

IDE Discussion Papers are preliminary materials circulated
to stimulate discussions and critical comments

IDE DISCUSSION PAPER No. 151

**Infrastructure (Rural Road) Development and
Poverty Alleviation in Lao PDR**

Syviengxay Oraboune*

April 2008

Abstract

Rural road in Lao PDR defined as connecting road from village to main road, where it will lead them to market and access to other economic and social service facilities. However, due to mostly rural people accustomed with subsistence farming, connecting road seems less important for rural people as their main farming produce is for own consumption rather than markets. After the introduction and implementation of New Economic Mechanism (NEM) since 1986, many rural villages have gradually developed and integrated into market system where people have significantly changed their livelihood with a better system. This progress has significantly contributed in improving income earning of people, better living standard and reduce

* Director, Policy Research and Analysis Division, National Economic Research Institute, Ministry of Planning and Investment, Lao PDR, and former Research Associate of IDE-JETRO for ERIA Support Activities.

poverty. The paper aims to illustrate the significant of rural road as connecting road from village to markets or a market access approach of farm produces. It also demonstrates through which approach, rural farmers/people could improve their income earning, develop their farming system, living standard and reduce poverty.

Keywords: rural road; poverty; subsistence farming system; value chain; network

JEL classification: O21, O53, R40

TABLE OF CONTENTS

I . Introduction	1
II . Overview of Road Sector in Lao PDR	7
2.1. Government policy regarding road sector in Lao PDR	7
2.2. Characteristic of road sector in Lao PDR	9
2.3. Road sector development in 30 years (1975-2005)	12
III. Poverty in Lao PDR	18
3.1. Measure of poverty	18
3.2. National Poverty Line and Criteria	19
3.3. Trend of Poverty	24
3.4. Cause of Poverty in Lao PDR	26
IV. Conceptual Background and Issues regarding Rural Road Development and Poverty Reduction	30
4.1. General Macro picture regarding the relationship between rural road development and poverty reduction	31
4.2. Micro analysis of the relationship between rural road development and poverty reduction	35
V . Some lessons on road development in Okinawa of Japan	45
VI. Conclusion and Policy Recommendations	49
VII. References	51
Appendix 1 General characteristic of surveyed villages	53
Appendix 2 Basic profile and network development figure of each surveyed village	54
Appendix 3 Analysis of road and rural livelihood and income in surveyed villages	62
Appendix 4 Report on field trip in Okinawa 18-20 March 2008	64

I . Introduction

As we are aware that the majority of poor people in the world live in rural areas where the level of public infrastructure especially roads is low. The inadequate roads and poor road access put the high cost of transportation; reduce ability to use access high quality inputs; limit the uses of local markets to the sales of their produces, the purchase of consumer goods and opportunities for off-farm employment. Poor road access has put nevertheless constraints for rural poor in terms of access to other social infrastructures such as education and health facilities. This is not an exception for Lao PDR, where majority of people still live in rural areas and mainly engage in agriculture activity. Therefore, improvement of rural road seems to be a clear means by which large numbers of people especially rural people might acquire the opportunity to participate in the market economy and thereby raise themselves out of poverty. The question is, however, does it practice in the reality?

Lao PDR is a small land-locked country, located in Southeast Asian region. It is one among poorest countries in the world with per capita income of about USD491 (2005) with a satisfactory economic result in 2006 and per capita income rated at around USD600 (NSC, 2007). Similar to other neighbouring countries, majority of people live in rural area where infrastructure is poor, 72 % of the households are located in rural areas (LECS III), Cambodia is about 80% (2004) of total population live in rural area; Vietnam is about 74.5% (2003), and Myanmar is 72.7% (1999). The Government of Lao PDR realizes that the absence of essential transportation and communication infrastructure is a significant cause of poverty, especially for rural remote areas. Many districts are not linked to the main national transportation network and most villages are not linked to the main district or provincial roads. Economic growth is therefore hampered and poverty persists. The development and improvement of rural roads is a poverty alleviation objective in itself, but it is also a basic condition for the creation of an enabling environment for a market economy.

Empirical reviews evident that inadequate infrastructure particularly poor and absent of road infrastructure is a significant cause of poverty in Lao PDR. Previous studies have also pointed out that improvement of road infrastructure would more or less help reduce poverty. For example, van de Walle (2001) explained the significant of rural road investment helps reduce poverty in developing countries; Peter Warr (2005) suggested that the improvement of seasonal road access contributes to poverty reduction in Lao PDR; Tim Purcell (2005) pictured out the significant of Farm-To-Market road in rural areas of Lao PDR helps improve farmer livelihood activities, access to better inputs and technology, raise income and reduce poverty.

The government of Lao PDR emphasizes road/transportation sector as the key sector to support market system and development of the country. After launching the New Economic Mechanism (NEM) in 1986, number of road infrastructure projects have been introduced and constructed. This has seemingly contributed to favorable outcomes by permitting greater participation in both local and regional markets in neighboring countries. However, it is recognized that removal of obstacles to the functioning of markets maybe little or no assistance to rural people if very poor roads prevent them from participating in these markets (Peter Warr 2005).

As a result of socio-economic performance after implementing NEM, poverty rate in Lao PDR has significantly declined from 46 per cent of total population at a national level in 1992/93 to 39 per cent in 1997/98. The recent estimation of poverty level in Lao PDR (2002/03) is about 32 per cent. Poverty in Lao PDR is concentrated in rural areas as the estimation of rural population with consumption expenditures below national poverty line were 46 per cent in 1992/93; 39 per cent in 1997/98; and 33 per cent in 2002/03. Whiles, the estimation of poverty incidence in urban areas were 27, 22 and 23 per cent in the same years respectively.

However, the statistic shows that, about 30 per cents and more that 15 per cents of total households in Lao PDR live in the area where there is no access road and only dry season road respectively. This is a reason why there are more poor people in rural areas. Constructing connecting roads to villages as to provide opportunities to rural people in liking their farming production to markets and gradually improve their living standard, but this is not enough, as giving this opportunity alone may not obviously help improve their production and livelihood unless they understand and know how they can capture the opportunity and gain benefits from the provision and that some other actions are needed to be done. Nevertheless, prior to the real situation of budget constraint to supply all connecting roads in every village in the country, if rural people understand and see the important of the rural road that helps improve their livelihood and reduce poverty, the provision might initiated from the grass root of the villages as this will also ensure the sustainability of the roads no mater dry season roads or all-weather roads, but at least the roads can connect them to market system, which will help them escape from poverty.

The paper aims to evaluate the relationship between the improvement of rural road describes by all-weather roads and poverty reduction in order to see how important of rural road and poverty reduction in general. This will be done by the analysis of the data from Lao Expenditure and Consumption Survey – LECS. Nevertheless, the paper also demonstrates how the rural roads or village connecting road could contribute to

improve rural livelihood, increase their income earning and helps reduce poverty and the end through the analysis a case study in some villages in Lao PDR.

The structure of the study is as follow. In the next section, the general information regarding road development and expansion in Lao PDR will be discussed. Section two reviews poverty in Lao PDR. Section three discusses the conceptual background and issues regarding rural road rural road development and poverty reduction. Section four discusses some lessons on road development in Okinawa of Japan. Finally, we conclude with some findings and policy recommendations.

II . Overview of Road Sector in Lao PDR

Surface transportation is the most economic efficient option for a land-locked country like Lao PDR. Comparing to other mode of transportation of the country, road is the most developed sector. At overall, the total length of road is almost 34,000 km with only about 28% paved and total area of the country is 236,800 square kilometers. This makes up the road density just a little above 0.14 which is relatively low even compare to other neighbouring country, Vietnam is 0.68 (2004); Cambodia is 0.22 (2004); and Myanmar is 0.04 (1999). Road sector has been addressed as a key sector for economic development of the country especially in this era of regional and international economic integration of the country.

2.1 . Government policy regarding road sector in Lao PDR

Due to recognition of the significant of road/transport sector as an important means to shore up market system of the country, the government of Lao PDR always emphasizes the development of road infrastructure as a key for country development. Although, agriculture has been identified as the first priority sector for poverty reduction as the means for food security of the country; if we look at the portion of public investment of the country, road/transport sector always accounts in the top public investment of the country.

In 1995, public investment in road/transport sector accounted for almost 64 per cent in economic sector and 47 per cent in total public investment. It accounted at 76.4 per cent for total investment in economic sector and 59.1 per cent for total public investment in 2000. Although, the portion of public investment in economic sector has slightly declined since 2002, with the increase in social sector, but it still accounted for almost 80 per cent for total public investment in economic sector and slightly over half of total public investment in fiscal year 2005/06 (see Table 1).

With recognition of the obstacle of the country location “land-locked” situation, which put tremendous constraint for economic development of the country especially high cost of transportation that reduce competitiveness of export sector of the country. Together of the trend of regional development and an effort to overcome this obstacle, the government of Lao PDR has introduced a “land-linked” strategy as a tool to catch up regional opportunity pushing industrialization and modernization process of the country. Land-linked strategy is a strategy to develop the country as bridging land to neighboring countries. This will not only improve opportunity of market access of the country, but the country would also gain from the development of related industries in concurrence with road/transport sector development. Therefore, a number of road construction projects have been identified as well as other relevant projects have also been introduced. Map 1 shows some road-link projects of the country in the strategy.

Table 1: Composition of Public Investment (as % of total investment)

Sector	1995	2000	2002	2003	2004	2005/06*	2006/07*
Economic Sectors	73.8	77.4	50.9	59.3	59.7	64.9	58.9
<i>Agriculture</i>	13.7	10.3	16.1	17.7	18.0	12.0	9.4
<i>Industry/manufacturing</i>	13.1	8.0	4.1	3.6	5.0	1.2	4.2
<i>Transport Communication</i>	47.0	59.1	30.3	37.7	35.7	51.7	45.3
<i>Others</i>	0.0	0.0	0.3	0.3	1.0	0.0	0.0
Social Sectors	19.1	18.7	27.4	27.6	29.7	35.1	41.1
<i>Education</i>	12.6	6.3	11.2	11.5	12.0	17.7	21.9
<i>Health</i>	4.4	6.3	7.9	8.8	9.5	5.5	3.5
<i>Culture/information</i>	1.1	2.3	3.8	2.6	3.7	3.2	4.4
<i>Labour/welfare</i>	1.1	3.7	4.4	4.8	4.5	1.2	2.7
Other services	7.1	3.9	21.7	13.1	10.6	7.5	8,6
Total PIP	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: NSC, 2005 and NGPES, 2004

E=estimate, * IMF Selected Issues 2007.

Map 1: Strategic Roads in Land-linked Strategy of Lao PDR



Source: National Economic Research Institute (NERI), Ministry of Planning and Investment, 2005

In order to achieve the said strategy, the Ministry of Communication Transportation Post and Construction (MCTPC)¹ introduced development plan to 2010, and the road/transportation was noted that *“Develop and expand national roads which are sub-regional and link between the north to the south, and from the east to the west, complete the construction of paved roads in Vientiane Capital, which link with municipal areas of provinces throughout the country. Roads from the provincial municipal areas to district in the provinces and focal development areas must be ensured to use in both seasons”*(MCTPC, 2005).

2.2. Characteristic of road sector in Lao PDR

Roads in Lao PDR have been classified into several categories, 1) national road; 2) provincial road; 3) district road; 4) urban road; 5) rural road; and 6) special road.

National Road

National road network classified as strategic roads which is very important for the development of national economy and wider region, including connections between the national capital, provincial and special zone capitals; roads to international borders; and roads of socio-economic or defense-security importance. Currently, the Ministry of Public Works and Transportation (MPWT) is directly responsible for the development of national roads in the whole country. The Department of Roads of the Ministry has developed strategic plan for national roads of the country in concurrence with the national land-linked strategy (see Map 2).

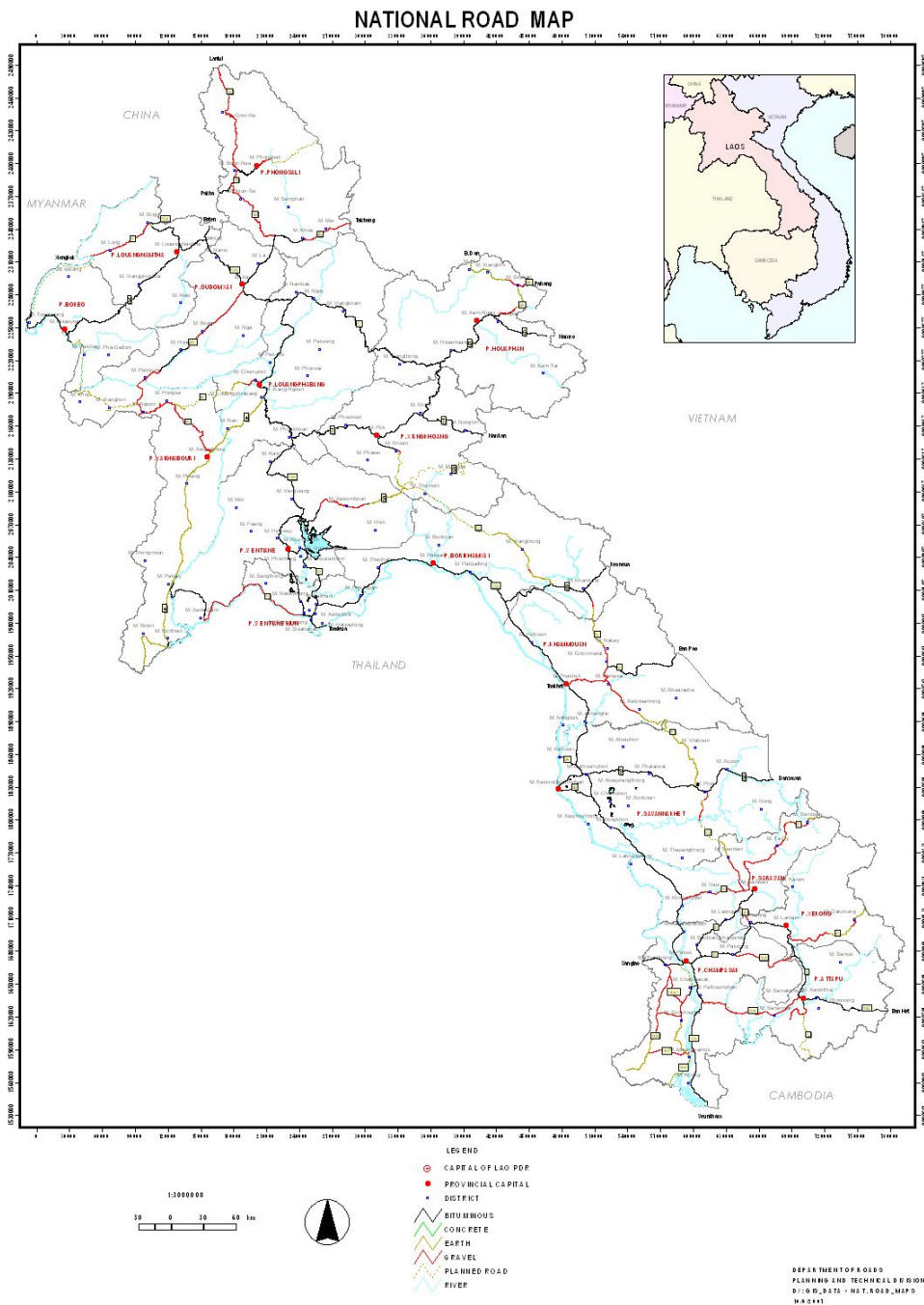
In order to construct the national roads respecting the plan of the Department, beside national budget, the government as represented by the MPWT has developed number of cooperation with international communities for fund mobilization and allocated to projected roads. In the next ten years (2006-2010), the MPWT will focus and complete the construction of national roads which considered as sub-regional roads and fund availability such as roads No. 3 (Houysai – Boten); No. 2 (Meung Ngeun – Pakbeng); No. 1 (Vientiane Mun.); No. 12 (Thakhek – Ngommalath); No. 9 (Xeno – Savannakhet) and No. 15 (Napong – Saravane – Lao/Viet Border) (Map 2).

Nevertheless, other national roads will also be carried out the studied, design and mobilized fund from international community for the construction, including roads No. 13 (Nateuy – Pakmong); No. 2 (Meung Khua – Tai Chang); No. 6 (Hang Long – Sobao – Ban Dan); No. 4 (Xieng Ngeun – Xayabury – Kenthao – Nakha); No. 11 (Khao Liao – Pakton); No. 16a (Xekong – Dax Chung – Lao/Viet border); and Attapue – Lao/Cambodia border). Other strategic roads for regional integration include Paknamnoy – Ban Yo;

¹ Since late 2007, the MCTPC was re-structured and changed to Ministry of Public Works and Transport (MPWT).

Hin Heub – Ban Vang – Sanakham; Meugn Sing – Xiengkok; Kasi – Meung Nan; road No. 14a (Pkase – Lao/Cambodia border); road No. 14b (Ang Kham – Nondeng – Nongnga – triangle jewelry “Lao/Thai/Cambodia border”); and road No. 16a (Paksong – Houykong – Attapue); interconnection road (Tha Thom – Meug Khamkeud – Meung Phin – Saravane); and road No. 13 in Vientiane province (see Map 2).

Map 2: National Road Network Plan of Lao PDR



Source: Department of Road, MPWT, 2007

Provincial Roads

Provincial roads are connected road between provincial capitals and district centers, river ports, tourist and important historic sites of the province. The provincial Department of Public Works and Transport (DPWT) in each province is responsible for the plan and implementation of those relevant to provincial road issues. In respect to the strategy issues by the MPWT, the provincial DPWT in each province is responsible for the development of strategic plan for the construction and development of each province. Currently there are 17 provinces in Lao PDR and each province is responsible for the development of provincial roads to connect at least provincial capital to all district capitals in the province. However, due to capacity of local officers, the Department of Road of the MPWT still plays significant role in assistance all provinces in the country in terms of development of road sector in each province.

The plan for the next ten years is to keep existing provincial roads in good condition in order to ensure good transportation. The connected road from provincial center to each district center must be paved and the rest in the province at least must be all-weather roads. Also, special focus to connecting road from district to focal villages as to develop to at least as all-weather roads.

District Roads

District roads are inter-district roads in order to connect the district centers to villages, river ports, tourist and historic sites and special economic zones of the district. At present, there are about 141 districts in Lao PDR. According to public administration system of the country, district is the administration level under provincial level. District has classified as the lowest level of public administration organ. Under district, there are villages as autonomous level of people.

Office of Public Work and Transportation (OPWT) of the district is responsible for the development of district roads. Due to the real situation of the country, especially in mountainous and remote areas district roads are often in not very well condition.

Urban Road

Urban roads are roads within urban areas. Due to level of infrastructure development in Lao PDR is still low, there are not so many areas considered as urban. Currently, only few areas have been classified as urban including in Vientiane, Savannakhet, Champasak and Louangprabang.

Since the structure of urban administrative body has not clearly been developed and unified. Often, provincial Department of Public Works and Transportation (DPWT) in each province is still responsible for the issues regarding roads and transportation of relevant urban areas.

Rural Road

Rural roads are roads that connect a village to other villages, to the main road accessing to markets, or to connect related production or service to particular centers. Due to the real situation of rural dominant of the country and most of poor people live in rural areas. Rural roads have been considered very important and play significant role in poverty reduction through linking rural farming to market, improve their productivity and increase income level.

A constraint for rural road construction is budget. These public goods in Lao PDR are mainly provided by the government, where the budget would mainly allocate to more economic strategic roads at national level. Majority of rural roads in Lao PDR are earth surface and often non-all-weather roads. Especially in rural remote areas, only dry season that the roads are able to commune and not for wet season. This situation by more or less reduces rural farming productivity and opportunity to access to a stable income and that poverty.

Special Road

Special roads classified as roads that use for special purposes of production or services to particular activities, for national security, and in forest preservation zones. Generally, special roads can be classified into two categories. One is special in terms of economic aspect; and two is in terms of security reasons.

Economical Special Roads: are economic strategic roads that support the development of potential industries of the country. For example, road number 9 can also be classified as special road. This road is the regional road (East-West Economic Corridor) of the Greater Mekong Sub-region (GMS), where the country can economically gain from.

