	100
<u>Household Head-Gender</u>						
Female head	42.86	57.14	0.00	0.00	0	100
Male head	58.00	32.00	4.00	6.00	0	100
<u>Poverty status</u>						
Non-Poor	62.50	25.00	5.00	7.50	0	100
Poor	41.18	58.82	0.00	0.00	0	100

Groups	Do not have any effect	Reduce household production slightly	Reduce household production remarkably	Stop the production, and find other jobs	Stop the production, become unemployed	Total
Total	56.14	35.09	3.51	5.26	0	100

It was interesting that many households reported that the investment the construction or rehabilitation of the road increased the value of land and houses around the road. 86% households reported an increase in the value of their house and land, and the value increased by 38% as a result of the road (Table 29). In addition, 33% of households opened small shops after the construction or rehabilitation of the road.

Table 29. Impact of the ADB Road on the Value of House and Land

Groups	% households reporting that the road helps increase the value of house and land	% increase of the value of house and land due to the road	% households reporting that the road helps them open small shops for business
<u>Ethnicity</u>			
Kinh/Chinese	85.52	38.72	37.93
Ethnic minorities	89.09	35.90	20.00
<u>Household Head-Gender</u>			
Female head	71.88	33.39	43.75
Male head	89.29	38.61	30.95
<u>Poverty status</u>			
Non-Poor	85.16	39.84	37.50
Poor	88.89	34.64	25.00
Total	86.50	37.92	33.00

General Economic Benefit of the Road

Table 30 examines the general economic benefit and its impact on household employment and production. 81% of the surveyed households estimated that the road could help their members find more non-farm employment. 57% of households considered that the road increased their non-farm production. The percentage of households who indicated that the road improved the market in crops and livestock/aquaculture was 78% and 76%, respectively.

Table 30. Assessment of the road (in percent)

Groups	The road helps household members find more non-farm employment	The road helps households produce and sell more non-farm products	The road helps households produce and sell more high-value crops	The road helps households produce and sell more high-value livestock and aquaculture products
<u>Ethnicity</u>				
Kinh/Chinese	79.31	60.69	73.10	73.10
Ethnic minorities	83.64	45.45	90.91	83.64
<u>Household Head-Gender</u>				
Female head	81.25	56.25	59.38	56.25
Male head	80.36	56.55	81.55	79.76
<u>Poverty status</u>				
Non-Poor	76.56	57.03	74.22	75.78
Poor	87.50	55.56	84.72	76.39
Total	80.50	56.50	78.00	76.00

Tables from 31, 32, 33 and 34 further examine the effect of the ADB sponsored road on several aspects of household production. Most of surveyed households indicated that the road helped them access to high technology and improved production skills. They believed that the road also helps increase employment and more efficient use of work time. The construction or rehabilitation of roads also contributed to increased production sale and decreased unit cost of the production.

Table 31. Distribution of Households by Assessment of the Road Impact on Technology

Groups	Access			Total
	Do not help increase households' access to high technology, production skills	Help increase households' access to high technology, production skills slightly	Help increase households' access to high technology, production skills remarkably	
<u>Ethnicity</u>				
Kinh/Chinese	13.10	36.55	50.34	100
Ethnic minorities	3.64	54.55	41.82	100
<u>Household Head-Gender</u>				
Female head	15.63	43.75	40.63	100
Male head	9.52	41.07	49.40	100
<u>Poverty status</u>				
Non-Poor	12.50	38.28	49.22	100
Poor	6.94	47.22	45.83	100
Total	10.50	41.50	48.00	100

Table 32. Household Assessment of the Road's Impact on Employment/working time of Household members

Groups	Do not help increase employment/working time of household members	Help increase employment/working time of household members slightly	Help increase employment/working time of household members remarkably	Total
<u>Ethnicity</u>				
Kinh/Chinese	10.34	42.07	47.59	100
Ethnic minorities	0.00	58.18	41.82	100
<u>Household Head-Gender</u>				
Female head	12.50	53.13	34.38	100
Male head	6.55	45.24	48.21	100
<u>Poverty status</u>				
Non-Poor	12.50	53.13	34.38	100
Poor	6.55	45.24	48.21	100
Total	7.50	46.50	46.00	100

Table 33. Household Assessment of the Road's Impact on the Production Sale

Groups	Do not help increase the production sale	Help increase the production sale slightly	Help increase the production sale remarkably	Total
<u>Ethnicity</u>				
Kinh/Chinese	13.10	53.10	33.79	100
Ethnic minorities	0.00	67.27	32.73	100
<u>Household Head-Gender</u>				
Female head	18.75	53.13	28.13	100
Male head	7.74	57.74	34.52	100
<u>Poverty status</u>				
Non-Poor	18.75	53.13	28.13	100
Poor	7.74	57.74	34.52	100
Total	9.50	57.00	33.50	100

Table 34. Household Assessment of the Road's Impact on the Reduction of Unit Costs of Products

Groups	Do not help reduce unit cost of products	Help reduce unit cost of products slightly	Help reduce unit cost of products remarkably	Total
<u>Ethnicity</u>				
Kinh/Chinese	15.86	44.83	39.31	100
Ethnic minorities	7.27	56.36	36.36	100
<u>Household Head-Gender</u>				
Female head	21.88	46.88	31.25	100
Male head	11.90	48.21	39.88	100
<u>Poverty status</u>				
Non-Poor	21.88	46.88	31.25	100

Groups	Do not help reduce unit cost of products	Help reduce unit cost of products slightly	Help reduce unit cost of products remarkably	Total
Poor	11.90	48.21	39.88	100
Total	13.50	48.00	38.50	100

3.2. Qualitative Evaluation from Value Chain Analysis and PRA Activities

The evaluation team reviewed and analyzed the quantitative data from the Household Survey. In addition a wide variety of supplementary quantitative data was gained from the Value Chain Analysis, case study fieldwork and PRA. Much of this work was ‘ethno-narrative’⁴ in that it used ethnographic fieldwork techniques to collect and analyse people’s stories and anecdotes about the ADB road. This analysis identified economic benefits arising from the ADB sponsored road, for a wide group of stakeholders. Fieldwork evidence supports the finding that all stakeholder groups confirmed their economic benefits from the new road and that economic benefits were created from many sources. The most visible evidence of economic benefit identified by all respondents was the reduction of transportation cost of goods and products, and the reduction in the time and cost for traveling. This was significantly important in areas of intensive agriculture production and remote areas, which was the location of most of subprojects.

