DFID Department for International Development

OVERSEAS ROAD NOTE 22

A guide to pro-poor transport appraisal

The inclusion of social benefits in road investment appraisal

TRL Limited, Crowthorne, Berkshire, United Kingdom

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham
Berkshire RG40 3GA

Department for International Development
1 Palace Street
London, SW1E 5HE

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DFID, 1 Palace Street, London SW1E 5HE
DFID, Abercrombie House, Eaglesham Road, East Kilbride, Glasgow G75 8EA
Tel: +44 (0) 20 7023 0000
Fax: +44 (0) 20 7023 0019

Public Enquiry Point: 0845 300 4100 (from outside the UK: +44 1355 84 3132)
DFID website: www.dfid.gov.uk
Email: enquiry@dfid.gov.uk

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OVERSEAS ROAD NOTES

Overseas Road Notes are prepared principally for road and transport organisations in developing countries. A limited number of copies are available to other organisations and to individuals with an interest in road management, and may be obtained from:

Centre for International Development
TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham
Berkshire, RG40 3GA
United Kingdom

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Foreword

Rural transport investment has an important role to play in the eradication of poverty and achievement of the Millennium Development Goals. It provides opportunity for isolated communities to access health, education, trade and social networks. It provides a gateway to unknown opportunity and for other service delivery components to be realised.

While these types of benefit from investment in rural transport are seemingly obvious and worthwhile, their valuation for inclusion in conventional appraisal processes is problematic. These social benefits do not lend themselves easily to economic quantification in the same way as more 'conventional' road benefits (like improved vehicle productivity and time savings). Yet in the rural context, traffic levels are very low, and the sum of these 'conventional' economic benefits is unlikely to justify road investment.

Evidently, the inclusion of social benefits in rural transport appraisal is necessary if appropriate and positive investment decisions are to be made. But this needs to be done in a consistent and transparent way at all levels in the process of allocating funds to road investment.

This ORN addresses these issues; it identifies the nature of social benefits, how they can be measured using indicators, and how they can be included in the appraisal process for rural transport. A software 'add-on' to include social benefits with HDM-4 is also described. The document also emphasises the need for process, and as part of the process, the participatory inclusion of the end-users of rural roads and transport services – rural communities.

The document is primarily targeted at those engaged in the appraisal of roads, but it will also be of value to other stakeholders who should be involved in the process of road-fund allocation.

Peter O'Neill

Central Research Team

Department for International Development

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1 Introduction

1.1 The importance of social benefits

This Overseas Road Note provides guidance on incorporating social development concerns into rural transport appraisal. These concerns need to be included in order to:

- Emphasise the role of rural roads as a major factor in addressing poverty.
- Enhance their potential for selection against investment projects in 'competing' sectors.

The changing development context. There is an increasing need for donor agencies and national governments to be able to justify investments in transport, as in any other sector, in terms of their contribution to the alleviation of poverty. There has also been an increasing trend towards highlighting the benefits of investments in all sectors in terms of the non-pecuniary impact upon social networks and low-income households' ability to survive. At the macro (national policy) and meso (national and regional government institutions) levels, there is also a need to assess the way in which social benefits are currently accounted for, and what measures are used to weight them in strategic planning across sectors.

The need for road investment appraisal to reflect the new development agenda. Improved rural roads and transport are recognised by many stakeholders as vitally important to the alleviation of poverty in developing countries. However, current transport investment prioritisation processes do not reflect this contention and instead focus on a very narrow set of benefits (from road investment) which are frequently insufficient to justify the proposed investment. Thus there is a need to better represent the wide and significant range of impacts that improvements in transport conditions have on rural communities, particularly on the poor and disadvantaged.

The need for decisions to be made in a transparent manner that promotes good governance. A key starting point for delivering infrastructure and services for pro-poor growth is the use of transparent processes of investment appraisal. This requires the use of standard economic techniques, for which government capacity can be built, together with stakeholder involvement to test technical assumptions and to render governments accountable. Poor people's perspectives need to be integrated, either through official representation, as with parliamentary oversight committees, or through independent, direct external monitoring (DFID, 2003). Processes should be participative, and include the voice of people often neglected in traditional transport investment appraisal such as women, low-income communities and young people.

1.2 Purpose of guidelines

This document describes an approach to transport appraisal within the new development context, by presenting:

- A framework for the inclusion of social benefits in technical appraisal of rural transport investment.
- Guidelines for the application of this framework.
- Its use with existing planning tools such as HDM-4.
- Guidelines on an appraisal process that is participatory and inclusive.

The aim is also to promote the development of a transparent, multi-layered and integrated planning process for rural transport investment which will equally inform macro-level budget allocation decisions, meso-level regional screening exercises as well as micro project appraisal exercises.

Finally, this document identifies good practice in the process of fund allocations and provides guidance for a varied audience from central government policy-makers and aid agency staff to managers of road organisations and local engineers as well as local communities and local authority representatives.

The structure of the guidance document is set out in Figure 1. Essentially the Overseas Road Note is in two parts:

- An examination of the nature of social impacts, their measurement and inclusion in the technical appraisal process (Chapters 3 - 5).
- A recommended process for involving stakeholders in the overall process of resource allocation within the roads sector (Chapter 6).

By way of introduction, Chapter 2 of the Overseas Road Note examines the nature of conventional cost-benefit analysis as applied to rural transport appraisal, and highlights the problems being encountered and hence why there is a need for a wider approach.

1.3 Target audience

This document is targeted principally at transport specialists involved in the process of informing decisions on investments to change rural transport conditions. It assumes a basic level of knowledge concerning the theory and application of Cost-Benefit Analysis (CBA) in road appraisal (see Figure 1 for the Overseas Road Note structure).

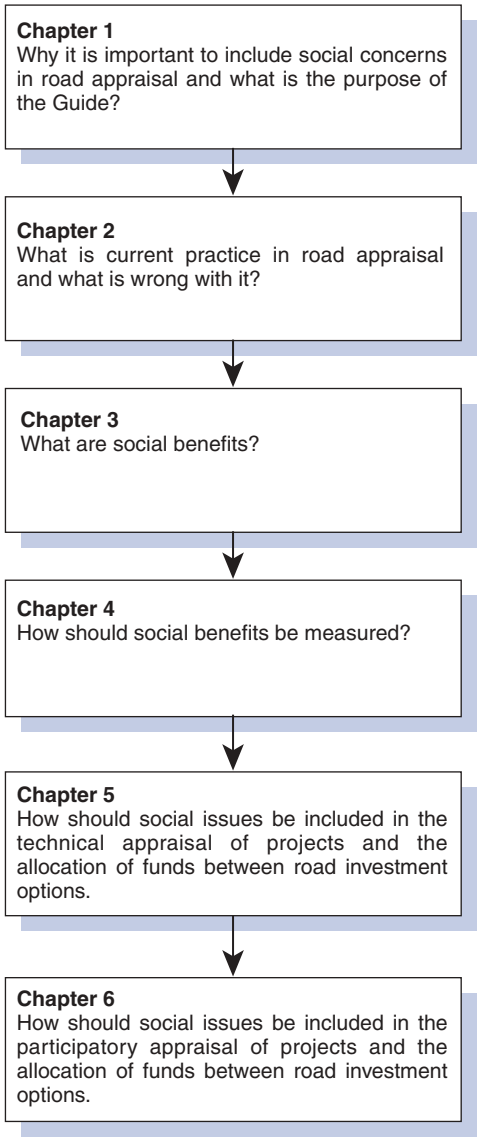

Figure 1 The structure of the guidelines

The Overseas Road Note also assumes that the reader has some understanding of the role (though not necessarily the application) of design, appraisal and management tools, and specifically the Highway Development and Management suite, HDM-4.

In guiding planners towards robust appraisal, it will also help to establish a better-informed process, which takes regard of all stakeholders. Thus it sets out how:

- Local communities can be involved in decision-making about their local road network.
- Road managers and others responsible for the condition of transport provision in rural areas can set up participative and transparent processes to help them prioritise road investment.
- Local authorities can compare decisions about investments in rural transport conditions with other poverty reduction options.
- Donor staff and senior national decision-makers (both within the transport sector and other sectors) can examine the contribution that rural transport investment makes to poverty reduction relative to other potential investments.

In some countries where the political context has maintained a need for social as well as economic considerations, social benefits have often been included implicitly in rural transport planning. But with the changing focus of attention (from strict economic efficiency to wider poverty equity issues), all countries will need to engage in the debate, or face a continual erosion of investment resources in rural transport (that cannot be justified on traditional grounds).

The changing context also supports a move away from purely project level planning for resources, to more integrated, strategic programme planning of which project appraisal is only part. As a result, the guidance in this document assumes that at the macro and meso levels there is also a need to assess the way in which social benefits are currently accounted for by national government and local authorities, and what measures are used to include them in strategic planning across sectors.