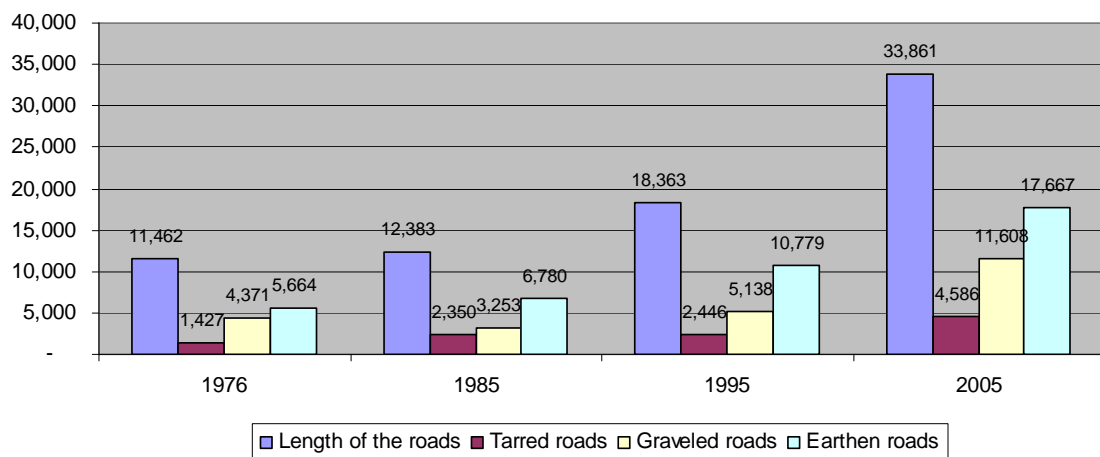
Security Special Roads: are roads in the areas where related to national security, non-traditional security issues such as forest preservation zones, and so on.

2.3. Road sector development in 30 years (1975-2005)

During the past 30 years since gaining independent, the government of Lao PDR has paid strong attention to the development of the country infrastructure, especially after 1986 when the government launched the NEM, infrastructure both hardware and software have gradually developed with quantity and quality supporting to the development of socio-economic of the country as the whole. The main mode of transportation in Lao PDR is traveling by road. Hence, development of road network always be critical issues of the country especially expansion of road to rural and remote areas. At the end of the 1980s, the road network was in very poor condition and further deteriorated due to lack of funding and appropriate maintenance (Alberto Nogales, 2004).

Since 1986, after announcement of NEM, road network has gradually been developed and expanded all over the country. The Ministry of Communication, Transport, Post and Construction (MCTPC) is responsible for the planning, budgeting and development of this type of infrastructure network including roads and road transport, inland waterways and ports, railways and aviation and airports. In the past 30 years, under development policy of the government, the MCTPC has carried out the development of road expansion in the country. In 2005, the total length of the road in Lao PDR is 33,861 km as increased from only 18,363 km and 12,383 km in 1995 and 1985 respectively; and increased more than 3 folds in 30 years (see Figure 1).

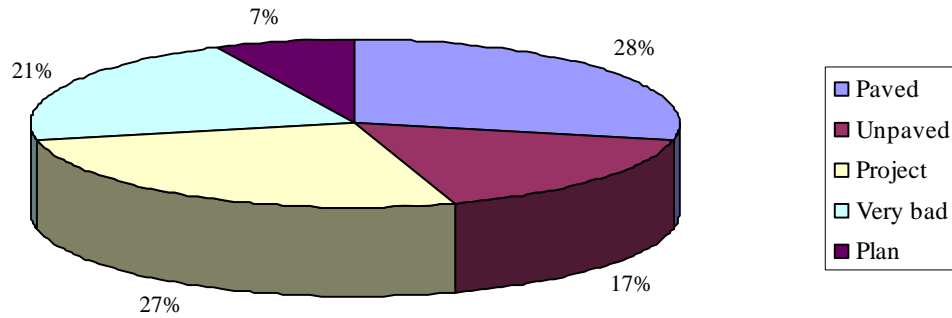
Figure 1: Length of Road in Lao PDR



Source: MCTPC, 2005

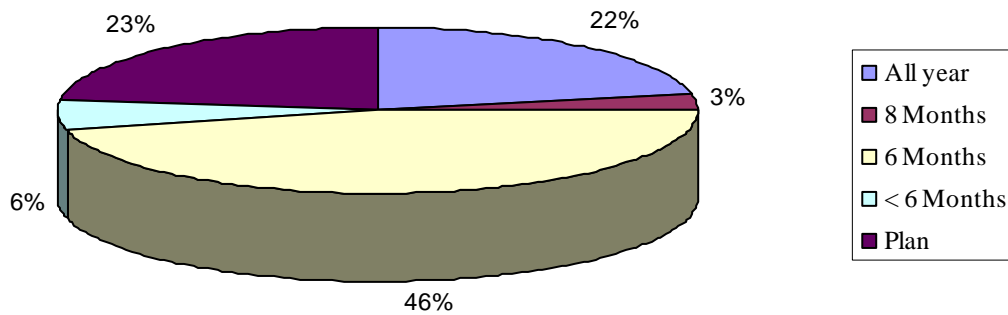
According to the statistic as of 2005, the entire road network in Lao PDR was about 33,861 km. It approximately comprises 7,200 km of national roads (22%), almost 9,000 km of provincial roads (27%), and 16,500 of district and local roads (51%). However, only about less than 14% of total roads are paved where the rest has gravel or earth surfaces. In 7,200 km of national roads, only about 28% of total are paved and 21% is in bad condition. Also for the provincial roads, only 22% out of 8,890 km are all year roads while almost more than 50% are only 6 months and less than 6 months availability (MCTPC, 2000, Strategic Directions for the Development of the Road Sector) (see Figure 2 and Figure 3).

Figure 2: National roads (7,200 km), 2000



Source: MCTPC, 2005

Figure 3: Availability of provincial roads (8,890 km), 2000



Source: MCTPC, 2005

Although, the MCTPC is responsible for overall road system and structure in the country but the Ministry has delegated its responsibility of work to lower levels such as to Department of Communication Transportation Post and Construction (DCTPC)² in respective provinces. At district and rural community, the responsibility is also delegated to the Office of Communication Transportation Post and Construction (OCTPC)³.

² Since 2007, its name has been changed to Department of Public Works and Transport (DPWT)

³ Since 2007, its name has been changed to Office of Public Works and Transport (OPWT)

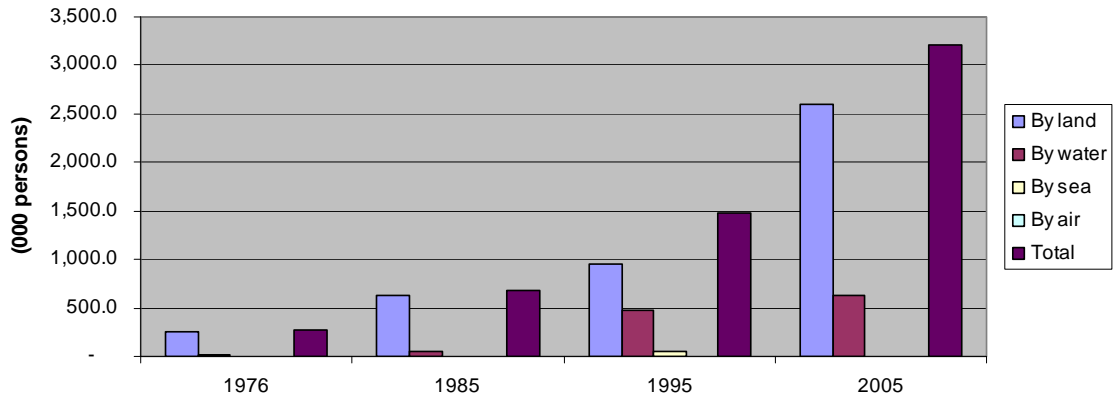
According to the survey, traffic volumes on primary roads are estimated at 250-500 vehicles per day, while traffic on rural roads is only about 1/10 of these levels (Alberto Nogales, 2004). Public road transportation has significantly developed and expanded including within Vientiane city as well as inter-provincial transportation after the majority of the freight services have been privatized and the balance is composed of state-owned enterprises, which are autonomous and operating on commercial principles.

Road expenditures are financed from general budgetary allocations, foreign loans, and grants. Road sector revenues are derived from sales and import duties on vehicles, spare parts, tires, and automotive fuel products, as well as annual vehicle license fees, vehicle registration, inspection fees, and drivers' license fees. In current Lao Kip terms, annual road sector expenditures for construction, operation, and maintenance have been increasing in recent years. This overall increase was mostly due to increases in expenditures funded from external sources (Alberto Nogales, 2004).

In 2001, the government decided to establish the Road Maintenance Fund (RMF) and Road Fund Advisory Board in order to be responsible for road maintenance fund mobilization. The RMF provides an enhanced and sustained source for financing the maintenance of the national road network. Since 2002, the RMF has been operated and experienced positively well especially after the government approved and established the fuel levy and other surcharges in January 2001. The RMF has played as the main tool for fund mobilization including inflows of funds from donors or abroad. In the mean time, the RMF also benefits from the proceeds of levy on gasoline and diesel fuel, a heavy vehicle surcharge, fines and penalties, and any road tolls and in near future will also benefit from international transit charges, etc. As defined by its regulation, about 90% of the RMF proceeds will finance the maintenance cost of the national roads, and the rest will go to provincial and other lower level of roads.

The development of infrastructure development in the past 30 years of Lao PDR has shown significant improvement and contribute to transportation sector of the country. The development of road, bridge, waterway, airway, etc., has supported the development of other sectors including agriculture, commerce as it eases market access. In 2005, the freight transport accounted for more than 3 million tons which sharply increased more than double in last 10 years (1995) and it accounted only about 685 thousand tons in 1985. The most routes used of freight transport is by road which accounted for more than 80% of total freight transport and water way accounted for about 19% and less than 1% for transport by airways. Significantly, the transportation by waterway has declined in recent years as the improvement of road transportation (see Figure 4).

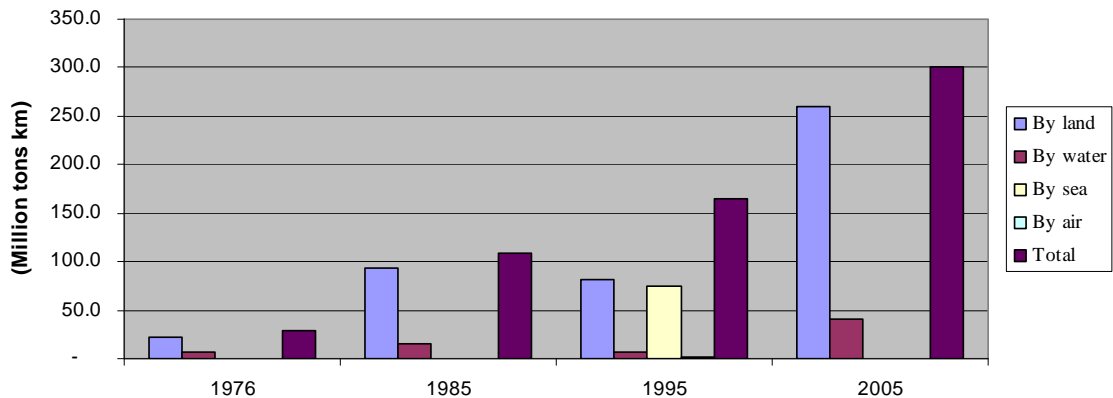
Figure 4: Freight Transport 1976-2005



Source: National Statistic Centre, 2005

Calculation by freight traffic, in 2005 was about 300 million tons kilometers of goods had been freighted which is almost double increased from last 10 years (1995); 3 times value of 1985 and almost 300% increase from 1976. More than 86% of freight traffic was transported by road in 2005 (see Figure 5)

Figure 5: Freight Traffic 1976-2005

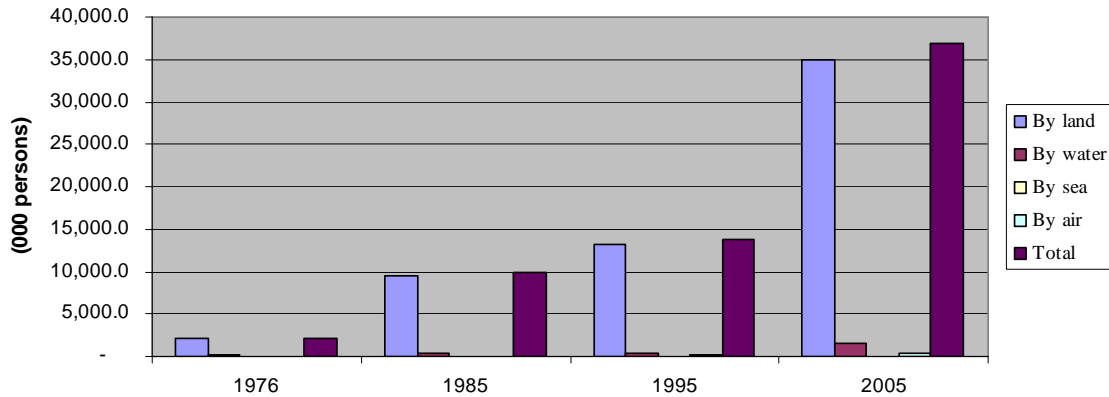


Source: National Statistic Centre, 2005

Nevertheless, the improvement of road network has improved the transportation of people within the country, from province to province including by private and public transportation means. In 2005, total passenger transport in the whole country was about 37 million persons which increased more than 20 times in last 30 years and about 95% of people travel by road. Though passenger transport by water was also significantly increased more than triple but it still accounts for only less than 3% (see

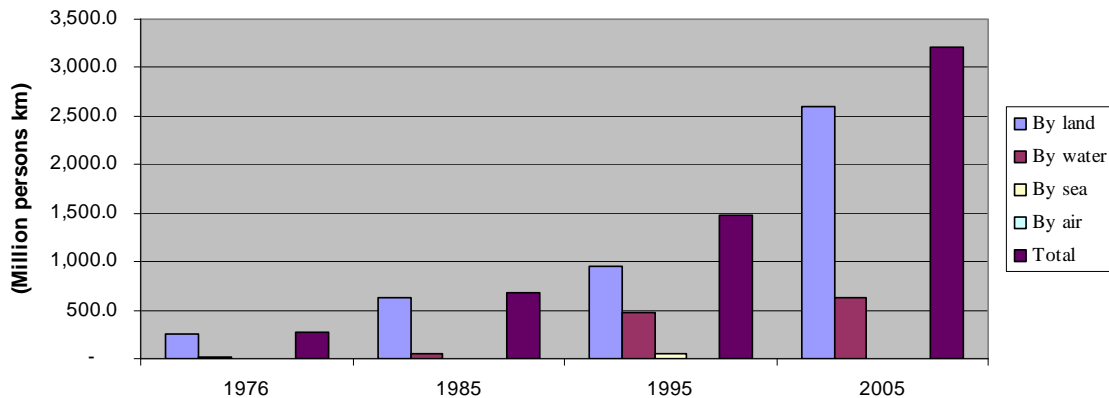
Figure 6). In calculation, there was about 1,900 million person kilometers in 2005 increased from only 76.5 million person kilometers in 1976. Also the most passenger traffic was by road which was almost 90% (see Figure 7).

Figure 6: Passenger Transport 1976-2005



Source: National Statistic Centre, 2005

Figure 7: Passenger Traffic 1976-2005



Source: National Statistic Centre, 2005

At overall picture, road sector in Lao PDR has dramatically improved in the last 30 years, but many areas are still needed to be further developed in order to contribute to social and economic development of the country.

III. Poverty in Lao PDR

3.1. Measure of poverty

Measuring poverty in Lao PDR, the government uses both quantitative and qualitative approaches. Quantitative poverty analyses carried out in the Lao PDR during the 1990s and recent years employ several key methodological features:

- Use of the data of the 1992/93, 1997/98, and 2002/03 Lao Expenditure and Consumption Surveys (LECS I, II and III).
- Use of an absolute definition of poverty (as distinct from a relative definition of poverty).
- Use of an income-based (cost of basic needs) approach to the measurement of Poverty.
- Use of consumption as the measure of individual income.
- Use of two poverty lines, a lower poverty line based on minimum food needs and a more comprehensive and higher poverty line that includes provision for non-food necessities.

The LECS III is more comprehensive compared to LECS I and II. In LECS III, modules on health, education, the labor force and other interests have been used in order to measure poverty. LECS III also has a price questionnaire concerning 121 commodities in village markets, as well as other fields relevant to assessing economic and social development in the Lao PDR as a whole⁴. Even though, the sample size seems to be too small to allow for in-depth analysis below the provincial level. It will, however, enable analysis of poverty from an urban/rural perspective.

Qualitative poverty analysis focuses on listening to the subjective ideas of people who are defined as poor or who consider themselves to be *poor*.⁵ In other words, qualitatively, one wants to understand how each *poor* group understands and experiences poverty. It was found that the poor people are primarily ethnic minority swidden cultivators. While poverty occurs throughout the country, it is less severe in Xayaboury, Vientiane Province and Vientiane Municipality than elsewhere. However, as found by the PPA, the poor people do not view themselves as being in an endemic state of poverty. Villages were subsisting in relatively stable agro-ecosystems, the outside

⁴ NGPES, 2004

⁵ In the Lao language, 'poor' */thuk/* is the condition of suffering arising from the human condition (in the Buddhist sense), as opposed to a physically defined condition as in English (derived from two Indo-European roots 'to produce' + 'little'). In Khmou, the term means 'unfortunate', an attribute associated with fate rather than economic status. Each ethnic group has similarly independent associations with the word 'poor'

perception of endemic poverty has been created by reliance on a numerical definition of poverty. In the minds of villagers, poverty is an issue of livelihood; as long as the villages are able to meet their consumption needs, they do not consider themselves poor. When agro-systems are disrupted or other upheavals occur, poverty may follow.

3.2. National Poverty Line and Criteria

Applying the said technique, the national poverty line has been developed as considered the most appropriate in the situation of the country. According to the real situation of the country, technically “poverty means the lack of essential needs of daily life such as the lack of food (inability to provide 2,100 calories per person per day), the lack of clothing, the lack of permanent accommodation, the inability to afford fees for medical treatment in case of illness, the inability to afford payment for education of members of the family and the lack of conditions for convenient communications” (Prime Minister’s Instruction No. 010 of June 25th 2001).

As indicated above, the Lao national poverty line is basically considered by the calorie intake per person. At national level, however, calorie intake requirement per day for Lao PDR in average is 1,983 calories per day (NGPES, 2004), as equal to about 16 kilogram of rice consumption per head per month. Hence, the national poverty line of Lao PDR is calculated by the rice intake per month, because rice is the main food item of Lao people. Although, the national poverty line of Lao PDR is based on the calorie intake, but it is also converted into amount of rice intake and income per month which approximately equals to 85,000 kip of income per person per month of which 100,000 kip for urban and 82,000 kip for rural inhabitants (see Table 2).

Table 2: National Poverty Line of Lao PDR

Calorie intake (person/day)	Calorie intake (person/year)	Rice consumption (per month)	Income (Kip) (at 2001 price)	
			Urban	Rural
1,983 calories	350kg rice	16 kg	100,000	82,000

Source: Lao-German Project 2001, NGPES 2005, Ministry of Agriculture and Forestry 2005

This technique is more appropriate to the real situation of the country rather than using the income alone⁶. Because, the majority of Lao people especially in rural live in subsistence system. They practice subsistence farming with low monetization. Consumption expenditure, then would be the most appropriate to determine level of poverty. By using the said approach, poverty criteria have been identified at household, village and district levels as follow:

⁶ World Bank poverty line of US\$1 per day

• ***Criteria for Poor Household:***

Households with an income (or the equivalent in kind) of less than 85,000 kip (100,000 kip for urban and 82,000 kip for rural) per person per month (at 2001 prices). This sum allows the purchase of about 16 kilograms of milled rice per person per month; the balance is insufficient to cover other necessities, such as clothing, shelter, schooling and medical costs.