Utilization of new/ rehabilitated road related factors to business promotion

Results from value chain analysis and PRA on inclusion in all subprojects visited indicated and at the head, middle and tail of new and rehabilitated roads businesses were established and production increased. However, all newly established businesses or increased production enterprises were small scale, and household based. Very few businesses or production enterprises employed additional labour. New businesses included sale agents for agriculture inputs, intermediary traders of agriculture outputs, small restaurants, small household and farm wares vendors, motorbike repair shops and, transportation service. New production enterprises included construction materials (brick, tiles), initial processing of agriculture

⁴ (Mellor, 2008)

produce such as sugar cane and dairy. In all subprojects visited, the number of new household based businesses was more than the number of new production enterprises.

Box : Better output linkage with traders

In Dong Thinh commune, raising dairy cows was a main livelihood activity for about 20 households. Before the road was rehabilitated, the households cared for 85 head. After the road was upgraded, and the price of milk was stable, the total number of cows of communes nearly doubled to 160 heads. Each household earned a stable income of 10 to 12 million VND per year. As a result of the increase in production, three intermediary milk collectors joined the market and invested in refrigeration to keep the milk fresh. The milk company visits the commune to collect milk every day. Producers received a better price for their milk because it was fresher (8.000 dong/l). Producers indicated that the good road directly increased their profit by 10%. The estimated value added to their total profits would vary from 1 million to 1.5 million dong for each family per year depending to their size

In some mountainous communes, processing enterprises had been established as a result of the subproject. Most of these enterprises were related to non-timber forest products such as bamboo shoots (see below value chain analysis on bamboo shoot), traditional herbs and soybean drink.

	Businesses established		Production enterprises established	
	Before the road	After the road	Before the road	After the road
Vinh Phuc				
Dong Thinh	20	35	4	8
Lien Son	12	20	4	10
Duc Bac	25	35	12	16
Bac Giang				
Binh Son	14	21	3	7
Da Mai	12	19	3	6
Thanh son	8	11	2	3
Song Mai	10	14	1	3
Tuyen Quang				
Tan Long	16	24	2	6
Kim Binh	6	11	2	4
Xuan Quang	8	14	4	5

	Businesses established		Production enterprises established	
	Before the road	After the road	Before the road	After the road
Yen Bai				
Mau A	5	12	2	3
Yen Hop	5	16	2	4
Ngoi A	9	12	1	3
Hoang Thang	10	15	2	5

Source: Commune People's Committees Socio – Economic Development reports in recent years and discussion with leaders and civil servants in the commune People's Committee.

15 among 20 interviewed traders and business owners confirmed increase and expansion of business and production as a result of the new or rehabilitated road. The most successful financial expansion and development was the provision of transportation services (4 interviewed business owners), construction material production (4 interviewees), food processing (traditional food such as rice cake, green been cake). Key conditions and motivation for entering the markets included the following:

- Expansion of the local market for particular product or products. All interviewees reported that as the result of new or rehabilitated road they could access the local market and people from nearby districts and towns came to buy products
- As a result of the new road conditions, bigger trucks could access local markets and producers. These transportation services were part of a new value chain where producers provided products to larger enterprises and customers who preferred to purchase a larger volume of products. For example, construction projects prefer to buy bricks in large volume, so they could economize on transportation costs.
- All transportation businesses and construction material production enterprises indicated that the number of regular customers had increased by at least 30%
- The new road conditions encouraged the introduction of new technology
- Access to credit and the level of credit available to villagers was higher because of increased in the price of land. Land was used for collateral for borrowing.
- Improvements in living standards included access to more restaurants and shops that a wide range of items and foodstuffs including medicine and nutrition supplements for children.

- Strengthened linkages with business and producers in the district towns and provincial city

In all subprojects, there was an increase in land price in areas near the new or rehabilitated road. Communes had revised the commune land use plan, and land along the new/rehabilitated road was rezoned for business use. Commune authorities sub-divided this land into smaller plots, which was sold at much higher price compared to other residential land in the commune. Only better off households could afford to buy this land and establish businesses.

Economic Benefit for Each Stakeholder Group

The new and rehabilitated roads contributed to economic benefits to different groups in the community in different ways. For better off households, those who had engaged in businesses production, households with members in the public sector, or received regular pension benefits.

Nearly all better off households had invested in trading and production enterprises.

Farming households had also in some extent benefited from the new road. 100% of interviewed farming households reported that the new road has helped them either in the reduction of production costs or increased product price or improved time efficiency and the amount of time in the field. Farming households considered the following as key benefits from the ADB road:

- 100% of respondents confirmed that the product sell price was better than before the new or rehabilitated road. More local produce collectors and traders from outside the commune visited the commune and village more frequently to buy produce during the harvest.
- In Tuyen Quang and Yen Bai, there were more opportunities for cash income from plantations of paper mill tree (tram, keo). These opportunities were not available before the road because big trucks could not access the plantations. In many communes in these two provinces, the area of these plantations had increased 200% to 300% and income was a minimum of 1.2 million VN per hectare per year.

