Access, Transport, and Local Economic Development

The socio-economic impact of
Labour-based rural infrastructure rehabilitation and maintenance
in Siem Reap province

Kingdom of Cambodia

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UNDP/UNOPS/ILO 'CARERE' CMB/95/011

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The content and views expressed in this report are the author's responsibility. I wish this report echoes the judgement and acclaim that ILO labour-based interventions in Cambodia have received from independent international experts, international donors and agencies (and as frequent deserved when the support was lacking). With the outcomes of the socio-economic impact assessment, labour-based infrastructure investments catch the development spotlight, and keep it shining. Evaluations and analyses of development interventions often find that the spotlight which taxpayers wish to dominate the development stage, follows the actors, blinks, and fades out. The reader judges accordingly. The results reflect upon the work and energy of several Chief Technical Advisors, project staff, the Cambodian Government, external advisors, and not the least, upon the commitment and inputs from international donors.

C.J. Sakko Bangkok ,1999

GLOSSARY

ADB	Asian Development Bank
CARE	Co-operative for American Relief Everywhere
CARERE	CAmbodian REsettlement and REhabilitation programme
CTA	Chief Technical Adviser
EGP	Employment Generation Programme
IALA	Inter-Agency Letter of Agreement between ILO, UNDP and UNOPS
ILO	International Labour Organisation
ILS	International Labour Standards
IRAP	Integrated Rural Accessibility Planning
ITC	Institut de Technologie de Cambodge
KfW	Kreditanstallt für Wiederaufbau, German aid agency
LBAT	Labour-Based Appropriate Technology
MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
NEDA	Netherlands Development Agency
NGO	Non-Governmental Organisation
PDRD	Provincial Department of Rural Development
PPWD	Provincial Public Works Department
RGC	Royal Government of Cambodia
SIDA	Swedish International Development Co-operation Agency
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNCHR	United Nations High Commissioner for Refugees
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
WFP	World Food Programme, United Nations

Exchange rate December 1997
1 US Dollar ≈ Cambodian Riels 3,500

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EXECUTIVE SUMMARY

Question I

What is the impact of the labour-based interventions in rural road rehabilitation on access to important economic and social services, within the influence zones of the rehabilitated roads in Siem Reap Province?

Changes in access were analysed as possible improvements in physical, economical and social ease to transport goods and to travel on the rehabilitated roads, and to travel and transport goods hence and forth from communities to important and economic social centres.

Improved access on the rehabilitated roads

The attention is drawn to the benefit of road users. Where road users go, money rides. Hence, part of this section addresses question II on the economic impact at the same time. The Transport and load survey demonstrates a strong direct relation between rural road rehabilitation on the one hand, and positive changes in transport pattern, transport fees, and load carry on the other. Improved physical access comes together with a broader use of transport vehicles, most clearly indicated by an increased use of motorised transport. Road users on rehabilitated roads are more flexible in choosing their travel destinations. By cutting travel time considerably they save physical energy, or can afford to travel longer distances (within the same time period) to important economic and social centres than road users on non-rehabilitated roads. Travelling and transport in poor rural areas is as important as it was before the rehabilitation. Travel frequencies for road users do not change much (an average frequency of 3 trips a day for all road users), but road users travelling hence and forth from remote areas bring transport frequencies in line with others using the rehabilitated road network around Siem Reap town.

Important savings on transport fees for goods and a considerable reduction in travel time indicate a more efficient use of transport facilities as economic capital. For road users the economic impact is best expressed by vehicles currently carrying a load quantity that multiplies the load carried before the rehabilitation by 2 up to 5. There is a strong trend of road users on rehabilitated roads paying and charging considerable lower fees for the transportation of goods. Passenger transport has become a more productive and profitable business.

Improved access for communities

Motorised transport is more and in broader variety available in communities along rehabilitated roads. Remote villages benefit most from new motorised transport, such as truck and motor trailer. Others than the road users, villagers in communities along rehabilitated roads increase their daily trips and travel more frequent than people from communities along non-rehabilitated roads. The geographical area in which people meet

social and economic needs is for road users wider than for people in the villages. But the benefits of improved access are for communities more crucial. They reduce their travel time to markets and health centres with about 40 per cent. The communities along rehabilitated roads also benefit from health facilities being closer established to their villages, thanks to the investments of other (international) agencies.

Question I I

To which extent do the labour-based interventions in rural roads have a measurable impact on local economic development, within the influence zones of the rehabilitated road network in Siem Reap province?

Measurable was understood as an analysis of growth, indicated by growth in local transport and travelling, business activities at shops and markets, and improvements in the social and economic capital resources of communities.

Impact on business activities at local markets

Rehabilitated rural roads contribute immediately to a boost of business activities at district and commune markets. Adequate infrastructure and good connections to other important economic centres (the added value of a road network!), such as the provincial capital, result in more vendors opening stalls or offering products and services.

The increase in shop volume has logically brought more competition to the markets. 55 Per cent of the vendors also selling before the rehabilitation face a drop in prices and profit shares, as a result of improved transport and supply of goods (and new vendors). A smaller group of (new) vendors takes advantage of more customers visiting the markets. Turnover and monthly profit of a majority of this group doubles. Thus, turnover and profit are 'redistributed' over a larger group of vendors, which enhances the capital flow in local economies. Observing a 600 per cent growth in shop volume in the project area, the overall productivity of local markets, measured by (changes in) profit volume, increases.

Rehabilitated roads underline the importance of location and geographical conditions, as an indicator of market potential and performance. This is expressed by changes in price level, profit, and higher rental fees. The majority of the vendors expect to be able to sell their shop and plots for more than 50 per cent of the market value before the rehabilitation.

The role of rehabilitated infrastructure is strong, mostly indirect, and has also its limits. Some of the surveyed business characteristics, such as pricing, are also influenced by other factors: the devaluation of the currency, and other effects emerging from the outbreak of the Asian financial crisis. However, their role at local markets seems limited (as the bulk of the goods and services are based on agriculture production). The political events that arose throughout 1997 hardly play a role in the assessment of the vendors.

Impact on community capital: social and economic resources

On the short term, road rehabilitation has a reasonable impact on improvements in capital assets of communities. Vehicle ownership (particularly for motorised transport) strongly increases, and household enterprises are boosted. Villagers make important per capita savings on the cost for operations and maintenance of vehicles. The Village survey demonstrates that communities along rehabilitated roads see the potentials of an adequate road network very clearly. They jump into the niches of transport and trading, facilitated by consequent improvements in a broad spectrum of access conditions.

Some of these *shock-effects* in capital development sustain. Part disappears – in some villages rather quickly. Rural road rehabilitation influences the planning and implementation of other infrastructure assets to a small extent, providing adequate physical access to communities that are targeted for other interventions. The aid sector is active in the project area. But even then, the needs for productive infrastructure investments remain high.

The outcomes of the Village survey reveal – probably more than the developments in transport and business at local market - that other factors play a role in the development of capital assets. Additional inputs are necessary to achieve productive outputs. One could think of private or public capital injections, skill development, facilities for business management, but also the advantage of scale (comparing villages with markets). Communities are particularly vulnerable to disasters, and some clearly to insecurity problems. The majority of the surveyed communities paid a high toll for the floods and droughts in 1997.

Question I I I

What is the impact of labour based rural road rehabilitation on other important conditions for community development, within the influence zones of the rehabilitated roads in Siem Reap province?

'Other important conditions*' were analysed as related aspects of local development, such as environmental conditions, security issues, and other impact effects that may reveal during the process of data collection.*

Impact on security, environment and other aspects

For a vast group of communities, the rehabilitated roads contributed to establish a basic and secure daily living. Their land and living area were cleared from mines when the road works were planned during the early nineties. This became most beneficial to the remote located communities, around Svay Chek and Loley, areas that were extremely difficult to access before.

The majority of the communities were more frequently visited by police patrols working on disarming the demobilised factions. Roads and adequate connections to Siem Reap town prove to be a preventive signal against brutal looting. This type of insecurity is still a big issue, which two communities along non-rehabilitated roads confirmed with examples.

Stemming from the top-layer of the rehabilitated roads causes dust clouds that receive a clear negative response in all villages, and go here and there together with respiratory problems. The dust problem is recognised in several countries were laterite or gravel roads are constructed, and apart from spraying the roads with water to bring the dust down, a more appropriate solution has not yet been found. The majority of the villages along the rehabilitated roads report a positive impact on water drainage in the village and on land irrigation. A small group of communities report negative effects in parts of their village.

The reservation of some folks against urban lifestyles that find their ways to the community through the young generation leaves a two-way interpretation. Is this dust or a road? In the end, even in the few negative responses, communities consider themselves being better off than before.

CHAPTER 1 INTRODUCTION: THE CMB/95/011 PROJECT AND LABOUR-BASED TECHNOLOGY IN CAMBODIA

1.1 Start of the project[1]

In 1992 after signing the Peace Accords, Cambodia faced an imminent resettlement of about 700,000 people. The shortage of land, the difficulties that refugees and internally displaced people dealt with in returning to farm lands and agriculture, and the fact that many demobilised soldiers had only limited skills, created a pressure to quickly generate additional employment in non-agriculture activities. Moreover, years of war, economic isolation and central planning had left the country with widespread poverty, especially in the rural areas, with an estimated per capita income of US$150. A second major problem was the state of the country's secondary and tertiary roads network[2]. The infrastructure mission organised by the United Nations Development Programme in 1990 concluded that travelling by road was extremely difficult. Many of the country's 4100 bridges had collapsed and hardly any maintenance had been done to roads during the twenty years of war.

Late 1992, the ILO and the UNDP established the *Labour-based infrastructure rehabilitation project (*CMB/92/008) to address these problems. The Cambodian administration at that time lacked the knowledge, the experience and skills to plan, organise and implement a large-scale labour-based programme. The labour-based project is one of the three components forming the ILO's Employment Generation Programme (EGP) in Cambodia, which was to a certain extent unique in its approach towards poverty alleviation and employment generation, and in geographical coverage[3]. When the labour-based project received funding from UNDP, it became part of UNDP's Area Development Programme.

1.2 Project history and funding

In May 1992 the UNDP and the United Nations' High Commissioner for Refugees (UNHCR) started funding a *Labour-based infrastructure rehabilitation project* (CMB/92/008). The Government of the Netherlands and the Government of Sweden were the biggest donors for

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1 This project backgrounder is based on the project document CMB/92/009/A/03/13 and the draft report of the SIDA project review mission in May 1998.

2 In 1990 the estimated provincial roads had a total length of 3,100 kilometres and the local and tertiary roads an estimated length of 28,000 kilometres.

3 The EGP further comprised of a programme component on small enterprise development (and credit provision) (CMB/92/010) and a component on vocational training (CMB/92/009). The component on enterprise development is still ongoing and has entered into a new phase. The component on vocational training has officially come to an end in October 1998.

the UNDP funding share. In 1996 the UNDP requested the ILO to enter into an inter-agency agreement with the UNDP and the UNOPS, to further integrate the labour-based project into the UNDP-framework of the *C*ambodia *A*rea *Re*habilitation and *Re*generation programme *(CARERE)*. The new agreement came in place in July 1997.

The UNOPS became the executing agency with the ILO as an associate agency. In real terms ILO continued to deliver management and implementation of the labour-based operations, in co-operation with the line departments of the Ministry of Rural Development and the Ministry of Public Works. The name of the project changed into the *Labour Based Rural Infrastructure and Maintenance Project* (UNDP/UNOPS/ILO CARERE CMB/95/011), in this report further referred to as *'the labour-based project'*. Under the new agreement the overriding project goal remained the same. However, 1996 marked a change in focus.

The project activities so far concentrated on construction and rehabilitation of the infrastructure. As from 1996 the project has been giving full attention to maintaining the investments made and the (indirect) socio-economic benefits that derive from these. The current resources set aside for new construction works on roads and canals are therefore relatively small.

The Government of the Netherlands and the Government of Sweden have been funding the second phase of the labour-based project. For The Netherlands Development Agency (NEDA) this was a continuation of the funding of the first project phase. The Dutch funds are allocated through the UNDP, the UNOPS, and the CARERE framework. The Swedish International Development Agency, SIDA, has been allocating funds from July 1996 to 31 December 1998, initially through the UNDP and later directly through the ILO. The funding ratio is approximately 1:2 for respectively NEDA and SIDA. From 1992 to 1997 the project has spent approximately US$15 million in total.

1.3 Project objectives

The overall objective of the labour-based project is to contribute to the short term and long term economic development of Cambodia through establishing ac sustainable labour-based infrastructure development and maintenance capacity (taking into account the shift in focus from construction to maintenance as from 1996). The labour-based operations are expected to generate a high number of workdays, meant to offer direct employment to rural folks who are urgently looking for income-generating opportunities. The project operations are expected to generate important spin-off effects that include improved access to markets in rural areas, improved water storage and expanded irrigation coverage, contributing to the development of agriculture and short term and long-term employment opportunities, and better access to social services.

The immediate objective (1) of the project is to design and implement an effective labour-based infrastructure rehabilitation project, generating employment for up to 4,000 people, particularly aiming to target socially and economically disadvantaged groups.

The project targets were in 1992 formulated as:

- the generation of 200,000 work days (end-of-project estimate)
- the construction of 150 kilometres of tertiary roads
- the construction of 6 irrigation and water storage schemes in the provinces of Siem Reap and Battambang
- clean-up activities to be performed on the ponds and the environs at the Angkor historical sites in Siem Reap (in association with the UNESCO).

The other immediate objective (2) of the project is to develop a strategy for long term sustainability of rural roads and irrigation projects nation wide, through the promotion and use of labour-based technology. The Government of Cambodia regarded the adoption of the recommended strategy as the ultimate proof of success.

1.4 Project strategy

The project addresses short-time employment problems by creating a large number of workdays for unemployed and underemployed workers, and for other vulnerable groups that can not be absorbed by the agriculture sector. An important part of the recruited work force are supposed to be women, aiming to target many of the female-headed households. Disabled people are encouraged to participate in the project, for selective works and tasks.

The project addresses long-term employment problems through important spin-off effects from the construction and maintenance of roads and irrigation canals. Improved access to markets and social services, and improved water storage and irrigation coverage are expected to contribute to productive agriculture development and to long term non-agriculture employment opportunities.

The project strategy combines several elements to establish a sustainable policy for rural roads and irrigation, using labour-based technology. The project trains government counterpart and local staff (engineers, technicians, supervisors, machine operators and administrative staff) as an integrated part of building and maintaining infrastructure assets. The training covers planning, organisation and implementation of labour-based roads and irrigation works. Likewise, the project strongly contributes to building up a system for cleaning and clearing the environs of the Anchor monuments on an ongoing basis.

The project builds capacity among provincial authorities to manage and execute labour-based projects effectively. Higher government structures are sensitised and involved to promote labour-based appropriate technology on a national scale. The project enhances the involvement of local private contractors in the implementation of labour-based works, and also co-operates with educational institutions.

1.5 Project beneficiaries

The direct beneficiaries of the project are persons affected by the war, returnees from the border camps, demobilised soldiers, disadvantaged groups, or in other words, the Cambodian poor. These people can find direct wage employment through labour-based construction and maintenance activities.

The ultimate beneficiaries were in the 1992-project document described as: "the general rural population and the small farmers living in the project areas benefiting from improved access to markets and social facilities, from improved income and employment opportunities, as well as from the supply of food at reasonable prices that will follow the rehabilitation of roads and irrigation systems".

The Cambodian counterpart and local staff, although not referred to as such in the project document, can also be considered as a small, but important group of beneficiaries. Based on ILO world-wide experiences with labour-based infrastructure projects, a considerable number of technical staff gain or improve their professional skills in labour-based engineering or administrative disciplines. Most staff has a good employment perspective, once the project activities have come to an end.

1.6 Project operations and staff

Since 1992 the project has been operating rehabilitation and maintenance activities for rural infrastructure in the provinces of Siem Reap, Banteay Meanchey, Battambang, Pursat, and until 1997 also in the provinces of Takeo and Kandal. Road rehabilitation and maintenance are performed in all provinces. Irrigation construction and maintenance works are performed in Battambang (Bovel area) and Siem Reap (Berai area) provinces. Cleaning and clearing of the Angkor monuments and environs take place in Siem Reap province. The activities of the labour-based project in the four provinces are administratively linked to the UNDP-funded *Ca*mbodia *A*rea *Re*habilitation and *Re*generation *(CARERE)* project. The road maintenance activities for the rehabilitated infrastructure in Takeo and Kandal Provinces have been handed over to the Rural Infrastructure Improvement Programme (RIIP), which receives funds from the Asian Development Bank (ADB).

The project operates from five project offices, located in Phnom Penh (co-ordinating office), Siem Reap, Sisophon, Battambang and Pursat. An international team leader and two international engineers run the project. Local staff is hired for the posts of office co-ordinators, clerks, secretaries, drivers, and technical personnel (engineers, technicians, supervisors, and machine operators). The project offices in the four provinces are located in or attached to the Ministry of Rural Development (MRD), or the Ministry of Public Works and Transport (MPWT). For roads and irrigation activities the project collaborates with the MRD and PWD line-offices, and with the Department of Hydrology of the Ministry of Agriculture. For the activities at Angkor, the project collaborates with the Angkor Conservation Office of the Ministry of Fine Arts and Culture.

1.7 Relations with other projects

The Government of Cambodia and many international donor - and aid agencies consider the development of rural infrastructure using labour-based technologies a most effective strategy to alleviate poverty and to improve the living standards in rural areas. The project achievements and the technical quality of the ILO labour-based project have created the standard for what has become a national policy for rehabilitating rural infrastructure. This position requires the labour-based project to act at the forefront of the developments in rural infrastructure. There is a continuous need to build strong relations with the government, international donors and technical organisations.