2 Current appraisal method

2.1 Cost-Benefit Analysis

Traditionally, Cost-Benefit Analysis (CBA) is employed to assess the economic worth of a road investment, which is judged over its life-time using the discounted values of all current and future flows of costs and benefits associated with the project. The project is judged on the basis of comparing the costs of having the project (the 'with' case) as against a base case of 'doing nothing' (or doing the minimum – the 'without' case).

In principle, all impacts of road development can be captured by economic theory, and hence included in a CBA. In practice, the valuation of many of the impacts is beyond the scope of current economic valuation tools. Thus CBA has tended to focus on so-called 'economic' benefits, which are those that can be valued in money terms. In this context, the non-quantifiable benefits are often referred to as social benefits and/or environmental benefits (which in turn are sometimes referred to as Kyoto-type benefits, which are the largely non-quantifiable impacts on resource sustainability and emission levels). The division between these so-called economic, social and environmental impacts is often blurred.

In practice, therefore, in a traditional CBA, the benefits and costs from a road project are typically confined to a series of discrete categories which can be quantified in money terms. These are:

- The initial costs of the road investment (rehabilitation, new construction, etc).
- The direct savings in the costs of operating vehicles on the new road.
- Economies from reduced road maintenance requirements.
- Time savings incurred by travellers and freight.
- Resource savings generated from reductions in road accidents.
- Wider effects on the economic development of a region from changes in transport conditions (while ensuring that these impacts have not already been captured in any of the above categories).

Non-quantifiable impacts are often assessed in a qualified manner, and the CBA may be modified to present option rankings (either in simple form, or in some form of multi-criteria or framework analysis). Many environmental impacts can be assiduously estimated, and in many cases roads will need to be designed to meet stringent environmental standards. In the case of 'social' impacts, there is less clear-cut understanding of impacts, and hence little or no attention is given to this category.

For high-volume roads that provide long-distance, inter-urban transport for people and goods, direct savings in the costs of operating vehicles over the new roads will be the most significant benefit. In urban environments, time savings are usually the most significant benefit of road investment. For all such investments, CBA provides a robust appraisal tool which is likely to yield (assuming favourable conditions and appropriate project design) acceptable rates of return by comparison with the benchmark across all sectors.

For low-volume rural roads, by contrast, economic justification for changes in transport condition rests mainly on the impact on local economic development, manifesting itself in extra, generated traffic. However, there are problems with current appraisal methods for estimating and valuing generated traffic,[1] and as a result the rates of return on low-volume rural roads are often insufficient to justify expenditure compared to other public investments. These problems occur because current appraisal methods assume:

a That market (or economic) prices should be used to allocate resources.

b That people have sufficient cash reserves to travel.

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[1] *The standard procedure is to take half the value of benefits to generated traffic (refer to Section 2.3 for a full explanation).*

c That there are no major changes in modal split (e.g. from walking and pack animals to vehicles).

d There are no major changes in the nature and form of access (i.e. road closure is not an issue in either the 'with' or 'without' investment case) – though this may be the precise reason investment to change rural transport conditions may be under consideration.

e That there is confidence in the ability to predict traffic growth.

f That normal traffic (i.e. traffic that would occur both with and without the investment) represents a satisfactory measure of the major component of total benefits – even though the absence of 'normal' traffic to remote rural areas may be why investment in changing rural transport conditions is under consideration.

g There are no major externalities involved (i.e. there are no longer-term impacts from changes in rural transport conditions, such as substantial change in rural lifestyle, major impacts on the sustainability of rural livelihoods, long-term impacts on local environment through land-use changes, etc).

h That all resources (including government agencies providing health care, education and extension services) are employed up to the point at which marginal benefits equal marginal opportunity costs.

Current estimates of the value of generated traffic do not represent accurately the importance of improved transport conditions to isolated communities, or the real long-term effects of significant changes in accessibility to rural communities.

2.2 The case for a new approach to rural transport appraisal

In many cases in remote rural areas without road access, the assumptions above do not hold. (For example see Box 1). The case for a different approach is strongest where a remotely-located large population makes relatively few trips and the only access is via a poor access footpath, road or track; where this access is liable to be severed or disrupted, possibly for several months of the year, vehicle movement may be prevented and mobility constrained. Issues that should be considered include:

- From the perspectives of both personal security and the need for vehicle access in a medical emergency, there is an important psychological benefit of all year round vehicle access even if emergency trips are rarely made.

- If a road is cut then it is likely that normal marketing activities in the area will either cease or be severely curtailed. Longer, more circuitous walking trips can be expected.

- While government services and external agencies remain crucial to the development of an area, there are strong arguments for reasonable all year round vehicle access to major centres within each local district.

- Any external institution (commercial, government, NGO etc) planning to locate staff and facilities in a remote location will think twice if vehicle access is very poor and cannot be guaranteed throughout the year.

Box 1 An example of failings in current appraisal methods

Take an extreme case where a new road is being introduced to a remote poor community where in the 'without' case people have to walk twenty kilometres and carry sick relatives to hospital, but in the 'with' case they can travel (perhaps very intermittently) by motor vehicle. Trip purpose does begin to matter, for it can be a matter of 'life or death'. The valuation of transport cost savings, based on either normal traffic (the difference in the opportunity cost of walking versus vehicle operating costs) or generated traffic (involving half the transport cost difference) looks distinctly odd (Hine, 2003).

It is also impossible to capture the long-term impact of improving accessibility (through the conventional measurement of normal, diverted and generated traffic benefits) when this has a direct impact on the location of important facilities. Perhaps correctly, new road investment in rural areas of developing countries is often seen as the precursor of many other interventions including schools, clinics, water supply, government offices, NGO activity and commercial investment.

As well as theoretical difficulties, there are also other problems in the practice of using conventional methods for assessing rural transport. Some of these relate to the systematic exclusion of certain benefits, the faulty measurement of the benefits that are included and the failure to recognise that the assumptions needed to justify ignoring distributional impacts – and so focus solely on efficiency gains – do not hold in practice. In essence these problems refer to the capacity available within national road and transport ministries and within local authority planning departments to use such investment appraisal techniques.

2.3 The valuation of generated traffic

Perhaps the biggest weakness of conventional CBA is the valuation of generated traffic benefits. 'Normal' traffic represents that which would exist both with and without the improvement; the benefits are calculated by multiplying this by the change in transport costs per trip. In most circumstances where the means of travel used and the nature and purpose of the trips made will not change, this measure of benefits is reasonable. Generated traffic benefits are traditionally valued as the predicted increase in traffic multiplied by half the difference in transport costs. If the market economy works well (i.e. there is perfect information, and cost and benefits are internalised by each stakeholder), this may be a reasonable assumption particularly where only marginal changes in transport costs and accessibility are envisaged. However the valuation of 'half' the difference in transport costs could well be a gross underestimate of the effects if the new trips that are generated lead to a step change in the social and economic life of those concerned. If the change in accessibility brings about a dramatic change in the amount of rural mobility, a change in how people travel can generate new activity (e.g. a school, clinic, water supply project, market or an externally funded new agricultural investment). The benefits to the local population however, may have very little to do with the predicted increase in the volume of trips made and may bear virtually no relationship to the valuation of half the difference in transport costs.

When there is poor accessibility (particularly when vehicle access does not exist or is threatened) and there is a low level of personal trip, the conventional measure of transport cost savings (particularly for generated traffic) is an unsatisfactory measure of benefits. In such cases the marginal assumptions break down.

2.4 Project versus strategic level analysis

There is also a question of which level and what stage should appraisal be undertaken. There are three recognised 'levels' involved in the decision-making process connected to changing rural transport conditions. These are:

- Macro-level, where national budgets are set and decisions need to be taken as to the allocation of resources to the transport sector *vis-à-vis* other policy sectors, by region and by modes and category of roads

- Meso-level where decisions are taken about resource priorities such as which transport modes and which areas of regions are to be given greater priority.

- Micro-level, where, within pre-defined resource constraints set at higher levels, alternative projects to change transport conditions are examined, and decisions taken about the best scheme option.

Traditionally, CBA is undertaken at the micro or project level, once resources have been allocated from central organisations to intermediate or meso level organisations to distribute throughout their geographical areas.

Analytical tools like HDM-4 have the capability for examining 'higher level' resource allocation issues, but in general the processes of resource allocation lack transparency and accountability. The degree to which resources are allocated on the basis of observed variations in poverty or the level

of public involvement in the criteria for distributing resources needs to be examined. There is therefore a need for any technical process of road appraisal to be incorporated in a process of decision-making that involves a wider set of stakeholders than are able to understand and interact with a technical planning exercise such as cost-benefit analysis. Their priorities and experiences need to be incorporated in a systematic manner into the decision process.

These Guidelines set out a process for decision-making on resource allocation to support changing rural transport conditions. It sets out methods involving analytical tools that can be used to determine efficient allocations of resources based on a series of objective criteria, including social benefits. The guidance also presents options for developing greater public participation and transparency in the decision-making around the allocation of resources between central financial institutions and sector-based organisations, such as national and regional roads authorities.

Thus as well as presenting the techniques for including social benefits in appraisal tools, it also provides a process for strategic decision-making in the allocation of resources between roads which allow the user of this guidance to adopt and develop an approach appropriate to the context and structure within which they work.