• ***Criteria of Poor village***

According the Government of Lao PDR, technically village will consider poor when it meet several criteria as follow:

- Villages where at least 51% of total households are poor
- Villages without schools or schools in nearby and accessible villages
- Villages without dispensaries, traditional medical practitioners or villages requiring over 6 hours of travel to reach a hospital
- Villages without safe water supply
- Villages without access to road (at least trails accessible by cart during the dry season)

• ***Criteria of Poor District***

At a higher level, the criteria of poor district also introduced as follow:

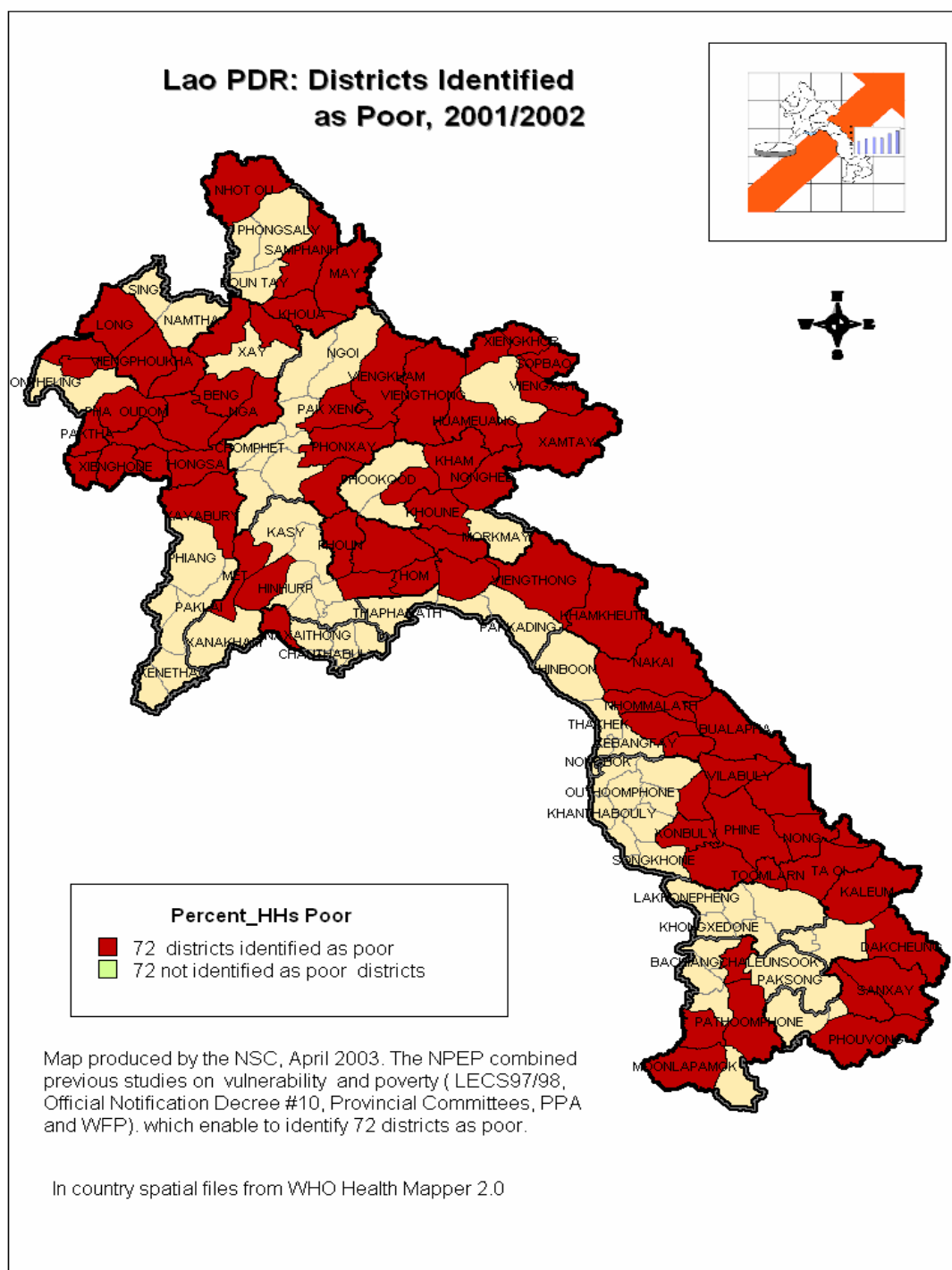
- Districts where over 51% of the villages are poor
- Districts where over 40% of the villages do not have local or near by schools
- Districts where over 40% of the villages do not have a dispensary or pharmacy
- Districts where 60% of the villages without an access road
- Districts where over 40% of the villages do not have safe water.

In addition, in order to support the process of poverty eradication of the country, the government has classified levels of poverty into poorest, poor and non-poor areas. Furthermore, criteria of poverty have also been identified as also include access to market, clean water, education, health services, etc (see Map 3 and 4). At present, of 141 districts, there are 72 poor districts across the country in which 46 districts considered as poorest areas in respect to the national criteria of poverty in Lao PDR (NGPES, 2004).

In order to ensure effective progress of poverty eradication strategy of the country, especially in this circumstance of budget constraint as well as to ensure appropriation and effective of funds allocation, together with criteria for considering poor household the Government of Lao PDR has also classified poverty at village and district levels by considering not only food consumption but includes other dimensions such as health,

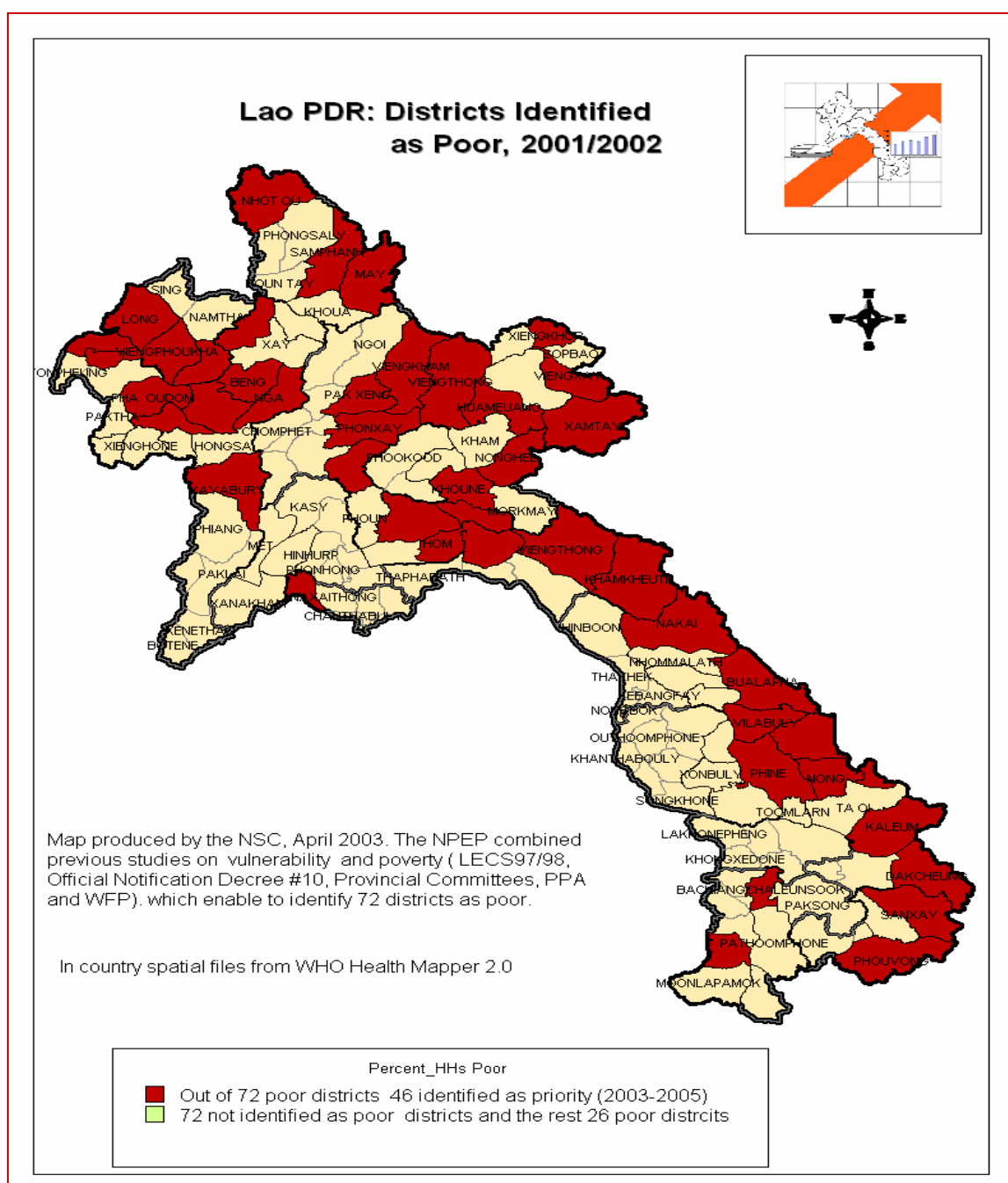
education, vulnerability, etc. in the criteria and showing the relation between household, village and district levels in multidimensional approach (see Diagram 1). The national criteria of poverty in Lao PDR can be summarized as follow:

Map 3: 72 Poor Districts in Lao PDR



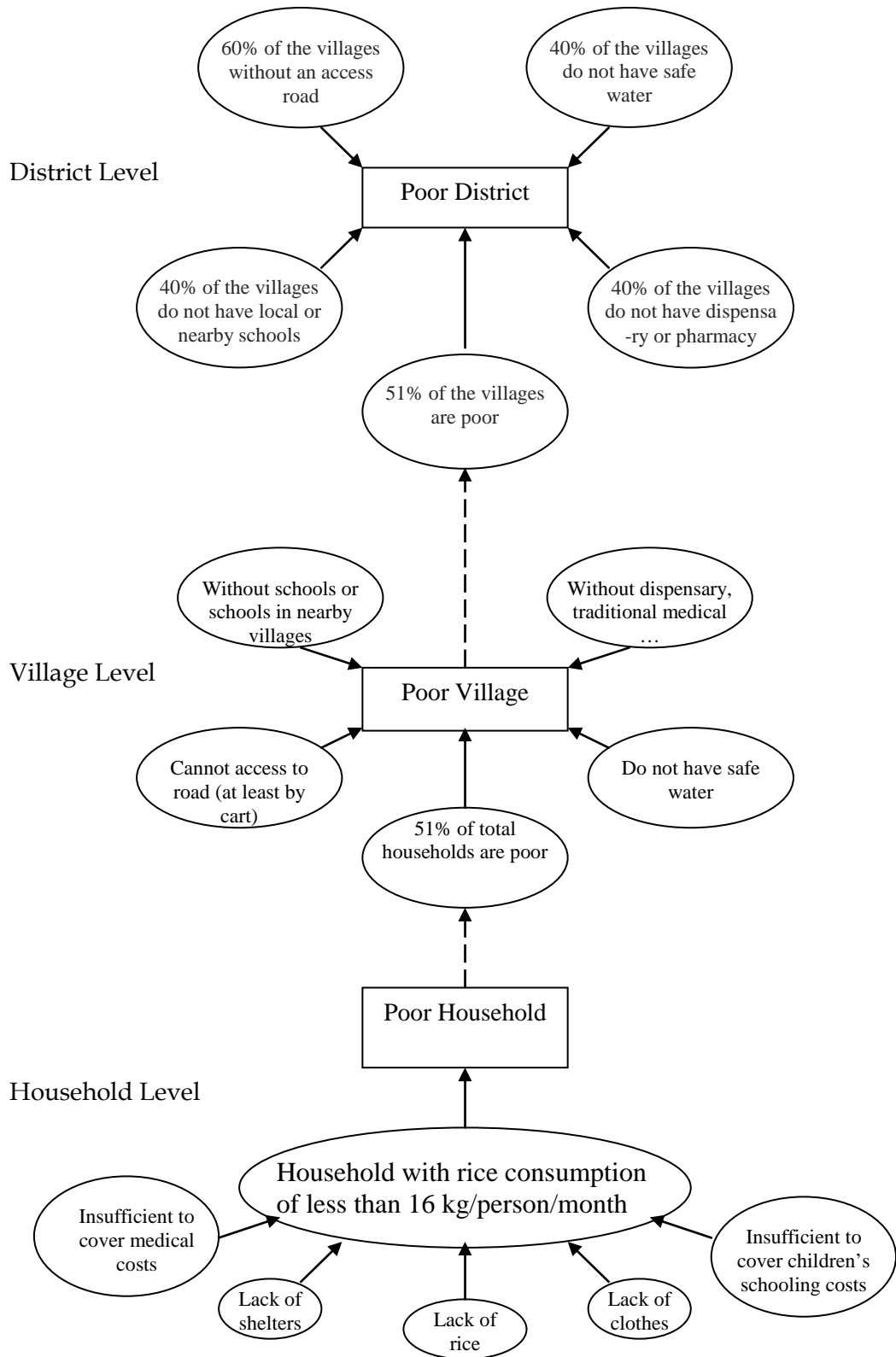
Source: National Statistical Center, CPI, 2003

MAP 4: 46 Poorest (Priority) Districts in Lao PDR



Source: National Statistical Center, CPI, 2003

Diagram 1: National Criteria of Poverty in Lao PDR



Source: Summarized from the NGPES, 2004

3.3. Trend of Poverty

According to LECS, the calculation, Human Poverty Index (HPI) of Lao PDR is still high at approximately 39.64% (Oraboune 2004), meaning human poverty is also considered high as well as the poverty incident at slightly lower than 1/3 of total population though it seems to decrease steadily as in the year 2002/2003 poor household accounted for approximately 218,054 households and expected to decrease to 193,180 and 141,448 in 2003/2004 and 2004/2005 respectively (see Table 3).

Table 3: Poverty Reduction in Lao PDR (2002 – 2005)

Region	FY2002-2003		FY2003-2004		FY2004-2005*		
	Actual	Existing poor household	Planned	Estimated actual	Existing poor household	Planned	Existing poor household
Northern	16,966	111,583	22,183	21,918	95,429	23,615	71,993
Central	23,299	61,624	21,459	9,660	56,566	15,478	41,088
Southern	8,690	44,847	7,312	6,725	41,185	12,818	28,367
Total:	48,955	218,054	50,954	38,303	193,180	51,911	141,448

* Estimate

Source: Committee for Planning and Investment (CPI) 2004, Executive Summary of the Report on the Implementation of the 2003-2004 Socio-economic Development Plan and Directives for 2004-2005 Plan

As per the head count index⁷ or incidence of poverty was about 32 per cent in 2002/03 compared to 39 per cent and 45 per cent in 1997/98 and 1992/93, respectively. As the progress of economic development, the statistics have shown that the average annual increase in real per capita consumption in Lao PDR was 5.8 per cent (see Table 4). This illustrates that households have benefited from economic growth. However, when comparing the real per capita consumption between rural and urban areas, the gap has clearly notified. Table 5 shows that rural real per capita consumption increased by 5.4 per cent per year compare to urban consumption increased by 9 per cent. The gap shows the disparity between urban and rural consumption or inequality of economic distribution has increased.

⁷ The head count index shows the percentage rate of the population with consumption of food and non-food essentials lower than the poverty line. For the Lao PDR in 1997/98, the overall poverty line was 15,218 kip per person per month; for urban and rural people the poverty line was 19,270 kip and 14,407 kip per person per month, respectively.

Table 4: Per Capita Real Consumption by Region

(In Kip; March 97to Feb 98 = 100)

Region	1992-93	1997-98	Growth Rate (%)
Vientiane Municipality	34,676	59,577	10.8
Northern	20,184	25,770	4.9
Central	25,720	32,586	4.7
Southern	23,623	29,504	4.4
Lao PDR	24,595	32,848	5.8

Source: N. Kakwani, Bounthavy Sisouphanthong and Phonsaly Souksavath: *Poverty in Lao PDR* (May 2001)**Table 5: Per Capita Real Consumption by Regions and Rural and Urban Areas**

(In Kip; March 97to Feb 98 = 100 (Lao urban areas))

Region	Urban			Rural		
	1992-93	1997-98	Growth rate	1992-93	1997-98	Growth rate
Vientiane Municipality	36,438	62,098	10.7	29,378.0	55,304	12.7
Northern	23,498	32,914	6.7	19,495.0	24,995	5.0
Central	30,111	42,477	6.9	24,872.0	31,197	4.5
Southern	30,842	39,938	5.2	22,138.0	28,378	5.0
Lao PDR	31,035	48,721	9.0	22,609.0	29,668	5.4

Source: N. Kakwani, Bounthavy Sisouphanthong and Phonsaly Souksavath: *Idem*

Some 830,000 people in the North are below the poverty line and they accounted for about 45 per cent of the total number of poor in the Lao PDR⁸. At the same time, the assessment also showed that the reduction rate of poverty in the North is slower than other regions in the country. Significant contributors to high poverty incidence in the North derives from poorer infrastructure in rural mountainous areas. PPA showed that the poor have much less access to basic infrastructure, compare to less-poor. For example, only 38 per cent of poor people have access to all-weather road and only 17 per cent have access to electricity. In terms of distance, the poor are on average 13 kilometers from a road, compare to 9 kilometers for the less-poor. Access to pipe water is also limited. Table 6 compares accessibility of the poor and less-poor to basic infrastructure in Lao PDR.

⁸ NGPES, 2004, pg. 22

Table 6: Percentage of Poor and Less-poor People with Access to Infrastructure

Access to	Poor	Less-poor	Total
All areas			
Road in dry season	70.8	84.8	79.4
Road in wet season	38.4	61.5	52.5
Electricity	17.1	40.0	31.6
Pipe water	38.6	57.1	49.9
Public transport	38.2	57.1	49.7
Primary school	86.4	87.6	87.1
Complete primary school	43.0	55.6	50.7
Medical practitioner	46.8	57.2	53.2
Trained nurse	63.0	63.7	63.4
Immunisation	87.7	90.2	90.9
Birth attendant	44.6	50.5	48.2
Pharmacy	23.8	37.5	32.1
Community health worker	41.7	45.9	44.3
Hospital/Health center*	84.2	95.7	91.2
Rural areas			
Road in dry season	67.8	80.7	75.2
Road in wet season	32.2	51.3	43.2
Electricity	10.1	25.6	19.0
Pipe water	34.6	51.9	44.5
Public transport	32.6	47.2	41.0

Source: LECS II

* Less than 6 hours away

As shown in Table 6, poor people have less access to road, especially during wet season. This directly effects to less access to transport, which is very important for farming activities as the tool to link farming to markets. Hence, there is close correlation between the absence of essential transportation and communication infrastructure and poverty in Lao PDR, especially in rural and remote areas. Many districts are not linked to the main national transportation network and most villages are not linked to the main district or provincial roads⁹. As the consequence, slowing economic growth of the area, low income and poverty persists. From this viewpoint, the development and improvement of rural roads is a poverty alleviation objective in itself, but it is also a basic condition for creation of an enabling environment for market economy of the country.

3.4. Cause of Poverty in Lao PDR

In order to determine the causes of poverty in Lao PDR, participatory poverty assessment (PPA) was used as allow poor people to identify factors causing their poor situation. As determined by the poor themselves, poverty situation indicates by the

⁹ NGPES, 2004, pg. 26

degree of rice sufficient¹⁰. While, the common cause of poverty was mostly cited as insufficient amount of land for cultivation and natural disasters (flooding or drought). According to poor people, rice sufficiency is the basic indicator of poverty and livestock is the indicator of their wealth¹¹. According to PPA, the main problems of their rice sufficiency include land available for swidden cultivation, livestock disease, ill-health, hiring out labor, lack of necessary technical knowledge, lack of access to roads, lack of clothing, and poor housing.

From the core issues and main problems of poverty as identified, the main causes of poverty can be pointed out as follow (according to the level of important indicated by the poor):

1. problems associate with land;
2. livestock loss because of lack of veterinary services;
3. lack of cash investment to make livelihood improvements;
4. natural disasters;
5. environmental problems; and
6. lack of water for agriculture.

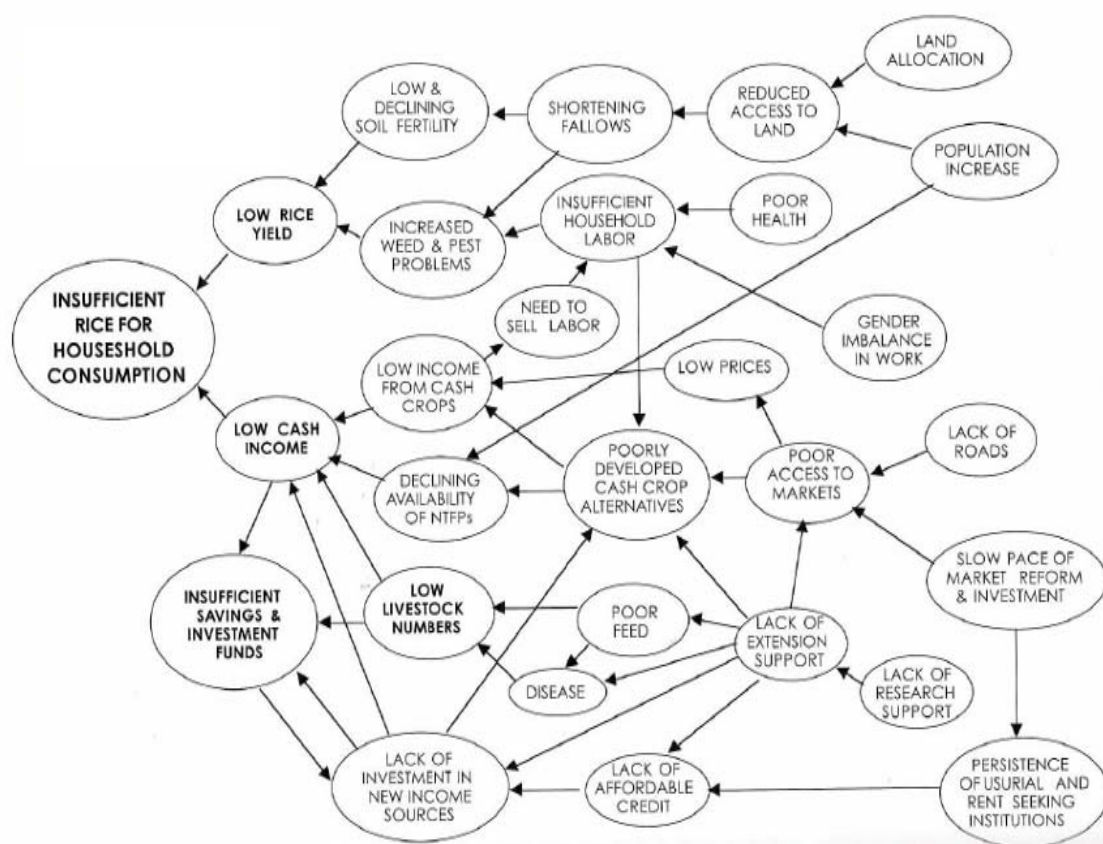
Considering the problems and main causes of poverty by region; land allocation and soil depletion problems appear to be especially important to the Northern and Eastern regions; natural disasters are major concern for Southern region; and the large family size is cited as the top concern for people in the Central region¹². However, common problems for all regions are lack of roads and pests and livestock diseases. As indicated, road connection is considered as an important factor for poverty reduction and it seems to be common factor for the whole country rather than in particular areas. Often, the lack of roads constraints the market access of farmers, especially in rural areas; and this contributes to poor development of cash crop of farmers as the price is low. As a result, their cash income reduces to buy rice for consumption. Consequently, on the one hand, they need to sell labors as to earn additional income. However, on the other hand, they face insufficient household labor for their agriculture activities, which leads to low rice yield drives to insufficient rice for household consumption and that poverty. Diagram 2 illustrates the full set of poverty relationship from PPA.