- 80% of poor households reported extra income from diversification of livelihood activities such as growing vegetable, raising chickens in the back yard and pigs for cash income. In mountain areas of Tuyen Quang and Yen Bai province, due to the limited wet land availability, farming households did not have large paddy field area, and so most rice production was for household consumption. Income from their other livelihood activities was the main source of cash for their children's education. The new and rehabilitated road was extremely important for the well-being of these households.
- A number of households purchased land along the road to establish and operate businesses or service provision. Often these households do not cultivate their agriculture production land anymore, which was an opportunity for local farmer households to negotiate with these households and contract the land and increase income and food production.
- The production of cash crops such as peanuts, cassava and maize was developed in all visited subprojects. In all subprojects visited, farming households introduced new varieties for increased productivity and improved quality. Market price for produce had continuously increased. All farmers in the focus group discussions confirmed that market opportunities had increased, input and output markets were developed and easy to access as a result of the new or rehabilitated road.

Commercialization of key products

Province	Commercialized products	Value added	Driving factors	Inclusion of the poor
Vinh Phuc	Rice	Unit price difference (gate price / in town delivered price) reduced by 10% (before than after the road) About 20% of total outputs are sold.	Reduction of transportation cost by 10%	All households also included in benefiting better price.
		Adoption of new high quality variables with high productivities	More visits of extension workers to villages	All households including the poor
	Peanuts	- Unit price increased - Expansion of land for peanut plantation	Twice increase of collectors from other provinces as the road could lead to Thai Nguyen and other province	Nearly half of the poor is inclusive
	Dairy	- Product price rise of	The company collector	Only better off

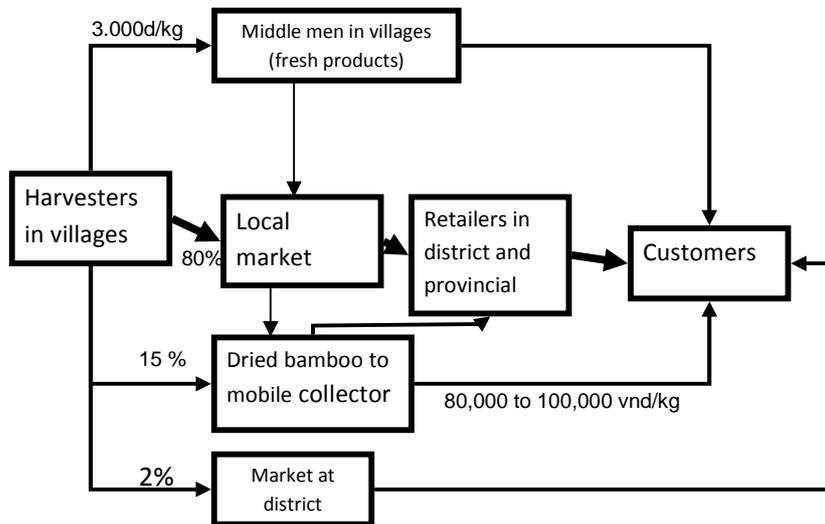
Province	Commercialized products	Value added	Driving factors	Inclusion of the poor
		1,000 dong per liter - More households engaged in raising dairy cow	could send refreezing truck every day to village to collect (before the road, they come every two day)	households are inclusive
Bac Giang	Rice	Little rice is sold as there is not many land for paddy production		All households also included in benefiting better price. However the poor often do not have surplus rice to sell.
	Peanut	Important cash crop for at least a third of households in visited areas	More traders come and good prices offered	Both poor and non poor inclusive
	Litchi	Good price at beginning of season	Farmers could transport fresh fruit to Hanoi for sold quickly (fresh litchi get stale quickly)	All households are inclusive
Tuyen Quang	Rice	More rice for food security	Cheaper agriculture inputs: pesticides, fertilizers, irrigation fees	All inclusive, both poor and non poor
	Trees for paper mill	Good and stable cash income source	Since the road is constructed, before that, land was unused	Non poor only, the poor often have no labour and capital to invest on plantation
	Livestock	Income is small but the easiest way to have cash in case of emergency	take less time to bring chicken or pig to markets or traders are more willing to go to farm to buy products	All poor inclusive
Yen Bai	Rice	Improved qualification and yield but not enough to be commodity		
	Sugar cane	Several hundred tons of sugar is sold to company for sugar processing	Vehicle could access, Transportation is the decisive factor that company invest on material	Only 20% of poor households inclusive as they do not have fund for investment
	Bamboo culms and bamboo shoot	Total products increased by twice in 3 among 5 visited communes Bamboo culms could be sold at price by one and a half increase	Good road has reduced transportation cost	Good source of income for the poor

Bamboo shoot in Yen Bai

Bamboo shoot was collected as a wild non-timber forest product or from planted bamboo trees. This was an important source of income for poor households, especially during food shortage periods. Bamboo shoot was boiled by the households before sale. In Yen Bai, bamboo shoots were consumed locally and a large amount of product was processed as dried bamboo and transported for sale in the low land region. Almost households in the visited communes collected bamboo shoot for sale. The estimated income from bamboo shoot harvesting during the season (August to October) was about 1.2 millions dong.