An important partner is the CARERE project, the national aid framework of UNDP in Cambodia. UNDP-funding for the labour-based project is channelled through CARERE. CARERE also develops project activities in local infrastructure, separate from the labour-based project. Target areas and the focus of CARERE investments (e.g. community planning for improved health, education and drinking water) are however different. Community participation, the use of local labour, and the use of low-cost materials are key-elements in CARERE activities. To implement CARERE investments communities are asked to provide labour; workers do not receive wage payments. CARERE has expressed an interest in receiving support from the ILO for training in Integrated Rural Accessibility Planning (IRAP) methods. The IRAP local planning techniques have been developed by ILO-projects in the Lao PDR, The Philippines, Malawi, and Tanzania, for over more than ten years.

The World Food Programme (WFP) of the United Nations has assisted the labour-based project from 1994 to 1997 in the payment of wages, by providing food-for-work inputs. The workers of selected target communes receive their wages in 50 per cent cash and 50 per cent food (on average). By the end of 1997 the WFP had contributed 876,895 workdays[4] to the project. The contribution in workdays shows a gradual decrease over 1996 and 1997. As from 1996 the WFP has shifted food targeting activities to the remote parts of Cambodia. Regarding wage-payments, the labour-based project observes the ILO International Labour Standards. In cooperation with the WFP the project carefully considers the impact of subsidised food on food prices at local markets.

As from July 1998 a new international project has become operational, parallel to the labour-based project. This project provides technical and capital assistance to the Government's rural infrastructure development programme. The project is called the 'Upstream' project (CMB/97/M02/SID) and receives funds from the Government of Sweden. The ILO provides technical assistance. The project activities contribute to capacity development in the Ministry of Rural Development, particularly to prioritise, plan, design, finance, manage and maintain the rural infrastructure network. The training of local private contractors, and the private sector being increasingly involved in labour-based operations are the main targets for the future. The project actively support the mainstreaming of labour-based appropriate technology curricula at Institute Technologie du Cambodge (ITC), Cambodia's premier engineering college located in Phnom Penh. The approved project budget until 2001 is approximately US$ 4.4 million.

Another large Rural Infrastructure Improvement Programme (RIIP) started in December 1997. The Ministry of Rural Development obtained a loan of US$26million for this programme from the Asian Development Bank. The loan agreement includes international technical

[4] 1997 Annual Report of 1997 of the labour-based project

assistance. The programme is operational in 6 southern provinces of the country. The RIIP project operations grew out of the experiences developed under the ILO labour-based project. It has taken over best practices in project design, and uses ILO training modules and course programmes. The RIIP took over part of the well-trained and skilled senior staff from the labour-based project. The RIIP further applies ILO-practices of employing workers under fair working conditions and paying minimum wages. Both projects aim to establish sound quality engineering standards for Cambodia's rural infrastructure. The two projects complement each other geographically and technically, and collaborate where necessary to promote the importance of labour-based appropriate technology in Cambodia.

The ILO has also been identified as the agency to provide technical assistance for a planning and infrastructure component of a new US$5 million community development project in the Northwest provinces of Cambodia. A loan is negotiated between the Ministry of Rural Development and The World Bank. The Ministry of Rural Development expects the ILO technical inputs for the SIDA-funded Upstream project to be closely integrated into this project.

The labour-based project collaborates and had working relationships with many other international funding agencies, technical organisations and (international) NGOs. The European Union, the aid agencies of the United States of America, USAID and CARE, the United Nations Capital Development Fund (UNCDF) and the German Kreditanstallt für Wiederaufbau (KfW) are a few examples. These organisations made or had made commitments to multi-million US$ projects in rural infrastructure, for which labour-based technology is considered the efficient development strategy. Active collaboration with some of these organisations came to an end when a political crisis broke out in July 1997, as a result of which several international donors suspended their development assistance to Cambodia.

1.8 Project achievements by the end of 1997

By the end of 1997[5] the project had generated 2.7 million workdays of direct employment since its start in 1992. The four provinces in the Northwest have delivered an average number of 20,000 to 35,000 workdays a month. An average 40 to 50 per cent of the workers is female, with higher percentages of women participating at road sites where women are the most abundant group of underemployed labourers to be targeted.

The project constructed, rehabilitated and established maintenance systems cost-efficiently for about 560 kilometres of rural roads, and for 96 kilometres of secondary irrigation canals. The project further cleaned-up about 500 square kilometres of the ponds and environs of the Angkor monuments.

Contributing actively to the development of human capital in government line departments, by the end of 1997 the project had trained approximately 250 engineers, technicians, and supervisors in labour-based appropriate technology. An external evaluator reflects: ''This is

[5] 1997 Annual report of the labour-based project

not just construction technique, it is also training of managers and workers and managing the paper flow and incorporate adequate monitoring and evaluation indicators[6]".
Training activities comprise in-class and on-the-job training. All interested local staff has been given the opportunity to improve their English language skills. Regular training on safety procedures for equipment operators and field staff has been an important ongoing activity within the provincial training programmes. Through practical work, awareness raising and training, the project has in addition managed to set certain traffic and safety standards on tertiary roads by promoting the use of traffic signs and by actually placing them. Such signs have also been introduced for more practical reasons to provide efforts to prevent the rehabilitated roads damaged by overloaded motorised transport.

The project has made progress in its contributions to establish a sound maintenance policy for rural roads and irrigation. The staff has conducted a road inventory system for the four project provinces. Maintenance records are regularly updated and a system of annual monitoring of road conditions is operational. Regular traffic counts are part of the project activities. A rolling five years road maintenance plan was presented for review in December 1997. Several other organisations that are active in infrastructure are interested to copy these systems and use them as a standard. Another consultant writes: "The project compares favourably with other projects in the world, despite the particularly difficult operational circumstances and historical context of the country. There is, however, an urgent need to institutionalise and extend the labour based maintenance approach developed under the project[7]." The project has been facing difficulties here. Although it has the ambition to hand over all the roads to the Ministry of Public Works and Transport, and the Ministry of Rural Development, these ministries have to become organised and regularly funded to take over the responsibility for their respective roads. So far, only the roads in Takeo and Kandal provinces have been handed over to the MRD, which was formalised in April 1998.

The major reasons for not being able to transfer roads maintenance tasks are a lack of government budgets, understaffing and underpayment at provincial departments. The earlier quoted evaluator reflects: "Cambodia is an extreme case in terms of funding for maintenance and the availability of human resources; continuing political upheavals are exacerbating the problem, simply because the first Government had no maintenance budget and the second is still to be formed and organised".

Here some extra background is necessary. The labour based project successfully contributed to the Cambodian Government declaring the use of labour-based appropriate technologies a nation-wide strategy for rural infrastructure development in 1995. An inter-ministerial taskforce on the promotion of labour-based technology was established, with support from the ILO and international donors. The committee formulates strategies for a broad application of labour-based techniques. Representatives of 15 Ministries have been participating in the committee's meetings. It is the council's mandate to make it happen that labour-based technologies are performed in *mainstream* investment policies, nation wide. At this level, success and failure stay close to each other. The committee did not meet between

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6 The evaluator Michael Hopkins on the labour-based project in: *An independent thematic evaluation: ILO's Employment Intensive Programme,* February 1998, Geneva

7 Robert Petts in: *Appraisal of technical assistance to labour-based infrastructure work programmes in Cambodia,* Sida, Intech Associates (UK), May 1997

May 1997 and May 1998. The strained political environment and the weak position of some government departments affected the agenda.
The taskforce has just recently been revived. The process of institutionalising labour-based methods remains key-priority for the future.

The project has contributed to establish agreements between the Irrigation Department (Ministry of Agriculture) and water user groups on maintenance responsibilities for secondary and tertiary canals. The Irrigation Department is responsible for irrigation reservoirs and primary canals, whereas water user groups maintain the tertiary canals themselves. The project has now facilitated an arrangement whereby the user groups also undertake routine maintenance on secondary canals.

The project further contributed to establish a maintenance system for the Angkor monuments. Maintenance implies controlling the vegetation grow, up and around the monuments, and maintaining the roads within the Angkor park. These efforts also serve tourism and the archaeological work to the monuments.

The ILO's labour-based operations indirectly achieved that other international agencies followed the example that the project has set since 1992. Several agencies have started labour-based infrastructure operations, such as the ADB-funded RIIP in 1996, the upcoming World Bank funded project in the Northwest provinces, and USAID/CARE projects at an earlier stage. The ILO field staff has in several projects actively advised or assisted, contributing to establish appropriate national standards for Cambodia.

The project has actively contributed to the promotion of International Labour Standards by employing labourers under fair working conditions, respecting minimum age and wage, and to an extent, enhancing work place co-operation. The experiences of the labour-based project demonstrate that international technical operations can provide an entry point for the promotion of International Labour Standards. Standards applied in the context of a construction project may create a further impact among local employers and small contractors. To put things in perspective, one can however not realistically expect that International Labour Standards are endorsed in (rural) Cambodia by setting project examples. In the transfer of labour-based technology, ILO projects put considerable effort in promoting local labour, an increased use of local resources, and the production of appropriate tools and equipment, that return their benefits to local economies. However, even the plain and visible common sense practices need effective follow-up at policy-levels to achieve that labour-based technology is nationally accepted as the most appropriate strategy for investing in rural infrastructure. The broader promotion of International Labour Standards needs effective follow-up through international assistance to the Ministry of Labour and the social partners, which are the appropriate parties to develop adequate policies. The new 'Upstream' project is in a position to mobilise further support for such initiatives in the context of labour-based infrastructure projects.

1.9 External observations on the project

The following quotes from evaluation reports, board recommendations, and donor reviews, reflect the views of external professionals and international missions on the adequacy of the labour-based project activities.

"The labour-based project has been a success; construction costs have been considerably lower than equivalent constructions using equipment; the project generated substantial employment opportunities for the rural population, including women and handicapped people; (..) roads have shown no significant problems, despite significantly increased traffic volumes."

"The economic internal rate of return (EIRR) calculated, using transport cost savings, is 70 percent, while the EIRR calculated, using incremental agricultural production, is 24 per cent. These rather high rates reflect in part the low costs of the ILO rural road construction technology and the present poor state of access of the current roads network."

[President of the Asian Development Bank in: Report and recommendation to the Board of Directors on a proposed loan and technical assistance to the Kingdom of Cambodia for the Rural Infrastructure Improvement Project, Manila, September 1995]

"Firstly it should be stated that the quality being produced by both the ILO and the ADB funded projects for tertiary road construction is very high, and as good, if not better, than any observed by this consultant in other countries in Africa and Asia. The operations are well-conducted, the site staff know what they are doing, and the costs are well within the accepted range for gravel tertiary roads."

"Maintenance procedures have been developed and are put in place on the ILO funded roads. These procedures cover both periodic and routine maintenance, and the ILO has produced recommendations for costs and inputs based on five years plan from 1998 to 2002. The maintenance procedures adopt good practices developed and tested on other labour-based programmes in Asia and Africa. The average costs are considered realistic..."

"All procedures on the ILO roads are based around a fully donor funded and staffed 'forced account' *operation. The provincial offices of the PDRD (Ministry of Rural Development) do not directly control the works or pay the workers (…). The project recognises that this must change in the next phase, and in particular a more contractual method must be developed for all aspects of routine and periodic maintenance."*

[Consultant David Stiedl in: Rural Road Maintenance Consultancy for the Cambodia Rural Infrastructure Improvement Project - ADB Loan No 1385-CAM SF, Summary report, May 1998]

"The labour-based project is the training ground for engineers, as well as all other categories of personnel required to implement labour-based projects. It has been very successful in training counterpart staff from the provincial departments."

"... the persons trained are reluctant to return to their government posts, but are instead very attractive to other donor-managed projects. The effect of this is that the capacity to carry out labour-based projects has increased considerably in the country. Institutional capacity in the departments concerned has so far been less effected."

"The road maintenance planning system is well-elaborated and can serve as a model for wider implementation."

"The major reasons for not being able to transfer the road maintenance tasks and responsibilities to MPWT and MRD: (...) there are no government budgets to maintain

secondary and tertiary roads, the provincial departments lack staff, and the staff available is paid at a level at which they are forced to use the working days on other activities to survive."

"As a consequence, there is no other means to sustain the currently maintained roads network than continued support from The Netherlands and Sida, if the roads should not be left to deteriorate."

"Donors can not within a foreseeable future expect that investments in rural infrastructure are sustainable, unless they themselves incorporate maintenance in the projects."

[Consultant Sture Hjelm for a Sida-mission in: Follow up of ILO/Rural roads, Cambodia, draft report May 1998]

"After reviewing and evaluating hundreds of projects around the world over the past 7-8 years, few had the quality of reporting that I saw in Siem Riep. Indicators to monitor the work done, people employed and costs incurred were professionally presented and available in more detail than practically any evaluator could desire."

[Independent consultant Michael Hopkins in: An independent thematic evaluation: ILO's Employment Intensive Programme, February 1998, Geneva]

"I have a further wish that the ILO would be in a position to both carry out and expand its activities at Angkor."

[Cambodian Minister of State for Culture in a speech, 1997]

"All of this work, in particular its co-ordination and technical excellence, can be attributed to the outstanding work of the ILO which has considerable international experience in the use of the labour-based approach. Over the years the ILO has fielded a team of exceptional professionals. I take this opportunity to salute them through the ILO-Representative to Cambodia, Mme Catherine Comtet who is with us today."

[UNDP Resident Co-ordinator for Cambodia, Paul Matthews, in address in the presence of the King and Queen of Cambodia for the inauguration of the road from Siem Riep to Prasart Bakong, Siem Riep, 19 January 1997]

1.10 An assessment of the socio-economic impact

So far an elaborated background on the achievements of the labour-based project within the context of labour-based appropriate technology in Cambodia. In 1997 the team leader of the labour-based project expressed his interest in assessing the socio-economic impact of the project achievements. The main reason for such an exercise would be to further promote the social and economic benefits from labour-based infrastructure operations, in particular the project's contribution to employment generation and poverty alleviation. Besides, a socio-economic impact assessment could establish a benchmark, or data-baseline, from which further socio-economic monitoring procedures can be developed by the project.

After discussions between the team leader and the Employment Development Specialist of the ILO's East-Asia Multi-disciplinary Advisory Team, in Bangkok, the author undertook a mission to familiarise himself with the project operations and construction sites. This mission resulted in a draft-list of impact-indicators, which were further refined in Bangkok. The labour-based project has kept record of the kilometres of roads and canals constructed and maintained, with the infrastructure operations (direct project outputs). An impact assessment aims to further explore related direct and indirect economical and social effects.

Reading the overall objective (section 1.3) and the project strategy (section 1.4), the impact assessment should analyse to which extent the spin-off effects from rural road rehabilitation promote and contribute to productive and long term employment objectives, and to local (economic) development. Since the project builds and maintains rural infrastructure, the author took possible improvements in physical access to markets and social services as a starting point for an analysis of the impact. Following this logic, rehabilitated roads can improve a range of access conditions, and - possibly - the capital resources of communities as well. Road rehabilitation is further expected to have an impact on transport, and probably contributes to a boost in business activities at markets. These elements provided the general outline for the impact assessment.

The draft-list of impact indicators initially included an analysis of changes in agricultural and non-agricultural employment, shifts in occupational pattern, and income. After reviewing workload, time and staff available to assist in the implementation of the impact assessment, and most practically, having experienced the conditions in the field, employment and income characteristics within communities were kept out from the study. Likewise, the author excluded agricultural production and live stock activities. These variables are ideally to be assessed in respectively, a labour force or household survey, and in a more focused agro-economic assessment in order to ensure quality data. This impact assessment focuses on changes at a more aggregate level than households, aiming to demonstrate the impact of scale.

The author further decided to limit the assessment to the impact of road rehabilitation, instead of analysing the impact of interventions in rural roads and irrigation. An inquiry into possible improvements in irrigation would have required a more complex survey design than the format that had been developed so far. A sound analysis of the impact of improved irrigation on agricultural production should include the role of other development interventions, such as fertiliser inputs, extension services, etc., which raises the number of variables considerably. Limiting the impact assessment to road interventions implies that part of the overall objective of the labour-based project is not addressed with this report.

The leading questions for the impact assessment are:

Question I

> *What is the impact of labour-based rural road rehabilitation on access to important economic and social services, within the influence zones of the rehabilitated roads in Siem Reap Province?*
>
> *'*Access*' is a dynamic concept. Much of its meaning depends on definition. This impact assessment analyses possible changes in access as likely improvements in physical, economical and social ease to:*

- *transport goods and to travel on the rehabilitated roads (focusing on road users), and*
- *travel and transport goods hence and forth from communities to important economic and social centres (focusing on the beneficiaries in the villages).*

Question I I

To which extent do the labour-based interventions in rural roads have a measurable impact on local economic development, within the influence zones of the rehabilitated roads in Siem Reap province?

*'*A measurable impact' *is analysed as quantitative growth, indicated by growth in local transport, travelling and load carry, in business activities at shops and markets, and possible improvements in the social and economic capital resources of communities*[8]*:*

Question I I I

What is the impact of labour based rural road rehabilitation on other important conditions for community development, within the influence zones of the rehabilitated roads in Siem Reap province?

*'*Other important conditions*' are analysed as related aspects of local development, such as environmental conditions, security issues, and other impact effects that may reveal during the process of data collection.*

To provide an answer to the leading questions the author planned and implemented a Transport and load survey, a Shops and markets survey, and a Village survey, during a three-weeks mission in December 1997. The author focused the assessment on the impact of the network of rural roads around Siem Reap town that has been constructed and rehabilitated by the ILO labour-based project.