¹⁰ National Growth and Poverty Eradication Strategy, 2004, page 29

¹¹ PPA

¹² NGPES, 2004, pg. 29

Diagram 2: Causal Diagram of the full set of relationships implicit in the people's poverty analysis



Source: Human Development Report. Lao PDR. UNDP. 2003

In 2002, the PPA follow-up was taken place and generally the study showed that most villages experiences improvement over the two-year period. Most villages showed that they progress benefits from improved roads, enabling access to paddy land and markets, their income increase and poverty decrease. The result of the public investment projects (PIP) showed that “most people say they are better off because of infrastructure investment, especially roads that allow access to the sale and purchase of goods and access to health and education services. However, forest products are being depleted”.

However, some cases showed no improvement and some had become worse off. Results of the assessment showed that in many cases agriculture production has not improved and village relocations often result in insufficient produce for sustainable livelihood. Due to one of the main reason for village relocation program is the attempt to link rural people farming to the markets. As relocation of remote villages in mountainous areas to the new places where closed to main roads would help improve market access of rural farmers and this is a more economical way when comparing to

constructing new roads to their villages, especially in the situation of budget constraint. Yet, moving villages close to main road is not enough as many cases there were not enough land in new areas for their cultivation. Farmers have to do farming back up to their former villages¹³. Therefore, this does not seem only not improve their farming activities, but often reduce their farming productivity due to increase their commute time from their villages to their farm land and again they have to deliver their products to the villages.

From this point of view, relocation program seems not effectively implemented. However, this does not mean that connecting road as to connect farmers to markets does not effectively. According to the real situation, the said program seems to act like an approach to connect farmers to markets rather than connecting their farm produces. In practice, farmers do their farming production back to former farm land up to former villages, this illustrates that the most important is linking their farm production to markets but not only allowing farmers to commute to market places. Although, living close to markets allows farmers to develop their commercial network with other farming stakeholders, but wasting time of four to six hours for travelling (go and back) to their farm land for cultivation and harvest will reduce their farm productivity. As the consequence, farmers face low farming outputs, low income and poverty.

This study will not deeply look at the said program as the outcome of the program does not really meet the aim of this study. However, in overall picture this program also shows an attempt to develop market access for rural farmers by reallocate their villages near to main roads in order to improve accessibility to markets. Although, the result of this approach does not so satisfied due to this does not help improve their farm productivity or even worsen in some cases, and does not shorten the time of transporting their farm products to markets, but more or less, this shows how important of market access, especially the need to develop road connection to their farm land.

¹³ Improving Farm Family Income Study, NERI/UNDP, 2005/06

IV. Conceptual Background and Issues regarding Rural Road Development and Poverty Reduction

Traditional cost and benefit (CB) analysis of roads is technically used to select road infrastructure investment. Usually, the investment on road infrastructure including road investment in World Bank financed projects have been selected based on benefit indicators derived from consumer surplus calculations of road user savings, comprising both of vehicle operating cost savings and journey time savings (Dominique van de Walle 2001). This helps to forecast traffic demand from looking at the growth trend of the traffic and how the projects generate the traffic that derives the willingness to pay estimates to proxy project benefits. However, using this method alone to analyze the benefit of road projects seems to bias especially in the situation of Lao PDR where majority of poor people live in rural areas with lower traffic demand. Therefore, purely using CB analysis method for road investment selection alone will lead to underinvestment in rural roads, which is critically important for poverty reduction. Traditionally, investment tends to dominant in richer areas due to demand for traffic and willingness to pay are higher for the rich, but threats are that hard to quantify from this method especially combining the benefits from the increase in agriculture production that help reduce poverty.

Although, this study does not focus on analysis method to select road investment but understanding this traditional way of determination would help clearer analysis and find out the link between rural road development and poverty reduction. Since late 1970s, altered roads benefit analysis method has been introduced by supplementing consumer surplus measures with producer surplus benefit measures for roads where traffic levels are low (see Beenhakker and Carnemark). The case for change in focus rested on the induced agricultural developmental impacts of roads not captured by traffic cost savings when traffic is low. Producer surplus estimates aimed to capture gains in agriculture incomes resulting from transport improvements and concomitantly higher farm-gate, and lower input, prices. The aim was to prevent biases caused by sole emphasis on consumer cost savings in predominantly agricultural areas (Dominique van de Walle 2001).

Lao PDR is a rural agricultural based country where most of population engages in agriculture activity. Majority of poor people also live in rural areas (NGPES). Prioritizing projects in rural areas is significant for poverty reduction especially, road infrastructure projects, which considered as a significant criteria of poverty. As mentioned earlier, in order to avoid bias of traditional method of road CB analysis and looking at consumer surplus alone, this study explains the impacts of roads, in particular, rural roads and poverty reduction in Lao PDR by focusing on producer

surplus (consumption of rural farmer producers).

As the main focus of this paper is to evaluate the relationship between the development of rural roads/village connecting roads and poverty reduction through the improvement of rural people's income, and as the main economic activities of rural people in Lao PDR is in subsistence system where they base on production for own consumption rather than for markets. Hence, the paper will also determine their income as the sum of cash income and own produced goods. Thus $RURAL\ HOUSEHOLD\ INCOME = CASH\ INCOME + VALUE\ of\ OWN\ PRODUCED\ GOODS$.

Cash income is income in cash from relevant sources such as wages and social benefits, pensions, dividend and royalties received, transfers from abroad in cash or remittance, entrepreneurial income (defined as income less current operational costs; this income is supposed to cover owners' remuneration, payments for work done by other household members, financing of investments and profit) from household businesses and agriculture, fishery and forestry, and so on.

In this context, rural road can refer to connecting road to main road, which considered as the means of market access for rural farmers/producers. Therefore, rural road provides income source opportunities to rural farmers/producers. This chapter illustrates some empirical reviews regarding the impacts of rural road development and poverty reduction of the country. Previous macro analysis (using data from LECS III) by looking at the development of all-weather road is used to discuss the relationship between the road development and poverty reduction. Some data from household surveys regarding the study on "Improving Farm Family Income in Lao PDR" (NERI/UNDP 2005) is also used to further discuss on the relationship between road condition and rural farmer income through development of their production network.

4.1. General Macro picture regarding the relationship between rural road development and poverty reduction

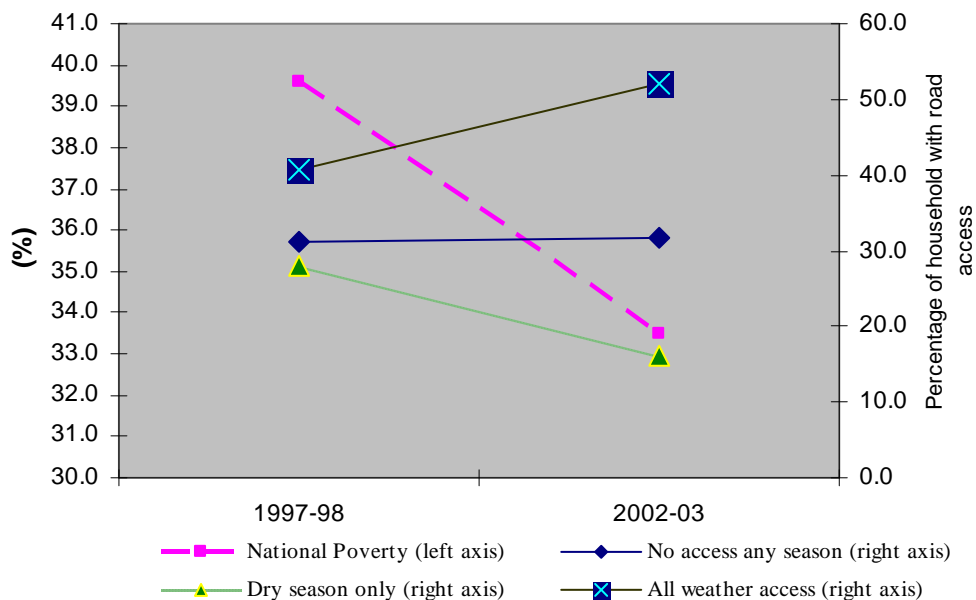
Using the data set from Lao Expenditure and Consumption Survey (LECS) of the National Statistical Centre¹⁴, the assessment confirm that areas with better access to main road had higher levels of consumption expenditures per person (Datt and Wang 2001) and (Kakwani, Datt, Sisouphanthong, Souksavath and Wang 2002). Although, some arguments said that the results was not so clear to present whether the correlation between good roads and economic welfare means that better roads reduce poverty or merely that richer areas receive improved roads ahead of poorer areas. However, further analysis by Dominique van de Walle (2001), illustrated the change of

¹⁴ From October 2007, name of NSC has been changed to Department of Statistics (DOS) under Ministry of Planning and Investment (MPI)

poverty over time effected by the provision of road infrastructure has further supplement.

Figure 8 clear shows the relationship between poverty incidence and the development of road in Lao PDR. At significant, within 5 years from 1997/98 to 2002/03, poverty incidence has reduced by more than 6 per cent with the increase in total number of population with all-weather road access by about 12 per cent. Another interesting figure shows that poverty incidence in rural areas reduced by 9.5 per cent over that period (see Table 7). This implies that most rural people or over 60 per cent of total population gained from road improvement over the same period.

Figure 8: Relationship between Road Development and Poverty Incidence in Lao PDR



Source: LECS II and LECS III, 2001, NGPES 2004

Table 7: Poverty Incidence by Urban and Rural

	National Poverty	Rural Poverty	Urban Poverty
1992-93	46.1	51.8	26.5
1997-98	39.6	42.5	22.1
2002-03	33.5	33.0	23.0

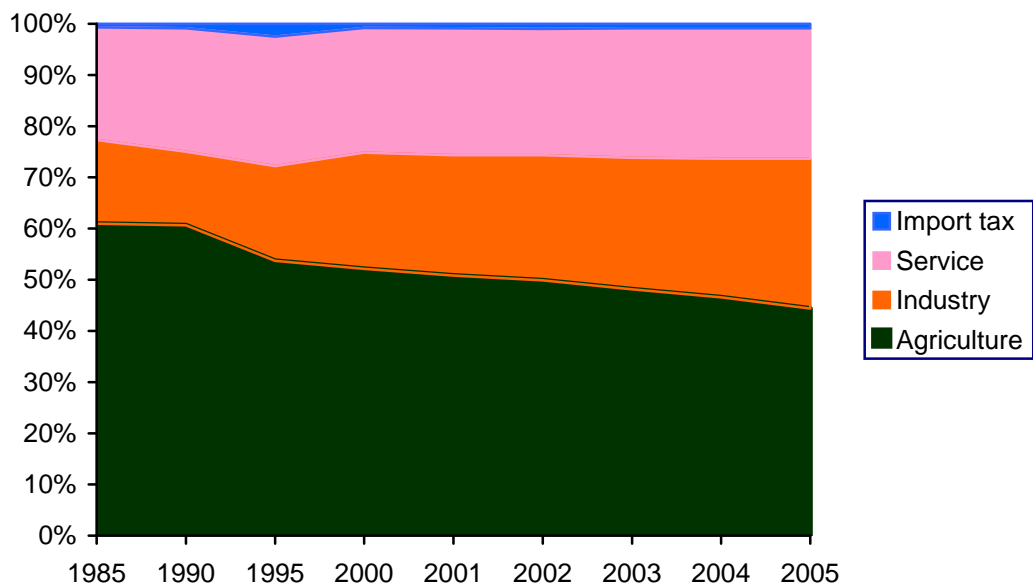
Source: LECS II and III, 2002; NGPES 2004; Peter Warr 2005

Although this may not be understood that the improvement of road alone had contributed to the change in poverty rate, but it requires to carefully looking at other social and economic aspects especially the change in economic structure. The

agricultural sector has step by step changed during that period contracted from 61 per cent of GDP in 1990 to 50 per cent in 2002 (Figure 9). As the result of dual agricultural policy of the Government, rice became a less attractive activity for upland people, while alternative crops with market outlets both within the country and in neighbouring countries in conjunction with regional integration process of the country.

Looking at this structural change in the country, where opportunity for income from alternative crops especially for upland farmers/people has increasingly improved. In consistence with the obstacle situation of the country as explained earlier, the upland remote areas are more constraints when discussing about the road access. Therefore, it might be understood that the improvement of road (all-weather road) during that period had facilitated/contributed to generate cash income to rural (upland) farmers/people through improvement of market access of their upland crops with markets within the country as well as with neighbouring countries. Because of this has contributed to the reduction of poverty incidence of the country over that period.

From the analysis of the data and the structural change of the country during that period, it might be possible to capture and observe the correlation between the development of rural road (all-weather road) and poverty reduction of the country.



From the statistic, it obviously shows the correlation between the road access and poverty reduction in Lao PDR. Deeper analysis was done by previous study group under Diagnostic Trade Interaction Study (DTIS). Using data from LECS, the team did the simulation of the impact of road improvement on the poor by the first calculating the changes in real expenditure per capita for each person after providing all-weather roads in particular areas (urban/rural) and regions with choice of districts-based on Warr's

results (regressing per capita spending on household and village characteristics). By ignoring relative price changes and assume that expenditure is unchanged in regions in which road access is not improved. The team estimated the changes in household expenditure affecting from the change in road access, then estimate the changes in the various poverty measures and the Gini-coefficient. The team runs simulations that differ according to the category of districts in which road access is provided:

1. All people in poorest districts (first priority areas) who do not already have all-weather road access are provided with it.
2. All people in poor districts (second priority areas) who do not already have all-weather road access are provided with it.
3. All people in non-poor districts (third priority areas) who do not already have all-weather road access are provided with it.
4. All people in rural areas who do not already have all-weather road access are provided with it.
5. All people in urban areas who do not already have all-weather road access are provided with it.
6. All people in Lao PDR who do not already have all-weather road access are provided with it.

The results of the simulation explained that the impact of road building on national poverty depends on whether the roads are built in which category (poorest, poor or non-poor districts). Among the three categories the results shows that, providing roads in the poorest districts has the largest impacted on poverty reduction as well as the reduction in inequality. If the poorest areas were given full access to all-weather roads, 3.3 per cent of the population (or about 185,000 people) would escape poverty. However, if providing all-weather road access in all rural districts would raise expenditure of rural people by 8.4 per cent which would push total expenditure up by 6.3 per cent and that reduce poverty by 6.4 per cent points or more than 350,000 people would escape from poverty in the whole country (see Table 8).

The results of this macro analysis and the simulation obviously show that improvement of road access in rural areas is much effective in terms of poverty reduction in Lao PDR. The results of providing road access (all-weather roads) to rural people have significant and high percentage as equivalent to the total of the country. This picture is obviously consistence with overall statistic of poverty in Lao PDR, as most poor people live in rural areas and the problems of road access is obvious explained in rural areas. Taking this situation into account, in order to ensure poverty reduction especially in the case of Lao PDR, given priority to rural areas might be a better option.

Table 8: Simulation results for impact of roads accessibility on poverty*

Location included in simulation:	Poorest district	Poor districts	Non-poor districts	Rural	Urban	Lao PDR
	1	2	3	4	5	6
Increase in expenditure (%)	9.3	10.0	4.7	8.4	0.4	6.4
Fall in head count (% points)	11.4	6.8	4.0	7.9	0.5	6.5
Fall in poverty gap (% points)	3.6	2.8	1.1	2.5	0.1	2.1
Fall in severity of poverty (% points)	1.5	1.2	0.4	1.0	0.0	0.8
Fall in Gini (% points)	1.0	0.4	0.5	0.6	0.1	0.9
Increase in total expenditure (%)	2.2	1.1	3.1	6.3	0.1	6.4
Fall in national headcount (% points)	3.3	0.8	2.1	6.4	0.1	6.5

* Note: based on the results of DTIS Group

Source : LECS III

4.2. Micro analysis of the relationship between rural road development and poverty reduction

To further discuss on the issue related to rural road development and poverty reduction, the author further analyze the situation of previous data from a survey on improving of farm family income in Lao PDR. The survey was done by research team from the National Economic Research Institute (NERI) in cooperation with a consultant from UNDP. The survey took place in 8 villages in 8 districts of 5 provinces namely Thonglum village in Nambak district and Phongvan village in Louangprabang district, of Lounagprabang province; Dindam village in Nong Het district and Gnumchong village in Kham district, of Xiengkhouang province; Nathen village in Viengxay district of Houaphanh province; Houysan village in Sephone district and Xebangnouan village in Songkhone district, of Savannakhet province; and Xekhaman-nuea village in Samakkhixay district of Attapeu province (see Annex 2).

All these 8 villages are accessible, but the level of access is different from one village to another. The level of access depends on several factors including distance to market, quality of road, and availability of other economic and social infrastructures which help local villagers to develop their livelihood activity and increase their income earning. However, author would like to focus on the issues related to market access in terms of distance as more or less this is a factor to measure a quality of access if assumed that other variables are similar in all villages.

As agriculture is the main livelihood activity of Lao people and the same in the surveyed villages. Looking at the general figure of the surveyed villages, the level of agricultural commercialization¹⁵ is different from one village to another. The level of

¹⁵ There are four levels of agricultural commercialization (Lao context): level 0: subsistence farming (no commercialized) – most of farmers produces are used for home

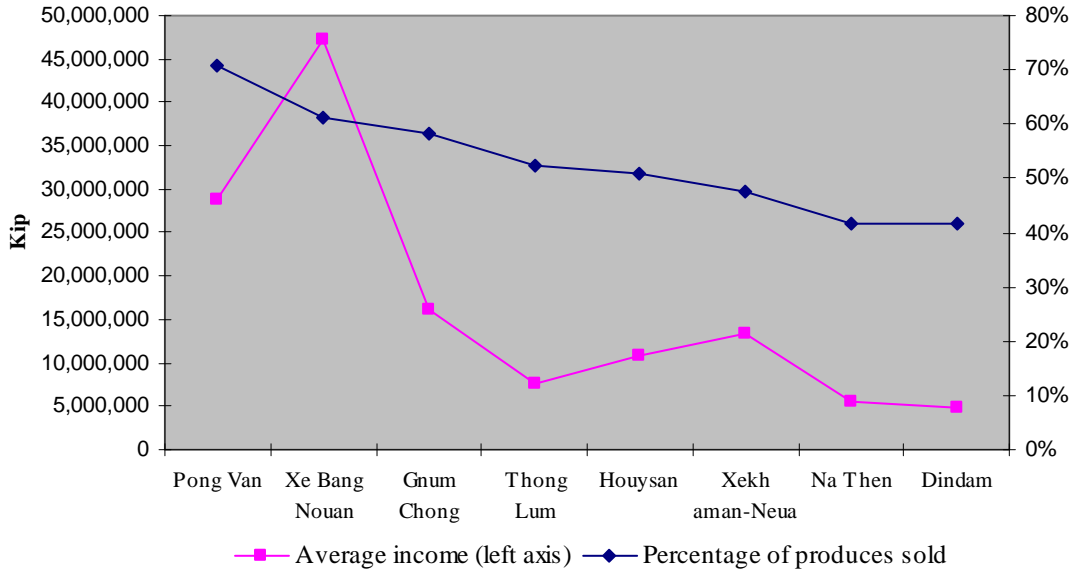
commercialization of rural farmers is very important as it shows how farmers address their farming system and how well that they develop their agriculture in market system. Higher level of commercialization demonstrates a higher level of agriculture in market system, which ensures a better income from agriculture activities. Even, the level of commercialization in those 8 surveyed villages does not that high, but comparing among themselves we can see some different especially in terms of average income of each village. A village which is the level of commercialization is higher its average income is much higher than other village (Figure 10). Although, Xebangnouan village is an outlier, but still the log-linear regression R^2 ($y = 0.1092\text{Ln}(x) + 0.2534$; $R^2 = 0.7299$) shows that nearly 73 per cent of the variation in the level of income is explained by the level of commercialization, and that as commercialization increases then the average income increases; and if excluding the outlier village Xebangnouan, the relationship is stronger as the regression R^2 ($y = 0.0116x + 0.3747$; $R^2 = 0.8757$) is even over 87 per cent of the variability in income explained by increasing level of commercialization¹⁶ (Annex 3).