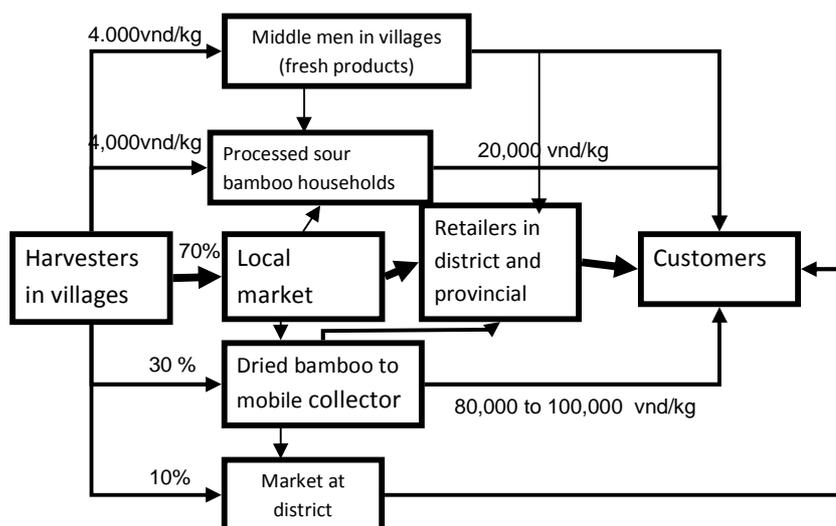
Men, women and children went to forest for bamboo shoot harvesting. Women and children collect bamboo shoot near the edge of the forest, while men and young people go further into the forest. Poor households often sell fresh bamboo shoot to middlemen in the village or commune for cash to buy food. Fresh bamboo shoot is sold at 4,000 dong to 5,000 VND/kg. Better off households or those who live in remote villages often produce dried bamboo. Dried bamboo shoot could be sold at 40,000 VND/kg to 50,000 VND/kg during the Tet season. Since the road was upgraded, a number of households who lived near the road produced processed sour bamboo. The sour bamboo shoot could be sold at 20,000 VND per box. Fresh bamboo shoot was sold in the local market. The middlemen in the village said that they could collect as much as six tons of fresh bamboo shoot in a season. A third of this volume was sold to traders from the district and other towns, and the remainder was processed as dried bamboo. The sale price of both fresh and dried bamboo shoots in the village was only about 25% (for fresh) and 50% (for dried) of the retail price in the district town and provincial city.

Figure 1: Bamboo shoots market chain in Van Yen district, Yen Bai province before the construction of the road



Source: Interviews and discussion with local people, businesses and commune People’s Committee

Figure 2: Bamboo shoots value chain analysis in Van Yen district, Yen Bai province after the construction of the road



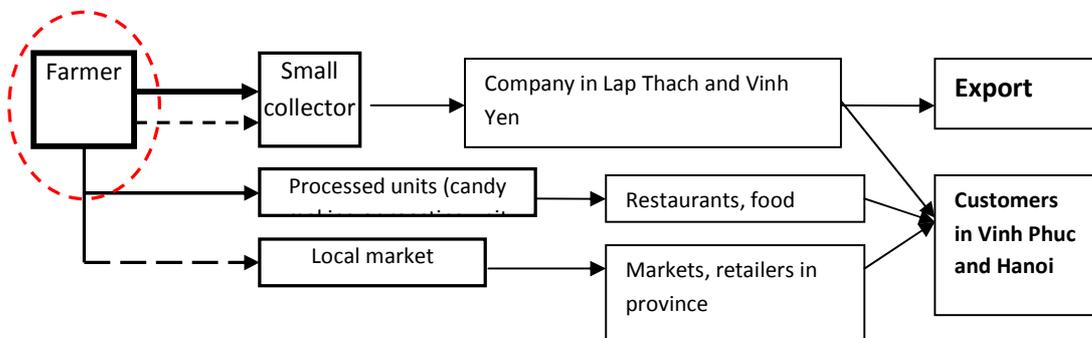
Source: Interviews and discussion with local people, businesses and commune People’s Committee

Value chain analysis for peanut products in Lap Thach, Vinh Phuc

Peanut was planted in all visited communes of Lap Thach district, Vinh Phuc province. In 2008, average yield of peanut across the commune was about 70 kg per sao (360m²) but some households had yields up to 90 kg per sao. A main factor was the increased availability and price of agricultural inputs. Traders used the road to conduct business with farming households

Farming households often sold from 90% to 100% of shelled peanut to traders in their village and saved seed for the next crop. Then, traders from other provinces come to small trades house to negotiate the purchase of the shelled peanut. In some cases, the farming household conducted small trading and hired a truck to transport peanut directly to the district market. These households receive a higher price for their product. One or two times each season peanut candy makers and roasted peanut processers came to the commune to purchase the highest quality peanut and paid a high price. This increased the competition between growers to improve quality and try new varieties for this niche market.

Figure 3: The market value chain for peanut



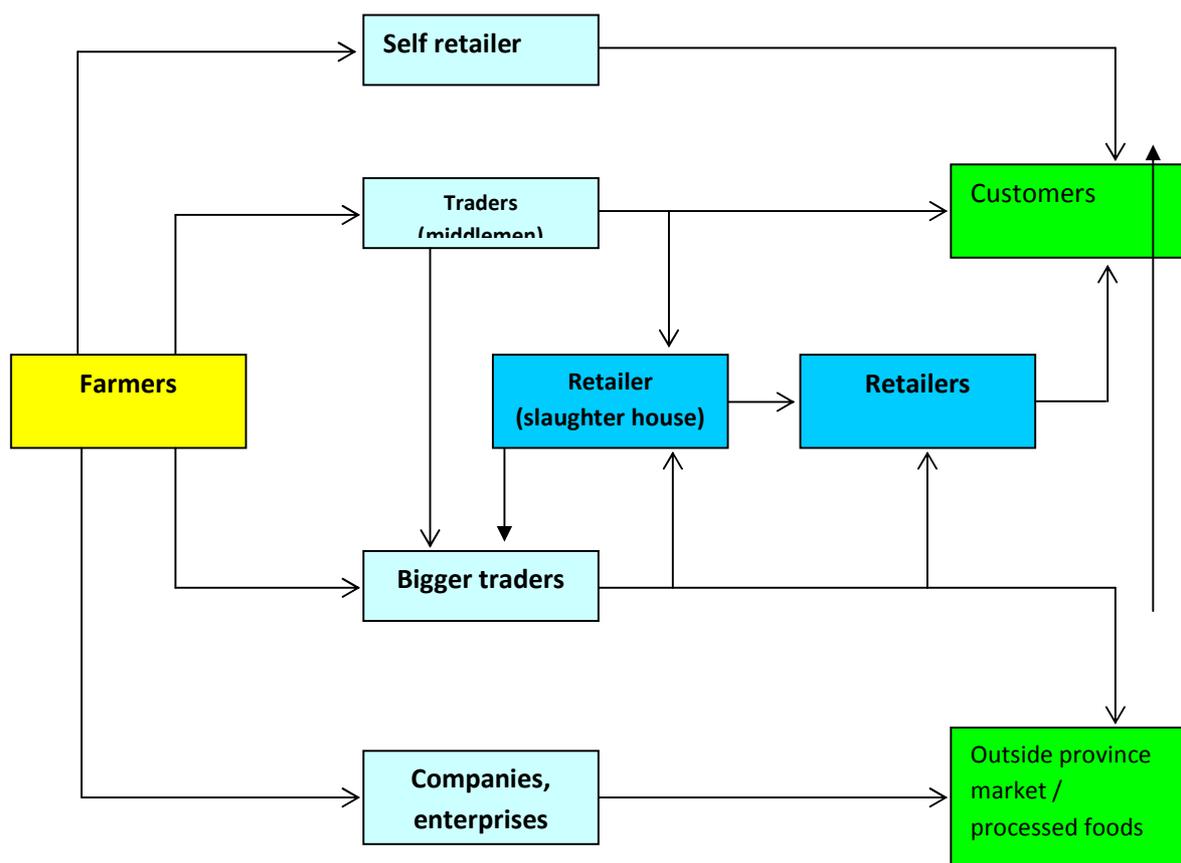
Farming households often have long-term contractual relationships with the traders in their village, and almost all peanut product was sold through this channel. A small number of households interviewed indicated that they sold their product to the trader with the highest price.