Chapter two elaborates on the structure of the impact assessment, and explains the survey concepts, the used methodological format, method of data collection, and sampling.

The author received general guidance from, Mr. David Salter, team leader of the labour-based project. The ILO-project staff based in Siem Reap assisted in the process of data collection. The author received technical advice on survey implementation from experts of the World Food Program, and from the World Bank Poverty Alleviation Project in the Ministry of Planning, Phnom Penh. Representatives from CARERE in Phnom Penh and Siem Riep provided additional advice on sampling. Data entry, processing and analysis, including report writing was done in Bangkok.

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[8] An analysis of changes in human capital, by surveying e.g. *employment* and *income* characteristics, is not part of this assessment. The project could do further research on these aspects through a separate household survey. The author has done initial work for a systematic inquiry. A possible research question could be:
"What is the impact of labour-based project interventions in rural roads on local employment, job patterns and on the living standards of rural households (in particular the workers employed on the road sites), and to which extent do the interventions contribute to poverty alleviation?"

CHAPTER 2 THE STRUCTURE OF THE IMPACT ASSESSMENT

2.1 Justification of three surveys and clarification of survey concepts

The immediate effect of quality road construction or rehabilitation is an improvement of physical access. Improved physical access is best expressed by changes in the social and economic importance of travelling and transport. Travelling and transport are indicated by *travel destination, travel time, travel frequency, passenger fares and transport fees,* and *load carry*. These indicators are to be observed for motorised and non-motorised transport. Possible changes in use of the various transport means, and in the travel and transport characteristics provide the outline for a *Transport and Load survey*, further explained in section 2.1.1.

Changes in travelling and transport are logically linked to economic activities in communities, at shops and markets. The project staff has witnessed an expansion in shops along the roads and at important market places, during the process of rehabilitation. After the rehabilitation works, some junctions suddenly happened to be strategic trading locations for communities. The author decided to analyse the changes in business activities at important market places that are located within the influence zones of the road network. Evidence for the impact of the labour-based road interventions on business activities has to be found among traders and salesmen, by clear developments in *sales volume, pricing, product variety, profit* and *market value of the shop.* These indicators provide the outline for the *Shops and markets survey,* further explained in section 2.1.2.

Communities play another strong role in local economic development. Road rehabilitation has primarily consequences for their physical, social and economic access to markets and social centres. But people in the communities travel hence and forth. When access conditions change, their living environment is likely to changes as well. Hence, the public and private assets in communities, and the perceptions of the beneficiaries on basic conditions for community development are also analysed. The *Village survey* assesses to which extent such characteristics of local development change as a result of road rehabilitation. The relevant indicators are further elaborated upon in section 2.1.3.

2.1.1 Transport and load survey

The regular traffic volume counts undertaken by the labour-based project provide insight into the traffic capacity on rural roads in Cambodia, and in the changes in use of the various means of transport (motorised and non-motorised).

The transport means (survey code between brackets) identified in this survey are:

Motorised transport:		*Non-motorised transport:*	
• motorcycles	(1)	• walking	(10)
• motor-trailers	(2)	• bicycle	(3)
• car	(6)	• ox-cart	(4)
• pickup	(7)	• horse cart	(5)
• light truck, 4t	(8)		
• medium truck, 6t	(9)		

The transport and load survey further completes the picture of transport capacity from the traffic counts[9]. It reveals the changes in *transport pattern*, *transport fares* and *load carry* which are measured as quantitative indicators. A quantitative focus enables the labour-based project to make statistical projections on the developments in travelling, transport and load. A quantitative focus has also practical advantages for the process of data collection, as compared to a more qualitative analysis (also refer to section 2.5).

Transport pattern

Travel or *transport pattern* is understood as the physical movements of all road users and transport means on the selected road. The author preferred the term *transport or travel pattern,* rather than *mobility*. The mobility of a person includes factors that are not immediately related to the geographical conditions and the availability of transport means. One could think of personal health, perceptions of distance, and other psychological aspects. The concept *transport pattern* inquires about the changes in *travel destination, frequency of trips a day travelling a certain distance*, and *travel time*.

a) *Travel destination*
Travel destinations provide insight into the distances travelled to meet important economic and social needs. The survey identifies the following trips (survey code between brackets):

- village to district centre, or vice versa (vi-dc)
- village to commune centre, or vice versa (vi-cc)
- village to village traffic (vi-ov)
- commune to district centre, or vice versa (cc-dc)
- village to provincial centre and further away, or vice versa (other)

Travelling to farmlands is not included in the assessment. A quick inquiry revealed that farmers are not solely dependent on the rehabilitated roads when visiting their lands.

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[9] A traffic count is a record of frequencies of the various transport means that pass by on a particular road during a certain time interval. A series of traffic counts show how the traffic volume and the frequencies of the various transport means change over time. Well-implemented traffic counts also show a clear order in the use of transport means, although this picture may be different for each rehabilitated road. The traffic counts of April 1998, undertaken at the rehabilitated roads in Siem Riep province, show the following average percentages for motorised and non-motorised transport:

bicycle	*ox-cart*	*motorcycle*	*motor-trailer*	*car/pick-up*	*truck*
56%	2%	37%	1%	3%	1%

They use access or field roads as frequent as the rehabilitated roads, or a combination of both.
Given the degree of infrastructure development in rural Cambodia, even well-planned rehabilitated roads can logically not address all travelling and transport needs from villages to farmlands, and vice versa. Hence, the author considered it more relevant to assess travelling and transport to farmlands in relation to all other trips undertaken by rural households. The issue should ideally be assessed in a household survey or case study.

b) *Frequency of trips a day*
The frequency of trips is understood as the number of one-way trips a day that the respondent travels the distance identified under *travel destination*.

c) *Travel time*
Travel time considers the travelled distance identified under *travel destination*, expressed in minutes.

What is the relevance of travel patterns for local social and economic development? In areas where the living conditions are (extremely) poor, travelling and transport are - like other activities - very much part of gathering a minimum daily living. It is necessary. Most rural transport is economically motivated, even trips that initially serve social needs[10]. Rehabilitated roads improve physical access to markets and social services and are expected to contribute to poor people making savings on physical energy and per capita inputs.

Transport fares and fees

Transport fares and fees are understood as the money paid for moving passengers and goods over a particular (stretch of) road. The recorded fares and fees are broken down to price per kilometre (for passengers) and price per 100 kilos (for goods), both figures expressed in Cambodian riels.

Transport fares and fees are assessed under the assumption that prices are influenced by changes in the cost for vehicle operation (for fuel, oil, etc.) and maintenance (for repair services and spare parts) - or in brief, *O&M cost*. O&M cost are in turn dependant on the quality of the roads. Following this logic, roads with low-quality pavement, or sandy and unpaved roads, go together with relative high transport fees. Roads with quality, or upgraded pavement[11] are expected to show respectively relative low or a drop in transport fees.

The height of a fare, for a trip that starts from a village, is dependent of the location of this village, its distance to main economic and social centre(s), and the variety in available transport services. A query at Puork district market, an important local trading place in Siem

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[10] A farmer who has an ailment, may have postponed a trip to a health post a few times, just to save money for transport fares, doctor fee, and medicines. However, at one point these savings do not weigh out the opportunity costs of a quick recovery and a steady continuation of earning and gathering her daily living. So he will take more expensive action and visit a health post or a pharmacy

[11] The minimum design standards observed to distinguish between low-quality and quality roads are those for 4-5 metre wide gravel roads.

Reap province, revealed that transport fees paid in and around the district centre are relatively higher than fares in areas with limited economic activities. As a consequence, transport fees are likely to drop the further one moves away from such centres. When appropriate and necessary this effect will be observed when comparing changes in the costs for vehicle operation and maintenance. For a hundred percent robust picture of the relative importance of O&M cost on the one hand, and demand and supply-driven factors on the other, a more detailed analysis of the subject is necessary. The author considers the extent of detail provided by changes in O&M cost relevant and sufficient in the context of an impact assessment (and in view of the traffic capacity on the rehabilitated roads). For practical reasons - sufficient time and the possibility to crosscheck answers - the cost for vehicle operation and maintenance are assessed in the Village survey.

Load carry

Load carry is measured by *number of passengers* and *kilos of goods* carried on vehicles. Load carry of pedestrians is not included in the survey.

The roads selected for the Transport and Load survey are given in section 2.3.1 and 2.3.2.

2.1.2 Shop and market survey

A growth in the number of private businesses has become visible during the process of rehabilitation. Along with the growth in transport movements, markets started to flourish and to expand. The shop survey assesses the business activities of shops at important district and commune markets, all located within the roads influence zone. The survey inquires to which extent the rehabilitated roads have contributed to changes in:

a) numbers of stands and stalls

b) pricing of basic goods
- basic goods are randomly selected from a particular shop

c) daily item sales
- daily sales of the selected products

d) product variety
- number of products sold in a particular shop

e) daily turnover
- daily sales of all items sold in the selected shop

f) monthly profit
- profit share of monthly sales (turnover)

g) rental fee for stall or plot

h) estimated market value

- expected sales value of the shop, which is an estimate of the combined values of products, clientele, and location of the shop

Businesses do not solely grow or collapse as a result of road rehabilitation. Other causes, such as the devaluation of the currency, or supply-driven effects that follow the outbreak of the Asian economic crisis, may affect pricing, profit, etc. as well. Hence, vendors are specifically asked to report the main reasons that have caused changes in profit, pricing, etc.

The indicators for the assessment are the listed business characteristics quantified by *numbers,* and the *main reasons* for possible changes in these characteristics. *Numbers before* and *after the rehabilitation of the relevant road nearby* are collected and compared. The names and locations of the selected markets are given in section 2.3.3.

2.1.3 Village survey

The village survey assesses to which extent access conditions, economic and social resources, and related conditions for community development change, once a nearby road is rehabilitated.

Access

The access conditions of villages are starting point for an analysis of changes in village development, as these are most directly related to road rehabilitation. Access is analysed as *physical, social and economic ease or difficulty* to move from communities to important social and economic centres and vice versa. This is indicated by changes in:

a) Access to public transport services
- availability of various transport means, and their use for public transport purposes, transport frequency, transport fares and fees

b) Access to the nearest and most important market places:
- distance in kilometres from village to relevant markets, and travel time by different means of transport

c) Access to education:
- distance in kilometres from village to primary school and travel time by walking and by motorcylce
- number of pupils from the village under survey that attend primary school, and school enrolment figures
- number of schools and teachers available in village and commune

d) Access to health care
- distance in kilometres from village to primary health facilities and (reduced) travel time by various means of transport

Conditions to get better access to schools, teachers, health posts and markets do not solely improve as a result of road rehabilitation. Sufficient food, income, extension services, tools, drugs, etc. play their own role, as explained in section 2.1.1 (transport pattern) on the difference between *access* and *mobility.* Hence, the identified indicators are most logically

not all of the same strength, or equally responsive to road rehabilitation. Numbers of teachers, doctors, etc. are less likely to change than numbers of pupils and enrolments, simply because they require other scarce resources (e.g. money needed for salaries) to change as well.

The access indicators that focus on physical and economical ease (e.g. kilometres, travel time, availability and frequency of transport means, fees) deserve priority, as they play a crucial role in changing a range of others. Other rural road projects in Siem Reap province (CARERE and WFP, although these roads are build according to different engineering design standards) may confirm this picture. More evidence of the importance of physical access improvements is found in neighbouring country the LAO PDR. The planning activities of the Integrated Rural Accessibility Planning (IRAP)[12] project reveal that 70 per cent of the local investment priorities, identified through participatory planning processes, focus on physical infrastructure improvements, in particular on rural roads. Road rehabilitation is expected to provide the key-solution to tackle the source of many access problems (in health, education, and drinking water). In His Majesty's Kingdom of Nepal several multi-million US dollar loan programmes for the construction of agricultural and village roads have been and are to be launched to open up the country to fight poverty most adequately.

The village survey pays attention to examples where road rehabilitation activities facilitated the planning of other local infrastructure investments, such as in health and education. Several other (international) agencies invest in activities that improve access to fresh drinking water. Hence, access to drinking water is, like the irrigation of farmlands, not part of the assessment.

The transport and load survey and the Village survey have a certain overlap in measuring travel time and physical distances. Travel time and distances are included in both surveys to crosscheck answers, and to identify possible differences in access improvements between road users and the beneficiaries in the villages. One could assume that petty businessmen, middlemen, traders, etc. use the rehabilitated roads more frequently and more intensively than beneficiaries in the villages. The report will pay attention to possible differences in outcomes.

Village capital: social and economical resources

The connections to nearby economic centres start to improve along with the rehabilitation works. The project staff observes an increase in transport, even when the earth-moving works have not yet been completed. Apart from increases in transport, villagers start to

[12] The Integrated Rural Accessibility Planning project (IRAP) active in eight provinces of the Lao PDR receives technical assistance from the ILO and is funded by the UNDP. The project trains officials of line departments in appropriate planning procedures for infrastructure investments and builds planning capacity in the Ministry of Communication, Transport Post and Construction in Vientiane. Besides IRAP trains (through ToT) counterpart staff in line offices to orient investment planning procedures towards the most appropriate and necessary investments; local communities play an active role in this process.

establish shops and stalls along the road. The services of existing shops expand, or may shrink because a certain business potential has to be shared with new vendors. *Soft* and *hard capital* is moved into villages: money, machines, materials, knowledge, and consumer goods. Improvements in social and economic capital resources are indicated by changes in:

a) *Numbers and variety of household enterprises*
   - the village questionnaire (Annex 9) identifies a list of non-farm activities, varying from wood processing to fish ponds; rice production and livestock activities are not included

b) *Numbers and variety of public assets*
   - public assets that are important for economic and social development; the questionnaire identifies community investments such as wells, electricity, mills, etc.

c) *Private transport*
   - ownership of vehicles, new prices of vehicles, and costs for vehicle operation and maintenance (cost for fuel, spare parts and repair fees) - *O&M costs*

If any changes, what is the real impact of road rehabilitation on these? Moving capital *into* and *out from* a village is complex process that depends on many factors. However, where adequate infrastructure importantly contributes to facilitate a boost in GDP at a macro-economic level, adequate roads and transport are as relevant catalysts for local development in micro-situations. Focusing on plain causal relations, some experts question whether rehabilitated roads lead to increased vehicle ownership. The argument is that roads may give people better access to public transport facilities, but capital, or credit interventions are needed to boost private property. Experiences from other labour-based projects reveal that developments in public and private transport services are very much inter-related. Improved physical access goes together with increased vehicle ownership, as community members start to exploit transport services. People are eager to invest in transport, and may accept the risk of making debts for that purpose.

As for vehicle ownership, the village survey records numbers of vehicles only. The author expects a significant difference in ownership between villages along the rehabilitated roads and those along non-rehabilitated roads. The author takes note of the fact that capital or credit interventions are important secondary conditions that may affect changes in vehicle ownership. For possible changes in other capital goods, the same logic applies. The Village survey assesses to which extent important social and economic resources have expanded or shrunk, by comparing *numbers* before and after the rehabilitation, by comparing the changes over the period December 1996 to December 1997, and by asking for the *main reasons* for possible changes. The author expects to find a significant difference in outcomes between villages with and those without a rehabilitated road.

The analysis in the Village survey is based on the assumption that a causal relation exists between road rehabilitation on the one hand, and improvements in access conditions and community assets on the other. The outcomes of the village survey may provide supporting evidence for this causal relation. Other characteristics, such as the development of transport on the rehabilitated roads, probably act as an intermediate factor in this process. Improvements in transport and improvements in capital assets are very likely to correlate positively.

Impact on security and de-mining

After many years of civil war and political turbulence, security is still one of the most important issues. In a recent study[13] the Cambodia Development Resource Institute calls insecurity arising from the absence of rule of law, one of the three main causes for poverty, apart from demographic pressure and lack of productive capital assets. The village survey questionnaire includes a few questions on security in and around the village. The questions inquire whether the rehabilitated roads have contributed to villages being more frequently visited by police patrols (e.g. disarming the demobilised soldiers). Changes in robberies and looting are another topic. The survey identifies *security in and around the village*, and *de-mining of land* as general categories to be commented upon by the respondents.

Impact on the environment

The impact of construction and maintenance operations on the natural environment is part of every quality-engineering job. The village survey pre-identifies *dust on the roads*, *drainage (placing of culverts)*, *flooding* and *logging* as possible areas on which the road has a positive, neutral or negative impact.

Impact on migration

In both micro - and macro situations economic growth, infrastructure and employment generation are related processes. The village survey inquires whether road rehabilitation and improved access result in labourers or families moving into villages close to the rehabilitated roads. The villages survey identifies *'migration into'* and *'out from the village'* as the main categories. *Numbers of migrating families (labourers)* and *reason for migration* are the indicators. The villages survey does not analyse the details of shifts in job pattern or employment days. These topics are reasonably covered by the National Social Economic Survey of Cambodia, rounds 1993-1994, round 1996 and 1997. A further analysis of the socio-economic impact, focusing on rural households in the project area can be related to these surveys.

2.2 Survey format and data collection strategy

Survey format

The impact assessment is implemented in survey form, which is appropriate as a large number of characteristics are to be analysed, and a range of information sources to be

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[13] Chan Sophal, Martin Godfrey, et. al., Cambodia Development Resource Institute, 1999, p.41, *Cambodia: The challenge of productive employment creation - Working paper 8,* Phnom Penh

consulted, to systematically judge the impact of road interventions on transport, access, business and community development. The survey is typical field research. The identified variables are not controlled such as in laboratory experiments.