2.5 The problem of double – counting

It is useful to identify the benefits from road investment as either primary or secondary benefits. The primary benefits are the directly measurable 'first round' traffic related effects. Examples of primary benefits include transport cost savings or accident cost savings. Secondary benefits arise at a later stage and include changes in land values or the wider economic development generated from the investment. Secondary benefits are very difficult to isolate and measure; in addition it would involve double counting to add primary and secondary benefits together. For example, in theory, reduced transport costs will directly induce a rise in land values; to add changes in land values to transport cost savings would involve double counting.

In general, the more competitive and less distorted an economy is, the more likely it is that the primary traffic benefits will cover the full consequences of a road investment. The arguments for introducing secondary benefits into the analysis are strongest in the following circumstances:

- For remote new rural road investment.
- Where a relatively large change in transport costs are anticipated.
- Where there are unemployed resources.
- The local economy is perceived to be uncompetitive and weak.

Social benefits, as described in the next section, are very much part of secondary benefits. Any analysis that includes social benefits has to be wary of the possibility of double-counting and appropriate action should be taken to resolve the problem.

3 Identifying social benefits

If social benefits are to be included in rural transport appraisal, the key questions that need to be addressed are:

- What are social benefits?
- At what level do social benefits occur (macro, meso or micro levels)?
- How are social benefits affected by changes to transport conditions?
- How do the social benefits from changes in transport conditions affect poverty?

In examining these issues, it is worth remembering that social impacts that are derived from a road project can be negative (i.e. a social cost) as well as positive. This Guide tends to focus on beneficial social impact, but any analysis should also identify and account for possible adverse impacts.

3.1 What are social benefits?

Social benefits are a wide range of multi-dimensional, interactive and complex non-economic benefits that arise from changes in transport conditions. These include such things as improved social networks and enhanced social capital that are acquired by maintaining links with family members outside of the immediate rural area; improved health and education through easier access to services, particularly with regard to maternal mortality and girls education; improved service delivery by clinics and schools and associated staff attendance.

Due to their complexity and the variety of possible benefits that may arise from person to person and context to context, social benefits are what local communities and users of transport perceive them to be, depending on their own experience and context. And hence, to determine the social benefits of a particular transport project requires the involvement of local communities, transport users and decision-makers in defining and assessing the likely impact on them (the social concerns) of the proposed project.

In a more generalised way, social benefits are the wide range of benefits that are connected to the way households and communities respond to changes in transport conditions (resulting from the transport project) that are not covered by the narrow boundaries of vehicle operating cost and travel time savings. Box 2 gives an example of a list developed from a USAID study.

3.2 At what level do social benefits arise?

An analysis of the social benefits of programme and project interventions should be set firmly within the wider contexts of national macro-economic and transport sector policy. To adequately integrate social benefit analysis into any transport sector investment programme, it is necessary to consider both:

- The implications of macro-economic and transport sector policies on social relations.
- The impact of social relations upon the whole transport sector analysis and its policy options.

Therefore the analysis of social benefits (connected to interventions to change rural transport conditions) should not just be constrained to micro-project level interventions but should also be reflected in the work of:

- Meso-level organisations (e.g. Regional Road Departments and transport operators) and how they decide rural transport priorities and operating practices.
- Macro-level institutions (Government Ministries and other national transport policy groups) and the importance they place upon investing changes to rural transport conditions.

Box 2 Beneficial social impacts of rural road construction and improvement of existing roads

Social change

- Increased national identity.
- Improves government-village relations.

Impact on women

- Provision of roads found to be liberating, providing them more opportunities, more choice and freedom from restraints of traditional society.
- With roads constructed by labour-based methods, increased employment opportunities.

Health and nutrition

- Enable inhabitants to reach health clinics and personnel more easily.

Education

- Rural roads enable more children to attend classes more easily and smaller more isolated communities to retain teachers.
- Associated with the construction of additional schools.

Migration

- Strengthening of local market towns as administrative and economic centres.

Perceived quality of life

- Represents progress and provides visible benefits immediately.
- Rural communities view roads favourably.

(Source: U.S. Agency for International Development, 1982).

Box 3 gives an example of a macro-meso-micro level structure. The analysis of social benefits should also focus on how these different levels are inter-related and inter-connected, establishing for example:

- What role national policy plays in a local transport project and vice versa?
- How do the rules and practices of a Regional Roads Department influence the design of transport investment and what impact does this have on rural communities' lives?

3.3 Impact of transport on social benefits

By its very nature of providing access and mobility to a range of activities and opportunities, transport must inevitably have a social impact which is likely to be profound. Social movements cover (amongst others) trips to health centres, hospitals, schools, government offices and to visit friends and relations. They are important because they strengthen the social capital of the individual and may help in personal or community crisis.

The argument for separately introducing 'social' benefits is strongest when roads become impassable to motorised traffic. When this happens whole communities may be cut off from conventional social services and hence personal trip making will be severely curtailed. Conventional economic analysis of road investment relies heavily on vehicle traffic movements in the estimation of transport benefits. If roads are impassable or suffer from strong traffickability problems, then clearly a measure based on existing traffic volumes alone will underestimate the

Box 3 Example of approaching gender relations within social benefits analysis

It is important to examine the ways in which gender relations, gendered norms, and gender imbalances affect performance, priorities and impacts throughout the transport sector. This involves recognising that:

- The transport needs of men and women can be different.
- Men and women have different capabilities to participate in the design and delivery of services.
- Institutions which design, deliver and evaluate sector programmes operate according to rules and norms which are gendered, i.e. they normally function in ways which prioritise men's needs and viewpoints over those of women.

In this case, the whole transport sector should be viewed as a 'gendered structure'. Seemingly gender neutral institutions may, in fact, be gender-biased by causing unintended consequences for the way in which households organise themselves, and who takes responsibility for the subsistence and reproductive burdens within the household. Unforeseen adverse impacts on household operations can have negative implications for a wider, commercially-oriented market economy, leading ultimately to an overall reduction in effectiveness of donor-supported investment.

benefits from road improvement. Even though it is possible, under the conventional analysis, to predict generated traffic and value the associated benefits it can be argued that when roads are cut off (and people directly denied access to critical services) this procedure is faulty and unlikely to give a reasonable estimate of the benefits of re-establishing access.

Research undertaken by TRL has highlighted the impact of changes in transport conditions upon rural communities. This work has highlighted a series of examples where positive and negative social impacts have been reported (See Box 4 for an example).

3.4 Transport and poverty

The World Bank (2000) describes poverty in terms of four dimensions:

- ***Opportunity.*** Poverty is expressed by a lack of access to labour markets, employment opportunities and to productive resources, constraints on mobility, and, particularly in the case of women, time burdens resulting from the need to combine domestic duties, productive activities, and management of community resources. Transport contributes to economic growth by mobilising human and physical resources. Improved productivity and output helps to 'lower transaction costs, allow economies of scale and specialisation, widen opportunities, expand trade, integrate markets, strengthen effective competition and eventually increase real income and welfare of society. Without efficient transport, economic growth is not possible, and without growth, poverty reduction cannot be sustained' (Gannon and Liu, 1997). As well as contributing to growth, transport also provides access to employment opportunities.

- ***Capability.*** Poverty is expressed through a lack of access to public services such as education and health, and hence an inability to build human capabilities. Transport can contribute to developing human capital and quality of life. Transport can play a big part in improving this attribute of poverty by providing access to education, health-care facilities etc. This constitutes access to the opportunities and means to improve human capital.

- ***Security.*** Poverty is expressed as vulnerability to economic risks and to civil and domestic violence. It reflects the vulnerability of the poor to the uncertainties of life (particularly the vulnerability of the poor to sudden shocks), and the ways in which they cope. Transport should contribute to greater security by removing any sense of vulnerability through isolation. Transport is also a source of vulnerability in that it provides a location and environment for harassment.

Box 4 Impact of changes in transport conditions on social conditions of rural community in Zambia

First year after the road intervention

Positive

- The food supply had improved.
- Flooding reduced because proper drainage system was set up.
- Traffic on the road increased, with more bicycles and motor vehicles passing along the road The increase in traffic on the road led to construction of small stores along the road.

Negative

- Because of the increase in traffic there was too much dust causing pollution.
- Because of the traffic people were disturbed with the noise.

In the second year

Positive

- More vehicles, including passenger buses had started coming to the area to provide transport.
- It started becoming easier for people to trade freely because more traders from outside were coming to the area to buy agricultural products.
- Generally, cleanliness in the settlement improved.

Negative

- Because the road was now in a good state, people had started over speeding causing road accidents especially among children

Since last year

Positive

- Food security has improved in the area.
- The road has promoted agricultural activities.
- Accessing places of importance such as the grave yard has been easier.
- There are more trading activities in the area.

Negative

- Because of heavy-duty vehicles coming to buy produce from the farmers, the road is getting damaged in some parts.