Value chain analysis of pig in Tuyen Quang

Almost all households in the five communes visited who raised pig had two to seven pigs. Only a few households had up to 20 pigs. For these households this was the main source of cash income. Interviewed People’s Committee and village leaders in visited communes confirmed that the number of pigs raised by households has increased by at least 15% annually and the price steadily increased with inflation. The price was stimulated by increased demand from other communes. Traders come to villages more frequently to buy pigs. On average, about 5000 pigs were sold per year in one commune.

Value market chain of pig production in Van Yen district, Yen Bai province involved four key actors: farmers, traders (middle-men), retailers (the local slaughter-house and sellers at the market), and food processing companies.

Figure 4: Value market chain of pig production in Van Yen district



Farming households in this value chain analysis often had long time contractual relationships with traders (middlemen) in their locality or local slaughterhouse. However, if the price fluctuates widely, households sought traders who offer better price. About 85 % of pigs were sold to small traders. Only households with large scale production (more than 50 pigs) sold directly to the company.

In Tuyen Quang, households that raise pigs mainly sell to local traders. Some traders have slaughter house facilities and provided pork to retailers in the local market. There was a wide network of traders who covered several districts in Tuyen Quang. The network also kept regular contact with traders in other districts and other provinces, such as Yen Bai and Ha Giang.

3.3. Inclusion in Social Opportunities

This section presents findings on the impact evaluation of the road on access to school and health care. Survey results indicated that 68% of households had members attending school during the past 12 months, and 93% of households had members visiting health care center and hospitals during the past 12 months (Table 35). Interestingly, the ratio of households using health care services in the centers was higher for ethnic minority and poor households.

Table 35. Percentage of households having members attending schools and members visiting health care centers during the past 12 months

Groups	% households having members attending schools	% households having members visiting health care centers, hospitals
<u>Ethnicity</u>		
Kinh/Chinese	68.28	91.72
Ethnic minorities	67.27	96.36
<u>Household Head-Gender</u>		
Female head	59.38	90.63
Male head	69.64	93.45
<u>Poverty status</u>		
Non-Poor	64.84	92.19
Poor	73.61	94.44
Total	68.00	93.00

According to Table 36, most households recognized that the road helped their members go to school more easily. Table 37 shows that the percentage of households who evaluated the “important” and “very important” role of the road in increasing access to education was 42% and 54%, respectively.

Table 36. Distribution of households by their assessment of the road impact on the current schooling of their members

Groups	Without the road, the members cannot attend the school	Without the road, the members still attend the school, but their traveling is more difficult	Without the road, the members still attend the school, and not difficult traveling	Total
<u>Ethnicity</u>				
Kinh/Chinese	1.01	95.96	3.03	100
Ethnic minorities	0.00	97.30	2.70	100
<u>Household Head-Gender</u>				
Female head	0.00	94.74	5.26	100
Male head	0.85	96.58	2.56	100
<u>Poverty status</u>				
Non-Poor	0.00	96.39	3.61	100
Poor	1.89	96.23	1.89	100
Total	0.74	96.32	2.94	100

Table 37. Distribution of households by their assessment of the role of the road on accessing education as a whole

Groups	Not important	Important	Very important	Total
<u>Ethnicity</u>				
Kinh/Chinese	4.83	44.14	51.03	100
Ethnic minorities	5.45	34.55	60.00	100
<u>Household Head-Gender</u>				
Female head	6.25	53.13	40.63	100
Male head	4.76	39.29	55.95	100
<u>Poverty status</u>				
Non-Poor	5.47	46.09	48.44	100
Poor	4.17	33.33	62.50	100
Total	5.00	41.50	53.50	100

Similarly, most households considered that the road helped their members travel to health care centers and hospital more easily (Table 38). The percentage of households who evaluated the “important” and “very important” role of the road in access to health care services was 41% and 59%, respectively (Table 39).