Although average income of farmers in surveyed villages have strong relationship with level of commercialization in each village, but there is not much relationship between distance to market and level of commercialization. As the linear regression R^2 ($y = 0.0115x + 0.6034$; $R^2 = 0.2072$) shows that correlation between distance to market and level commercialization is not so strong due to commercialization also depends on other factors including quality of roads and other infrastructures, but in the case of the surveyed villages are access to traders, market information, etc., which requires rural farmers/ people to improve their capacity in order to capture the opportunity (according to the situation of the surveyed villages) (Annex 3). This means that provision of connecting roads from the villages alone does not help them improve their agricultural production much, so that other actions from related agencies are needed to be done including agricultural extension, improvement of agricultural market information, and especially the awareness of rural farmers/people on the benefits they would get from the opportunity of connecting roads from their

consumption; level 1: farm production with better technology – with improvement of productivity, production outputs increased and surplus, where surplus can be sold but mainly through middle traders who regularly visit the villages. Main farmers production is still under subsistence farming system; level 2: division of farming production – farmers have better and more effective plans and divided their production into two part – consumption and markets; and level 3: commercial production – farmers produce their farm production based on market system

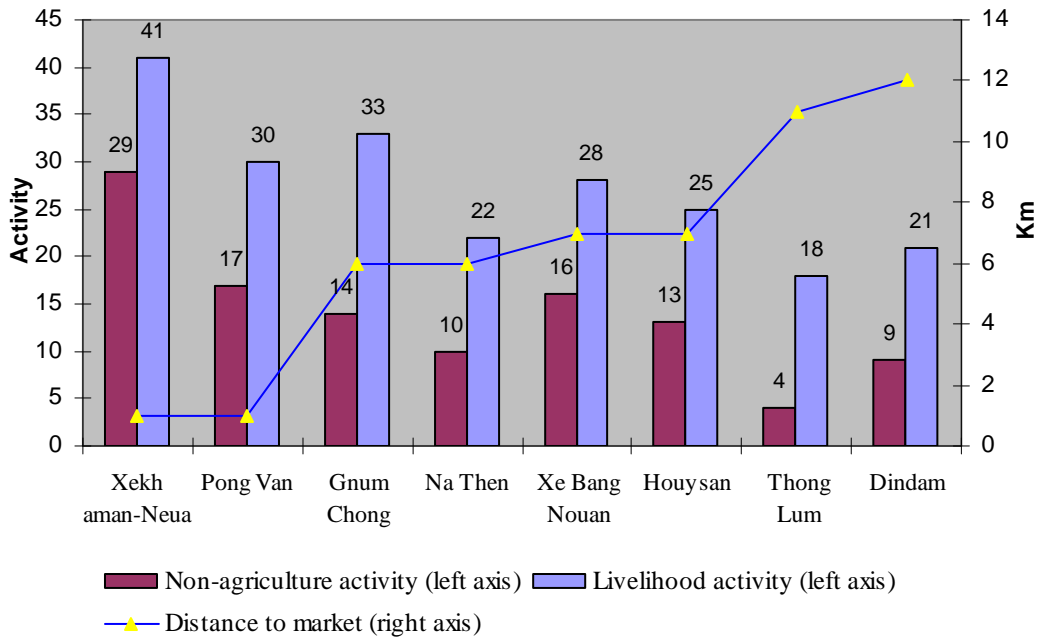
¹⁶ NERI/UNDP, Improving Farm Family Income in Lao PDR, 2005, pg. 51

Figure 10: Commercialization and income



Source : NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

Figure 11: Distance to market and livelihood activity



Source : Farmer Income Survey 2005, NERI/UNDP (adapted by author)

village to main road and markets.

However, looking at overall picture of the surveyed villages in general, villages

those closer to markets have better livelihood system. Villages that close to markets have more livelihood activities than other villages. More livelihood activities mean more income opportunities for villagers (villagers are involved in more income earning activities). Figure 11 shows that in surveyed villages, total livelihood activities rank (according to the survey) from 18 to 41 where most agriculture activities are similar to each other from 12 to 14. This implies that access to market does not have much relation to agriculture activities in all villages as they are the main livelihood activities of rural people, no matter they produce for own consumption or markets.

However, looking at other livelihood activities which rank from 4 to 29; these activities refer to non-agriculture activities where the survey has shown that villages which closer or easier access to market, the level of income opportunity from other non-agriculture including off-farm activities is much higher than those villages with more difficult in market access. Table 9 shows the list of livelihood activities in surveyed villages. The distance to market from surveyed villages rank from 1 to 12 kilometers; although this seem not very constraint in many areas and countries, but considering rural areas where walking is the main transportation mode, this is much different in terms of time use from only 1 kilometer and 12 kilometers.

Table 9 Types of Agricultural and Non Agricultural Livelihood Activities in Surveyed Villages

Agriculture (41)		Non-Agriculture (50)	
Annual crops plantation	Pineapple	Alcohol brewing	Migration to VTE
Banana	Plum	Animal feed mill	Noodle processing
Buffalo	Poultry	Bamboo handicraft	NTFP
Carambola	Rubber	Barber shop	Off-farm (unspecified)
Cassava	Sesame	Battery recharging service	Pharmacist
Cattle	Snake bean	Bird Catching	Portrait sculpture
Chili	Soybean	Blacksmith	Priest
Cotton	Sugarcane	Boat service	Repairing shop
Eggplant	Sweet potato	Brick making	Resin
Fish pond / fishing	Taro	Cement blocks	Retail shop
Fruit Trees	Tea	Charcoal	Rice mill
Garlic	Teak	Construction worker	Roofing tile (Grass/leaf)
Goat	Tobacco	Daily labor	Sewing
Green bean	Upland rice	Electronic repair	Silver/goldsmith
Jackfruit	Vegetable	Employee	Small restaurant
Job's tear	Water melon	Firewood collection	Small retailer
Lotus pond		Fishing tools	Teacher
Maize		Furniture	Tractor service
Mango		Gas station	Trader
Onion		Government officer	Traditional physician
Paddy rice		Ice cubes	Transportation service
Papaya		Knife making	Weaving
Peach		Knitting	Wholesaler
Peanut		Mattress	Wood sawing
Pig		Scrap Metal Collection	

Source: Farmer Income Survey - Focus Group Interviews, 2005

Although Gnum Chong village seems to be an exception, but according to the log-linear regression line $R^2 (y = -6.1322\ln(x) + 23.348; R^2 = 0.6603)$ shows that over 66 per cent of the variation in the number of livelihood activities is explained by distance to market, and that as distance from market increases non-agriculture activities undertaken also increase (Annex 3). As only distance to market per se effects to livelihood activities of rural farmers, the more difficult areas or even absent of connecting road would worsen the situation. On the other hand, although agriculture activities especially for rice (in terms of Lao PDR) indicate as the main source of rural farmers' income (28.4 per cent), but about 95 per cent of rice produce is mainly for own consumption. Whilst, the second rank of income source is off-farm and remittances (23 per cent) and over 95 per cent of this source of income is used as accumulated capital investment of rural farmers (see Table 10). This implies that the better market access the better livelihood activity development and hence the better capital accumulation for monetary source of income. Nevertheless, with road connection, rural villages also have better market access.

Even with better access to market, rural farmers do not seem to upgrade their agricultural commercialization, but the increase in the livelihood activities shows how the extension of other industries in the villages that help diversify income source of rural people. From this point of view, the road access to village helps connecting rural

Table 10: Farm Income - Average Percentage Reported

Farm and Non-farm Activities	Income and Capital Accumulation	Consumption/ Own Use	Total
Rice	4.4	24.0	28.4
Root and Tuber Crops (cassava, potato etc)	0.2	0.6	0.8
Upland Crops (maize, other cereals, legumes etc)	5.7	3.1	8.8
Vegetables	5.5	2.5	7.9
Perennial Crops (rubber, coffee, pepper etc)	0.9	1.0	1.9
Annual Industrial Crops (Sugarcane, Cotton, etc)	0.1	0.3	0.4
Fruit Trees	2.4	1.3	3.7
Fishing and Aquaculture	0.8	0.3	1.1
Small livestock (poultry, pigs, goats, etc)	5.9	3.9	9.8
Large Livestock (Cattle, buffalo, etc)	3.5	2.3	5.7
Non-Timber Forest Products	2.7	0.9	3.6
Forest Products	1.5	0.6	2.1
Other Farm Activities	0.8	0.9	1.8
Handicrafts and Weaving	0.8	0.2	1.0
Off-Farm Work and Remittances	20.4	2.5	23.0
Total	55.7	44.3	100

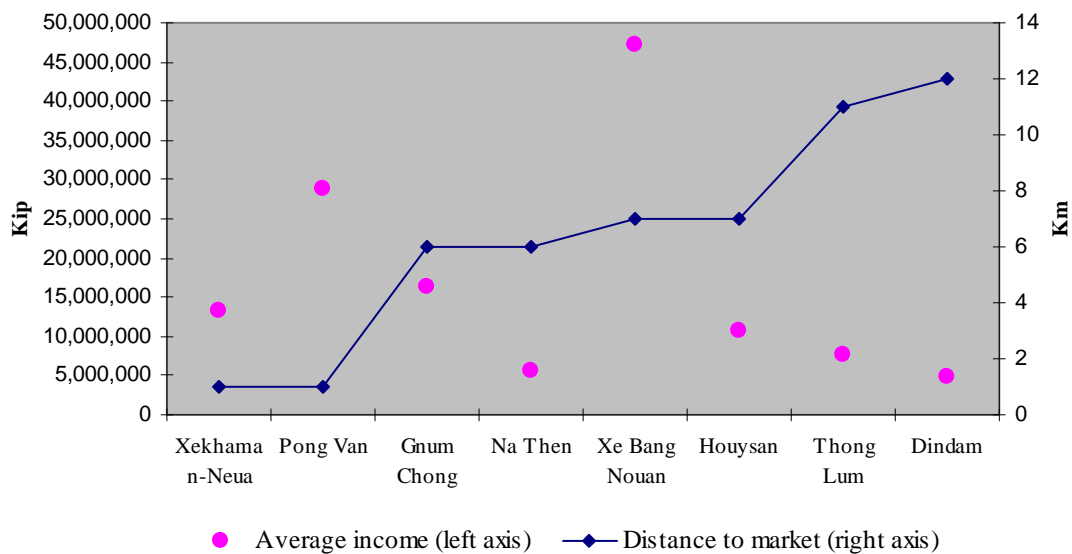
Source: NERI/UNDP Farm Family Income Survey 2005.

people with potential industries nearby, where the cash incomes of rural people are from. On the other hand, the increase in other industries nearby village is the sign of the increase in demand for agricultural production, and this is an opportunity for

agricultural commercialization in the areas. However, other agricultural extension and facilities are needed to be in place in order to ensure that rural farmers are able to catch up with the opportunities.

It is interesting that even distance to market does not have much relationship with income (according to the surveyed villages), but due to it has quite strong relationship with livelihood activities which rural people could diversify their income earning and that their average income in villages where are closer to markets is higher than other villages. Even Xebangnouan village is an exception, but if we excluded this outlier Xebangnouan village, the linear regression R^2 ($y = -1E + 06x + 2E + 07$; $R^2 = 0.5352$) shows that almost 54 per cent of the variation in the level of income is explained by distance to market (Figure 12 and Annex 3)). Meaning that when distance to market decreases or market access level increases average income in the village increases.

Figure 12: Distance to market and income



Source: NER/UNDP, Farm Family Income Survey, 2005 (adapted by author)

While diversification of livelihood activities presents opportunities to earn from more income sources; and this shows how local people develop and link into livelihood value chain. The more livelihood activities develop, the more linkage into livelihood value chain and the more income be created. The linkage into livelihood value chain can be observed through the linkage of livelihood activities of rural people with other social and particularly economic stakeholders (individual or organizations). Looking at the data from the survey which had also obtained information regarding the linkage between farm family respondents and relevant livelihood stakeholders; although there are not much other economic stakeholders that farmers in surveyed villages have

linkage with rather than other farmers, collectors and traders, and retailers which showed that the level of commercialization of those villages is not that high (see Table 10). However, if compare among villages themselves, there are some significant different we can observe.

Table 10: Type of Linkage with Different Individuals/Groups/Organizations by Farm Families

Linkage Organization	Village (average meet)								
	Thong Lum	Pongvan	Dindam	Gnum Chong	Na Then	Houysan	Xebangnuan	Xekhaman-Neua	
Farmer	1.4	1.3	1.3	1.2	1.3	1.4	1.4	1.2	
Farmer Group	1.4	2	1.3	1.5	1.7	1.9	2	2.2	
Farmer Cooperative/ Association	2	1	2.5	3	3	0	0	0	
Trade and Industry Associations	0	0	0	0	3	0	3	0	
Input Trader	2.3	1.4	1	1	1	1.2	1.5	1.8	
Collector/Output Trader	1.6	1.3	1.4	1.3	1.3	1.3	1.4	1.5	
Private Processors	0	1	0	0	0	0	2	0	
Private Exporters	1	0	0	0	0	0	2	0	
Private Wholesaler	0	2.5	0	0	0	2	1.5	0	
Private Retailer	1.3	1.3	1.5	1	1	1.3	1.3	1.5	
State Owned Enterprise Processor	1	0	0	0	0	0	0	0	
State Owned Enterprise Exporter	0	0	0	0	0	0	0	0	
State Owned Enterprise Wholesaler	0	0	0	0	0	0	0	0	
State Owned Enterprise Retailer	0	0	0	1	0	0	2	0	
Private Seed/Hatchery/ Breeding Companies	3	1	0	0	0	0	1.5	1	
Private Feed/Medicine/ Fertilizer/ Pesticide Companies	2	1.3	0	0	0	0	1.5	0	
Private Machinery and Equipment Companies	0	0	0	1	1	3	1.4	1	
SOE Input Companies	0	2	0	0	0	1.8	0	2.3	
National Government Commercial Banks	3	2.6	0	3	3	2.5	3	2	
Private Commercial Banks	0	3	0	0	0	0	3	1	
Microfinance Institutions	0	0	0	0	3	2	2	0	
Moneylenders	3	2.3	0	0	0	0	2	0	
National and International NGOs	0	0	0	0	0	1.8	1.5	2	
Local NGOs	0	0	0	0	0	0	0	0	
Research Stations and Organizations	2	1.3	0	0	0	0	0	2	
Government Extension Agencies	2	2.3	0	0	0	1.9	1	1.3	
Government Agencies	2	3	0	0	1	1.5	1.7	1.7	
Provincial Level Government Administration	0	3	0	3	3	0	1	1.3	
District Level Government Administration	1	2.8	0	3	2.3	1.5	1	1.3	
Mass Organizations	2	2.4	1.8	1.6	1.3	1.5	2.2	1.9	

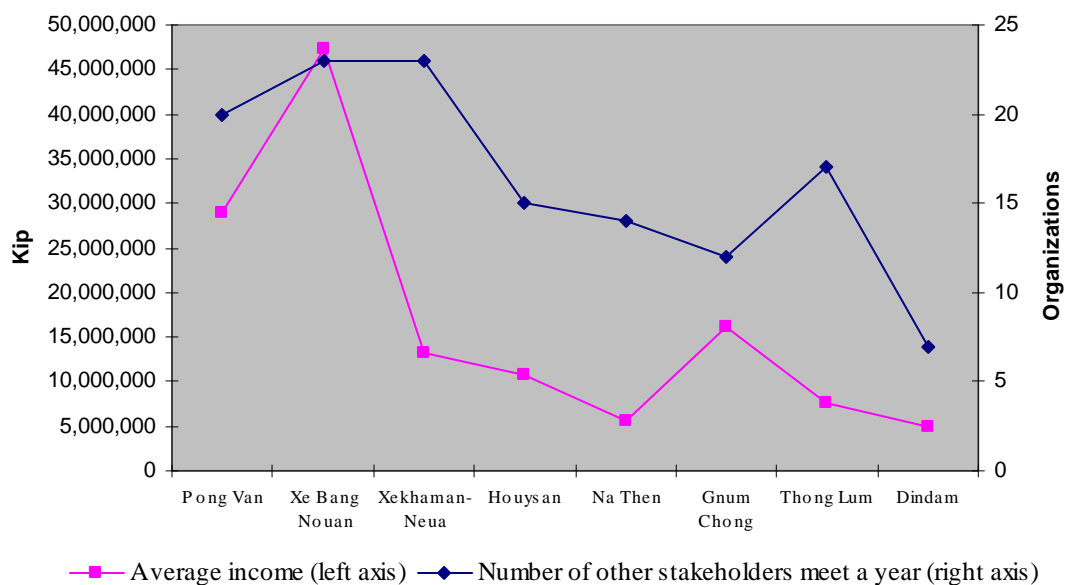
Source : UNDP/NERI Farm Family Income Survey 2005.

General observation is the different linkage between upland and lowland villages where lowland villages are having greater linkages with various stakeholders. This result roughly responds with the early review regarding poverty of the country as the majority areas identified as poor and poorest is occupied by upland and mountainous, and remote areas. In comparison, the lowland is much more developed in terms of infrastructure including road connection, transportation and communication. This result confirms that the better infrastructure particularly, road connection helps improve market access. Where market access improves, the breadth and extent of linkages with other stakeholders in economic activities is also improved and this increases income with a more stable sources.

Those lowland and along Mekong corridor villages including Phongvan village in Loungprabang, Xebangnouan village in Savannakhet, Xekhaman-nuea village Attapeu

and Houysan village villages Savannakhet have relatively higher average incomes than other surveyed villages in parallel with the average number of linkage with other stakeholders in the economy is relatively higher than other villages in upland areas (see Figure 13). This is consistence with level of commercialization could also indicated by the level of linkage with stakeholders in the economy, where this shows a diversification of local people/farmers for their income in the livelihood value chain, and the outcome is the increase in income earn.

Figure 13: Network development and income



Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

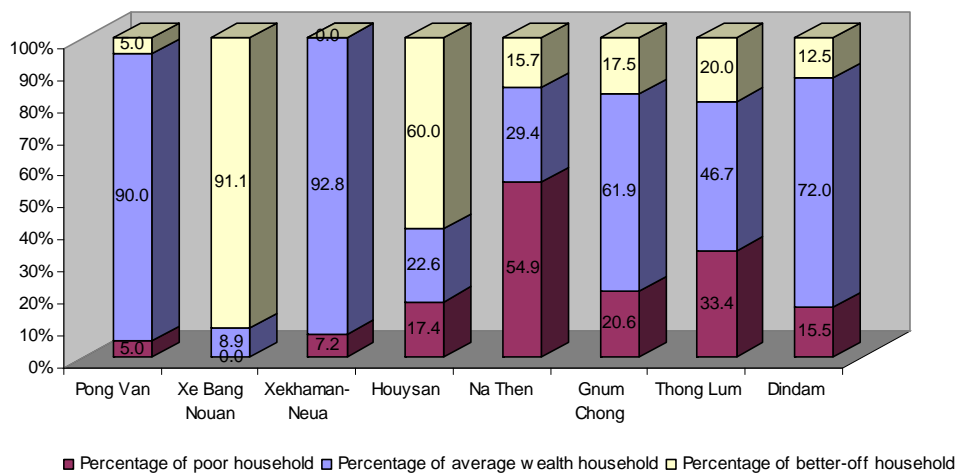
Whether or not a household has a linkage or relationship with another individual or organization is one indicator of extent of networks. However, merely having a linkage is not enough; the strength of that linkage is also important. The strength of a linkage can be proxied to a certain extent by the number of different individuals within a type of stakeholder (e.g. the number of different traders), or the number of times the household met with those stakeholders (Purcell T. 2005).

According to the survey, farm family households met around 20 other farmers during the year (business relationships, rather than personal relationships) in average. Farm families also met on average 14 different collectors and traders, and 22 different retailers. In terms of differences between households in different wealth categories there were large differences between households. As examples, poor households met on average 8 different farmers in a business relationship, compared with 17 for average wealth households and 53 for better-off households. Poor households met on average 8

different collectors and traders, compared with 12 for average wealth households and 31 for better-off households. Poor Households met on average 5 different retailers, while average wealth households met with 19 and better-off households met on average with 63 retailers.