- ***Empowerment.*** Poverty is expressed as being without voice and without power at the household, community, and national levels to influence decisions made that affect ones livelihood. The dimension of poverty that reflects the need (and inability on the part of the poor) for participation and inclusion in all the political and social processes and networks. Transport is a mechanism for supporting effective participation.

It is clear that changes in transport conditions will have a series of impacts and benefits upon these four dimensions of poverty; Table 1 sets out examples of such impacts. The table indicates the three main categories of benefit (economic, social and environmental), and shows that changes in transport conditions will bring not only monetary benefits but also environmental and non-monetised or social benefits. It will only be possible to develop a complete and appropriate list of all benefits associated with a particular scheme to change transport conditions with the involvement of local decision makers and local communities.

Table 1 Impact of benefits on poverty dimensions

			Cost/benefit of road improvement	*Money valuation of benefits (costs)*	*Impact on:* *Economic opportunity*	*Capability*	*Security and isolation*	*Empowerment*	*Comments*
Economic benefits			Road maintenance.	Road deterioration relationships and unit maintenance prices.	Increased marketing and income generation opportunities.	Enhanced emergency access to health services and continuous access to education.	Reduced isolation Enhanced mental well-being Reduced exposure to vulnerability from ill-health.	Enhanced ability to participate in civil society decision-making.	
			Vehicle maintenance.	Vehicle wear relationships and spare part prices.	Increased output/ productivity.	Enhanced profitability for public transport services increases access to services networks and opportunities.	Enhanced safety of vehicles will reduce vulnerability and shocks caused by road accidents.		
	Social benefits		Journey time changes (existing traffic).	Speed-flow relationships and value of time.	Access to employment Increased output/ productivity.	Reduced time burden on women and children that can be utilised for improving quality of household care and management social networks.	Reduced isolation. Enables better management of ill-health and economic shocks for household.	Reduced time burden of household and income-generating tasks enables greater control of time for women and children.	Main economic benefit of road improvement (value of time and time saved are proxies for economic growth). Adding in other benefits (impacts) may be double counting.
			Lower travel costs generate more travel.	Forecast travel change and change in travel price.	Access to employment. Increased output/ productivity.	Enhanced ability to access health and education services and social networks.	Enhanced ability to manage economic shocks through access to social networks and outside help.	More opportunity for interaction with democratic process/ family networks and safety nets	Problem of 'step-change' improvements – forecasting the change is problematic. Hence the case for assessing 'social' impacts, based on analysis of expected changes in livelihood.

Continued ....

Table 1 (Continued) Impact of benefits on poverty dimensions

		Cost/benefit of road improvement	*Money valuation of benefits (costs)*	*Impact on:*				
				Economic opportunity	*Capability*	*Security and isolation*	*Empowerment*	*Comments*
Social benefits	*Environmental benefits*	Road accidents.	Road design-accident relationships and values of life/injury.	Impact on family earning potential/ household budgets.	Greater benefit from investments in human capital such as schooling.	Reduced vulnerability and risk of shocks from accidents.		
		Severance.		Impact on access to employment.	Impact on access to health and education services.	Impact on household's vulnerability.	Impact on interaction and co-operation between communities from shocks and use of social networks to manage shocks.	Probably of more concern in urban environments.
		Resettlement.	Compensation payments.	Impact on access to employment, natural resources etc.	Impact on access to natural capital (firewood & water).	Impact on social networks may increase vulnerability.	Process of decision to resettle may affect community cohesion and perception of power.	
		Emissions (noise and pollutants).			Impact on health.			

4 Measuring social benefits of transport

4.1 Outline

As has been set out earlier in Section 3, social benefits are a wide range of multi-dimensional, interactive and complex non-economic benefits that arise from changes in transport conditions. Findings from case studies undertaken as part of the development of this Overseas Road Note suggest that social benefits from changes in rural transport conditions can be seen as:

- Improved social networks and enhanced social capital from people who maintain links with family members outside the immediate rural area. Such links facilitate social interaction and access to external assistance and resources in times of adversity.
- Enhanced community development may arise from the community working together to maintain or improve their own transport conditions. This depends upon how changes in transport conditions are brought about and how they are maintained.
- Increased confidence in an ability to travel to access services and opportunities.
- Improved health and education through easier access to services, particularly in areas such as maternal mortality and girls' education.
- Reduced vulnerability to unexpected events and shocks from crop failure, accidents and poor security. This is often due to an increased ability to access assistance and to secure income from an alternative source.
- Greater reliability of clinics and schools in securing staff for clinics and schools and easier to maintain these services because drugs can be supplied and school supplies replenished.
- Reduced time burden from engaging in mobility due to the improved environmental impact of roads (e.g. less dust) and increased transport service frequency.

The social benefits of changes in transport conditions are best measured with the use of proxy indicators. These indicators are based on participatory enquiry which seeks to estimate a community perspective of how transport influences their lives and livelihoods. However, from the case study research undertaken as part of the development of this guidance, a set of indicators (as set out in Table 2) could include the following, derived from consultations with communities in Vietnam, Zambia and Ethiopia.

All of the indicators listed in Table 2 should be disaggregated by gender, age and income wherever possible.

4.2 Methodological approach

In order to identify perceived and actual social benefits for individual cases, and to undertake consultation and sensitisation of local communities for defining and assessing road appraisal options, it is advised that a robust methodological approach be adopted for measurement of social impact.

The measurement of social impact on the range of stakeholders listed below should follow a series of clear steps which include:

- Creation of study team.
- Survey reconnaissance.
- Surveys of key informants.
- Focus group and questionnaire surveys.
- Analysis.

Table 2 Possible indicators for social benefits

Increased access to education services

- Number of schools (primary and secondary) per 100 children in each settlement.
- Enrolment into primary and secondary school (proportion of children).
- *Actual* attendance at school (frequency).
- Distance to primary and secondary school and tertiary college.
- Cost of attending school (transport and school fees).
- Literacy rates.

Increased access and use of health services

- Distance to health facilities (health post, local clinic, hospital).
- Number of health facilities (health post, local clinic, hospital) per 100 people in each settlement.
- Attendance at health facility (frequency).
- Cost of attending health facility (transport and medical fees).
- Life expectancy.

Greater access to income and marketing opportunities

- Proportion of expenditure on social/transport activities (well-connected compared to remote rural settlements).
- Economic growth measured by improved living standards and income/expenditure.
- Access to/ownership of transport means by income group.
- Acquisition of credit – proportion of trips and cost of journeys to community associations.
- Unemployment rates.

Improved transport and mobility services

- Transport fare per km.
- Proportion of expenditure on transport.
- Proportion of sample that commute to work and commuting time.
- Improved mobility.
- Distance to transport pickup point.
- Passability during wet/dry season.
- Transport fare per unit of goods.
- Cost of fuel per litre.

Enhanced social networks and improved social capital

- Proportion of expenditure on social activities by income group.
- Distance to social activities.
- Frequency of social trip-making.
- Cost per km of social trips.
- Number of places of worship per 100 people in each settlement.
- Proportion of social visits undertaken by men/women/boys/girls.
- Access to/ownership of communication means, by income group.
- Rate of migration to/from settlement.

To measure the social impact within a settlement of changes in transport conditions, the following stakeholders should be assessed:

a Transport user.

b Livelihood earner.

c Residents within the settlements living by or near the transport improvement.

d Community service user.

e Community service provider (school teacher, health worker, religious leader, local government official).

4.3 Creation of a study team

The team leader should construct a survey team that includes expertise of a sociologist, an economist, and an engineer, preferably with specialist knowledge in the field of transport, depending on the budget. Post-graduate qualifications are desirable. In addition, three university graduate survey enumerators are recommended. The tasks of each are as follows:

1 Team leader

- Selection of study areas.
- Liaising with local officials.
- Local-level interviewing of key informants.
- Finalisation of background contextual reports on the area.

2 Two or three specialist team members (together they should cover the disciplines of sociology, economics and engineering)

- Compilation of contextual background reports on the case study areas based on data provided by local-level key informant interviews and secondary data collection from official documents, census data, household budget surveys, agency reports, and published case studies.
- Survey enumeration.
- Analysis of survey data.

3 Survey enumerators

Administering survey questionnaires and helping with the focus group discussions and participatory appraisal exercises

4.4 Survey reconnaissance procedure

This step should be desk-based and features gathering secondary sources and existing information on the social characteristics of the communities involved. The types of information should include:

1 Maps of anticipated catchment area of transport improvement.

2 Latest detailed census and household budget data of the area.

3 Background information from various sources (including government, donors, NGOs and academic sources) on transport infrastructure, services and conditions in the area; and in particular.

4 Survey material relating to the area including household and transport surveys, participatory mapping etc.

4.5 Key informant surveys:

Key informant interviews should be held with each of the community service provider categories to provide accurate information on socio-economic characteristics of the community (see Questionnaire A, Appendix 1). The community service providers include, but are not limited to:

- School teachers.
- Health workers.
- Religious leaders.
- Local government officials.