Table 38. Distribution of households by their assessment of the road impact on the current access to health care services of their members

Groups	Without the road, the members cannot have health services	Without the road, the members still have health services, but their traveling is more difficult	Without the road, the members still have health services, and not difficult traveling	Total
<u>Ethnicity</u>				
Kinh/Chinese	1.50	96.99	1.50	100
Ethnic minorities	0.00	100.00	0.00	100
<u>Household Head-Gender</u>				
Female head	3.45	93.10	3.45	100
Male head	0.64	98.73	0.64	100
<u>Poverty status</u>				
Non-Poor	0.00	99.15	0.85	100
Poor	2.94	95.59	1.47	100
Total	1.08	97.85	1.08	100

Table 39. Distribution of households by their assessment of the role of the road on accessing health care services as a whole

Groups	Not important	Important	Very important	Total
<u>Ethnicity</u>				
Kinh/Chinese	0.69	42.76	56.55	100
Ethnic minorities	0.00	34.55	65.45	100
<u>Household Head-Gender</u>				
Female head	0.00	46.88	53.13	100
Male head	0.60	39.29	60.12	100
<u>Poverty status</u>				
Non-Poor	0.78	46.09	53.13	100
Poor	0.00	30.56	69.44	100
Total	0.50	40.50	59.00	100

The impact of road on social issues was examined in Table 40. Only a few households mentioned the effect of the road on increasing traffic jams and accidents. However, the percentage of households who think that the road contributed to increased robbery, theft and disease including HIV/AIDS was very high, at 19% and 56%, respectively.

Table 40. Percentage of households reporting impacts of the road on the following social issues

Groups	Traffic jam, accidents	Increased robbery/theft	Increased diseases including HIV/AIDS	Increased women and children trafficking	Other bad social issues such as drug, prostitution	No negative impacts
<u>Ethnicity</u>						
Kinh/Chinese	26.90	16.55	8.97	34.38	15.63	6.25

Groups	Traffic jam, accidents	Increased robbery/theft	Increased diseases including HIV/AIDS	Increased women and children trafficking	Other bad social issues such as drug, prostitution	No negative impacts
Ethnic minorities	25.45	18.18	1.82	25.00	17.26	7.14
<u>Household Head-Gender</u>						
Female head	3.45	17.93	53.10	0.00	21.88	37.50
Male head	1.82	21.82	63.64	3.57	18.45	59.52
<u>Poverty status</u>						
Non-Poor	2.34	17.19	51.56	2.34	17.19	51.56
Poor	4.17	22.22	63.89	4.17	22.22	63.89
Total	3.00	19.00	56.00	3.00	19.00	56.00

The value chain analysis and PRA helped identify improvements in social events and participation of the poor/ women/ children as a result of new or rehabilitated roads. All respondents confirmed that because of improved road conditions, there were more community activities on special occasions during the year such as Tet, women's day and children's day. For example, in four communes, villagers said that the organization of activities and festivals for children on the mid-lunar year festival (15/8 of lunar calendar) only occurred after the improvements to the road.

Women reported that there were more women specific activities such as vocational training courses on handicraft production for women in villages and awareness raising events on women's health issues. There were many practical activities for women and children such as the campaign on prevention of HIV/AIDs, knowledge on the nursing of small children, education on sanitation and environment and family planning.

In all visited subprojects, the mass associations were the most active in information dissemination to women. Interviews with the chairwomen of the commune Women Union indicated that there was a small direct contribution of the road to improving the involvement and inclusion of women in community activities, but there was an extensive indirect contribution through the improvement of household living conditions and quality of well-being. An immediate result of better living conditions and increased household income was women were released from many of the heavy burdens of livelihood production and housework. They had more time to participate in community activities.

In comparison to before the subproject, there were more opportunities available for poor women and women headed households. In all visited communes and villages, nearly 95% of poor women had access to at least one credit source for livelihood improvement and at least one form of support from GoV or donor projects or programmes. Examples of this support included the following:

- The saving and credit club in Yen Bai
- Support for improving of food security for households with many young children in Tuyen Quang
- Illiteracy classes for women in Yen Bai,
- Subsidies for pig for livestock in Bac Giang

All groups of villagers reported that much better access to health care and medical treatment services, especially in cases of emergency after the subproject. In all visited communes, there was a consequent increase in the number of motorbikes and reduction in the time to take patients to health stations or hospitals. In cases where a vehicle was hired to take patients to hospital, car hire was much cheaper. There were more vehicles after the project and competition had reduced the price for car hire.

Cheaper transportation also improved the access to hospitals for the poor. All members of poor households were provided with health insurance card to access free of charge medical treatment. Before the subproject, the poor were limited to the services provided by commune health station because the cost of travel to district or city hospitals for treatment was expensive (about 40,000 VND per trip in average). Since the road investment, the poor could access district and provincial health services with the lower cost of 20,000 VND on average.

New and rehabilitated roads were evaluated by villagers as the greatest contribution to their access to better quality of health services. Leaders of communes said that the visits of doctors from district hospitals to village stations had doubled. Before the subproject, district doctors only came to the commune health station and usually for the health care of children.

Villagers also confirmed that the new and rehabilitated roads provided significant advantages for the schooling of children, for example the reduced time of traveling to school. However, a number of parents said that they take their children to school and do not allow them to walk or go by bicycle because of increased danger of traffic accident. All respondents said that there was more opportunity for children to attend high secondary school. Children could travel by bicycle to the high secondary school (7-10km). Before the subproject, they needed to stay in boarding schools for high secondary education. However, the percentage of high school enrollment did not increase considerably in all visited sites (varying between 20 to 25% in all communes).

In all visited subprojects, there was improved social capital and kinship network of support in the community. Villagers explained that more opportunity for traveling and visits was a key factor to improve the social network.

All respondents confirmed that traveling in the commune and to other communes was more intensive after the construction of the road. The number of motorbikes increased by 70% in communes in Tuyen Quang, Vinh Phuc about 80% and 50% in Bac Giang and Yen Bai. However, much of the traveling was carried out by young people. Young people reported that they learnt about new technology, and business know-how, and new varieties of seed and livestock from friends or relatives when they traveled to other districts or the provincial city. Many young people and households who traveled to the district towns and provincial city helped them access to better paid and stable employment. However, the poor and aged people still relied mainly on their close family ties in the village and commune for assistance and did not often travel outside the commune.

After the new or rehabilitated road, there were more drug users in Yen Bai and Tuyen Quang. In these two provinces, in four of the eight visited communes have six to eight registered drug users. The majority were young people who dropped out of school and often travelled to large urban areas.