General hypothesis

The impact assessment starts from the assumption that a causal relation exists between road rehabilitation on the one hand, and desired changes in access conditions, transport, business activities, and community development on the other. Based on this assumption, improvements in access conditions, transport, business activities, and community development are likely to show a positive correlation. Important evidence for both causal relation and correlation is found in other research examples and socio-economic impact surveys on rural infrastructure interventions, in Africa (e.g. Tanzania) and Asia (e.g. Nepal, Indonesia). However, rural road interventions in Siem Reap province were not systematically surveyed at an earlier stage, thus one can not assume a causal relation nor a positive correlation a-priori. The immediate objective of the survey is to provide collected evidence which confirms the causal relation between road rehabilitation and the identified characteristics, and supports a positive correlation. The survey outcomes should most practically communicate, in terms of measurable effects. If not available, the author will conclude accordingly.

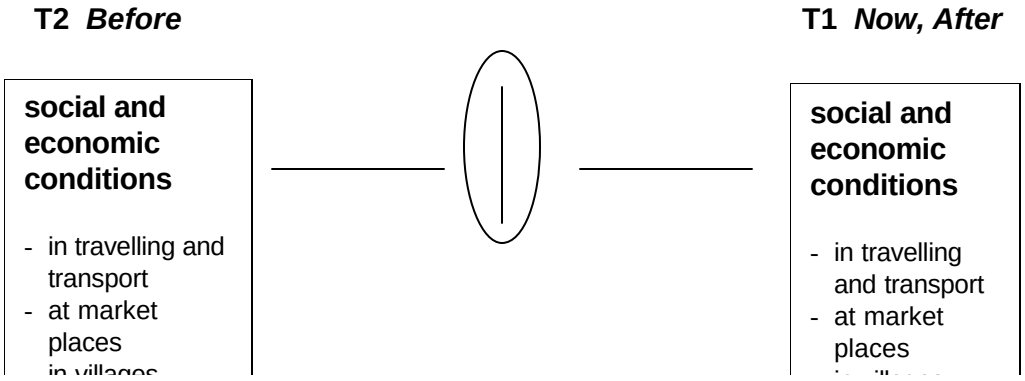
The identified characteristics on *transport and load*, *business activities at markets* and of *community development*, explained in section 1.2, are the *dependent* variables. The rural road interventions are considered as an *independent* variable. Rehabilitated roads are an independent stimulus for the survey objects: non-discriminatory to all possible road users, salesmen, and the intended beneficiaries in the communities, and constructed, rehabilitated and maintained according to the same engineering design standards. For practical reasons, this report uses the term *'rehabilitation of the road'* or *'road rehabilitation'* to characterise

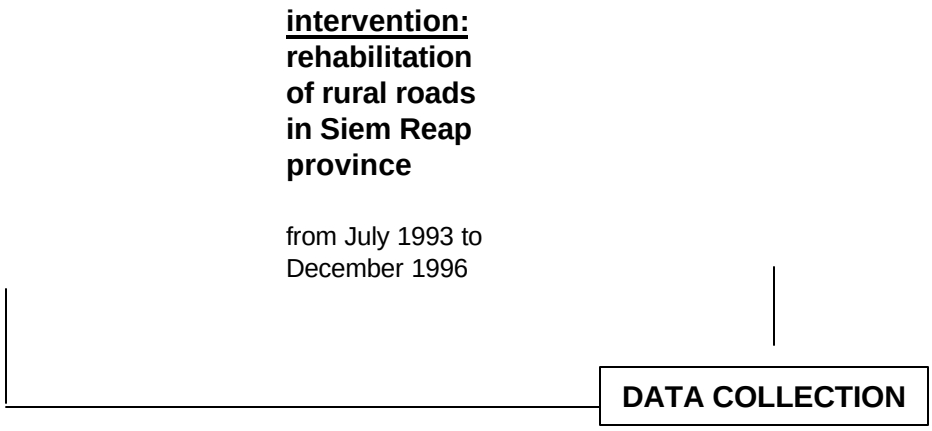
Active an retro-active information

The three surveys collect data from two specific moments in time: *before* (T2) and *after* (T1) the road interventions. T1 is December 1997 and T2 is the month in which initial construction works started, for all rehabilitated roads roughly a date between July 1993 and December 1996. This is visualised in figure 2.2.

The data from T2 are in this survey collected at T1. The respondents reflect by providing active (T1) and retro-active information (T2). The survey can therefore be characterised as *quasi-longitudinal*, or *retro-active.* The collected data, especially those at T1, provide opportunities for pure longitudinal research to be carried out in the future.

FIGURE 2.2 SURVEY FORMAT AND DATA COLLECTION STRATEGY





Control groups

For the Transport and load survey and the Village survey the author uses the instrument of a *control group*, to simulate a pre-project situation. This implies that the surveys will also be implemented on non-rehabilitated roads (*control roads*) and in villages along these roads (*control villages*). There are pros and cons to the use of a control group. The author decided to simulate a pre-project situation, to compare the active (T1) and retro-active (T2) information collected from rehabilitated roads and villages to objects that have been relatively neutral to road interventions. This will minimise errors in data interpretation, and enhance the validity of the conclusions. The selected control roads and control villages match with the intended objects of research, which will for practical reasons be further referred to as: '*ILO-roads'* and '*ILO-villages'*. The criteria for matching couples are explained in section 2.3.2. For the Shops and markets survey the author did not use the instrument of the control group, for reasons of time and staffing. Besides, the author decided to avoid questioning salesmen at *control-markets,* which would create the risk of raising false expectations towards the ILO and the labour-based project. The data taken from control roads and control villages will directly be useful to other development agencies.

Method of data collection: interviews

The author considered the road users on the rehabilitated roads, the salesmen at markets located near these roads, and groups of community members in the villages along the rehabilitated roads, as reliable and most adequate information sources to systematically judge possible impact effects. To collect this information interviews are to be held with road users, shopkeepers, and key-informants from the villages to be selected. Interviews give the advantage of collecting most updated information, through figures and opinions, as compared to other data collection methods, such as consulting and comparing statistical records. Moreover, a purely statistical analysis would not have been possible, as the author could not draw upon data-records from previous years. Live interviews give the opportunity to crosscheck answers with other sources, on the spot, which serves the reliability of the data.

The instruments to systematically collect evidence on the identified characteristics are three pre-structured questionnaires, that include instructions for the interviewer (refer to Annex 7, 8 and 9).

Standardisation of responses

The starting date of the labour-based interventions (T2) varies per road, and is roughly a date between July 1993 and December 1996 (refer to figure 2.2). In the analysis, the respondents' answers and reflections on the situation before the rehabilitation (T2) will however be treated as figures that are equally comparable. Road rehabilitation can be considered as a major change in development conditions - reference point in people's minds - of which the impact is commonly known. The author justifies this compromise to standardise T2 entries, realising that an extensive standardisation of answers in e.g. one-year periods is difficult to achieve.

Control groups are not 'treated' with road interventions. Hence, all the respondents will be asked to reflect on the changes in relevant characteristics over the last year (December 1996 to December 1997). This standardisation is necessary to be able to adequately compare answers from 'ILO-objects' with those of control-objects. The author considered a further standardisation of answers not relevant. Respondents can not reasonably be expected to reflect on the changes in characteristics over several one-year periods. A further breakdown in annual figures would most practically result in an extra burden of calculations, for which the surveys are not likely to provide sufficient reference data.

2.3 Sampling: the selection of roads, villages and market places

The relevant roads, market places and villages are located within a geographical circle with a diameter of about 40 kilometres, around Siem Riep town. This area is further referred to as the *ILO-project area.* The area directly bordering to the rehabilitated road, with a width of 1 to maximum 2 kilometres at both sides, is referred to as the *road influence zone*. Some experts define the width of the influence zone up to 5 kilometres. The author identified a relative small zone, as the rehabilitation works at some road sites have only recently been completed. Another reason for identifying a relative small influence zone is to minimise the risk that the collected data include impact effects of other important development interventions.

2.3.1 Selection of rehabilitated roads

For the Transport and load survey the author selected seven roads out of the sixteen rural roads that the labour-based project has rehabilitated in Siem Reap province since its start in 1992. Except one, all the selected roads are classified as tertiary roads[14]. Except two, all selected roads are located outside the *Berai*, a fertile area that is irrigated by labour-based dug canals which connect to the Berai irrigation basin (the area is further referred to as *'the Berai'*). Krao Bai Real junction and Puork-Khnat road (11 km) are located in the Berai; Puork

[14] The classification in primary, secondary and tertiary roads is based on traffic volume calculations and related criteria developed by the Ministry of Public Works. The Ministry of Rural Development responsible for tertiary roads in rural areas follows this classification.

Khnat has an irrigation canal coming along. The rehabilitated roads (*'ILO-roads'*) selected for the survey are:

- *Tasek road (4.0 km)*
  Tasek road is located ± 17km west-north west of Siem Reap town and starts from highway 6 near Puork district market. Tasek road heads north-north west and cuts the Lvea commune. The labour-based project rehabilitated the first four kilometres of Tasek road. The remaining part of Tasek road continues as rehabilitated earth road; this rehabilitation was part of the WFP's food-for-work activities.

- *Puork-Doun Keo road (5.0 km) and Svay Chek road (16.5 km)*
  Puork Duon Keo starts from highway 6 near Puork district market and heads north. After 5.0 km Svay Chek road takes over from Puork-Doun Keo road. It heads east-north east and cuts Svay Chek commune. The road continues through the Angkor Thom district and connects to the northern part of the rehabilitated roads network around Siem Reap town, at the junction of Trapeng Svay road and Taprok road (north of the Angkor temples).

- *Taprok road (4.0 km)*
  Starts from Trapeng Svay road (2.7 km), north of the Angkor temples, and heads further east to a dead end in Sam Rong village.

- *Loley road (12.8 km)*
  Loley road starts from highway 6, approximately 28 km east of Siem Reap town, and heads 12.8 km north to the Phnom Bhok gravel quarry.

- *Puork-Khnat road (11.0 km)*
  Puork-Khnat road starts from highway 6, near Puork district market, and heads south into the Berai area. After a sharp curve it heads back north-north east and connects to highway 6 near Khnat village.

- *Krao Bai Real (junction)*
  Located at a crossing of roads in the Berai area, .. kilometres southwest from Puork distrcict.

2.3.2 Selection of control roads

The author selected five c*ontrol roads* to measure a possible difference in outcomes between rehabilitated and non-rehabilitated roads. Given the necessary limitations in time and staff, only 5 rehabilitated roads were compared with control roads. The data from five road-couples should present an adequate picture. Besides, some overlap between the Transport and load survey and the Village survey provide possibilities to crosscheck findings. The selected control roads are:

- *Wat Prey road (5 km)*
  Wat Prey road starts halfway the Bantey Srey road and heads west, crosses a river, and heads further west. It continues after a sharp curve southwards and connects to the junction of Trapeng Svey and Taprok road. At the moment of survey Vat Prey road was rehabilitated by the labour-based project. The earth works had just started. Vat Prey is therefore still considered as control road.

- *Access road to Tasek (1.5 km)*
  This very sandy access road starts from Tasek road, a few metres north of Preah Ang Trung village and heads east into Kouk Thlok/Snou village.

- *Access road to Taprok road (1.50 km)*
  This access road starts north of Taprok village and heads south. It connects to the rehabilitated Taprok road at the junction to Som Rong village.

- *Feeder road to highway 6 (south side)*
  This road starts about 19.0 km east of Siem Riep town at highway 6 and heads south for about 5.00 km before reaching the villages Ro Lours and Do Nom (Meanchey commune). The road is sandy, but some parts are covered with old stone-pavement that probably dates back to the French colonial époque, decades ago. A canal or small river comes along with the road at about 2,50 km from highway 6.

- *Feeder road to highway 6 (north side)*
  This sandy access road starts about 19.5 km east of Siem Reap town from Angkron market place along highway 6. It heads north for 3.5 kilometres before reaching Pong Ro village, after which it heads further north-northwest.

The control roads Vat Prey, access road to Taprok, and access road to Tasek are located within the project area. The two other control roads are located outside the project area.

Road couples and selection criteria

The matching criteria for roads that are selected within the same couple (Figure 2.3) are a comparable length in kilometres, and most important, comparable geographical locations (an equal and comparable distance to primary roads and to markets and social centres). Traffic volume is not an adequate matching criterion, because the developments in transport and load are actually object of survey.

FIGURE 2.3 SELECTED ILO- AND CONTROL ROADS WITHIN ROAD COUPLES

ILO road:	*with*	*Control road:*
1 Tasek	-	1 Access road to Tasek
2 Svay Chek	-	2 Vat Prey
3 Taprok	-	3 Access road to Taprok
4 Loley	-	4 Feeder road to Highway 6 (north side)
5 Puork Khnat	-	5 Feeder road to highway 6 (south side)

Puork/Khnat road and the Feeder road south of highway 6 have both a similar irrigation canal coming along. Impact effects that may result from two interventions, in roads and canals, are in this way neutralised.

The data from Duon Keo road and Krao Bai Real junction are not represented when comparing outcomes between ILO and control roads. They are however included in the overall figure for ILO roads.

The total number of respondents in the Transport and Load survey is 118, of which 81 on ILO-roads and 37 on control roads.

After data collection, the records from Tasek road and the Acces road to Tasek had to be removed from the survey. They could not be used due to mistakes in completing the forms. Hence in presentation of the data and in the conclusions, the report will refer to 4 instead of 5 road couples.

2.3.3 Selection of market places

All selected markets are located within the project area and road influence zones. The selected markets are:

- Krao Bai Real commune market, located along the Berai road at Krao Bai Real
- Puork district market, located west of Siem Reap town, along highway 6 between the junctions with Tasek and Duon Keo road
- Bantey Srey district market, the end of Bantey Srey road, north of Siem Reap town
- Phnom Bok district market, at the of Loley road near the Phnom Bok gravel quary
- Ban Caông village market, halfway Loley road, east of Siem Reap town

The respondents for the survey are 38 randomly selected shopkeepers. The sub-sample at each market represents 20 to 30 per cent of the actual number of shops and stalls.

2.3.4 Selection of villages

The sample villages are directly located along the ILO and control roads. For the selection of villages the author followed primarily the format and criteria applied to the selection of roads and road couples. ILO-villages and control villages that are paired in village couples are equally comparable in distance to nearby primary roads, markets and social centres. Additional attention was paid to comparable size and household number. The 10 surveyed ILO and control villages have an average households number of 169, whereas the actual number of 5 villages lies between 153 and 158 households.

FIGURE 2.4 SELECTED ILO-VILLAGES AND CONTROL VILLAGES WITHIN VILLAGE COUPLES

ILO Village (along road):	*with*	*Control Village (along road):*
1 Preah Ang Trung (along Tasek road)	-	1 Kuok Thlok/Snou (along Access road to Tasek)
2 Taa Cheet (along Puork-Khnat)	-	2 Do Nom (along Feeder road to highway 6
3 Svay Chek (along Svay Chek road)	-	3 Prey Thmai South) (along Vat Prey road)
4 Som Rong	-	4 Taprok

Data from one extra village along Tasek road, Chom Bok Hae, are added to the Village database in Annex 6.

The respondents for the Village survey are the village chiefs who are seconded by a group of other villagers who supporting him in answering the questions.

The Village database includes information on characteristics that are not necessarily related to the socio-economic impact of rehabilitated roads, such as population characteristics, etc. Some extra characteristics were included in the Village questionnaire (Annex 9) to serve the project and other Cambodian and international organisations with baseline data from the project area. The analysis and reporting focuses however on characteristics that are likely to be influenced by road rehabilitation, as explained in section 2.1.3. The village database provides additional information on the following characteristics:

- *population characteristics*
  (numbers of adults and children, numbers of births, specified by sexe)
- *numbers of disabled people*
  (specified by sexe)
- *numbers of internally displaced people (IDPs)*
  (specified by sexe)
- *health*
  (numbers of health posts, nurses, doctors, pharmacies in commune and district)
- *education*
  (number of schools, numbers of teachers, in village and commune)
- *new prices of transport vehicles*
  (NB. analysis showed a weak relation between vehicle price and road rehabilitation)
- *agricultural land*
  (cultivation area - in hectares - before and after the rehabilitation; NB. analysis showed a weak correlation between road rehabilitation and increased cultivation area)

2.4 Data collection

For the Transport and load survey the respondents were randomly selected road users (vehicles and pedestrians) who were stopped for 5 to 10 minutes and exposed to the questions in Annex 7. The survey was implemented over 6 consecutive days at different

hours of the day. The interviews were repeated during a fixed time interval of 1½ hours. The project staff collected the data.

For the survey at 5 market places 38 shopkeepers were randomly selected and exposed to the questions in Annex 8. Each interview took approximately 20 minutes. Before starting the interviews, author and enumerators walked around and drew a rough map to ensure that various shop types and locations were adequately represented in the sub-sample. The survey was carried out over 3 days, at different hours of the day.

For the Village survey the interviews with the village leaders and groups of villagers were planned by appointment. The community members, both men and women, most naturally joined the village chief in providing the answers. The author conducted the interviews, with the help of the national project staff who translated and clarified questions and answers, verifying the entries where necessary. Ways to crosscheck findings were: locating the public and private assets in the village before or after the interview, cross-checking recorded distances on the counter of the project vehicle, motorcycling the recorded distances to check travel time, cross-checking figures on education with teachers at schools, etc. The 10 villages were surveyed over 6 days.