4.6 Focus groups and questionnaire surveys

The community service providers should be asked to help in organising separate focus group discussions with the following demographic groups that may be disaggregated further to account for age differentials:

- Adult women (aged 18 to 30 / 31 to 45 / 46 to 60)
- Adult men (aged 18 to 30 / 31 to 45 / 46 to 60)
- Secondary school students (aged 12 to 18)

Each group should number about 30 people (for guidelines on how to conduct focus group discussions and an example question set see Appendix 2). Before participating in the focus group, each individual will have a short questionnaire administered to them to establish occupation, income and expenditure, travel requirements for income earning and social trips, and ownership and access to means of transport (for an example of Questionnaire B see Appendix 3).

Based on this methodology and depending on sample size, data collection in each settlement will take approximately 5 working days. Tasks within these 5 days should be distributed thus:

Day 1 devoted to establishing contact with the key informants to mobilise survey sample and doing a physical reconnaissance of the settlement.

Day 2 would involve in-depth interviews with the community service providers.

Days 3-5 would involve administering the individual questionnaires and interviewing the focus group discussion participants. Other participatory mapping techniques may also be used to measure the development of social networks.

After administering the household survey questionnaire to the randomly selected groups of the sample of adult men, adult women and students, each group should be requested to give its views about the village including drawing of the map of the village (for a description of how to use maps, mobility charts and ranking exercises to collect data, see Appendix 4).

In preparation for these enquiries the team leader must brief the groups about the objective of the survey and the general participatory approach to be followed during the study to map the area's resources and social attributes.

Aspects that need to be considered during the mapping activity include:

- Selection of appropriate place for drawing the map and discussion - principally under tree shade.
- Drawing the map of the village should involve discussion among the group members under the guidance of the enquiry team.
- The map may be prepared on paper, on a board or on the ground.

After the groups have agreed on the map produced by the participation of all members, the enquiry team should transfer the information to a permanent format (e.g. sketched on paper, or photographed). This can then be used in all focus group questionnaires administered to each group. After finalising the participatory mapping process, the group should be allowed to respond to the other questions presented in the Focus Group questionnaire.

A summary of the methodological approach adopted for the case studies in Vietnam, Zambia and Ethiopia is described in Box 5.

Box 5 Methodological approach to conducting social benefits surveys adopted in Vietnam, Zambia and Ethiopia

Step 1: Sampling and site selection

- Undertake purposive sampling to capture the impact of rural road improvements and compare the impact of transport improvements at:

  National level: three countries chosen from a wide array of geographical areas – Vietnam, Zambia and Ethiopia

  Settlement level: a) remote rural settlement and b) well-connected rural settlement

- For each, a settlement where road maintenance, rehabilitation or construction has taken place in the last 5 to 10 years, and a control settlement where NO road maintenance, rehabilitation or construction has taken place in the last 5 to 10 years, selected with assistance from the local transport authority who has information on recent transport interventions and local socio-economic characteristics.

- The control settlement is used to factor out any non-transport benefits/disbenefits on the community.

Step 2: Survey team composition

- Identification of Team Leader, specialist team members and enumerators, with disciplines in sociology, economics and engineering.

- Undertake survey reconnaissance drawing on secondary literature and Census data and in discussions with personnel working on associated research projects from multi/bi-lateral donors and government departments.

Step 3: Survey methodology

- Key informant interviews held with each of the community service provider categories (teacher, health worker, religious leader, local government official). These four people asked to help in organising three separate focus group discussions of adult women, adult men, and secondary school students, respectively, numbering 20 people each (total of 60 people in each settlement).

- Before participating in the focus group, each individual to have a short questionnaire administered to them.

- Data collection in each settlement takes approximately 5 working days. The first day devoted to establishing contact with the key informants and doing a physical reconnaissance of the settlement. The second, third and fourth days spent interviewing the focus group discussion participants, administering the focus group discussions and the individual questionnaires. The fifth day undertaking in-depth interviews with the community service providers. Other participatory mapping techniques may be used to measure the development of social networks.

Continued ....

Box 5 (Continued) Methodological approach to conducting social benefits surveys adopted in Vietnam, Zambia and Ethiopia

For each settlement:

Day 1 – Arrive in settlement, meet key informants and administer Questionnaire A
Day 2 – Focus group with 20 *adult women* preceded by 20 questionnaires (Questionnaire B)
Day 3 – Focus group with 20 *adult men* preceded by 20 questionnaires (Questionnaire B)
Day 4 – Focus group with 20 *students* preceded by 20 questionnaires (Questionnaire B)
Day 5 – Slack period: local data collection, interviewing community service providers etc

- The timeframe for undertaking field testing is approximately 15 days per country (the control and non-control for each location can be surveyed simultaneously if two separate teams are available).

Step 4: Analysis and reporting procedure

- The summary report by the survey team to contain an analysis of the data from the surveys undertaken in each settlement. The report should contain the team leader's views on the significant issues which emerged from the study and any recommendations that would follow from this.

Analytical report format:

- Background to the country area under survey.
- Institutional framework and planning of roads in the country area under survey.
- Characteristics of survey provinces, districts and villages.
- Findings from the focus group discussions and questionnaire analysis.

4.7 Analysis of the data

Analysis and interpretation of data collected in the field is key to providing an overall impression of the pre-impact (and post-impact) condition of the infrastructure intervention at the survey sites. Assuming the data has been collected correctly and provides an accurate representation of trip-making activities prior to road investment, it can be analysed to determine key relationships between the status of the road infrastructure and the prevailing socio-economic situation in the surrounding communities.

Data from the survey can be stored in a database or spreadsheet format, from which both quantitative and qualitative data can be analysed. The household survey data can be recorded in a Microsoft Excel spreadsheet, and so too can qualitative data.

Both qualitative data from the focus group discussions, and the other participatory processes as well as from the quantitative surveys should be reported. (Box 6 shows an example of qualitative data reporting from the case study in Zambia). Here respondents from a well-connected rural and remote rural village were asked to rate the importance or severity of the phenomenon that they were reporting, in this case the extent to which the transport intervention was a catalyst for social impact (both benefits and disbenefits) on the community. The scale used was from +10 for very positive advantages to –10 for very negative disadvantages.

The scores obtained from tables generated by the survey questionnaires and focus group discussions, as shown in Box 6, can be averaged across the survey sample to indicate overall 'preference' by the community, disaggregated by gender, age and income. It is important that interpretation of the scores include feedback from the community, to explain their reasons for the score given.

Box 6 Reporting focus group data on social impact of transport interventions

	Kawama (well connected)			*Makangila (remote)*		
Group	*Advantage*	*Disadvantage*	*Score**	*Advantage*	*Disadvantage*	*Score**
Adult men.	Trips to places e.g. trading places have reduced, able to travel out of the village and back the same day.	Too much dust on the road causing environmental problems.	4	Trading has become easy.	Has opened access to the area for thieves.	2
Adult women.	Women are able to use bicycles to get to various places.	Women cyclists are vulnerable when they meet male cyclists.	8	Find it safe now to travel on the road.	Non availability of public transport in the area.	2
Male youth.	The road has provided access to other villages where they go to look for employment.	They tend to over speed causing accidents.	5	Are now confident to travel to town either walking or riding.	A lot of accidents with bicycles.	-3
Female youth.	Road has improved access to the market where they go to buy vegetables and other food.	Forced to walk to such places due to traffic congestion (bicycle) on the road.	6	The road has made them more secure to travel to social places on their own.	The road has made them to be more outgoing.	-2
Male children.	They are able to go to school on their own because the road is now open and safe.	They play on the road and hence are involved in accidents.	5	No impact.	No impact.	0
Female children.	They go to school on their own.	Play in the road and cause accidents.	4	No impact.	No impact.	0

** +10 very positive advantages to -10 very negative disadvantages.*

5 Incorporating social benefits into technical appraisal of roads

5.1 Introduction

Transport appraisal provides an important link between technical work and political decision-making. A sound and comprehensive system should combine engineering, economic, environmental and social appraisal within a single analytical framework. It should be capable of explanation and communication to a wide range of decision-makers and other stakeholders and map on to their information needs. The main shortcomings of the existing methods of appraisal have been identified and discussed in Section 2 of this ORN. This ORN attempts to set out an adapted process for transport appraisal that better incorporates wider social considerations. To aid this process, analytical software for social benefit analysis has been produced. This section of the ORN gives a description of the social benefits software tool developed and how this tool can be used to supplement the *Highway Development and Management Model* (HDM-4), and other similar systems, in road transport appraisal (Kerali, 2000).

5.2 Social benefits software tool - methodology

As has been explained earlier, many social benefits are difficult to quantify, let alone to value in money terms, using current tools and techniques. The challenge is to develop a comprehensive appraisal system that is flexible and capable of combining both quantitative and qualitative benefits, and monetised and non-monetised benefits into a single analytical framework.

Associated with this Overseas Road Note, a suitable framework has been developed, based on multi-criteria analysis (MCA) principles and incorporated into a computerised software tool. This tool provides a means of assessing the social consequences of different transport investment projects, standards, strategies and policies. In particular, the results of analysis carried out using this newly-developed tool can be used within globally accepted road appraisal models, such as HDM-4. Firstly though, the following paragraphs outline the principles of multi-criteria analysis used in the development of the social benefits software tool and the principles of operating the tool itself.