Even the average number above is the average number of all surveyed villages and classified by wealth category, but as observed that those richer villages compose by more percentage of better-off and average wealth households than poorer villages, which burden by poor households (see Figure 14).

Figure 14: Composition of household category

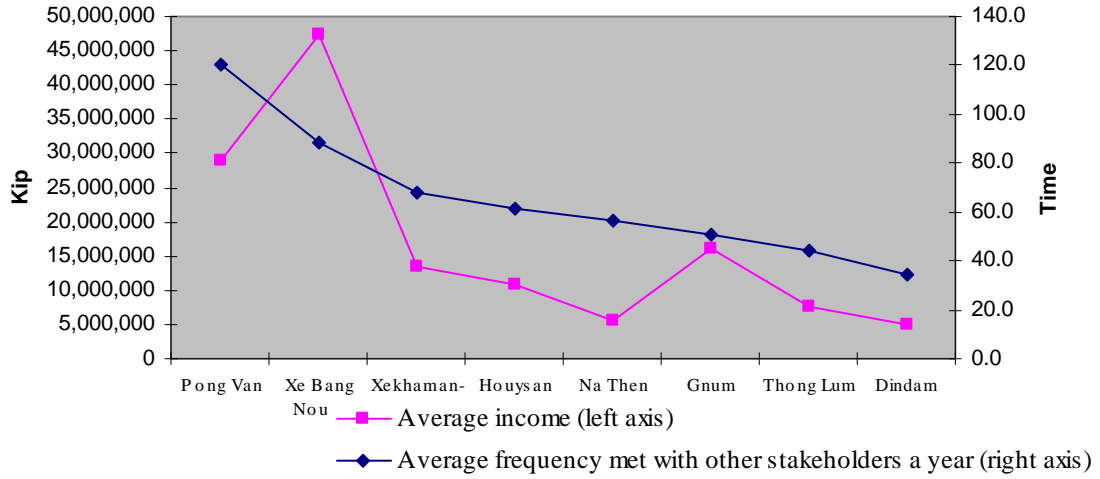


Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

This also implies that those frequent met with other stakeholders in the economy of better-off households in average can refer to the strength of linkage in those richer villages rather than poorer ones. Figure 15 shows a clearer explanation that those higher income villages have more strength linkage with lower income villages as the total average met with all stakeholders in a year is much higher in those higher income villages than lower income villages.

From the sample, we can obviously observe the relationship between market access and income of rural farmers. The market access which derives from the distance to market as well as the quality of access provide opportunity to develop their social and economic network, which shows the strength of rural people in integrating into livelihood value chain, where their cash income comes from. And through this approach, rural people earn more and stable income, improve their livelihood activities and gradually reduce poverty.

Figure 15: Network development and income



Source : NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

V. Some lessons on road development in Okinawa of Japan¹⁷

Okinawa prefecture is one of 47 prefectures in Japan, located in the southern half of the Nansei Islands which stretch between Kyushu and Taiwan. It is the fourth smallest prefecture in Japan after Kagawa prefecture, Osaka prefecture and Tokyo Metropolis, with total area of about 2,274 square kilometers. Its total population is approximately 1,368,137 (2006), with about 91 per cent of total population resides on the Okinawa main island and concentrated particularly in the central and southern areas around the prefectural capital of Naha.

The development of Okinawa has significantly started in 1972 after Okinawa has been returned to Japan from the United States. The Okinawa Promotion and Development Plans had been initiated since 1972 as an effort to reduce the gap between that region and the rest of Japan, especially in the area of social infrastructure. As the main effort is to reduce the gap and to provide employment opportunity to local people especially for the young people, the three plans were introduced and implemented with total seed budget from Japanese Government of about USD6.7 billion. The recent plan has also been initiated toward building up a self-reliance economy led by private sector, since 2002 with current seed fund from the Government of about USD1.3 billion (Table 11).

Table 11: Total Amount of Previous Okinawa Promotion and Development Project Expenditure

	Period	Budget amount (million Yen)
1st Okinawa Promotion and Development Plan	1972-81	1,249,200
2nd Okinawa Promotion and Development Plan	1982-91	2,134,800
3rd Okinawa Promotion and Development Plan	1992-21	3,370,400
Subtotal		6,754,400
Okinawa Promotion Plan	2002-	1,330,100
Total		8,084,500

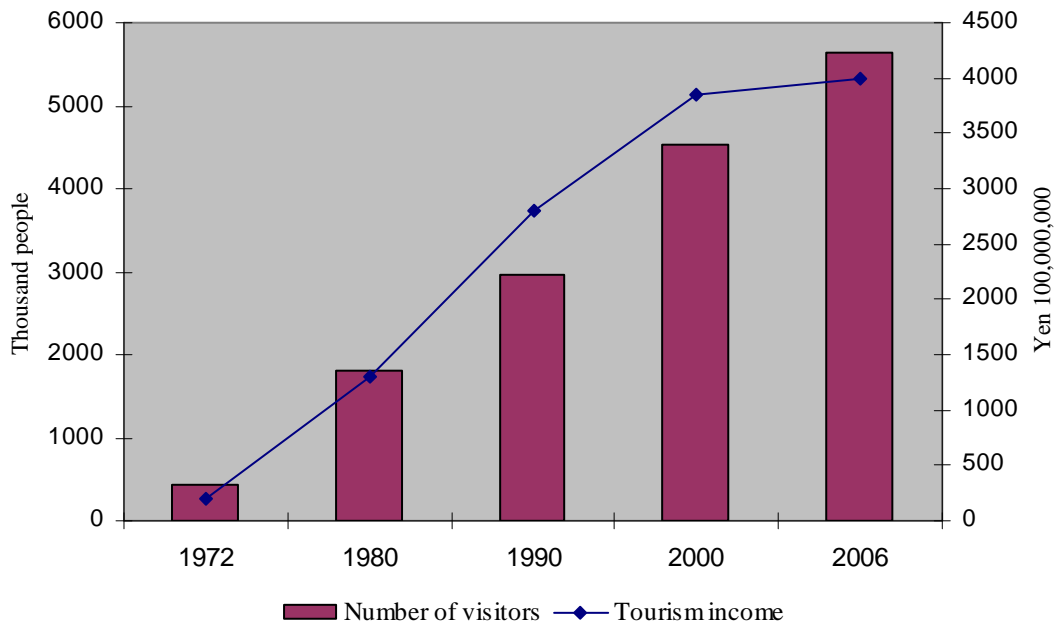
Source: Okinawa Prefectural Government, 2007

The development of Okinawa started from tourism industry with significant income earning from the sector though slightly declined since 2000, but catching up in 2006 with total tourist of about 5.6 million (Figure 16). Over 90 per cent of tourists who come to visit Okinawa are from main land Japan. As a result the economic development of Okinawa has made steady progress. This is the result of the efforts of the government in combination with the hard work of the prefecture, local municipalities, and ordinary citizens. Nevertheless, Okinawa has recently moved its strategy toward development in more advance industries including information technology, financial sector and trade

¹⁷ Bases on the field trip of author 18-20 March 2008 (Annex 4)

logistic by introducing of Okinawa Special Information and Industry Zone, Financial Business Promotion Zone, and the Special Free Trade Zone. This initiative was also based on the geographical advantage of Okinawa in comparison to other regions in Japan.

Figure 16: Number of Tourists and Tourism Income



Source: Okinawa Prefectural Government, 2007

The development of road sector in Okinawa prefecture is also based on the general development plan of the prefecture. Road sector is very important for Okinawa as it is the most transportation mode and there is no existence of railway system in Okinawa at present. Road in Okinawa has been classified into several categories including general national road, national government funded road, prefectural road, municipality road, city/village road, forest road, etc. There are several criteria to categorize the road including source of maintenance fund, but at present, Okinawa still receives priority seed fund from national government. Although, funds for road maintenance and development comes from various sources including tax on gasoline, gas, diesel, car using (buying), etc., but most of road development in Okinawa still receives about 90 per cent of budget from national government.

Technically, the development of road infrastructure in Okinawa is also based on

the traffic demand study.¹⁸ The result of technical study is very important to determine of road construction, but the demand for the road construction from local people is also be considered. The construction of road No. 18 in Nago city, for example, economically, based on the cost and benefit analysis, the B/C is very low, but according to the needs from local inhabitants this road was later approved and funded by national government (90 per cent). The road has been constructed with a very environmental friendly approach as the aim to also preserving biodiversity in the area. The road has been constructed as the most effective approach to protect natural disaster also e.g. the land slide into the sea that would destroy tourism resources of the prefecture. Nevertheless, the road would also be considered as important means of tourism expansion in itself though it might take some times.

The forest road, another example in Okinawa, the traffic demand of road is very low for the investment as most of the traffic is just only for wood carrying from the forest and very few for daily transportation of local people. However, as the construction of forest roads is very in the environmental friendly and to prevent many natural disaster, so that would help keeping or even expanding tourism sector of the prefecture in the future. This public goods might not have immediate effective in terms of economic aspect, but considering the multiplier effects in the longer terms, it would positively effects not only in terms of economic and also social aspects.

The other difficulty regarding road construction in Okinawa is in prohibited areas e.g. the areas that under national management in especially the areas for military issues as some by pass roads have to constructed in stead of passing the road through the areas. Technically, this would reduce economic effectiveness in road transportation in terms of time and also fund.

Some lessons learnt

From the interview and the field visits in Okinawa, some lessons can be learnt as follow:

- Technical cost and benefit analysis alone may not be the only approach for determination for road construction, but long term vision should also be analyzed especially the multiplier effects of this public goods in economic development of the areas.
- Road infrastructure is very important not only in terms of economic, but also social aspect, therefore, the social benefits should also been analyzed for the effectiveness of road construction.

¹⁸ Mr. Ikehara and Mr. Higa, Road and Street Construction Division, Department of Civil Engineering and Construction of Okinawa prefecture.

- The demand for road construction from local area is also important as it would ensure how local people would gain benefit from the road construction. This would also help in the negotiation process regarding the construction of the roads.
- Finally, the construction of the roads should be consistence with development trend of the country or areas, so that will ensure the effectiveness and contribution of the road construction in socio-economic development of the areas/country.

VI. Conclusion and Policy Recommendations

Previous chapter shows an important linkage between road connection and income of rural people. In summary of the above analysis, we can observe that the improvement of all-weather road in Lao PDR has significantly contributed to poverty reduction as the consumption expenditure increased. To be more clarified, the data from sample surveyed villages illustrates that there is a close link between village connecting roads and poverty reduction through increase in income opportunities to rural people. All in all we could describe that the rural connecting road provides market access opportunities to rural farmers/people, which they can develop market linkage with other stakeholders in the economy. The development market linkage, in other word, network development helps them diversify their income sources as they have linked with more variety and functional livelihood value chain system. Through this, they can earn more income with stable sources. When income improved, their farming production improved through the increase of opportunity to improve technology and other relevant to their farming production in closer link to markets. This circulation ensures a stable income; improve living standard and that reduction of poverty.

However, provision of village connecting road alone does not enough to ensure that rural people could gain benefit as much as they can. Provision of agriculture extension works including other relevant issues like agricultural market information, etc., is needed together with raising awareness of rural farmers/people of the benefits they could gain from the village connecting road in order to capture opportunity to increase their income and reduce poverty through improving their agricultural activities toward commercialization, diversifying their livelihood activities, and developing their proper market network system.

Therefore, village connecting roads (rural roads) could also be developed from rural initiative by utilizing own capacity of rural people and gradually cooperate with relevant agencies toward upgrading into better quality to ensure proper functional utilization of the roads.

Recommendations

It is important to realize that infrastructure development, particularly rural road or village connecting road is crucially significant for poverty reduction of Lao PDR. As the country set its strategy to reduce poverty by half by 2010 and graduate the country from the list of less developed countries (LDCs) by 2020, therefore, pro-poor development strategy is needed. Hence, rural road develop should be a supplement in the road sector development strategy and address in an appropriate way regarding the real situation of the country. Some recommendations for the considerations regarding the development of rural road issues toward poverty reduction in Lao PDR are as follow:

1. Although, development of national roads or other economic roads is urgently important for the country due to the real situation of poor countrywide infrastructure and budget constraints, but having a strategy to connect rural people to the main roads should also be considered and developed in conjunction with the national strategy of the sector development.
2. At national level, prioritizing development of rural roads where there have more potential or aspiring crops or other livelihood activities that are in demand domestically, regionally and internationally, so that will help develop rural farming production in linkage with markets and that ensure a more stable income for rural farmers/people.
3. Establishment of Rural Infrastructure Fund (RIF) to act as the means to mobilize funds for rural road development should be considered. As currently, main sources of infrastructure (including road) are international communities including foreign donors, international organizations, non-governmental organizations (NGOs), etc. Development of appropriate mechanism for mobilizing fund is needed because each donor differs from one another.
4. Nevertheless, in cooperation with village authority, the RIF should also proactively raises rural people/farmers awareness of their village connecting road especially the areas with no access and encourage them initiate the development of the roads from their own capacity in the beginning.

VII. References

- Shenken Fan and Connie Chang-Kang (2005), *Road Development, Economic Growth and Poverty Reduction in China*, International Food Policy Research Institute, Washington DC: 2005
- Peter Warr (2005), *Road Development and Poverty Reduction: The Case of Lao PDR*, ADB Institute Discussion Paper No. 25, Asian Development Bank Institute: February 2005
- Government of Lao PDR (GOL) Ministry of Communication Transportation Post and Construction (MCTPC) (2000), *Strategic Directions for the Development of the Road Sector*: Vientiane, June, 2000
- GOL, MCTPC (2007), *Road Network Statistics 2006*, Department of Planning and technical issues, June 2007
- GOL, Committee for Planning and Investment (CPI), National Economic Research Institute (NERI) (2001), *The Study of Social-Economic Impacts on the Use of Road 9* Vientiane, 2001
- GOL, CPI (2004), *National Growth and Poverty Eradication Strategy - NGPES*: Vientiane, 2004
- Economic Growth, Trade, Transport, and Technology*, Bajpai and Carruthers IBRD ESCAP (1994), *Corridor Study: Singapore, Malaysia, Thailand, Lao, Vietnams*, ESCAP 6/94
- GOL, CPI, NERI/UNDP (2006), *Macroeconomic of Poverty Reduction Project, Improving Farm Family Income Study*: Vientiane, 2007
- GOL and UNDP (2001), *National Human Development Report Lao PDR – Advancing Rural Development*, UNDP, 2001
- GOL and UNDP (2006), *National Human Development Report Lao PDR – International Trade and Human Development*, UNDP, 2006
- Government of India, Ministry of Surface Transport (1995), *Basic Road Statistics of India: 1989-91 to 1991-92*, Ministry of Surface Transport, New Delhi: January 1995
- Government of Pakistan, National Transport Research Centre (1987), *Analytical Review of Road and Road Transport Statistics (1947-85)*, Planning Commission, December 1987
- Dominique van de Walle (2001), *Choosing Rural Investments to Help Reduce Poverty*, World Bank, Washington, DC, USA, November 2001
- John Howe and Peter Richards (1984), *Rural Road and Poverty Alleviation*, Intermediate Technology Publication, London, 1984

- Buddhadeb Ghosh, Prabir De (2004), *Investigating the Linkage between Infrastructure and Regional Development in India: Era of Planning to Globalization*, Journal of Asian Economics, November 2004
- GOL, National Statistical Centre (2004), *Lao Expenditure and Consumption Surveys (LECS III)*, NSC, Vientiane: March 2004
- C. Gannon, K. Gwilliam, Z. Liu, and C. Malmberg Calvo (2001), *Transport, Infrastructure and Service*, (Draft): 2001
- Tony Airey (1984), *Feeder Roads and Rural Development in Africa: The Case of Sierra Leone*, Centre for Development Studies, University College of Swansea, University of Wales, 1984
- Mohider Singh and L.R. Kadiyali (1990), *Crisis in Road Transport*, Konark Publishers PVT LTD, 1990
- _____ (2005), *Diagnostic Trade Integration Study – Lao PDR*, under Integrated Framework (IF), 2005
- The International Road Federation (IRF), *World Road Statistic 1999-2004*, www.irf.org
- Raphael Kaplinsky and Mike Morris (2000), *A Handbook for Value Chain Research*, International Development Research Centre (IDRC), 2000
- Agrifood Consulting International (2004), *Integrating Value Chain Analysis and Methodologies into Policy Analysis for the Value Chain Development Training Project*, Agrifood Consulting International: December, 2004
- Karl M. Rich, *A discussion note on value-chain analysis in agriculture: methodology, application, and opportunities*, Agrifood Consulting International
- Agrifood Consulting International (2005), *Value Chain Workshop*, Vientiane, Lao PDR: November, 2005
- Okinawa Prefectural Government (2007), *Looking at Okinawa – Situational Overview of Okinawa Prefecture*, Okinawa Prefectural Government: March 2007
- Okinawa Prefectural Government (2007), *Welcome to Business Paradise – Industrial Promotion Guide*, Okinawa Special Free Trade Zone: March 2007
- Okinawa Prefectural Government (2007), *Industry and Communication Industry Location Guide*, Okinawa Prefecture: 2007
- Nago City Government (2007), *Welcome to Nago – Okinawa*, Nago city, 2007
- Road No. 18 Project*, Okinawa, 2007

Annex 1 General characteristic of surveyed villages

Characteristics of Surveyed Villages

Province		Louangprabang		Xiengkhouang		Houaphanh	Savannakhet		Attapue
		Nambak	Louang-prabang	Nong Het	Kham	Viengxay	Xephon	Song-khone	Samakixay
District		Thong Lum	Pongvan	Dindam	Gnum Chong	Na Then	Houysan	Xebang-nouan	Xekham-neua
Village									
Mountainous		X		X		X			
Flat Land			X		X		X	X	X
Lao Ethnicity			X		X	X		X	X
Ethnic Minorities		X		X	X	X	X		
Very Far from Domestic Markets		X		X		X			
Close to Domestic Markets			X		X		X	X	X
Close To Border Markets				X		X	X	X	
Total Number of Households		60	251	32	97	51	115	157	223
Livelihood Activities	Agriculture	14	13	12	19	12	12	12	12
	Non-Agriculture	4	17	9	14	10	13	16	29
	Total	18	30	21	33	22	25	28	41
	Average Active Household	9	5	15	22	12	13	12	9
	Percent Sold	52.50%	70.90%	41.50%	58.20%	41.70%	50.70%	61.20%	47.60%
	Percent Consumed	47.50%	29.10%	58.50%	41.80%	58.30%	49.30%	38.80%	52.40%
Market Access	Distance to District Town	37	4	14	10	5	38	42	0.5
	Distance to Market (km)	11	1	12	6	6	7	7	1
	Access Ranking	7	2	8	3	4	6	5	1
Access to Services	Education	Low	High	Low	Medium	Medium	Medium	High	High
	Health	Low	High	High	Medium	Medium	Medium	Medium	High
Average Household Income ('000 Kip)		7,607	28,838	4,950	16,206	5,493	10,719	47,293	13,320

Source: Study Team Calculations

Annex 2 Basic profile and network development figure of each surveyed village

1. Thonglum village

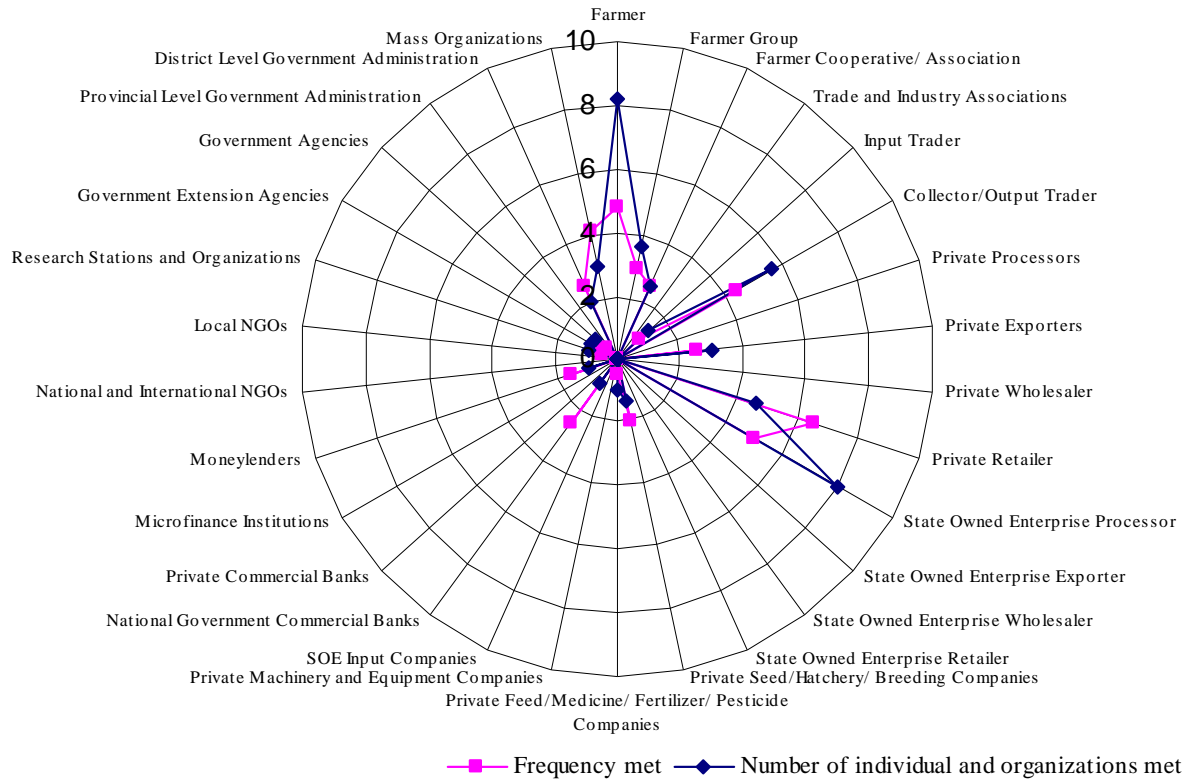
Thonglum Village is located in the northern part of Nambak District of Louangprabang Province. In common with most of Nambak District, the topography of Thong Lum Village is steep to undulating, at around 336 meters above sea-level rising to undulating foothills and mountain ranges in all directions.