The author, with background in social and economic sciences, received the help of 5 Cambodian nationals, all field staff of the ILO labour-based project, and based in Siem Reap. The author trained the staff, most of them have a background in engineering, for one day in basic concepts of surveying and principles of data collection (refer to the instructions on the questionnaires in Annex 7, 8, and 9). Training of enumerators was necessary, and basic knowledge of the survey format, questionnaires, and principles of interviewing most adequate transferred when translating the questionnaires from English into Khmer and vice versa. The author focused on the importance of wording and interpretation of the questions. After some classroom training, the transport and Load questionnaire (with simple questions, forms and response categories) could directly be implemented by English form.

The author entered the data into electronic databases (Excell5.0) upon return in Bangkok. Clarification on response categories, measures, and figures, is included in the databases of the three surveys, in Annex 4, 5, 6. The author did not follow special coding procedures for data processing and for calculations. For the calculation of percentages, averages and total figures, the author applied basic principles of statistics: calculating sum, mean, median, modus, etc.

2.5 Clarification on some questions in the Village questionnaire (Annex 9)

Question 12: Village investment prospects

In processing and presentation of the data (Chapter 3) the village investment prospects for the near future were subdivided into categories, varying from roads to housing:

1. Investments in roads or road network, including:
- build or rehabilitate a nearby road
- connect a nearby access road to the road network

- further develop the road network

2. *Investments in schools, including:*
   - build a school
   - add extra class rooms

3. *Investments in irrigation, including:*
   - dig irrigation canals nearby the village
   - build a dam to block the water flow
   - build a bridge

4. *Other investments, including:*
   - build shops and/or invest in business training
   - intervene in agricultural production

5. *Investments in drinking water facilities, including:*
   - build wells

6. *Investments in housing facilities, including:*
   - build houses

CHAPTER 3 PRESENTATION OF THE DATA

3.1 Transport and load survey

3.1.1 Use of the various transport means

The survey assessed transport and load characteristics for the following transport means:

motorised transport:
- motorcycles (1)
- motor-trailers (2)
- car (6)
- pickup (7)
- light truck, 4t (8)
- medium truck, 6t (9)

non-motorised transport:
- walking (10)
- bicycle (3)
- ox-cart (4)

Table 3.1 shows the use and relative importance of the various transport means. The frequencies are expressed in fractions. The fractions are based on the respondents answering the question on travel destination (refer to question 1 of the questionnaire, Annex 7).

Table 3.1 Use of the Various Transport Means

Transport means	1	2	3	4	5	6	7	8	9	10	N=
On all surveyed roads	.32	.06	.36	.11	0	.02	.02	.07	.01	.03	N=118
On all ILO roads	.32	.07	.32	.11	0	.03	.03	.07	.01	.04	N=81
On 4 ILO roads	.38	.07	.43	.07	0	0	0	.05	0	0	N=37
On 4 control roads	.32	.03	.46	.11	0	0	0	.05	0	.03	N=42

The use of transport means on control roads is in line with the traffic volume percentages given in section 2.1.1. On ILO roads transport by bicycle decreases, in favour of an increase in motorised and heavy loaded transport, in particular by motor trailer, car, pick-up and truck. When subdivided in motorised and non-motorised transport, Table 3.2 shows ILO roads carrying 10 per cent more motorised transport than control roads.

Table 3.2 Use of Motorised and Non-Motorised Transport

	Motorised transport	Non-motorised transport
On all ILO roads	53%	47%
On 4 ILO roads	50%	50%
On 4 control roads	40%	60%

The figures in both tables demonstrate a strong trend, but should not be taken as absolute percentages of how transport means are distributed among road users.

3.1.2 Travel destination

All road users travel in order of importance from village to other villages (31 per cent), to the district centre (29 per cent), to the provincial town or further away (25 per cent), and to the commune centre (13 per cent). The district centre is the most important destination for rural transport. 54 Per cent of the vehicles and pedestrians in Siem Riep province travel to the district centre, or further away, taking into consideration that Siem Riep town for part of the road users acts as a district centre.

The outcomes of road couples show a difference between road users on ILO roads and on control roads. 60 Per cent of the ILO road users travel to the district centre or further away, compared to 40 per cent on control roads. The average number of kilometres travelled is not specified, and considered to be an equal factor for both groups of road users. The road users were stopped at different spots along the surveyed roads.

3.1.3 Travel frequencies

All road users travel this distance an average 3 times a day, which is an average 11.3 kilometres to the market and 8.2 kilometres to the nearby health post. Comparing 3 road couples, ILO road users travel an average 2.9 times a day and control road users 2.7 times a day.

However, 85 per cent of the respondents on all ILO roads report to have almost doubled their trips (average increase of 90 per cent compared to before the rehabilitation). The remaining 15 per cent only started to travel regularly after the rehabilitation. Occasionally, increases in frequencies go up to 200 or 300 per cent, particularly on the roads further away from Siem Riep town, such as on Doun Keo, Svay Chek, Loley and Kroa Bai Real. Considerable increases on ILO roads are not contradictory to the common average frequency of 3 trips a day. Duon Keo, Svay Chek and Loley were extremely insecure and difficult to access before the rehabilitation. Here, passengers and carriers have brought their frequencies in line with those measured on other roads. Moreover, the average frequency for control roads is slightly progressive. Road users on some control roads are to an extent benefiting from the rehabilitated roads, which they access by sandy feeder roads. Road users at Taprok report an average frequency of 1.8 trips a day, observing the situation when nearby roads were not yet constructed and rehabilitated.

3.1.4 Travel time

99 Respondents on 10 roads (6 ILO roads and 4 control roads) answered the questions on travel time. Table 3.3 subdivides the recorded travel time in time classes. The distances that road users travel and possible deviations in kilometres are considered to be a constant factor.

Table 3.3 Travel Time of the Road Users (in minutes)

Travel time	Up to 30 minutes	More than 30 up to 60 minutes	More than 60 up to 90 minutes	More than 90 minutes	N =
On all surveyed roads	.51	.28	.10	.11	N=99
On all ILO roads	.57	.32	.08	.03	N=62
On 4 ILO roads	.41	.45	.09	.05	N=42
On 4 control roads	.41	.21	.14	.24	N=37

51 Per cent of all road users are approximately half an hour underway to reach the main economic and social centres. More than a quarter travels up to one hour. A specification of current travel time by transport means is presented in Table 6.5 in Annex 1.

45 per cent of the road users on ILO roads spend 30 to 60 minutes to reach the market and social services, compared to 21 per cent on control roads. However, 38 per cent of the road users on control roads travel one hour or more (a quarter more than 90 minutes), compared to 14 per cent on ILO roads. The latter reflects a clear trend of a large group of ILO road users reducing their travel time, especially those travelling long distances.

Asked directly about travel time before and after the rehabilitation, all ILO road users report to have cut their travel time considerably. The average reduction is 44 per cent of the time travelled before the rehabilitation. Figure 3.5 shows the reduction in travel time specified by transport means.

FIGURE 3.5 REDUCTION OF TRAVEL TIME BY TRANSPORT MEANS

Transport Mean	Time Reduction
Motorcycles	52%
Motor trailer	29%
Bicycles	45%
Ox-cart	41%
Light and Medium trucks	50%
Pedestrians	54%

3.1.5 Passenger fares and transport fees

Table 3.5 shows the passenger fares and the fees paid for the transportation of goods, for all transport means.

The response on changes in transport fares and fees was limited. Table 3.5 demonstrates however clear trends in the developments of transport cost. As for passenger transport, 44 per cent of the road users on control roads pay or charge prices in the lowest fare range (up to 150 riel), compared to 14 per cent of the road users on ILO roads. Another 44 per cent of

the road users on control roads pay or charge fees in the medium fare range (more than 150, up to 300 riel). Passenger transport on ILO roads seems to be more expensive.

Table 3.5 Passenger Fares and Transport Fees

	Passenger fares (in Cambodian riel a kilometre)				Fees for transportation of goods (in Cambodian riel a 100 kg.)			
	Number of respon-dents	Up to 150 riel	More than 150, up to 300 riel	More than 300 riel	Number of respon-dents	Up to 150 riel	More than 150, up to 300 riel	More than 300 riel
On all surveyed roads	19	37%	52%	11%	14	43%	29%	28%
On all ILO roads	10	30%	60%	10%	9	67%	11%	22%
On 4 ILO roads	7	14%	86%	0%	3	67%	0	33%
On 4 control roads	9	44%	44%	12%	5	0	60%	40%

Turning to fees for the transportation of goods, fees paid and charged on ILO roads are lower than on control roads. About two third (67 per cent) of the ILO-road users pay or charge less than 150 riel for 100 kilos of goods. For transporting the same quantity of goods, all road users on control roads pay or charge at least 150 riel, meaning that transporting goods over ILO roads is cheaper.

Asking ILO-road users directly about the prices *before* and *after*, current fares and fees are reportedly lower than the prices paid and charged before the rehabilitation, as is shown in table 3.6.

Table 3.6 Decreases in Transport Fees after Rehabilitation, for all Transport Means

Decrease in transport fees	Up to 10%	More than 20% up to 30%	More than 30% up to 40%	More than 50% up to 60%	More than 90% up to 100%
Frequency (in fractions)	.07	.50	.22	.07	.14

About 50 per cent of the road users on all ILO roads report a 20 to 30 per cent decrease in prices after the rehabilitation. Average decrease in transport price for all transport means is 38 per cent.

The respondents report the savings on cost for operations and maintenance (6 times), 'the good road' (4 times), loading more quantity (1 time), expanding the transport capacity (1 time), and better security (1 time) as the reasons for cost reduction. A further breakdown in

cost reduction for ‘motorised’ and ‘non-motorised’ transport is not relevant, as the sample size is limited.

Remains the question why prices for passenger transport on rehabilitated roads are higher than on non-rehabilitated roads? Most logically one could conclude that passenger transport has become a (more) profitable business, or that profit is made on passenger fares, rather than on the transportation of goods. While collecting the data on control roads, the author gathered from petty businessmen that the price of transport (based on the frequency of daily trips) is actually too low, even to make up for the cost for operation and maintenance. Looking at the passenger fares on ILO roads, this means that transport on rehabilitated roads is shifting away from a business of surviving to a more productive way of earning income. A combination of "the good road”, “savings on the cost for operation and maintenance", increases in travel frequency (refer to section 3.1.3), and a more cost-efficient loading (refer to section 3.1.6) keep the price for transportation of goods relative low. But then vehicle owners raise the passenger fares to increase their profit margin.

3.1.6 Passenger transport and load carry

Table 3.7 Passenger Load for All Transport Means and Changes

Passenger load	Average number of passengers per vehicle	Average increase in number of passengers per vehicle	Total number of passengers on all surveyed vehicles	Number of respondents N =
On all surveyed road	3.0		101	32
On all ILO-roads	3.1	75%	79	24
On 4 ILO-roads	2.0	43%	20	14
On 4 control roads	2.8		22	8

There is hardly a difference in average passenger load per vehicle, between ILO roads and control roads. Looking at the 4 road-couples, the average passenger load on ILO roads is probably lower because of increased vehicle ownership. Another reason is that vehicles transporting hence and forth from remote places take less passengers than vehicles operating more closely to economic centres. In general most respondents report an average load of 3 passengers per vehicle. Respondents on ILO-roads report to have increased their passenger load with 43 to 75 per cent after the rehabilitation; this primarily accounts for road users travelling hence and forth from remote areas who have brought their passenger load more in line with passenger loads on other roads.

Table 3.8 Loading of Goods and Changes, for All Transport Means

Loading of goods	Total volume of transported goods on all vehicles (in kilos)	Average volume of transported goods per vehicle (in kilos)	Average increase In transported goods per vehicle	Number of respondents N =
On all surveyed road	16, 338	268		61
On all ILO roads	22, 568	512	103%	44
On 4 ILO roads	6,828	262	98%	26
On 4 control roads	4,460	212		21

After the rehabilitation, vehicles on ILO roads have almost doubled the load carry (103 per cent on average). Vehicles on ILO roads carry a bigger load (average volume of 262 kg) compared to vehicles on control roads (average volume of 212 kg). On all ILO roads average load carry per vehicle is 512 kg.

3.2. Shop Survey

3.2.1 Numbers of shops

Table 3.9 Numbers of Stands at Local Markets, and Changes

Market place	Number of stands after Rehabilitation of the roads	Number of stands before rehabilitation of the roads	Average growth
Krao Bay Real	11	3	267%
Puork	400	50	700%
Bantey Srey	25	10	150%
Phnom Bok	30	3	900%
Bang Caông	16	2	700%
Totals	***481***	***68***	***607%***

The five local market places in the project area have considerably expanded. The total number of the shops and stalls (figures cross-checked with various shop keepers) increased with 607% as compared to before the rehabilitation.

3.2.2 Pricing

Table 3.10 Changes in Pricing of Goods

Market place	Average price increase	Frequency (by fraction)	Average price decrease	Frequency (by fraction)	No change in pricing (by fraction)	New prices (by fraction)
Kroa Bay Real	34%	.31	38%	.54	.08	.07
Puork	0%	0	16%	.86	.14	0
Bantey Srey	24%	.33	36%	.22	.33	.12
Phnom Bok	57%	.11	24%	.33	0	.56
Bang Caông	0%	0	0%	0	0	1.00
Total averages	***23%***	***.15***	***23%***	***.39***	***.11***	***35%***

Table 3.10 shows the changes in pricing of goods and services, comparing price levels before and after the rehabilitation. Prices of 39 per cent of all goods and services surveyed have decreased. The average price decrease is 23 per cent. Prices of about 15 per cent of the goods and services have increased, and the average increase is also 23 per cent. Although each market has its own price characteristics, price decreases are dominant. Price increases concentrate at two markets, Bantey Srey and Kroa Bay Real. Prices of 11 per cent of the surveyed goods and services did not change. More than one third (35 per cent) of all surveyed goods and services are newly offered products, and most of these are sold in shops that have only recently started their business.

Table 3.10 shows that price patterns at individual markets vary substantially. Within the scope of this impact survey the author considered it most relevant to focus on price effects at 5 market places, to demonstrate the general trend. For this purpose sufficient detail is provided by price changes expressed in market averages.

Asked for the reasons for changes in pricing, shopkeepers report “more vendors offering and selling goods” and “increased competition” as the primary reasons for price decreases. The infrastructure plays an important indirect role: Several vendors report “improved transport and supply of goods”, and “improved accessibility of salesmen to markets” as the direct cause for lower prices.

The main reasons for price increases are price effects being imported from the crisis-hit economy of Thailand, the devaluation of the Cambodian currency, and simply also a result of higher demand. Markets with relative low outputs before the rehabilitation are now more frequently visited. A (new) group of customers is willing to pay the (higher) price for necessary daily goods and services. Some vendors have raised their prices, as a result of higher transport costs.

The ‘political events’ of July 1997 and the turmoil that arose after that are known to have had a considerable impact on national export and business life in Phnom Penh[15]. This impact

[15] Chan Sophal, Martin Godfrey, et. al., January 1999, Cambodia Development Resource Institute, *Cambodia: The challenge of productive employment creation-Working paper no.8*

should however not be overestimated, e.g. by automatically converting the drop in demand and supply to local markets without collecting appropriate evidence. The impact of the July 1997 events on trading at local markets, where business is primarily dependent on agriculture cycles and on products that are locally produced, has been very limited. Local price levels did not suddenly change, according to shopkeepers. Instead, imported price effects from the crisis-hit economy of Thailand have created more impact on local business, best expressed by higher prices for the more luxury consumer goods.

The specific geographical location and the benefit of a good connection to Siem Reap town or other local business centres, play a role in supply and demand, and thus in pricing. However, comparing price patterns of individual markets, there are important differences, in which commercial attitudes of vendors also play an important role. Increased competition forces some vendors at Krao Bay Real market to raise their prices, to compensate for a decrease in turnover, whereas others keep their prices low to boost the volume of sales.

During data collection, the author got the impression that commercial and accounting skills were weak. A group of vendors calculate their benefits on the short term, and prefer fast cash (small profit, little savings) rather than focusing on long-term investments (higher profit margins, and savings). The information is based on individual reports of vendors. A systematic inquiry into savings and investment patterns was not part of the survey.

3.2.3 Daily item sales and product variety

Daily item sales of more than one third (36 per cent) of the surveyed products have decreased. The average decrease is 38 per cent. For another 37 per cent of the products daily sales have increased with 89 per cent. The developments at 4 markets show sales decreases being more dominant than increases. Daily item sales of 6 per cent of the surveyed products have remained the same, or are new figures, such as at Ban Caông commune market.

48 Per cent of the interviewed vendors do not make changes in the variety of products. 22 Per cent of the vendors have introduced one or two new items. The rest of the interviewed vendors (38 per cent) account for newly established shops and products.

3.2.4 Turnover and monthly profit

The interviewed vendors use different practices in regularly monitoring their sales and profit. 18 Per cent of the vendors presented daily or monthly sales figures (turnover), and 58 per cent of the vendors keeping record of monthly profit. 24 Per cent of the vendors reported both. Table 3.2.3b shows current rating of daily turnover for all shopkeepers at the 5 markets participating in the survey.

Table 3.11 Rating of Shopkeepers, by Turnover (in 1000 Riel)

Daily sales	More than 20 to 40	More than 40 to 60	More than 60 to 80	More than 80 to 100	More than 100
Frequency in percentages	*38%*	*31%*	*13%*	*6%*	*13%*

69 Per cent of the vendors have a daily turnover between 20,000 and 60,000 Cambodian Riel a day. (60,000 Cambodian Riel equalised approximately US$17 in December 1997). 45 Per cent of the vendors increased their total daily sales, with an average 139 per cent. 25 Per cent of the vendors faced a decrease in daily turnover of 44 per cent (on average). Increases in sales are more equally distributed over four markets than decreases. Decreases concentrate at Puork and Phnom Bok.