Multi-criteria analysis

Multi-criteria analysis provides a systematic framework for breaking a problem into its constituent parts in order to understand the problem and consequently arrive at a decision. It provides a means to investigate a number of choices or alternatives, in light of conflicting priorities. By structuring a problem within the multiple criteria analysis framework, road investment alternatives may be evaluated according to pre-established preferences in order to achieve defined objectives.

MCA basically requires the clear definition of possible *investment alternatives*, together with the identification of the *criteria* under which the relative *performance* of the *investment alternatives* in achieving pre-established *objectives* is to be measured. Thereafter it requires the assignment of *preferences* (i.e. a measure of relative importance, or weighting) to each of the criteria.

This section will describe in more detail the different basic elements of Multi-Criteria Analysis.

Investment alternatives

Several investment alternatives can be analysed to determine, for example, which is the most cost-effective to implement. An alternative is one of a set of mutually exclusive works alternatives specified as options to be analysed for a road section. It could consist of different works options applied to various sections making up the study. For example, the resurfacing of a road section constitutes an option or alternative. Similarly the existing maintenance practices would constitute another option for the same section. Standards refer to the targets or levels of conditions and performance that a road administration aims to achieve. Road agencies set up different standards that can be applied in practical situations in order to meet specific objectives that are related to functional characteristics of the road network system.

Any number of investment alternatives may be specified. However, it should be noted that when the number of criteria and alternatives is large, this results in a large number of pair-wise comparisons, which reduces its practicality.

Objectives and criteria

Perhaps the most important component of the MCA process is the identification of the objectives relevant to the problem of defining investment alternatives, together with their associated criteria. A general objective may be specified from several viewpoints; for example social, economic, environmental and political. An example of the social impacts of road investments has been given in Box 2, Section 3.

Objectives should be developed in a hierarchical fashion (Stewart, 1992). The hierarchy may be obtained by either a deductive or an inductive approach.

- Deductive approach, the starting point is a general but imprecise objective statement (e.g. a main goal), which is refined into more precise sub- and sub-sub objectives.

- Inductive approach, all the possible features of the alternatives are laid out and then grouped and aggregated until they form a coherent and logically connected set of evaluation objectives.

The deductive approach has been used for the development of the social benefits software tool.

Two important concepts, those of *specification* and *means-ends*, are utilised repeatedly when developing objectives.

Specification means that when an objective is subdivided into lower-level objectives the intended meaning of the more general objective is clarified. Similarly, the lower-level objectives can be thought of as the *means to an end*, the end being the higher-level objective. Careful attention to these concepts helps in reducing the presence of 'holes' in the hierarchy.

The identification of objectives normally takes place during the problem formulation stage. It is by no means a trivial task. Keeney and Raiffa (1976) provide some guidelines for the generation of objectives as follows:

- The study of existing literature to review whether similar problems have been tackled before, as some objectives may be drawn from previous works.

- The modelling of the system under consideration, as some objectives may emerge naturally from the model definition.

- Surveys of interested parties or through the use of focus groups.

The development of criteria is a key task associated with the development of objectives. A useful general definition of a ***criterion*** is as a (Voogd, 1983):

'Measurable aspect of judgement by which a dimension of the various choice possibilities under consideration can be characterised'

Voogd identifies three types of criteria:

1 *Attainability*, which give an insight into the chances of a specific alternative being realised;

2 *Veto*, which allow the exclusion of those alternatives which are not relevant; and

3 *Desirability*, which allow the degree to which an alternative is desired from a particular point of view to be specified.

In decision-making problems, only achievable and relevant alternatives are considered. The criteria used in this type of problem therefore correspond to the desirability criteria type. These criteria constitute a means for determining the degree to which objectives are achieved.

Depending on the way the objectives are defined, one or more criteria may be associated with each objective. In the case of a general objective a number of criteria may be needed to ascertain whether the objective is met. In the case of more precise objectives, each of them may have an associated criterion used to describe whether each individual objective is met.

Attributes and measurement scales (Performance)

Attributes are surrogate measures of performance, and they may measure the achievement of objectives directly or indirectly. Each criterion should be represented by an *attribute*, or surrogate measure of performance, of the consequences arising from the implementation of any particular alternative, A_j. For each objective, O_i, an attribute X_i may be identified to indicate the degree to which objective O_i is achieved. A specific level of achievement measured on the attribute, X_i, is indicated by x_i.

In a particular problem with n attributes, the vector of consequences may be expressed as $\mathbf{x}^o(x_1, \ldots, x_n)$. For a particular alternative, A_j, the consequences may be expressed as $\mathbf{x}^j$, where the elements x_i^j could be either a probability distribution over the possible consequences of A_j or a deterministic relationship between A_j and its consequences[2].

Attributes may measure the achievement of objectives directly or indirectly. When the objective is measured indirectly the attribute is called a *proxy attribute*. Proxy attributes reflect the degree to which an associated objective is met, without directly measuring the objective. Scales are needed to measure both direct and proxy attributes. There are two types of scales:

- *Natural* are those which are established and enjoy common usage and interpretation, and
- *Constructed* (subjective) are those developed specifically for a problem being addressed.

The latter are normally employed when no natural scales are available (e.g. for measuring social capital, where, for example, verbal descriptions of various degrees of social capital may be linked to an integer value along a scale). An important aspect that should be taken into account when dealing with scales is that of standardisation. The aim of standardisation is to bring the measurements of all attributes to a common scale (e.g. between zero and 100). This, although not a requirement, makes the understanding of the alternatives' performance on each criterion easier.

Preferences (Relative importance)

The selection of a particular set of investment alternatives will greatly depend on the relative importance (or weights) assigned to each criterion. The identification of those responsible for defining the weights will depend on the extent of the applicability of the investment alternatives being defined, whether they are local, regional, national, or whether the standards defined are legally binding or are simply guidelines.

Ideally, all stakeholders together with those involved in the identification of objectives and the measurement scales for quantifying attributes should be involved in the process of deciding the relative importance. Consequently, the different views of environmentalists, social scientists, representatives of the community, engineers and politicians may be combined in a rational way to reach weightings that are acceptable to all.

Implementation of AHP methodology

The social benefits software tool, produced in association with this guidance, has been developed using the Analytical Hierarchy Process (AHP) method. The AHP method has been selected for implementation in the social benefits software tool because it systematically transforms the analysis of competing objectives to a series of simple comparisons between the constituent elements. In particular, the approach does not require an explicit definition of trade-offs between the possible values of each attribute (i.e. it is not necessary to build utility functions), and it allows users to understand the way in which outcomes are reached and how the weightings influence the outcomes. Hence, the approach is useful when the decision maker needs to decide whether an alternative option is better than another option on the basis of all the criteria and to easily determine the relative importance of these criteria. It is an attractive methodology as the decision makers may focus, in turn, on each small part of the problem. AHP is based on 'pair-wise' comparisons of alternatives for each of the criteria to obtain the ratings, (Cafiso *et al.*, 2002).

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[2] *It is assumed here that the attributes are defined in an increasing sense, that is, the decision maker prefers larger to smaller values of each x_i, all other things being equal.*

Input requirements

The social benefits software tool requires three main inputs:

- A clear definition of mutually exclusive investment alternatives (for each road section) to be compared.
- The main goal, objectives, criteria and attributes under which the alternatives are to be compared.
- A statement of preferences on the set of objectives.

A comprehensive definition of the main goal, objectives, attributes and the relative weights will result in what can be called the 'MCA tree'. Figure 2 shows an example of the MCA tree constructed for the following:

- The main goal (e.g. poverty alleviation).
- Two hierarchies of objectives; the first level contains two objectives (e.g. focus on agricultural access to export markets (M) and local access to services (N)), and the second level comprises 5 sub-objectives (e.g. For the 2nd objective you could have sub-objectives of paths and tracks to local clinics (Y), roads to major service centres (Z) etc). The number of levels to be defined is at the discretion of the user, and it is not limited in the software.
- Three mutually exclusive investment alternatives to be compared (A, B, C) (e.g. investments in changing transport conditions in three geographically separate areas).

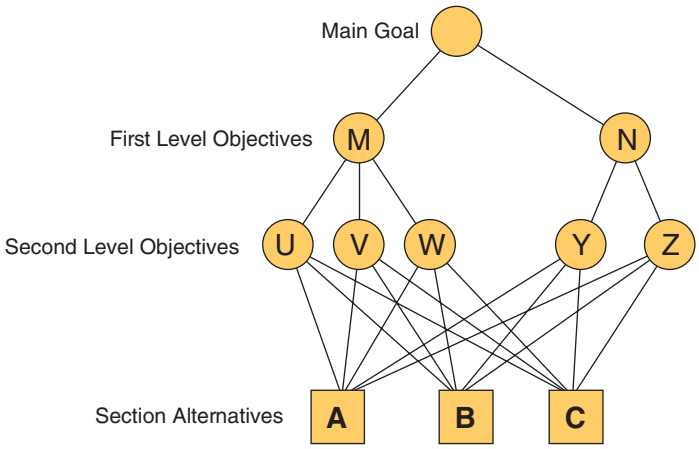

Figure 2 MCA tree

Figure 3 illustrates the inter-relationships amongst the objectives, and between the lowest-level objectives (or indicators) and the investment alternatives. It is important to verify that the sum of weights defined for all the branches originating from each object equals unity.