In Bac Giang, young women from communes migrated to Bac Giang city, Lang Son and Hanoi searching for work. In two communes, about 60 young women had left home to work in these cities for several years. There were four reported cases of women trafficking to China. It was assessed how the new or rehabilitated of the road contributed to these

problems. However, there was high danger of trafficking and moral exposure risk for these women, as they were all very young and low education level (most of them have only primary or lower secondary education).

Small beer stalls and internet shops quickly emerged along the new and rehabilitated roads. Nearly 60% of women interviewed stated that they were worried about the problems as a consequence of their children more frequency visiting the internet shop and their husbands more frequent visits to drink beer. Many women said that they take children to school and pick them up from school to protect them from such problems. This involves more work and time for women.

Traffic accidents and disorders such as men fighting each other happened more often along the road. Some of fighting was not related to local people. Traffic accidents with children and young people increased. Serious injuries to children from illegal use of motorbikes was a major problem in Tuyen Quang. In at least 2 communes, four children in the last 2 years had been seriously injured.

3.4. Inclusion in Institutional Development

Table 40 presents households' visits to People Committee and State organizations. 99.5% and 93% of households reported visiting the commune People Committee and State organizations during the past 12 month, respectively. The number of annual visits to People Committee and State organizations was around 33 and 36 per household, respectively. More than 90% of these households used the ADB road to go to People Committee and State organizations.

Table 41. Household visits to People Committee and State Organizations

Groups	% households reporting the visits to People Committee	Average annual number of visits to People Committee	% households use the road to go to People Committee	% households reporting the visits to State organs	Average annual number of visits to State organs	% households use the road to go to State organs
<u>Ethnicity</u>						
Kinh/Chinese	99.31	39.27	95.90	94.48	45.76	88.32
Ethnic minorities	100.00	16.84	96.36	89.09	9.06	97.96
<u>Household Head-Gender</u>						
Female head	100.00	27.38	100.00	90.63	37.00	93.10
Male head	99.40	34.16	95.33	93.45	35.92	90.45
<u>Poverty status</u>						
Non-Poor	99.22	31.91	96.52	93.75	34.51	95.00
Poor	100.00	35.13	95.16	91.67	38.97	83.33
Total	99.50	33.07	96.05	93.00	36.09	90.86

Table 41 presents households' visits to commune cultural houses and commune post offices. 99% and 77% of households reported that their members had visited commune cultural houses and commune post offices during the past 12 month, respectively. More than 90% of these households used the road to go to commune cultural houses and commune post offices.

Table 42. Household visits to commune cultural house and post office

Groups	% households reporting the visits to commune cultural house	Average annual number of visits to commune cultural house	% households use the road to go to commune cultural house	% households reporting the visits to commune post office	Average annual number of visits to commune post office	% households use the road to go to commune post office
<u>Ethnicity</u>						
Kinh/Chinese	98.62	45.61	96.40	79.31	48.53	92.31
Ethnic minorities	100.00	12.95	98.18	69.09	11.89	97.37
<u>Household Head-Gender</u>						
Female head	100.00	32.91	96.88	65.63	32.14	100.00
Male head	98.81	37.23	96.91	78.57	40.59	93.18
<u>Poverty status</u>						
Non-Poor	98.44	35.02	96.72	75.78	35.06	92.65
Poor	100.00	39.19	97.22	77.78	47.00	97.14
Total	99.00	36.54	96.91	76.50	39.43	94.17

Capacity and awareness of local people

In most subprojects visited, villagers confirmed improved access to more services from state agencies in villages, especially extension workers' visits. A result of these visits was agriculture, forestry and livestock production had significantly increased in the years after the road improvement. Villagers used the information provided by the extension workers such as new and effective methods for cropping and livestock.

In all villages visited, the community house or village house was used for public and community meetings. According to commune leaders, the new or rehabilitated road was a key factor that motivated villagers' contributions to build the community house. An increased number of activities for women, farmers, veterans, elderly and the poor were held in communities since the village house was built. This was a good opportunity for local people to obtain the capacity and awareness to increase production and businesses, non-farm income generation and health and education.

In Van Yen commune in Yen Bai, the majority were Kinh. Before the road investment, ethnic minority groups were often not included in economic or social activities. After the road, ethnic minority people started to travel to the market and attend community classes and meeting. After a couple of years, their capacity was increased and they are much more confident to speak in Kinh language.

Capacity of local authority

The construction of the road improved the capacity of commune and local authorities. In some provinces, there was policy of "replacement of land into infrastructure". Local authorities used the revenue from selling land along the road to plan and invest in infrastructure to service the community. Carrying out the process increased capacity of leaders and civil servants in areas such as land use planning, land financing, bidding procedures for land, ownership and management of infrastructure projects, settling complaints and feedback from local people.

Commune People Committees also reported increased revenue from the new businesses and production enterprises. There was more workload for civil servants such as registration, certification, control and supervision, settling of complaints from local people

relating to the land use, and the operation of business in villages. This learning by doing experience helped develop the capacity of officials in a practical and sustainable way.

3.4. Impact on Environmental Issues

Table 43 presents analysis of the impact of the road on the environment. Table 43 shows that 43% and 16% of households indicated that the road led to more dirt and more garbage in their communes, respectively. Few households, less than 5%, mentioned that the road resulted in very harmful impacts such as increased collection of forestry products, increased flooding, and soil erosion. 47% of households identified that the road did not have any adverse impact on environment.