Table 3.12 Rating of Shopkeepers, by Monthly Profit (in 1000 Riel)

Monthly profit	Up to 50	More than 50 up to 100	More than 100 up to 150	More than 150 up to 200	More than 200 up to 250	More than 300
Frequency in percentage	*26%*	*26%*	*29%*	*3%*	*3%*	*13%*

55 Per cent of the shopkeepers earn a monthly profit ranging from 50,000 to 150,000 Riel (equalised approximately US$ 43 in December 1997). Since the road works started 52 Per cent of the vendors saw their monthly profit shares drop with 26 per cent on average. 23 per cent of the vendors earn more profit, an average increase of 102 per cent. 25 Per cent of the vendors did not report changes in profit, as their shops or products were relatively new. The changes in profit are equally distributed over four markets.

After the rehabilitation, the numbers of stalls and shops have sharply increased, which has brought more competition to local markets. About 60 per cent of the relevant vendors emphasise “improved transport” and “better supply of goods (from farm lands)” as the major causes for a decrease in profit shares. Increased competition redistributes total profit made before the rehabilitation. However the productivity at 5 markets, measured by profit share volume has increased. About one third of the (new) vendors raises profit (and turnover), because more customers visit the market and transport and supply of goods have been improved. Dependent on individual gain or loss, shopkeepers judge the effects as positive or negative.

Changes in profit and turnover at individual markets

- *Krao Bay Real:*
  For 60 per cent of the shopkeepers turnover or profit have sharply increased. The other vendors (40%) report a decrease in profit of 50 per cent (on average).
- *Puork:*
  For most of the vendors daily turnover or profit have sharply decreased, expressed by an average of 45 per cent.

- *Bantey Srey:*

44 Per cent of the vendors report a drop in profit shares of about 25 per cent. 27 Per cent of the vendors have increased their turnover or profit as compared to before the rehabilitation. Increases go up to 100 per cent, or more.

- *Phnom Bok:*
  The vendors who face a decrease in turnover and profit equally balance the vendors who gained more profit and turnover. However, profit increases are much higher (75 per cent, 300 per cent) than decreases (43 per cent, 10 per cent).
- *Ban Caông*
  Bang Caông is a relatively new market place, which makes a comparison of profit *before* and *after* less relevant.

The picture at individual markets is not much different. A large group of vendors, also trading before the rehabilitation, face a drop in profit shares. Profit shares can be scaled down to half the money made before the rehabilitation. Decreases in profit shares are specifically concentrated at Puork district market. Another large group of vendors, although smaller than the former, has raised turnover and profit. These vendors multiply profit by two or three times the share earned before the rehabilitation. The third important group represents the newcomers. They adapt their businesses to the new market situation, and earn a monthly profit ranging from 50,000 to 150,00 Cambodian Riel (refer to table 3.12).

3.2.5 Daily rental fees and estimated market value of shops

Rental fees and estimated sales value are combined in the survey as they proved to be complementary. Only the vendors at Puork district market pay rental fees for running their stalls. The average rental fee of 4,000 riel a day (approximately US$1.14) is an increase of 45 per cent compared to before the rehabilitation of the roads. The vendors at Puork mention the boost in economic activities, with the market becoming more and more important as Puork's social and economic centre, as the major reasons for the increase in rental fees. Some vendors complain about the monopoly of the organisation responsible for renting out the stalls and plots.

The question on the estimated market value of the shops got only limited response. Recorded estimates show large differences between shops. In general, all respondents firmly expect to be able to sell their shop for more than 50 per cent of the sales value before the rehabilitation of the roads.

3.2.6 Control inquiry

A brief control inquiry into profit shares marginsgwas undertaken at about 15 shops and stalls along the feeder road from Pong Ro village to Angkron market (located along highway 6, east of Siem Reap town). Except for the road pavement (earth and sand), these shops are located in a geographical setting comparable to Bang Caong commune market, along Loley road. Monthly profit figures of the interviewed vendors concentrated around 15,000 Riel, which is 4 to 5 times less than monthly profit at Bang Caong market.

3.3 Village survey

The 10 surveyed villages have an average number of 169 households per village. The actual number of households of 50 per cent of the surveyed villages lies between 153 and 158. The exact numbers are given in the Village database in Annex 6. When appropriate outcomes on certain village characteristics will be related back to household numbers.

3.3.1 Effects of other interventions

Disasters

Almost all surveyed villages report to have been plagued by severe flooding in the early rainy season of 1997. On top of this, again almost all villages were confronted by droughts that brought even more damage to agricultural production. The respondents of 50 percent of both ILO and control villages estimate the damage in terms of a harvest lost of 30 to 50 hectares, with some exceptional losses in other villages that can be added to this. The impact was devastating. Many local small-scale agro-businesses being triggered off by the rehabilitation of the roads were literally washed away (please refer to section 3.3.4 on changes in household enterprises).

40 Per cent of the ILO villages and 60 per cent of the control villages report to have been affected by fights and political instability during previous years (the early nineties). For some villages, along Svay Chek and Taprok road, the rehabilitation of the roads have given better physical access to economic centres, such as Siem Reap town.

As was also found at market places, the political events and the tensions that arose after July 1997 hardly play a role in the assessment of the respondents in the communities (Or should it the author's total ignorance, or a complete hesitation of the respondents to talk about it). As earlier referred to in the Shops and markets survey, the outbreak of the financial crisis in Thailand also exported its impact to Cambodia, which was to an extent felt in the surveyed communities, at the moment of survey.

Other infrastructure investments

The respondents report a broader range of infrastructure investments being planned and implemented in the project area. Activities of other international aid and technical agencies concentrate on improving access to health, education and drinking water facilities, and to a limited extent on food security through the construction of earth roads. Some villages report that the construction of particular investments, such as the building of schools, were facilitated by the rehabilitation works of the labour-based project. In general, the answers of the communities on the focused investments of other aid agencies (refer to 'other investments' in the Village database, Annex 6) confirm the technical competence and comparative advantage of the labour-based project in planning and rehabilitating rural roads and irrigation canals.

3.3.2 Village future investments

Table 3.13 shows the planned or desired future investments in infrastructure of the communities under survey. The investments are prioritised, in which both priorities (1 and 2) receive an equal weight. The priorities are based on actual answers, rather than on calculated ratings.

In spite of the labour-based rehabilitation, the primary sector for future investments in infrastructure remains rural roads, for both ILO (25%) and control (20%) villages. The priority is further explained in community's wishes to construct new roads or to upgrade the existing dust roads and connect these to the rural road network. For ILO villages the roads sector is followed by investments in irrigation (15%) which includes the construction of bridges and dams to block a 100 per cent free water flow. Control villages consider investments in schools and education a higher priority (15 %). It is at least surprising that investments in drinking water facilities did not receive a high priority. Investments in health facilities were not even considered as a second priority for the future.

Table 3.13 Future Investment Priorities of ILO and Control Villages

Type of investment	Investment priority 1		2		Total of sector priorities 1 and 2		Overall sector priority
	ILO villages	Control villages	ILO villages	Control villages	ILO villages	Control villages	
Roads or road network	10%	15%	15 %	5%	25%	20%	45%
Schools	5%	5%	0%	10%	5%	15%	20%
Irrigation	10%	5%	5%	0%	15%	5%	20%
Others	0%	0%	5%	5%	5%	5%	10%
Wells	0%	0%	0%	5%	5%	5%	5%
Housing	0%	0%	0%	0%	0%	0%	0%
Weight	*Total priority weight 50 %*		*Total priority weight 50%*		*Total ILO weight 50%*	*Total control weight 50%*	*Weight of all sectors 100%*

The author notes that questions on a village needs profile, may feed the respondents' impression that the ILO considers to further invest in rural roads. The error of measuring social desirable answers was partly neutralised by emphasising the purpose or the interview, namely to assess the impact of existing investments, and by stressing the ILO's role as technical agency.

Table 3.13 reflects the needs of a group of community representatives: village leaders who are accompanied by other villagers. Other planning tools, such as bottom-up planning processes, or instruments that combine community participation and appraisal (PRA), may

result in different need profiles. Each planning tool has its pros and cons regarding practical use and reliability. Table 3.13 provides justification for the conclusion that Cambodia's rural economy still lacks sufficient and adequate infrastructure facilities that are necessary to boost local economic development[16]. The future investment prospects further demonstrate which local investments are needed to meet the expectations of communities of the development process.
The Village survey supports ILO's decision to further integrate the expertise in Integrated Rural Accessibility Planning [IRAP] techniques into the labour-based project.

3.3.3 Migration

Table 3.14 shows the changes in migration over 1997 expressed by migration surplus (the number of people moving into a village minus the number of people moving out from the village).

Table 3.14 Migration Surplus over 1997

ILO villages	Migration surplus	Control villages	Migration surplus
Preak Ang Trung	0	Kouk Thlok / Snou	-5
Taa Cheet	13	Do Nom	8
Svay Chek	-1	Prey Thmai	0
Som Rong	12	Taprok	6
Ban Caông	10	Pong Ro	0
Total averages	***6.8***	***Total averages***	***1.8***

Migration is not significantly impacted by the interventions in rural roads, observing the reasons for migration provided by the respondents. "Family reunion", and "returning to former property or family land" are the primary reasons to move into a particular village. However, table 3.14 shows a consequent higher 1997-migration surplus in ILO-villages: 6.8 versus 1.8 in control villages. Extreme poor living conditions and the visible benefits of the rural road network may stimulate people to migrate more quickly. Respondents in the villages along Tasek, Taprok and Loley road explain that "a good connection to the road" (2 times) and "access to the road network" (1 time) contribute to the decision to move.

3.3.4 Household enterprises

Variety

At the moment of survey ILO villages had an average variety of 5 household enterprises, compared to 3 different types in control villages. To adequately compare between household enterprises in ILO and control villages, numbers of households should be in a comparable range, which is the case, as shown in table 3.15.

[16] Chan Sophal, Martin Godfrey, et. al., January 1999, Cambodia Development Resource Institute, *Cambodia: The challenge of productive employment creation-Working paper no.8*

Table 3.15 Number of Household Enterprises in Villages, and Changes (household numbers between brackets)

ILO villages	Number of household enterprises	Growth over 1997	Control villages	Number of household enterprises	Growth over 1997
Preah Ang Trung	16 (73)	-27%	Kouk Thlok / Snou	13 (95)	0%
Taa Cheet	18 (108)	-14%	Do Nom	69 (153)	8%
Svay Chek	63 (184)	26%	Prey Thmai	156 (166)	1%
Som Rong	139 (253)	30%	Taprok	9 (160)	All new Shops
Ban Caông	13 (172)	30%	Pong Ro	8 (173)	0%
Totals	***249 (790)***	***19%***	***Totals***	***255 (747)***	***2%***
Averages	***50 (158)***	***9%***	***Averages***	***51 (149)***	***2.25%***

Numbers and changes

Total number of household enterprises in ILO villages is 790, compared to 747 in control villages. The average numbers of household enterprises are not much different either: 50 in ILO villages, compared to 51 in control villages (refer to table 3.15), which is 1 household enterprise in every three households.

Average growth figures over 1997 show however a difference. Household enterprises in ILO villages increased with 9 per cent versus 2.25 per cent in control villages. The total volume growth of household enterprises in ILO villages was also bigger: 19 per cent versus 2 per cent.

The respondents explain that the rehabilitation and better access to markets triggered off a boost in small local businesses. Vendors started a hopeful business with bicycle repair and battery-charge services. Wood and coal stalls were established along the roads. However, these positive effects are simply neutralised by a similar number of household enterprises not being able to survive. As for the reasons, respondents report that fish and frogs in ponds were not properly protected, or consumed. Palm sugar businesses collapsed. Household enterprises paid a high toll for floods and droughts in 1997 (for a complete overview of the reasons, refer to the Village database in annex 6).

A field expert explained the relation between comparable numbers of household enterprises (ILO villages versus control villages) on the one hand, and differences in growth figures over 1997 as follows: “Businesses pop up as quickly as they appear”. The author concludes that household enterprises in villages are too small and too vulnerable to become a sustainable source of income, although the rehabilitation of the roads gave them a strong initial boost.

3.3.5 Public properties and assets

The changes in public properties and assets concern the investments other than physical infrastructure, such as schools, roads and health centres. At the moment of survey, ILO villages had an average variety of two public assets, compared to one in control villages. Most villages have a well (with working pump), and few a motorised rice mill. Community ponds, electricity, etc. are extremely scarce. The average number of assets in ILO villages is 10 and in control villages 4.

Growth figures over 1997 show an average increase of 2 assets in ILO villages, compared to 4 assets in control villages. The growth in public assets is explained by other international agencies investing in e.g. water, health, etc. The rehabilitation of roads by the labour-based project has a small indirect impact on such investments. Rehabilitated roads improve physical access to villages, which facilitates a smoother planning and probably a quicker construction of some assets and properties.

3.3.6 Travelling and transport

Available transport means

Transport by motorcycle, ox-cart and bicycle are directly available in all surveyed villages. In four villages people can also rely on transport by motor-trailer (or by truck). Besides, they walk to travel destinations.

Transport frequencies

a) Transport frequencies of motorcycles

Table 3.16 Frequencies of Motorcycle Transport Available from Villages, and Changes

Village name	ILO villages			Village name	Control villages		
	Daily frequenc.	Growth over 1997	Growth before		Daily frequency	Growth over 1997	Growth before
Preah Ang Trung	4	100%	100%	Kouk Thlok / Snou	2	0%	0%
Taa Cheet	1	0%	200%	Do Nom	2	100%	n. app.
Svay Chek	3	50%	n.t.	Prey Thmai	1	0%	0%
Som Rong	6	n.av.	50%	Taprok	0.3	n.av.	200%
Bang Caông	7	n.av.	300%	Pong Ro	2	33%	n.appl.
Total averages	***4.2***	***50%***	***163%***	***Total averages***	***1.1***	***33%***	***67%***
					Median = 2		

n.av. = figure is not available
n.appl. = figure is not applicable as there was no rehabilitation of a road nearby
growth before = the reported growth in frequency from the start of the rehabilitation works up to December 1997
n.t. = new transport; there was no motor cycle transport available before the rehabilitation

In ILO villages, regular motorcycle transport is about 4 times a day available, compared to 2 times in control villages. In this comparison the *median* is taken as the appropriate statistical measure for the mean value of control villages, since the *weighted average* does not adequately represent the overall picture of 5 villages.

For 60 per cent of the ILO villages, the 1997-growth in number of daily trips is 50 percent, 80 Per cent of the control villages experience a growth in daily trips of 33 per cent. Starting from the first day of rehabilitation, the average daily frequency of motor cycle trips has increased with 163 per cent. For three control villages that partly benefit from the rehabilitated roads, the figure is 67 per cent.

b) Transport frequencies of motor trailers

Transport by motor trailer is an almost completely new means of public transport, once a road is rehabilitated. 60 per cent of the respondents in ILO-villages report frequencies varying from 2 to 40 trips a day. The average growth in daily trips over 1997 is at least 100 per cent. As from the first day of rehabilitation, average growth in daily trips is also at least 100 per cent.

c) Transport frequencies of light and medium trucks

Light trucks (maximum axle load of 4 tons), such as 'eteans', and medium trucks (maximum axle load of 6 tons) are increasingly used as means of public transport in and around remote ILO villages. The trucks are passing by regularly; frequencies vary from 2 to 35 trips a day.

d) Frequencies of transport by bicycle

Table 3.17 Frequencies of Bicycle Transport from Villages, and Changes

VILLAGE NAME	ILO villages			Village name	Control villages		
	Daily frequency	Growth over 1997	Growth before		Daily frequency	Growth over 1997	Growth before
Preah Ang Trung	6	100%	100%	Kouk Thlok / Snou	2	0%	0%
Taa Cheet	1	0%	67%	Do Nom	2	0%	n.appl.
Svay Chek	1	0%	n.t.	Prey Thmai	1	n.t.	n.t.
Som Rong	4	n.av.	100%	Taprok	2	n.av.	300%
Bang Caông	10	n.av.	n.av.	Pong Ro	3	200%	n.appl.
Total averages	***4.4***	***33%***	***89%***	***Total averages***	***2***	***67%***	***150%***

n.av. = figure is not available n.appl. = figure is not applicable as there was no rehabilitation of a road nearby
growth before = the reported growth in frequency from the start of the rehabilitation works up to December 1997
n.t. = new transport; there was no motor cycle transport available before the rehabilitation

People in ILO villages travel an average 4 times a day to the nearest economic centre, compared to 2 times in control villages. In 60 per cent of the ILO villages bicycle transport frequencies increased with 33 per cent over 1997 and with 89 per cent as compared to before the rehabilitation. In control villages the growth in transport frequencies is higher: an average increase of 67 per cent over 1997, and an 150 per cent increase for those villages that have partly been benefiting from a rehabilitated road nearby. About 20 per cent of the growth in bicycle transport frequencies is new transport.

e) Frequencies of walking

Table 3.18 Frequencies of Walking from Villages, and Changes

Village name	ILO villages			Village name	Control villages		
	Daily frequency	Growth over 1997	Growth before		Daily frequency	Growth over 1997	Growth before
Preah Ang Trung	2.0	100%	100%	Kouk Thlok / Snou	2.0	100%	100%
Taa Cheet	1.0	0%	80%	Do Nom	3.0	0%	n.appl.
Svay Chek	1.0	0%	n.t.	Prey Thmai	1.0	0%	0%
Som Rong	2.0	n.av.	100%	Taprok	n.av.	n.av.	n.av.
Bang Caông	n.av.	n.av.	n.av.	Pong Ro	1.0	0%	n.appl.
Total averages	***1.5***	***33%***	***93%***	***Total averages***	***1.8***	***25%***	***50%***
		Modus =2 (0%)				***Median = 0%***	

n.av. = figure is not available
n.appl. = figure is not applicable as there was no rehabilitation of a road nearby
growth before = reported growth in frequency from the start of the rehabilitation works up to December 1997
n.t. = new transport; there was no motor cycle transport available before the rehabilitation

People in all surveyed villages walk an average one or two times a day to important destinations. For both ILO and control villages this is hardly different compared to last year. When comparing current frequencies with the situation before the rehabilitation, people in ILO villages make one extra trip a day.