The main agricultural activities in Thonglum are a single crop of lowland and upland rice, along with maize grown under contract, vegetables, taro, and sesame.

The village is located approximately 37km from the district capital and 83km from Louangprabang town. The village comprises some 60 households, all of which are engaged in agricultural activities. The total population is around 356 persons (178 males and the same number of females). Of the 60 households, 7 (11.7 percent) are considered very poor, 13 (21.7 percent) are poor, 28 (46.7 percent) are average wealth and 12 (20 percent) are considered better-off.

Linkage structure of network

Number and Frequency met with other stakeholders in economy - Thonglum village



2. Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

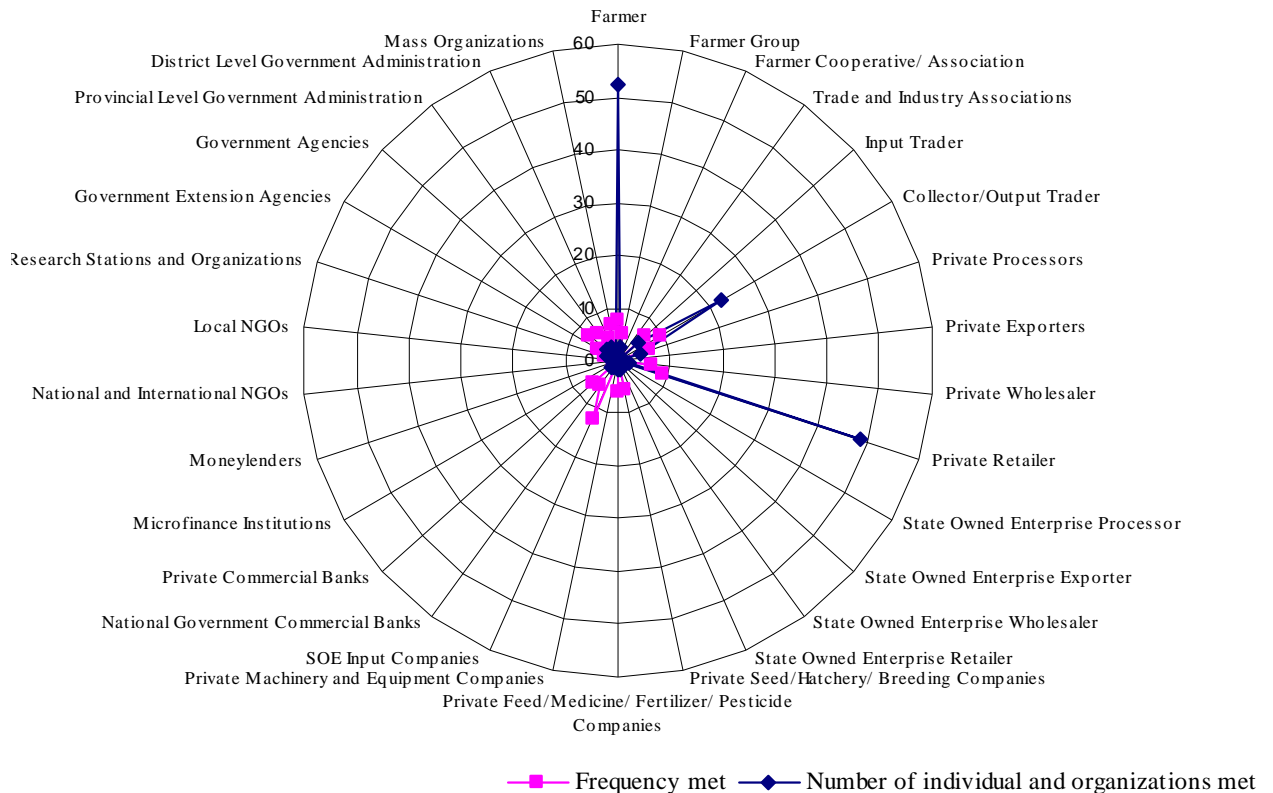
Pongvan Village is located in the southern part of Louangprabang District of Louangprabang Province. In common with most of Louangprabang District, the topography of Pongvan Village is flat along the Mekong river and undulating foothills further away. The village is around 286 meters above sea-level rising to undulating foothills and mountain ranges in all directions.

The main agricultural activities in Pongvan are a single crop of rice, along with soybeans, vegetables, maize and Job's Tears. Dry season production is restricted to vegetable cultivation.

The village is located approximately 4-5km from Louangprabang town along the road to the Khouangxi waterfall; a major tourist destination in Louangprabang. The village comprises some 251 households, of which around 201 households (84 percent) are engaged in agricultural activities. The total population is around 1,386 persons (696 males and 690 females). Of the 251 households, 5 percent are considered poor, 90 percent are average wealth and 5 percent are considered better-off.

Linkage structure of network

Number and Frequency met with other stakeholders in economy - Phong van village



3. Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

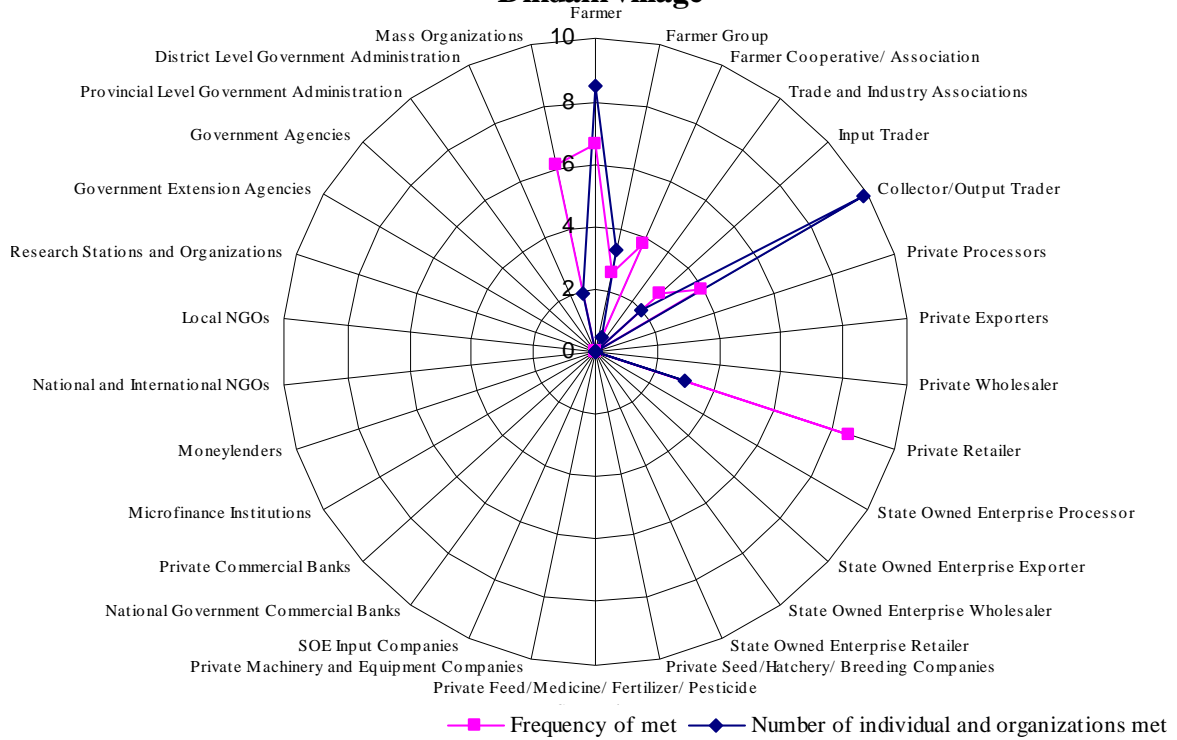
Dindam village is located in the eastern part of Nong Het District of Xiengkhouang Province two kilometers from the border of Lao PDR and Nghe An Province in Vietnam. In common with most of Nong Het District the topography of Dindam Village is steep to undulating, at around 1066 meters above sea-level rising to undulating foothills and mountain ranges in all directions.

The main agricultural activities in Dindam are a single crop of upland rice (1.5 t/ha), maize, vegetables, taro, cassava, banana, pumpkins and fruit trees. In the dry season only vegetable production is carried out.

The village is located approximately 14km by road from the district capital and 146km from the provincial capital. The village is a relatively new village, having moved from their traditional lands some 1-2km further up the mountains. The village comprises some 32 households, all of which are involved in agricultural activities. The total population is around 229 persons (133 males and 96 females). Of the 32 households, 5 (15.5 percent) are considered poor, 23 (72 percent) are considered average wealth, and 4 (12.5 percent) are considered better-off.

Linkage structure of network

**Number and Frequency met with other stakeholders in economy -
Dindam village**



4. Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

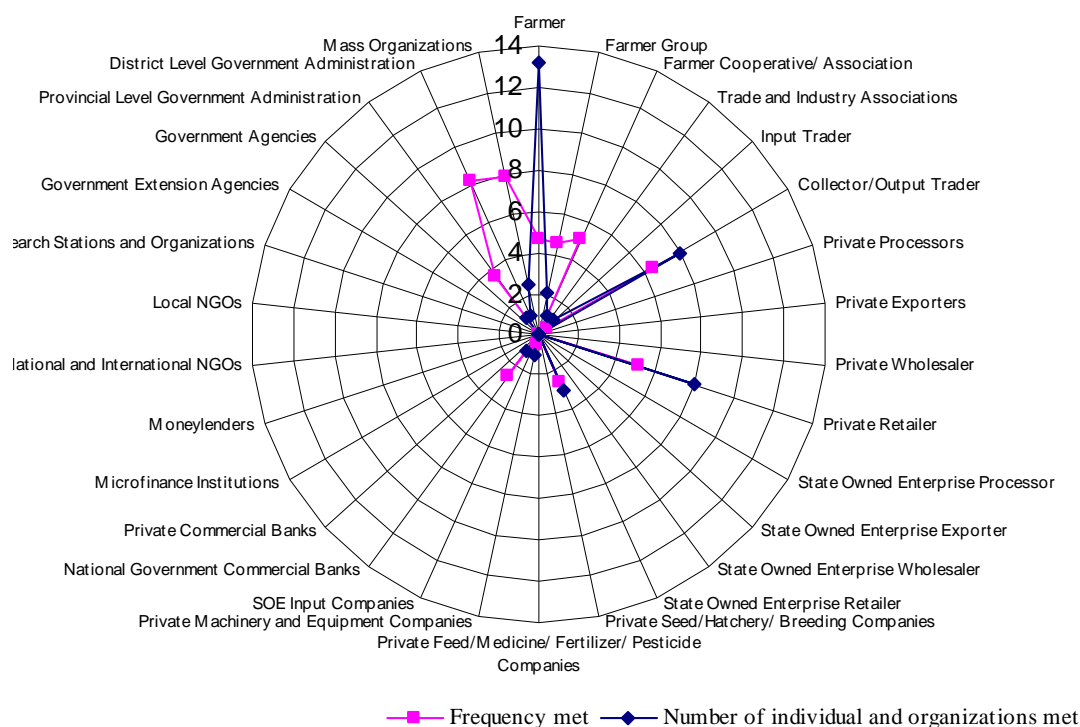
Gnum Chong village is located in the eastern part of Kham District of Xiengkhouang Province. In common with most of Kham District the topography of Gnum Chong Village is flat to undulating, at around 517 meters above sea-level rising to undulating foothills and mountain ranges in all directions.

The main agricultural activities in Gnum Chong are rice, maize, vegetables, garlic, chili, soybean and fruit trees. Most rice is single cropped, but there is a small area of land (15ha) which is also cultivated in the dry season. For the rice area there is water users group which formed in 1999 under an ADB project. The annual fees are 10kg of rice per hectare of dryland paddy and 50kg of rice per hectare of irrigated paddy.

The village is located approximately 10km by road from the district capital and 64km from the provincial capital. The village comprises some 97 households, all of which are involved in agricultural activities. The total population is around 556 persons (273 males and 283 females). Of the 97 households, 20 (20.6 percent) are considered poor, 60 (61.9 percent) are considered average wealth, and 17 (17.5 percent) are considered better-off.

Linkage structure of network

Number and Frequency met with other stakeholders in economy - Gnum Chong village



5. Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

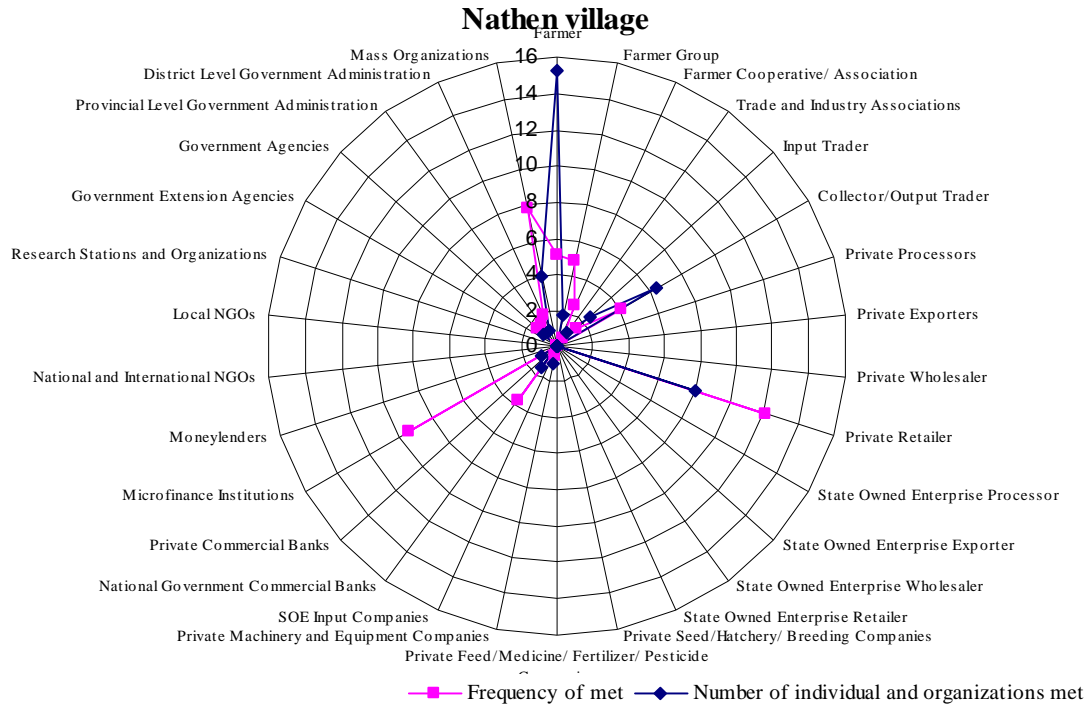
Na Then village is located in the eastern part of Viengxay District of Houaphanh Province. In common with most of Viengxay District the topography of Na Then Village is undulating to steep, at around 810 meters above sea-level rising to undulating foothills and mountain ranges in all directions. The village is located approximately 5-6km by road from the district capital and 23 km from the provincial capital. There is ready road access to northern Vietnam through the Vietnamese provinces of Thanh Hoa and Son La. Most commercial trade between Lao PDR and northern Vietnam passes through the road to Thanh Hoa and has to pass through Na Then village.

The main agricultural activities in Na Then are rice, maize, vegetables, garlic, peanut, and cassava. Rice is single cropped, and vegetables and garlic are cultivated in the dry season.

The village comprises some 51 households (56 families), all of which are involved in agricultural production. The total population is around 305 persons, of which 140 are male and 165 female. Of the 51 households, 28 households (54.9 percent) are considered poor, 15 households (29.4 percent) are average wealth, and 8 households (15.7 percent) are considered better-off.

Linkage structure of network

Number and Frequency met with other stakeholders in economy -



Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

Houysan village is located in the eastern part of Xephon District of Savannakhet Province. In common with most of Xephon District the topography of Houysan Village is flat to undulating, at around 236 meters above sea-level rising to undulating foothills in all directions. The village is located approximately 38km by road from the district capital and 234 km from the provincial capital. There is ready road access to central Vietnam through the Vietnamese province of Quang Tri. Most commercial trade between Thailand, Lao PDR and central Vietnam passes through the road to Hue, some 75km to the south, but Houysan lies only 7km from the border of Quang Tri and National Road Number 9 to Hue (135km away by road).

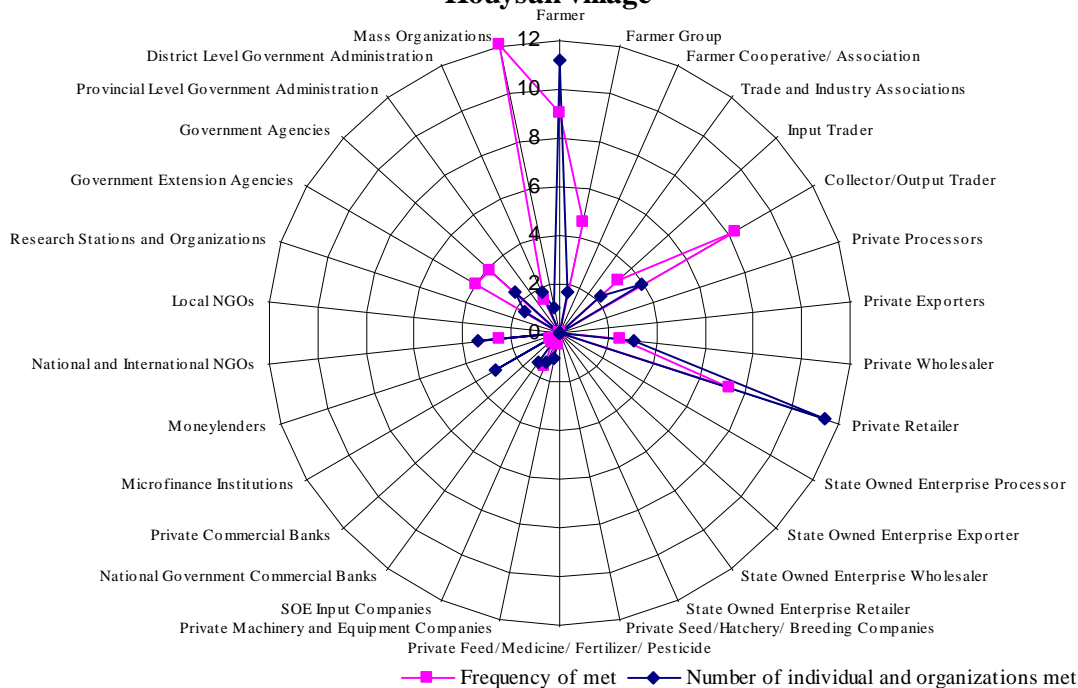
The main agricultural activities in Houysan are rice, maize, vegetables, tobacco, and sweetpotato. Rice is single cropped, and vegetables, sweet potato and maize are cultivated in the dry season.

The village comprises some 115 households, all of which are involved in agricultural production. The total population is around 742 persons, of which 356 are male and 386 female. Of the 115 households, 20 households (17.4 percent) are

considered poor, 26 households (22.6 percent) are average wealth, and 69 households (60 percent) are considered better-off.