5.3 Analysis and outputs

Putting the approach into practice, this section guides you through the methodology employed. For each investment alternative, a score is calculated as the sum of the products of normalized weights along each branch of the MCA tree ending at the investment alternative node. Figure 4 illustrates how the score is calculated for investment alternative A:

Score = [(0.8x0.5x0.1)+(0.8x0.3x0.3)+(0.8x0.2x0.8)+(0.2x0.6x0.7)+(0.2x0.4x0.1)]

= 0.332

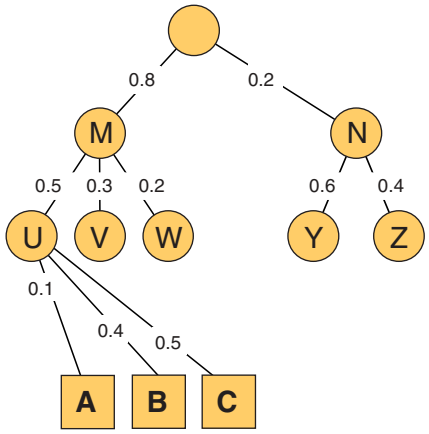

Figure 3 Normalized weights at each node

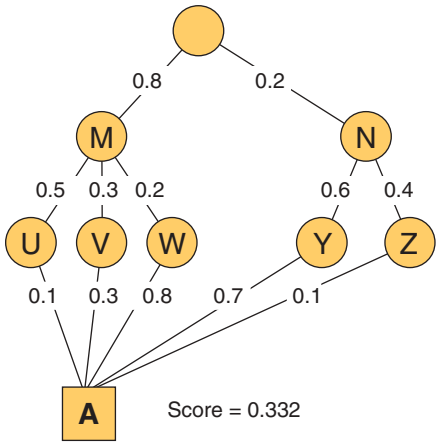

Figure 4 Calculation of scores

The scores can be considered as the utility index (UI) in terms of social benefits value that each investment alternative could yield, and can therefore be used as an indicator for ranking or prioritisation of projects. The ratio of the utility index to the cost of implementing the investment alternative also provides a useful prioritisation index.

5.4 The operation of the HDM-4 model

The social benefits software produced in association with the ORN is designed to be compatible with well established road appraisal tools such as HDM-4. This section briefly sets out the key features of HDM-4 that the reader needs to be aware of to appreciate how the social benefits software integrates with the HDM-4 road appraisal tool.

HDM-4 caters for three applications levels commonly used in decision-making within the road sub-sector at the meso and micro-levels. The different applications are:

- *Strategy analysis*: For estimating medium and long-term budget requirements for the development and preservation of a road network under various budgetary and economic scenarios.

- *Programme analysis*: For preparing single or multi-year work programmes under budget constraints, in which those sections of the network likely to require maintenance, improvement, or new construction, are identified in a tactical planning exercise.

- *Project analysis*: For estimating the economic or engineering viability of different road investment projects and associated environmental effects. Typical projects include the maintenance and rehabilitation of existing roads, widening or geometric improvement schemes, pavement upgrading, and new construction.

For all three applications, the underlying operation of HDM-4 is based on the concept of life cycle analysis under a user-specified scenario of circumstances. This involves the analysis of pavement performance, road works effects and costs, together with estimates of road user costs and environmental effects, and economic comparisons of different project alternatives.

5.5 Prioritisation in HDM-4

There are often situations when the budget available for road projects will not be sufficient to undertake all projects shown to have a positive return, that is, projects with positive economic net present values (NPV). In such situations, a formal method of selecting projects to be included within the budget can be applied. Capital budgeting or rationing can be applied to a group of projects that meet either of the following conditions:

- Projects that are independent of each other (e.g. list of road projects from different parts of the country).

- Mutually exclusive projects (i.e. projects that are alternatives to each other) when only one alternative can be selected.

The NPV capital budgeting rules can be applied in both situations where sufficient funds are available, and also when there is a budget constraint. The rules are summarised below:

- When sufficient funds are available to undertake all projects; select all independent projects with NPV > 0, select mutually exclusive project alternatives with the highest NPV.

- When capital rationing is to be applied due to shortage of funds; select independent projects with the highest NPV to cost ratio, select mutually exclusive projects using the incremental NPV to cost ratio method.

The incremental analysis is used to test whether the ratio of the increase in NPV to the increase in costs between alternative mutually exclusive projects is greater than a specified marginal ratio. If the ratio is greater than a specified marginal value, then the project alternative is included among those to be funded. The marginal value is usually determined from the benefit cost ratio (BCR) of the road project at the budget boundary.[3]

In addition to the economic prioritisation methods described above, HDM-4 (version 2) includes another method of prioritisation based on a multi-criteria analysis framework that considers a wider range of transport related issues. These include economic efficiency, road safety, functional efficiencies, environmental issues, energy efficiency, and political concerns.

5.6 Linking the social benefits software tool to HDM-4

For compatibility with HDM-4, the basic unit of analysis in the social benefits software tool is the road section. These can be physical road sections (for all strategy, programme and project analyses) or representative road sections (for strategy analysis). For each road section, the user can define the section by descriptive parameters such as name, length, traffic and cost. Additional information can be given on administrative unit, road functional class, surface type, and Annual Average Daily Traffic (AADT).

The road sections can be defined directly by the user when operating the social benefits software in stand-alone mode, or imported from HDM-4 (or other road investment software systems). The cost

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[3] *For further details of the prioritisation method used in HDM-4, see Odoki and Kerali (2000).*

of implementing each investment alternative should be determined. An indication of benefits and resulting NPV may be determined from a technical (engineering and economic) analysis, using for example HDM-4.

The investment alternatives analysed in the social benefits software can be exported to HDM-4. These can then be analysed together with the other investment alternatives defined in HDM-4 within the multi-criteria analysis framework incorporated in HDM-4, version 2. The scores (or utility indices) calculated in the social benefits software can be used in the HDM-4 version 2 MCA process to combine social concerns with others (e.g. economic, environmental, energy efficiency, road safety, etc). For project analysis at community level, the utility indices will be used to rank and select project alternatives. At national, regional or district level, the ratio of the utility index to the cost of implementing each investment alternative can be used through optimisation procedures as follows:

- Programme analysis to prepare work programmes under specified budget constraints.
- Strategy analysis to allocate budget between road classes, administrative units, and work types.
- Research, for example to assess the impact of including/excluding social concerns on funding for low volume roads.

5.7 How to use the social benefits software as a stand alone tool

The social benefits software can be used as a stand alone tool to analyse road transport investment choices where the key objectives include enhancement of social benefits. For each investment alternative a score, also referred to as the Utility Index (UI), is calculated as described in Section 5.3 of this ORN. This index gives an indication of the utility, in terms of social benefits, that may accrue as the result of implementing the investment alternative. The utility index is considered to be analogous to the NPV which is used in economic analysis.

As a stand alone tool, the utility index can be applied under certain rules to select and prioritise investment projects in both situations where sufficient funds are available, and also when there is a budget constraint. The rules to be applied are summarised below:

- When sufficient funds are available to undertake all projects; select all independent projects with UI greater than that of the 'base case' project (which is usually a 'do minimum' case), select mutually exclusive project alternatives with the highest UI.
- When investment capital rationing is to be applied due to shortage of funds; select independent projects with the highest UI to cost ratio, select mutually exclusive projects using the incremental UI to cost ratio method.

The UI to cost ratio is also referred to as the Prioritisation Index (PI). The incremental UI to cost ratio analysis is similar to the incremental NPV to cost ratio method, and is used to test whether the ratio of the increase in UI to the increase in costs between alternative mutually exclusive projects is greater than a specified marginal ratio.

6 The process of prioritisation: a participatory approach to transport appraisal

6.1 Introduction

For consistency and transparency there is a need to develop a road project prioritisation process that incorporates both the appropriate appraisal tools such as HDM-4 (with the added value of including the social impact effects) and full participation of stakeholders in establishing the criteria for selection. Any process will need to be tailored according to the national context of each road authority and so will be unique to that country. However, there are set out some principles and common steps that should be followed.

In many cases, countries will already have well-established, accountable processes to determine allocations of resources across government departments. In these cases the incorporation of social benefits will be merely a technical exercise, controlled by an accountable and transparent decision-making process. However, in some cases, as well as making processes for project selection and decision-making more accountable and transparent, there may be a need to develop accountable and transparent processes at all stages of the transport decision-making process. This section sets out the development of an accountable, transparent multi-level decision-making process:

- It sets out the development of a participatory approach at the central and regional government level that allows the setting of objectives and goals on which to base resource allocation decisions.
- It also maps a participatory process of deciding on policy options at the regional or district level. This will allow the development of robust criteria to select projects at the micro or community level.
- It details processes that can be followed at the community or micro level to ensure involvement and input of social benefits

At the meso, or regional level, prioritisation procedures are used to allocate funds for road rehabilitation and maintenance to different regions and districts, as well as to different types of road. The procedures are very varied and may be based on bidding and negotiation between national and local authorities and road organisations, or they may be based on a formula.