Travel destination

The main travel destinations for people in all villages are the district centre (46 per cent), followed by the provincial centre (27 per cent) or the commune centre (27 per cent). This picture is slightly different from the Transport and load survey (refer to section 3.1.2), looking at transport by motorcycle, bicycle and ox-cart (in order of priority). There is a slight difference for walking. In remote villages (Svay Chek, Prey Thmai) people restrict their walking to nearby villages; they hardly walk to the provincial market in Siem Reap town.

3.3.7 Vehicle ownership

Ownership of motorcycles

The total volume of motorcycles in ILO villages is 74 compared to 61 in control villages. The actual differences between ILO and control villages are bigger, as 80 per cent of the control villages report consequently smaller numbers. Hence, an average of about 15 motorcycles in ILO villages relates to 5 motorcycles in control villages. The *Median* (=5) is taken as reliable mean value. Growth in motorcycle ownership over 1997 was higher in control villages: 45 per cent, compared to 38 percent in ILO villages.

Table 3.19 Motorcycle Ownership in Villages, and Changes

Village name	ILO villages			VILLAGE NAME	Control villages	
	Numbers	**Growth over 1997**	**Growth before**		**Numbers**	**Growth over 1997**
Preah Ang Trung	2	100%	100%	Kouk Thlok / Snou	3	n.t.
Taa Cheet	14	27%	367%	Do Nom	49	14%
Svay Chek	12	7%	n.t.	Prey Thmai	5	66%
Som Rong	22	n.av.	22%	Taprok	8	33%
Ban Caông	21	17%	n.t.	Pong Ro	5	66%
Volume totals	***74***	***68%***	***237%***	***Volume totals***	***61***	***30%***
Total average	***14.8***	***38%***	***163%***	***Total average***	***12.2***	***45%***
					Median = 5	

n.av. = figure is not available
n.t. = new transport; there was no motor cycle transport available before the rehabilitation
growth before = reported growth in frequency from the start of the rehabilitation works, up to December 1997

A closer look at volume growth (237 per cent) and average growth per village (163 per cent) over previous years, learns that the big boost in motorcycle ownership in ILO villages has taken place, presumably directly after the rehabilitation. However, the reasonable annual growth figures for both ILO and control villages justify the conclusion that increases in motorcycle ownership are also dependent on other factors. One could think of available capital, improved social mobility, etc.

Ownership of motor trailers

As earlier stated, motor trailers are a new means of transport after the rehabilitation of roads. Based on the data from the villages in the sample, ownership of motor trailers is restricted to ILO villages (refer to the Village database annex 6), even to particular villages. Most of the growth in ownership took place between December 1996 and December 1997.

Ownership of bicycles

The total volume of bicycles in ILO villages is 753 compared to 596 in control villages. Given the exceptional differences between ILO villages, and between control villages, the statistical mean values of *average, median, and modus* present an inadequate overall picture. Looking at proportions, table 3.22 shows that bicycle ownership in 60 per cent of the control villages varies from 143 to 173, compared to 70 to 88 in 60 per cent of the ILO villages. Total average growth and total volume growth over 1997 are also higher in control villages: 25 and 36 per cent, compared to 13 and 17 per cent in ILO villages. The latter figures reflect a *shock-effect* in control villages, compared to a gradual increase in bicycle volume in ILO villages.

Table 3.20 Bicycle Ownership in Villages, and Changes

Village name	ILO villages			**Village name**	Control villages	
	Numbers	**Growth over 1997**	**Growth before**		**Numbers**	**Growth over 1997**
Preah Ang Trung	75	25%	25%	Kouk Thlok / Snou	70	17%
Taa Cheet	70	17%	17%	Do Nom	150	67%
Svay Chek	88	21%	4%	Prey Thmai	60	9%
Som Rong	350	n.av.	17%	Taprok	143	70%
Ban Caông	170	13%	1600%	Pong Ro	173	15%
Volume totals	***753***	***13%***	***60%***	***Volume totals***	***596***	***25%***
Total average	***150.6***	***17%***	***336%***	***Total average***	***119.2***	***36%***
	Median = 88		***Median = 17%***			

n.av. = figure is not available
growth before = reported growth in frequency from the start of the rehabilitation works, up to December 1997

The author concludes that bicycle ownership is not as sensitive to road rehabilitation as motorcycle ownership. The increase in ownership is more gradually and could probably also be the result of other factors, such as a general improvement in living standards.

Ownership of ox-carts

The volume totals and average numbers of ox-carts per village in table 3.21 give a good impression of the developments in ox-cart ownership. An average of about 51 ox-carts for control villages compares to an average of 46 ox-carts in ILO villages. However, the numbers in ILO villages are more equally spread around 50 vehicles.

Table 3.21 Ox-cart Ownership in Villages, and Changes

Village name	ILO villages			Village name	Control villages	
	Numbers	Growth over 1997	Growth before		Numbers	Growth over 1997
Preah Ang Trung	50	0%	0%	Kouk Thlok / Snou	30	25%
Taa Cheet	30	15%	67%	Do Nom	40	n.t.
Svay Chek	51	2%	2%	Prey Thmai	n.av.	n.av.
Som Rong	50	n.av.	11%	Taprok	32	19%
Ban Caông	50	n.av.	150%	Pong Ro	103	3%
Volume totals	***231***	***83%***	***60%***	***Volume totals***	***205***	***36%***
Total average	***46.2***	***9%***	***336%***	***Total average***	***51.3***	***16%***

n.av. = figure is not available n.t.= new transport; there was no motor cycle transport available before the rehabilitation

Changes are difficult to measure because of limited data records. Growth percentages over 1997 tend to say that changes in ownership are rather the result of improvements in the general living standard. The author concludes that ox-cart ownership is not very sensible to road rehabilitation.

Ownership of light and medium trucks

Heavier types of motorised transport are even newer than motor trailers. Only particular ILO villages (based on the sample data) own the locally produced ‘eteans’, or medium trucks. Truck ownership seems to be much dependent on adequate roads. Most of the growth in ownership took place between December 1996 and December 1997.

3.3.8 Cost for operations and maintenance

O&M of motorcycles

Monthly cost for operations and maintenance are for ILO villages considerably lower than for control villages. One gets a good impression (refer to table 3.22) when comparing total average cost for O&M in ILO villages (30,400 Riel) and in control villages (40,0000 Riel). The importance of cost savings is best explained by an example. The extra monthly cost of 8,600 Riel have to be recovered from the profit made on transport fees, which is not that easy. The fee for a one-way trip varies from 150 to 300 Riel a kilometre (refer to section 3.1.5 on transport fares and fees). Or to put it in a different perspective: a worker can earn 8,600 Riel with 2 full workdays on a labour-based construction site.

Table 3.22 Monthly O&M Cost of Motorcycles, and Changes (cost in Riels)

Village name	ILO villages			Village name	Control Villages	
	Current monthly cost	**Decrease over 1997**	**Decrease since the rehabilitation**		Current monthly cost	**Decrease over 1997**
Prea Ang Trung	56,000	6%	6%	Kouk Thlok / Snou	65,000	0%
Taa Cheet	60,000	0%	25%	Do Nom	60,000	- 50% *****
Svay Chek	20,000	n.av.	44%	Prey Thmai	20,000	0%
Som Rong	11,000	n.av.	45%	Taprok	n.av.	n.av.
Ban Caông	5,000	17%	n.t.	Pong Ro	15,000	25%
Total cost value	***152,000***	***X***	***23%***	***Total averages***	***160,000***	***10%***
Total average cost	***30,400***	***8%***	***30%***	***Total average cost***	***40,000***	***- 5% ****

n.av. = figure is not available
n.t. = new transport; there was no motor cycle transport available before the rehabilitation
* = negative decrease is an actual cost increase

Less clear is the picture on changes in O&M cost over 1997. Be it for ILO villages a cost saving of about 8 per cent, the figures for control villages tend to a conclusion that people in the latter communities were hardly able to save money on O&M cost. Since the start of the rehabilitation works, operation and maintenance costs for motorcycles in ILO villages have decreased with an average 30 percent.

O&M of motor trailers

As motor trailers are a relative new means of transport, adequate records of operation and maintenance cost are not yet sufficiently available.

O&M of light and medium trucks

One record gives an amount of about 80,000 riel for 1997 and an amount of 90,000 riel for the previous year. This 11 per cent cost decrease over 1997 is in line with the 1997 cost decrease for motorcycles in ILO villages (8 per cent).

O&M of bicycles

Monthly O&M costs for bicycles are for ILO and control villages more or less the same: 6,000 riel versus 5,500 riel. Higher O&M cost for ILO villages could be explained by a higher frequency of trips than in control villages. Cost savings on operation and maintenance over 1997 are small and vary from 0 to 6 per cent.

O&M of Ox-carts

The cost savings on operation and maintenance after the rehabilitation are limited. Major savings are made on long distances, for which public transport services has become an adequate alternative on rehabilitated roads. Moreover, roads carry a very limited percentage of ox-carts (1% of the roads volume in traffic counts over April 1998). Ox-carts are particularly field transport, which makes a calculation of savings on operations and maintenance within the perspective of road rehabilitation less relevant.

New prices of vehicles

An initial analysis of vehicles prices showed a weak relation between changes in pricing and road rehabilitation. In some remote control villages prices of vehicles were significantly higher than in the vast majority of all other villages.

3.3.9 Access to markets

Distance

The exact distances to markets and social services are presented in Table 6.2 in Annex 1. People in ILO villages bridge physical distances of 4.0 to 20.0 kilometres to reach the main and nearest markets, compared to 1.0 to 24.0 kilometres for people in control villages. The average distance travelled is about 11 kilometres for both village groups.

When comparing distances to markets of paired villages, it is noted that people in all ILO villages travel an extra 2.5 kilometres (sum of calculated actual differences between ILO and control villages within pairs of villages). This implies that when comparing current travel time and average travel time, the figures for ILO villages are conservative and for control villages progressive.

Travel time

Table 3.23 Travel Time from Villages to Markets, and Changes

Transport means	ILO villages		Control villages	
	Average travel time in minutes	Average reduction (in percentages)	Average travel time in minutes	Average reduction (in percentages)
By motorcycle By bicycle By walking	24 52 150	43% 40% 27%	33% 61% 168%	21% 32% 16%
Total for all transport means	**-**	***37%***	**-**	***23%*** ***0%***

Travelling to the market takes considerably less time for people in ILO villages than for people in control villages, as shown in table 3.23. Since the rehabilitation works started, travel time has reduced with an average 37 per cent for all transport means. Moreover, the 23 per cent reduction in travel time for control villages only applies to those villages that have partly been benefiting from the rehabilitation of the rural road network. These villages are connected to the roads network through dust/access roads. The reduction in travel time for the other control villages is 0 per cent.

3.3.10 Access to health services

Distance

People in ILO villages travel an average 7.7 kilometres to the nearest health post or hospital, compared to 10.22 for control villages. The difference can be attributed to one or two communities where people travel exceptional distances. The *Median* is for ILO 4.0 and for control villages 4.8 kilometres. When comparing pairs of ILO and control villages, control villages travel an extra 12.6 kilometres (sum of the actual differences). As a consequence, travel time figures for ILO villages will be progressive, and for control villages conservative.

Travel time

Table 3.24 Travel Time from Villages to Health Centres, and Changes

Transport means	ILO villages		Control villages	
	Average travel time in minutes	Average reduction in percentages	Average travel time in minutes	Average reduction in percentages
By motorcycle By bicycle By walking	15 33 96	50% 46% 37%	31 53 111	28% 26% 20%
Total for all transport means	**-**	***44%***	**-**	***24%*** ***0%***

The difference in travel time is again considerably high. When using bicycle and motorcycle transport, people in ILO villages travel two third to half the time that people in control villages need to reach a health centre or hospital. Needless to say that energy resources are already challenged when people are sick, and that every minute counts in case of medical urgency.

People in ILO villages have reduced their travel time to health posts and hospitals with an average 44 per cent, which is observed for all transport means. The outcomes, which are even more positive than for travel time to markets, deserve some explanation. Most of the hospitals and health posts are nearby economic centres, aiming to serve a range of communities. Svay Chek, Taa Cheet, Som Rong and Taprok (control villages) benefit from new health posts that are now closer located to the community (and built along the rehabilitated roads).
Most new health centres are a salute to the work of other international aid agencies. They also demonstrate the complementary efforts of these agencies to invest in development.

3.3.11 Access to schools

Distance and travel time

Children in all surveyed villages walk similar distances to school, with exceptions in three villages. The travelled distance is maximum one kilometre. The rehabilitation of the roads has little impact on physical conditions to get access to schools.

Enrolments

Did the rehabilitation have an impact on school enrolments? Some ILO and control villages could not provide data on school enrolments. Based on the recorded numbers (refer to table 6.1 in Annex 1) the average number of enrolments in ILO villages is 133, compared to 149 in control villages. The total number of enrolments in ILO villages is also lower. However, the average increase in enrolments over 1997 is 49 per cent for ILO villages, compared to 29 per cent in control villages. The rehabilitated roads probably have a small positive impact on school enrolments. The data are however too limited to further explore the relation between the two variables. Hence, the issue needs further follow-up in a household survey.

3.3.12 Security

General security

67 Per cent of the ILO villages report a positive impact of the road works on general security. Police officers (are able to) visit the villages more frequently, which contributes to disarming the political factions. The other ILO villages hold a neutral position on this aspect of security. 50 Per cent of the control villages, which partly benefit from the rehabilitated roads, also take a neutral position (no specific positive or negative impact). Several villages explain that the rehabilitation works contributed to a force back of troops, and prevent the community against looting. Taprok village (control village) however, is still remote enough to be visited by looting troops.

De-mining of land

50 Per cent of the ILO villages report a positive impact of the road works on the de-mining of land. One control village confirms this positive impact. The rest of the ILO villages hold a neutral position. Several villages explain that the planning of rural roads resulted in a large area being de-mined. These areas are now being used for cultivation or living.

3.3.13 Environmental aspects

Dust on the Roads

Stemming from the gravel top-layer causes dust clouds on the rehabilitated roads, which is mentioned as a serious problem. All ILO villages (and 40 per cent of the control villages)

report a negative impact. Some villages clarify that families whose property directly borders to the road, complain about health problems. Where dust clouds are a serious problem, communities face the dilemma: dust clouds, or no road. However, the village representatives clarify that they would not think of asking the labour-based project team to plan the road in a different area.

Drainage and Flooding

50 Per cent of the ILO villages and 20 per cent of the control villages report a positive impact of the rehabilitation works on water drainage. The drainage system that is established along with the road takes better control over possible flooding. Taa Cheet village emphasises the enormous benefit of currently being connected to the Berai water basin, thanks to the irrigation canals dug by the labour-based project. Another 33 per cent of the ILO villages report that the alignment of the road could have negative consequences for the water drainage in certain parts of a village (during the rainy season). Rehabilitated roads block a hundred per cent free water flow, and drain the water through side-drains and mitre-drains. Here is another development dilemma, as culverts and pipes have to be planned at places where they are most necessary to protect the road from collapse. Provided that villagers have a say in the placing of culverts, at some places development interventions put people for a choice: a free water flow, or no road.

Logging

50 Per cent of the ILO villages and control villages report that the rehabilitation works do not have a particular impact on logging, whereas 33 per cent of the ILO villages report a negative impact. Respondents in the latter communities explain that the rehabilitated roads facilitate transport of all vehicle types; hence, logging in specific areas has increased.

3.3.14 Other impact areas

33 Per cent of the ILO villages report that the roads have changed their traditional culture, which they consider a negative side effect. Another reported side effect is certain political parties gaining more influence in their village. One village reports that the traffic has become more dangerous.

CHAPTER 4 CONCLUSIONS AND RECOMMENDATIONS

4.1 An answer to leading research question I

Question I

What is the impact of the labour-based interventions in rural road rehabilitation on access to important economic and social services, within the influence zones of the rehabilitated roads in Siem Reap Province?

Changes in access were analysed as possible improvements in physical, economical and social ease to transport goods and to travel on the rehabilitated roads, and to travel and transport goods hence and forth from communities to important and economic social centres.

4.1.1 Improved access on the rehabilitated roads

Use of transport means

1 Rehabilitated roads carry 10 per cent more motorised vehicles than non-rehabilitated roads (50 per cent of the road users on rehabilitated roads, compared to 40 per cent on control roads). Rehabilitated roads carry more motorcycles, motor-trailers, pick-ups, and light ('etean') and medium trucks. Motor-trailers and trucks are new means of transport for literally 'trailer loads of passengers'.

Travel destinations

2 Road users on rehabilitated roads are more flexible in choosing and changing their travel destinations. The rehabilitation has widened the geographic area in which passengers and carriers meet important social and economic needs. 60 Per cent of the road users on rehabilitated roads travel to the district centre or further, compared to 40 per cent of the road users on non-rehabilitated roads.

Travel frequency

3 Travelling and transport in poor rural areas is as important as it was before the rehabilitation. All road users travel an average 3 times a day. 54 Per cent travels to the district centre (29 per cent), or to the provincial capital and further (25 per cent).