Table 43. Percentage of households reporting impacts of the road on the following environmental issues

Groups	More dirt in commune	More garbage in commune	Reduction in coverage of woods, forestry	Increased flood	Increased soil erosion	Other harmful impacts on environment	No harmful impacts on environment
<u>Ethnicity</u>							
Kinh/Chinese	43.45	19.31	4.14	2.07	1.38	13.10	44.14
Ethnic minorities	40.00	7.27	7.27	0.00	10.91	10.91	54.55
<u>Household Head-</u>							
<u>Gender</u>							
Female head	46.88	15.63	3.13	0.00	6.25	12.50	43.75
Male head	41.67	16.07	5.36	1.79	3.57	12.50	47.62
<u>Poverty status</u>							
Non-Poor	41.41	9.38	6.25	1.56	3.91	15.63	48.44
Poor	44.44	27.78	2.78	1.39	4.17	6.94	44.44
Total	42.50	16.00	5.00	1.50	4.00	12.50	47.00

From PRA activities, all villagers confirmed that there was more noise and dust after the road improvement. Traveling of big trucks caused extensive noise during the night, which was a serious problem for old people. In subprojects where big trucks use the road, such as trucks from the mine in Yen Bai, the road quickly degraded.

4. Conclusions

These conclusions were developed from the findings presented above. The conclusions are presented in four key areas: economic, social, institutional and environmental. This analysis identified economic benefits arising from the ADB sponsored road, for a wide group of stakeholders. Fieldwork evidence supports the finding that all stakeholder groups confirmed their economic benefits from the new road and that economic benefits were created from many sources. The most visible evidence of economic benefit identified by all respondents was the reduction of transportation cost of goods and products, and the reduction in the time and cost for traveling. This was significantly important in areas of intensive agriculture production and remote areas, which was the location of most of ADB investment in roads.

Economic

- There is good evidence that the investment in rehabilitated and new roads had an impact on livelihoods and well-being for most of the people in the subproject area. However, the more wealthy households were included in economic benefits more than any other group. The before and after impact of subproject is presented in the table below. There were some poor and ethnic minority people who were not included in development because of their remoteness.
- Investments in rehabilitated and new rural roads provided local people in the subproject area the ability to add value to products and increased the access to markets outside the subproject area.
- The road also resulted in an increase in the number of input traders. Increased competition for these traders reduced the price of agricultural and other inputs.
- People were motivated by reduced costs to invest in products that required processing in other locations.
- Backward linkages were developed in different market chains which helped stabilize the market network for the long term. Linkages included information, money and materials
- Forward linkages were developed with some products exported to countries such as China to become the raw material of another market chain.

- Local people increased their knowledge of markets and how they operated efficiently and effectively. This enhanced the ability of local people and traders to diversify products and develop a more attractive range of products for consumers.
- Local people better understood the price range for the products they were selling or buying and so their capacity for bargaining improved as a result. This result was especially important for ethnic minority people who before the road did not have this information and could be exploited by traders.
- Off-farm enterprises were developed by more wealthy households. Off-farm employment was mainly limited to people living along the road.
- Road infrastructure resulted in the intensification and diversification of crops. However, it is the average and wealthy households who are mostly included in these activities. Poor and ethnic minority people were excluded from subproject benefits and opportunities because they lived in the high areas and it was not feasible to provide service.
- Good harvests and an increase in the total volume of agriculture products encouraged households to invest in commercial livestock. Some poor and ethnic minority households entered the market, especially households who had the capacity to borrow.

Social

- The impact of the road was significant to improve the access to education and health services for many people but not significant enough to develop the conditions so that the poor and ethnic minorities were included in higher secondary education. However, an important point was the level of income for these groups was the biggest barrier for inclusion in accessing services away from their immediate area
- As a consequence of new and rehabilitated roads more traffic accidents occurred and there had not been an awareness campaign to prepare local people for the change in traffic conditions
- New businesses had been established and these were having an impact on family life. Children were going to internet shops and playing games on line and more men were visiting beer stalls.

Institutional

- Some provincial People's Committees had issued policy instructing local authorities to utilize the funds from the sale of land and invest in other local infrastructure. However, these policies do not include a mechanism to ensure that the poor and ethnic minority groups are given priority in the allocation of this infrastructure and they are included in decisions about infrastructure.
- Only a few households had lost land as a result of PRIP. However, the local government authorities had not resolved these land issues in an equitable way.
- Groups for the operations and maintenance for most infrastructure were not established which will have an impact on the sustainability of the subprojects. In addition, some groups have been formed but they are not very effective. The exception was groups in Quang Tri.
- Local authorities and the community were not included in the design stage of some infrastructure subprojects. This resulted in the construction of some infrastructure that was not feasibility.
- Rehabilitated roads were a special problem. Ideally, the design and location of roads would include public consultations and a strategic planning process. With rehabilitated roads this was not possible. The location had been decided many years ago when local participation and consultations were not used.
- The infrastructure was included in the annual socio-economic development planning process. This planning process is the main instrument for local development. Inclusion in the government local planning improved the sustainability of subprojects.

Environmental

- The increased number of people using the infrastructure and number of businesses resulted in more waste and rubbish in the environment.
- There was minimal visual impact on the environment reported by households who participated in the evaluation. However, measurement should be conducted on the

issues such as diesel run off from the road into the water source. More research is needed on

- The investment in roads resulted in increased production and an increased use of chemical fertilizers and agricultural sprays. The impact of these chemicals on the environment is not known in the subprojects but awareness raising should be conducted and the situation monitored.

Reference

Donnges, Ch., Edmonds, G. and Johannessen, B. (2007). "Rural road maintenance - sustaining the benefits of improved access", International Labour Office, 2007.

Jalan, J., and Ravallion, M. (2001). "Geographic poverty traps? A micro econometric model of consumption growth in Rural China", *Journal of Applied Econometrics*, vol. 17, No. 4, pp. 329-346.

Lipton, M., and Ravallion, M. (1995). Poverty and policy. In -. J. Behrman & -. T.-N. Srinivasan, eds, (Eds.), *Handbook of development economics. Volume 3B. Handbooks in Economics, vol. 9* (pp. ages 2551-2657). Amsterdam; New York and Oxford: Elsevier Science.

Van de Walle, D. and D. Cratty (2002). "Impact evaluation of a rural road rehabilitation project", Unpublished manuscript.

World Bank (1994), *World Development Report 1994: Infrastructure for Development*. New York: Oxford University Press.