Linkage structure of network

Number and Frquency met with other stakeholders in economy - Houysan village



7. Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

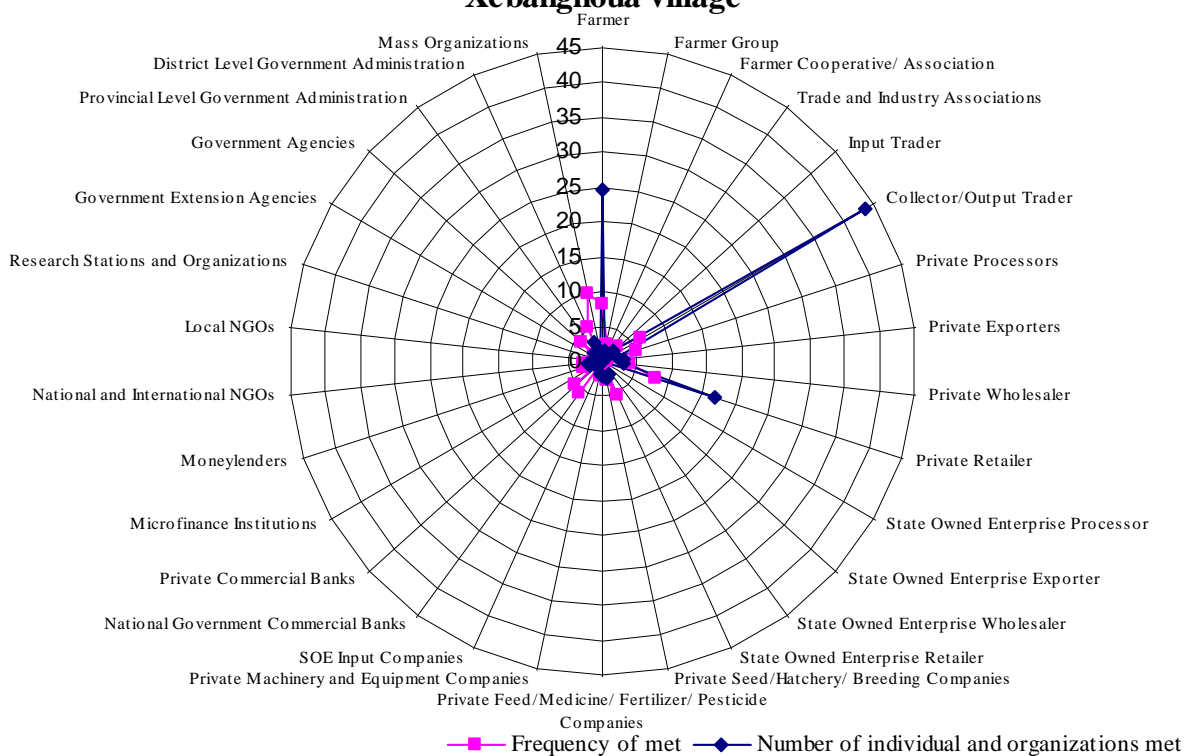
Xe Bang-Nouan village is located in the southern part of Songkhone District of Savannakhet Province. In common with most of Songkhone District the topography of Xe Bang-Nouan Village is flat, at around 146 meters above sea-level rising to undulating foothills in all directions. The village is located approximately 42km by road from the district capital and 115 km from the provincial capital. There is ready road access to Thailand through the Thai province of Ubon Ratchasima only 6km away.

The main agricultural activities in Xe Bang-Nouan village are rice, maize, vegetables, soybean, tobacco, sweetpotato, fruit trees and cotton. Rice is single cropped, and vegetables, sweet potato, maize, soybean, tobacco and cotton are cultivated in the dry season.

The village comprises some 157 households, of which 143 households are involved in agricultural production. The total population is around 1061 persons, of which 533 are male and 528 female. Of the 157 households, 14 households (8.9 percent) are average wealth, and 143 households (91.1 percent) are considered better-off.

Linkage structure of network

Number and frequency met with other stakeholders in economy - Xebangnoua village



Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

8. Xekhaman-neua village

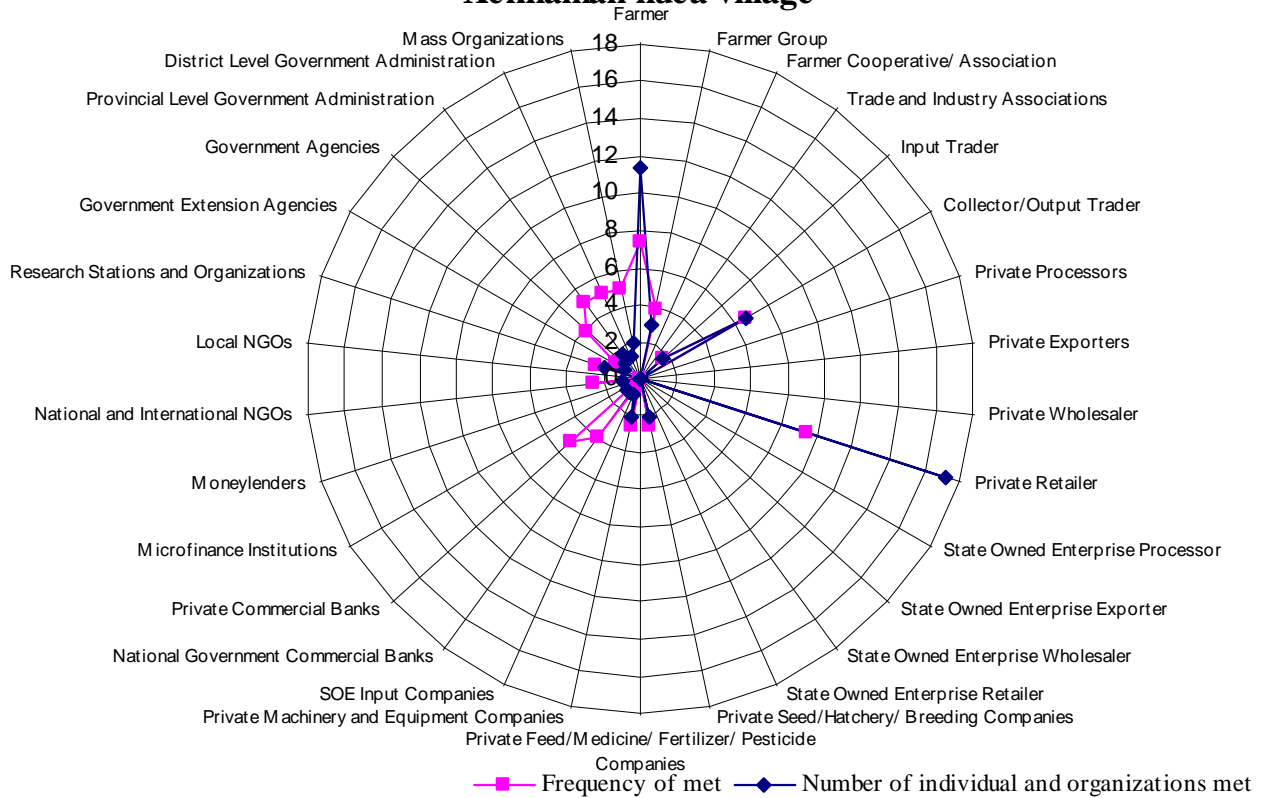
Xekhaman-Neua village is located in the southern part of Samakixay District of Attapeu Province. In common with most of Samakixay District the topography of Xekhaman-Neua Village is flat, at around 100 meters above sea-level. The village is located approximately 500 meters by road from the Provincial capital. There is ready road access to Rotanak Kiri Province in northern Cambodia 58km away, as well as to Kon Tum Province in Vietnam (100km).

The main agricultural activities in Xekhaman-Neua village are rice, maize, cucumber and watermelon. Rice is single cropped, and cucumber and watermelon are cultivated in the dry season.

The village comprises some 223 households, of which 205 households are involved in agricultural production. The total population is around 1172 persons, of which 588 are male and 584 female. Of the 223 households, 16 households (7.2 percent) are classified as poor and 207 households (92.8 percent) average wealth.

Linkage structure of network

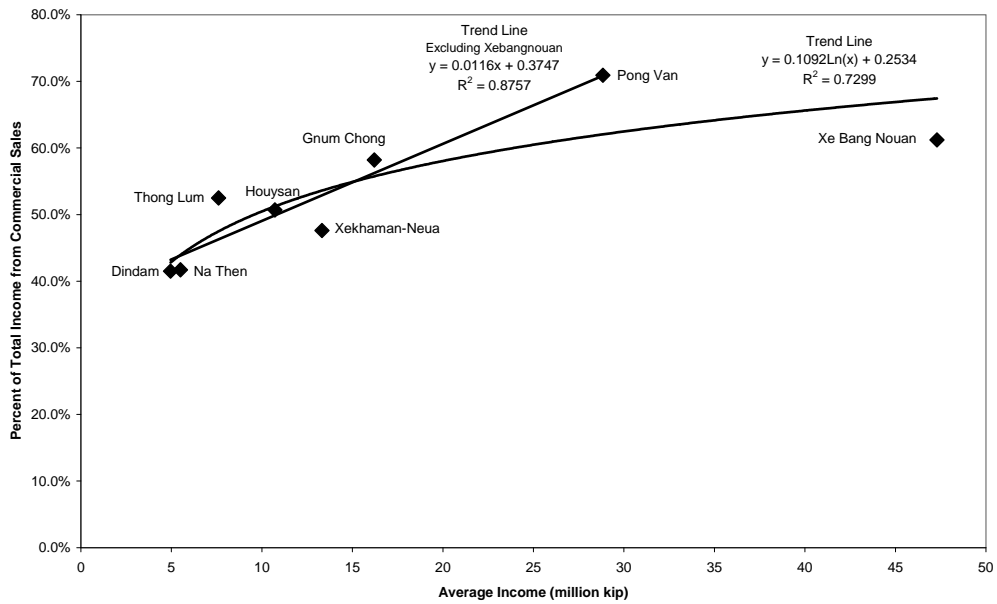
Number and frequency met with other stakeholders in economy - Xekhaman-nuea village



Source: NERI/UNDP, Farm Family Income Survey, 2005 (adapted by author)

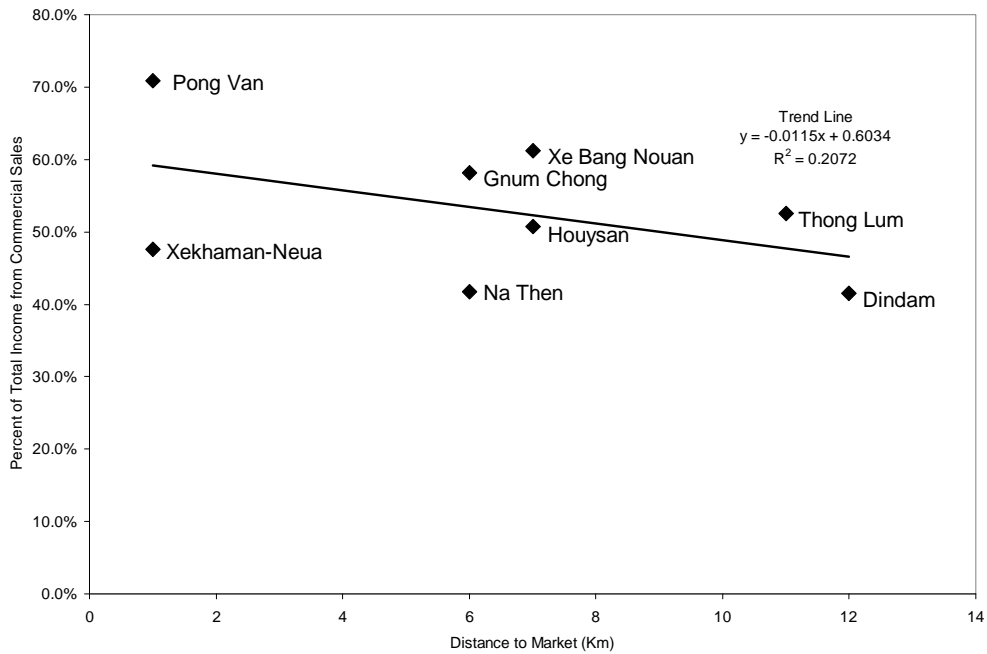
Annex 3 Analysis of road and rural livelihood and income in surveyed villages

Figure 3-1: Relationships between Commercialization and Income



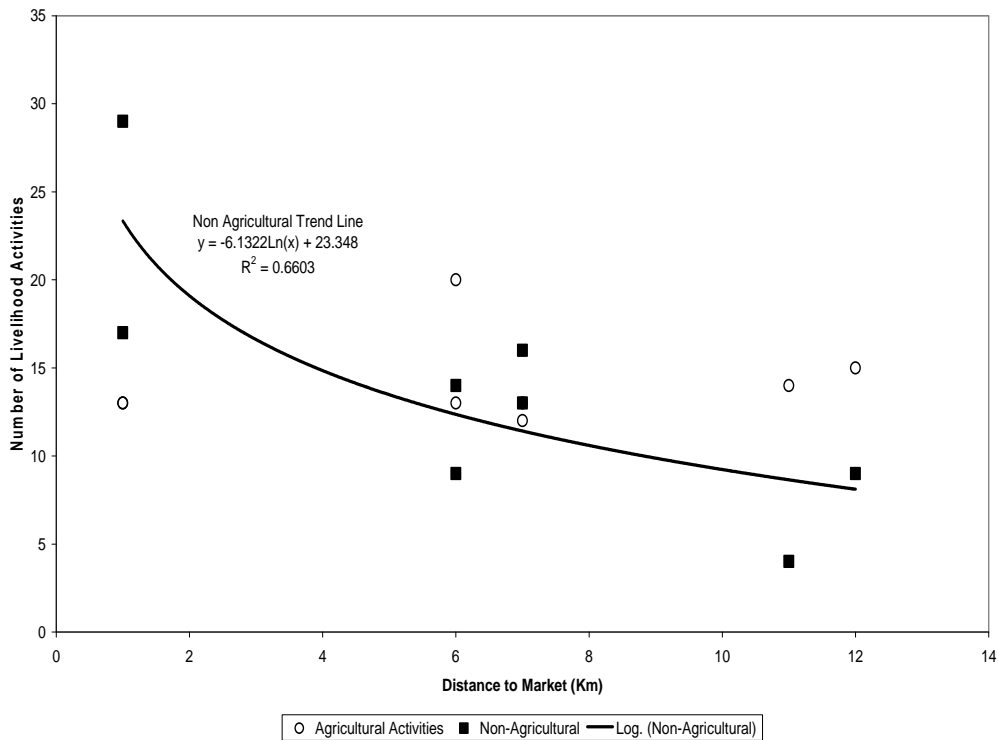
Source: based on Farmer Income Survey – Improving Farm Family Income in Lao PDR, Macroeconomic of Poverty Reduction, NERI/UNDP, 2005

Figure 3-2: Relationships between Distance to Market and Commercialization



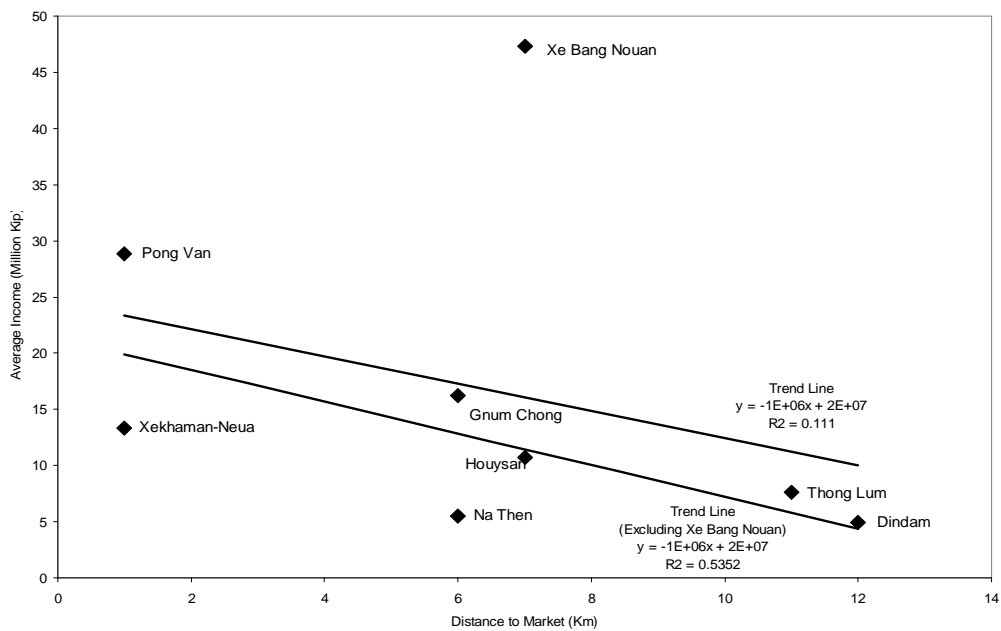
Source: based on Farmer Income Survey – Improving Farm Family Income in Lao PDR, Macroeconomic of Poverty Reduction, NERI/UNDP, 2005

Figure 3-3: Relationships between Distance to Market and Livelihood Activity



Source: based on Farmer Income Survey – Improving Farm Family Income in Lao PDR, Macroeconomic of Poverty Reduction, NERI/UNDP, 2005

Figure 3-4: Relationships between Distance to Market and Livelihood Activity



Source: based on Farmer Income Survey – Improving Farm Family Income in Lao PDR, Macroeconomic of Poverty Reduction, NERI/UNDP, 2005

1. Main Purpose of the Field Trip

The main objective of my research on “Infrastructure (Rural Road) Development and Poverty Alleviation in Lao PDR” as an ERIA Research Associate at IDE-JETRO is try to demonstrate the relationship between infrastructure development with special focus on road development and poverty reduction in developing country like Lao PDR. The approach is to see how rural road development contributes to rural people livelihood and increase their income level through linking their farming activities to stable markets as this is the most efficient way to increase their income and gradually reduce poverty in rural areas. Yet, rural connecting road offers also opportunities to access to off-farm employment as well as other social aspects.

An intention to be included in the research is to review a lesson from Japan in terms of rural road development, which can be a case study for the research. Considering real situation, Okinawa might be the most appropriate place in Japan in order to present as a lesson for Lao PDR. In Lao PDR, some national main roads have already been constructed with better condition including Route 13, 9, 12, etc. However, the connecting road from many villages are very bad condition, some road are only usable during dry season but many absent. In Okinawa, the expressway from Naha city to Nago city has already been developed with very good condition, but there are many natural heritage sites which are in national protection account. This would be a good lesson to learn on how the government of Japan as well as Okinawa prefecture address this situation and develop the most appropriate road development policy in the prefecture.

The main purpose of the study tour is to observe, review and learn related lessons from Okinawa prefecture as follow:

- History of road network development in Okinawa
- Main objective and process of road network development in Okinawa
- Difficulties facing and how to solve the problems
- The main difficulties at present regarding road system
- Plan for future

2. Schedule and Activity

- 18 March, 2008

13:00	Planning & Administration Division of Okinawa Prefecture
13:30-15:30	Briefing on Special Economic Zone Mr. Tamaki, IT Industry Promotion Division, Department of Tourism, Commerce and Industry Mr. Kinjo & Mr. Motonaga, Industrial Site promotion Division,

Department of Tourism, Commerce and Industry

15:30-17:30 Briefing on Road Development in Okinawa Prefecture

Mr. Ikehara & Mr. Higa, Road & Street Construction Division,
Department of Civil Engineering & Construction

- 19 March, 2008

9:30-9:45 Mr. Omine, Industrial Site Promotion Center

9:45-10:30 Mr. Ishida, Convault Japan, Inc

11:20-12:00 Promotion Center for Agriculture, Forestry & Fishery of Northern
Part

13:30-15:00 Field Survey of Setaka Forest Road

15:00-16:00 Field Survey of Prefecture Road No. 18
Civil-Engineering Office of Northern Part

16:00-17:00 Financial Special Economic Zone
Nago City Multi-Media Complex
Planning Complex for Future

3. General Observation

Although, the development of Okinawa prefecture is still heavily depended on national budget of the government of Japan but looking at the overall development process of the prefecture we could see how the prefecture changed its development strategy from one sector to another over period of time. The main reason is the real situation of Okinawa including the trend of social and economic both within the country and the location advantage of Okinawa itself. This strategic change is very important to ensure sustainable development of each country/region. (Some lessons learnt has already been integrated into the paper).

The Institute of Developing Economies (IDE) is a semigovernmental, nonpartisan, nonprofit research institute, founded in 1958. The Institute merged with the Japan External Trade Organization (JETRO) on July 1, 1998. The Institute conducts basic and comprehensive studies on economic and related affairs in all developing countries and regions, including Asia, the Middle East, Africa, Latin America, Oceania, and Eastern Europe.

The views expressed in this publication are those of the author(s). Publication does not imply endorsement by the Institute of Developing Economies of any of the views expressed within.

INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO
3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI
CHIBA 261-8545, JAPAN

©2008 by Institute of Developing Economies, JETRO