4 However, still 85 per cent of the road users report to have almost doubled their trips after the rehabilitation. This conclusion is not contradictory to the previous one. The road users travelling hence and forth from remote (and during a long period poorly accessible) areas, such as on Doun Keo, Svay Chek and Loley, benefit in particular from improved

physical access. Their transport frequencies increase with 200 to 300 per cent, and are brought in line with those of other users of the rehabilitated road network.

Travel time

5 Road users on rehabilitated roads travel only half the time it took before the rehabilitation (an average decrease of 44 per cent for all transport means). 86 Per cent is 30 to 90 minutes underway to reach markets and social centres, compared to 62 per cent of the road users on non-rehabilitated roads. The rest of the road users (25 per cent) on non-rehabilitated roads is more than 90 minutes underway.

Passenger fares and transport fees

6 Passenger transport is for part of the rehabilitated road network more expensive than on non-rehabilitated roads, but has also become a more productive (profitable) business. 86 Per cent of the passenger fares are in a medium range (150 to 300 Riel a kilometre) compared to 44 per cent on non-rehabilitated roads. Another 44 per cent of the passenger fares at non-rehabilitated roads is in the lowest range (150 to 300 Riel).

7 Most road users on rehabilitated roads pay or charge at least 20, and up to 40 per cent less for the transportation of goods than before. For all transport means, the average drop in fees is 38 per cent. Respondents report "the good road" and "savings on the costs for operation and maintenance" as the main reasons for lower transport fees.

8 Transporting goods over rehabilitated roads has become much cheaper: 60 Per cent of the road users pay or charge less than 150 Riel (approximately US$ 0.043) per kilometre for transporting 100 kilos. 60 per cent of the road users on non-rehabilitated roads pay or charge more than 150 Riel.

Load carry

9 After the rehabilitation, total volume of transported goods expands with approximately 100 per cent. On four rehabilitated roads non-motorised and motorised vehicles carry an average 262 kilos, compared to 212 kilos on non-rehabilitated roads. The average vehicle load on all rehabilitated roads is 512 kilos of goods.

4.1.2 Improved access for communities

Available public transport in villages

10 Motorised transport is in a broader variety available in villages along the rehabilitated roads. Transport by motor-trailer and by light and medium trucks are new and frequently available means of motorised transport which serve the remote located communities in particular.

Transport frequencies

11 Transport services of motorcycles and bicycles are about 100 per cent more available in communities along the rehabilitated roads. Vehicle owners and passengers travel an average 4 times a day to social and economic centres, compared to 2 times in villages along non-rehabilitated roads. Transport frequencies have reportedly increased with approximately 100 per cent since the rehabilitation started. People in villages along rehabilitated roads walk less.

Travel destinations

12 The main travel destinations for all communities are the district centre (46 per cent), the provincial town, and the commune centre (both 27 per cent). Comparison with the outcomes of the Transport and load survey reveal that the geographical scope of road users is broader compared to people in the communities.

Access to markets

13 People in villages along rehabilitated roads cut their travel time to markets with an average 37 per cent (conservative figure), observing all transport means. Villagers in communities along non-rehabilitated roads who partly benefit from the road network cut travel time with 23 per cent (progressive figure).

Acces to health services

14 People in villages along rehabilitated roads cut their travel time to health centres and hospitals with 44 per cent (progressive figure), observing various transport means. They travel two third or half the time that people are underway from villages along non-rehabilitated roads.

15 Health posts and centres have been more closely established to communities along the rehabilitated roads. Other (international) agencies were responsible for these investments. The rehabilitated roads facilitated the planning and construction of some of these facilities.

Acces to school

16 Children in communities along rehabilitated and non-rehabilitated roads walk similar distances (most children less than 1 kilometre) to nearby primary schools. As a consequence road rehabilitation does not have a significant impact on travel time.

17 If any impact, a positive correlation between road rehabilitation and an increase in school enrolments is not significantly proven by the outcomes of the Village survey. The subject needs further follow-up in a household survey.

4.2 An answer to leading research question II

Question I I

To which extent do the labour-based interventions in rural roads have a measurable impact on local economic development, within the influence zones of the rehabilitated road network in Siem Reap province?

Measurable was understood as an analysis of growth, indicated by growth in local transport and travelling, business activities at shops and markets, and improvements in the social and economic capital resources of communities.

4.2.1 Impact on business activities at local markets

Growth in shop volume

18 Total volume of shops and stalls at 5 important market places in the relevant districts has increased from 68 before to 481 after the rehabilitation of nearby roads. The average increase in shops per market is 607 per cent.

Pricing

19 Road rehabilitation has a strong indirect impact on price level at local markets. Improved access, transport, and supply of goods result in more vendors and more competition. Road rehabilitation strongly contributes to create ideal geographical conditions for business success: the road network provides ”good connections with Siem Reap town" and other district centres.

20 After the rehabilitation, 39 per cent of the shopkeepers faced a drop in prices of basic goods with an average 23 per cent. 15 Per cent of the vendors increased the prices of their goods, also with an average 23 per cent.

21 Apart from better infrastructure, price increases are influenced by a devaluation of the national currency, and imported price effects emerging from the Asian economic crisis. The political tensions built up throughout 1997 have reportedly had very limited impact on price levels at local markets in rural areas around Siem Reap town.

Item sales and product variety

22 Daily item sales at individual shops hardly change after the rehabilitation. Increases and decreases in product variety (one or two items) balance each other. New vendors add more goods of existing varieties.

Monthly profit

23 52 Per cent of the vendors, also selling before the rehabilitation of the roads, faced a drop in monthly profit share of 26 per cent on average. 23 Per cent of the vendors increased profit and/or turnover with 102 per cent on average. Approximately 50 per cent of the shopkeepers earn a monthly profit varying from 50,000 to 150,000 Riel (150,000 Riel equals US$ 42.86 in December 1997).

24 Many vendors mention "improved transport" and "better supply of goods" as the direct causes for profit decreases. They refer indirectly to the roads bringing more vendors and more competition to local markets. Vendors raise their profit and turnover as a result of more customers visiting the markets than before.

Rental fees and market value of shops

25 After the rehabilitation rental fees of stalls and plots at Puork district market have increased with 45 per cent, on average (average stall rent is 4,000 Riel a day, which equals approximately US$1,14). Several vendors at the 5 market places expect to sell their shop for more than 50 per cent of the market value before the rehabilitation.

26 The main reasons are the district centre becoming more and more important, as several social (e.g. hospital) and economic services are concentrated at one location. A strong increase in transport of farm products from the surrounding communes to the district centre can be added to that.

Impact of other factors

27 Rehabilitated infrastructure has also its limits. The shops and markets survey indirectly explores the ceilings of changes in sales and profit. During the data collection, the author came across weak developed commercial and accounting skills. Inputs other than infrastructure are also needed to improve output potentials of local businesses.

28 Prices are also affected by the devaluation of the national currency, and by imported price effects emerging from the Asian financial crisis. The political tensions that arose throughout 1997 did reportedly not create a big impact on local business in rural areas around Siem Reap town.

4.2.2 Impact on community capital: economic and social resources

Household enterprises

29 The variety of household enterprises in villages along the rehabilitated roads is somewhat broader than in villages along non-rehabilitated roads, but generally speaking limited. Average numbers of household enterprises do not differ that much.

30 Rehabilitated roads and improved transport give small businesses in communities a strong initial boost. Household enterprises in villages along the rehabilitated roads have increased with 9 per cent over 1997, compared to 2.3 per cent growth in control villages. Growth in total volume shows similar differences. However, few of the (new) household enterprises are able to survive. Too small and particularly vulnerable to disasters (floods, droughts), the majority runs the risk to collapse during the first year. A lack of business skills can be added to that. Village economies are still extremely dependent on agricultural production.

Public properties and capital assets

31 Villages along rehabilitated roads have an average of 10 assets, compared to 4 in control villages. Growth in assets is however mainly triggered off by other (international) agencies investing in communities. Rehabilitated roads have a small impact on the planning and implementation of some of these investments.

Vehicle ownership

32 Total volume of motorcycles (the most important means of transport) in communities along rehabilitated roads is 21 per cent higher than in communities along non-rehabilitated roads. Total volume growth, and average volume growth per village have y increased with 237 per cent and 163 per cent, respectively since the rehabilitation works started.

33 Ownership of motor-trailers, pick-ups, and light and medium trucks is more or less limited to communities along the rehabilitated roads, if not to only a few villages. The increase in ownership took place between 1996 and 1997.

34 The outcomes demonstrate a direct relation, and a certain positive correlation, between road rehabilitation and changes in ownership of motorised transport.

35 Communities along rehabilitated roads own still more bicycles than communities along non-rehabilitated roads, 753 versus 596. However, bicycle ownership is not as sensitive to road rehabilitation as ownership of motorised vehicles. The growth in vehicle ownership takes place more gradually, in which other factors play a role as well. Developments in ownership of ox-carts tend to follow this picture.

36 Rehabilitated roads have a direct impact on operations and maintenance cost of vehicles, creating an income surplus out of cost savings. Monthly cost for O&M dropped with an average 30 per cent since the rehabilitation works started, and are an average 24 per cent less than in communities along non-rehabilitated roads. Monthly savings on O&M cost equal the payment of about 2 full days of work at a labour-based construction site.

4.3 An answer to leading research question I I I

Question I I I

What is the impact of labour based rural road rehabilitation on other important conditions for community development, within the influence zones of the rehabilitated roads in Siem Reap province?

'Other important conditions*' were analysed as related aspects of local development, such as environmental conditions, security issues, and other impact effects that may reveal during the process of data collection.*

General security

37 Road rehabilitation has a positive impact on general security in the majority of the villages along rehabilitated roads. The communities are more frequently visited by police patrols. The rehabilitation adequately contributed to force back troops. Improved access is to an extent a preventive measure against looting.

Demining of land

38 50 Per cent of the villages located along the rehabilitated roads report a positive impact on clearing land and living areas from mines.

Environmental aspects

39 Stemming from the top-layer of the road causes dust clouds that receive a clear negative response in all villages, with here and there people having respiratory problems. However, dust problems do reportedly not counterweight the generated benefits from rehabilitation.

40 50 per cent of the villages along rehabilitated roads, and some others report a positive impact of road rehabilitation on water drainage in the villages. One third of the communities report negative effects for certain parts of the village. Even then, respondents consider all villagers being better off than before.

Other aspects

41 The reservation of some folks against urban lifestyles that find their ways to the community through the young generation leaves a two-way interpretation. Is it dust or a road? In the end, even in the few negative responses, communities consider themselves being better off than before.

4.5 Recommendations

Recommendations from the Transport and load survey

1 The author recommends the project repeating the transport and load survey, annually or biannually. Now that the roads are rehabilitated and the positive impact is known, the project can concentrate on monitoring the changes in key-variables: changes in use of

transport means, transport frequencies, fees (and load carry), which will further enhance the accuracy of data.

2 The author recommends the project combining the assessment of transport frequencies, fees and load carry with the regular traffic counts undertaken by the project. Both measurements enable the project to make statistical projections on transport, traffic, and load volume. These characteristics provide key-information for a possible calculation of road taxes. The questionnaire for the Transport and load survey can be used for an integration of both exercises.

Recommendations from the Shops and markets survey

3 The author recommends the project monitoring shop volume and profit figures annually or bi-annually. The figures enable the ILO to draw conclusions about the effect of the rehabilitated road network on the long term, also in relation to other interventions in the rural sector. It is expected that on the medium and long term, changes at shops and markets will be less significant, and develop rather gradually than through 'shock-effects'.

4 The author recommends the project linking the outcomes of the Shops and market survey to sector studies on the perspectives for productive non-farm employment, and the potential role of labour-based infrastructure assets.

5 The changes at shops and markets demonstrate that labour-based infrastructure investments and business activities are most closely related. Adequate infrastructure boost businesses, but also uncovers the gaps (such as in business skills, etc.). The outcomes confirm earlier conclusions that ILO interventions in employment generation need to be further integrated, in technical cooperation projects and technical advice. The original intention of the Employment Generation Programme for Cambodia, in 1992, provides the outline for such an operation. Like-minded initiatives will further enhance the ILO's comparative advantage in the sub-sector, and create an impact of scale that lifts the development of labour-based technology to a next stage.

Recommendations from the Village survey

6 The strong bias of communities for rural roads should be viewed in perspective. The village future investment priorities (section 3.3.2) underline the still enormous need for economically productive infrastructure. The Cambodian Government obviously has to allocate resources for this objective, more systematically. Appropriate local planning procedures may prove to be an adequate tool. The 'Upstream' project currently introduces IRAP planning techniques. It is recommended that regardless the type (*bottom-up* or *top-down*) of planning, the methodology aims for a rational appraisal of necessary infrastructure investments. '*Rational*" is clarified as needs being identified and prioritised in line with cost-benefit-recovery projections, for which the measurements can be integrated activities in the planning procedure.

7 The author recommends the impact of the project interventions on employment and household production to be further analysed in household survey.

8 The conclusions of the Village survey call even more for integrated interventions that target a productive development of community capital resources. The author

recommends integrated interventions at village level paying close attention to the typical nature of agriculture-based economies, for which conventional ILO support packages may have to be readjusted to promote the ILO-agenda adequately

ANNEX 1

Additional Tables

Table 6.1 School Enrolments of Surveyed Villages, and Changes

ILO villages			Control villages		
Village name	**Number of enrolments**	**Change over 1997**	**Village name**	**Number of enrolments**	**Change over 1997**
Prea Ang Trung	82	44%	Kouk Thlok / Snou	55	38%
Taa Cheet	57	58%	Do Nom	225	25%
Svay Chek	360	45%	Prey Thmai	147	23%
Som Rong	n.av.	n.av.	Taprok	n.av.	n.av.
Ban Caông	n.av	n.av.	Pong Ro	170	0%
Total enrolments	***399***	***13%***	***Total enrolments***	***597***	***17%***
Total average	***133***	***49%***	***Total average***	***149***	***29%***

Change over 1997 = the change in enrolments between December 1996 and December 1997, expressed in percentage of increased enrolments
n.av. = figure not available

Table 6.2 Distances from Villages to Markets and Social Services *(in kilometres)*

ILO villages				Control villages			
Village name	**Market**	**Health centre**	**School**	**Village name**	**Market**	**Health centre**	**School**
Preak Ang Trung	4.0	4.0	0.6*	Kouk Thlok Snou	4.8	4.8	1.3 *****
Taa Cheet	7.0	4.0 *****	2.0	Do Nom	1.0	1.0	1.5
Svay Chek	15.0	7.5	0.5	Prey Thmai	24.0 *****	24.0 *****	0.5
Som Rong	20.0	4.0	0.5	Taprok	20.5	4.5	0.5
Ban Caông	10.0	19.0 *****	0.5	Pong Ro	3.5	16.3 *****	0.5
Total average	***11.2***	***7.7***	***0.82***	***Total average***	***10.76***	***10.22***	***0.86***

***** = the people in this community visit two markets, health posts or schools regularly; figure is the calculated average of the
distances to both service centres

Table 6.3 Travel Time from Villages to Markets, and Changes

ILO Villages							Control villages						
Villages Names	**Motorcycle**		**Bicycle**		**Walking**		**Villages Names**	**Motorcycle**		**Bicycle**		**Walking**	
	Time	**Reduc-tion**	**Time**	**Reduc-tion**	**Time**	**Reduc-tion**		**Time**	**Reduc-tion**	**Time**	**Reduc-tion**	**Time**	**Reduc-tion**
Preah Ang Trung	10	50%	20	50%	60	33%	Kouk Thlok /Snou	20	33%	40	25%	120	25%
Tua Cheet	15	505	30	33%	90	40%	Do Nom	5	n.app.	10	n.app.	150	n.app.
Suay Chek	30	50%	75	50%	210	22%	Prey Thmai	68.5	14%	120	56%	225	12%
Som Rong	40	20%	90	25%	240	11%	Ta Prok	50	17%	105	16%	270	10%
Bang Caong	25	n.t.	45	40%	150	29%	Pong Ro	20	n.app.	30	n.app.	75	n.app.
Total Averages	24	23%	52	40%	150	27%	**Total Averages**	33	21%	61	32%	168	16%

Table 6.4 Travel Time to Health Services and Changes

Village Names	ILO villages						Village Names	Control villages					
	Motorcycle		**Bicycle**		**Walking**			**Motorcycle**		**Bicycle**		**Walking**	
	Time	**Reduc-tion**	**Time**	**Reduc-tion**	**Time**	**Reduc-tion**		**Time**	**Reduc-tion**	**Time**	**Reduc-tion**	**Time**	**Reduc-tion**
Preah Ang Trung	10	50%	20	50%	60	33%	**Kouk Thlok / Snou**	20	33%	40	33%	90	25%
Tua Cheet	15	50%	30	50%	90	40%	**Do Nom**	10	n.app.	20	n.app.	30	n.app.
Suay Chek	n.a.	n.a.	45	50%	120	33%	**Prey Thmai ***	60	17%	105	13%	225	10%
Som Rong	10	50%	25	44%	60	33%	**Tap Rok**	20	33%	40	33%	90	25%
Bang Caong	25	n.a.	45	40%	150	29%	**Pong Ro**	45	n.app.	60	n.app.	120	n.app.
Total Averages	15	50%	33	46%	96	37%	**Total Averages**	31	28%	53	26%	111	20%

Time = current travel time in minutes
Reduction = decrease in travel time as compared to before the rehabilitation
***** = Prey Thmai visits two health posts and market centres; the recorded figure is the average value of both travel times
n.a. = figure is not available
n.app. = figure is not applicable, as roads nearby have not been rehabilitated
n.t. = new transport; there was no transport available before the rehabilitation works started