At the micro level, prioritisation processes are used to develop consensus about choices between competing projects and alternatives. The procedures employed draw upon the wide-range of robust and established techniques that are used to facilitate community involvement and decision-making. They also highlight the use of techniques to give voice to marginal groups within communities and incorporate all needs into the decision-making.

6.2 Principles

Any approach that is developed should adhere to a common set of principles. These principles should be:

- ***Transparent.*** The approach must be transparent enough for all involved to be able to understand how funds are allocated.
- ***Consistent.*** It must also be possible for all involved to be able to reasonably predict how funds will be allocated using the procedure in the future.
- ***Participatory***. The approach will use consultation with a variety of stakeholders at all stages of the development of the allocation process and within its operation. Consultation should particularly be balanced between men and women and involve stakeholders that are not traditionally involved in allocation decision-making. It should also be guided by the principal that every opinion is valuable and should be included in the process.
- ***Flexible.*** The approach developed should have flexibility enough for it to be adaptable to a variety of situations. Approaches should be flexible enough to be used for a range of transport and geographical situations and for a range of different levels and audiences, from low-income communities, to national NGOs and policy-makers.

- ***Of assistance and not prescriptive***. Technical approaches using engineering, economic and social analysis should be employed to assist transparent and participatory decision-making processes. Technical approaches should not be there to decide actions or justify non-transparent decisions.

- ***Iterative.*** A repeated exchange should take place between technical analysis and public consultation and decision-making processes in order to allow consensus to be developed between the public perception of priorities and the technical assessment.

- ***Multi-level process***. Any approach developed will need to apply not only to decisions at a local village level, but at district, regional and national levels as well. Decisions at different levels should be connected and integrated and the decision-making processes should follow consistent approaches.

6.3 Participatory goal setting at the macro level

This approach seeks to involve a range of stakeholders in drawing up goals, objectives and priorities for road development. It also seeks to set out in explicit fashion the assumptions and positions of the different stakeholders. It must be recognised that this approach is inherently political and must incorporate an understanding of the different interest groups and stakeholders involved in the process.

The negatives of this approach are set out as (World Bank, 2000):

- Costs of consulting wide groups of stakeholders, particularly hard-to-reach groups.

- Attitudes of technocrats.

- Capacity of the poor to participate effectively.

- Time requirements.

- Budget cycles and programme preparation deadlines.

- Negative prior experiences, lack of mutual trust.

By contrast there are a series of potentially positive aspects and outcomes and these include:

- Views of civil society and hard-to-reach groups (such as low-income communities) are considered in policy formulation.

- Increased equity.

- Better understanding of implications for a variety of stakeholders including low-income communities.

- Improved strategy in policy design.

- 'Demystification' of policy content – increased accountability and transparency.

The approach set out in this guidance will involve the following steps:

- Organise budgetary debates with stakeholders. These incorporate an intensive consultative process involving lengthy deliberation, negotiation and bargaining over a set of macro socio-economic priorities between a diverse group of citizen representatives and the government.

- Review investment plans of the previous year and discuss proposals for the new year.

- Rank demands and aggregate stakeholder claims.

- Divide resources based on weighting system that combines subjective preferences of stakeholders with the objective quantitative criteria.

This stage will involve a significant degree of capacity building for a range of stakeholders. This capacity-building will involve key tasks such as:

- Building skills to understand and analyse the budget.
- Democratising the information and the capability to understand the budget.
- Organising social coalitions to support the cause.
- Actively engaging in the budget formulation.

6.4 Meso level participatory option development

This involves a similar participatory process to the macro-level participatory goal setting stage set out in Section 6.3. It features promoting the involvement of civil society in the setting of objectives, development of funding criteria and allocation of resources by a meso-level institution such as a roads authority, transport or public works ministry.

Guidance on participation of and consultation with civil society can be found at www.worldbank.org/participation. It will set out the following steps to consider in the planning and development of consultation:

- Timeframe for planning and undertaking consultation exercise. Lack of time to consult will often lead to a small set of well-organised actors being able to respond. These will often be governmental bodies or those with external resources. More marginal or vulnerable groups will often miss out on such consultation, though their contribution is as valuable.
- Selection of which organisations will be involved and invited? Thought needs to be given to who is to be involved. Benefits will occur if groups other than the obvious or regular stakeholders are involved.
- How should groups be made aware of specialised information and issues within a sector? Professionals and regular stakeholders may well be familiar with technical terms and technical issues, although the ability of marginal, (but important) stakeholders in technical discussions needs to be supported.
- How should any information be presented? Again stakeholders not used to engaging in technical transport discussions may need information set out in a particular way to aid their understanding and appreciation.
- Where and in what type of place should involvement take place? Women stakeholders may not attend involvement events after dark for fear of their personal security. These type of issues need to be considered in designing the method of stakeholder involvement.
- How much resources should be allocated for participation? In a similar way to time availability, consideration needs to be given to how much resource is allocated to promote participation. Limited resources will limit the number and range of people who can be involved, thus damaging the accountability of any decision-making process.
- What will happen after the consultation process? There needs to be a direct and observable link between people being involved and the decisions made. People who spend time contributing to a participation process will not involve themselves again if decisions appear to be made that do not reflect what they perceive to have been decided.

6.5 A micro-level participatory road funding prioritisation approach

There are common steps that many processes will have. A way of representing these is shown in Figure 5, and Boxes 7 and 8 give examples of applications. The list that follows provides a step process for road funding prioritisation.

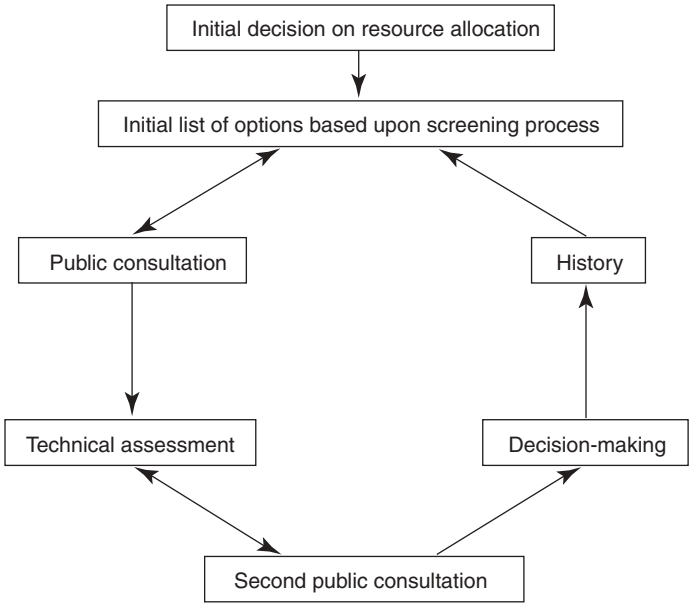

Figure 5 Flow chart of process to include social benefits in rural transport appraisal

Box 7 An example of a road fund allocation process developed in Ghana

As part of a DFID-funded project a transparent and consultative process was developed to allocate road funds for rural roads in Ghana. The process was developed for use by the Department for Feeder Roads and the District authorities. The process consisted of a series of 5 steps set out as follows:

1. First round of improvements. Approximately 50% of the funds are allocated equally between the nine Districts in the project area.

2. Consultation. Consultation is used to derive a list of candidate roads from within the District. These roads are then ranked by local communities prior to a technical analysis in Step 3.

3. Technical analysis of candidate roads. Candidate roads are then assessed on economic and social grounds and to produce a technical ranking based on this assessment.

4. Return to consultation. The objective of this step is to compare the technical ranking (Step 3) with the earlier District ranking (Step 2), and to achieve consensus on the final selection of roads for improvement.

5. Second round of improvements. Remaining funds not allocated in Step 1 (approximately 50%) are used for more road improvements in accordance with the ranking process. The list of candidate roads will be retained for several years for further rounds of improvement as they occur (Hine, 2003).

Box 8 ILO approach to prioritisation and selection of villages – the Integrated Rural Access Programme (IRAP) in India

This approach was developed to identify access priorities of villages and sectors within a district. It involved a participatory prioritisation workshop with the participation of District functionaries and village representatives, in addition to District and Block level concerned officials. It also involved the analysis of data, existing norms for provision of basic services and facilities by the government, indicators and accessibility base maps; after comparison of different levels of accessibility between villages across sectors, village priorities were established based on existing levels of access. The process comprised a series of activities undertaken step by step as follows:

1. Methods and formula for calculating Village Access Problem Indicators
   Based on the present national norms and targets of the Central/State Government for different sectors in rural and tribal areas.

2. Training on calculation of indicators and prioritisation
   Part 1: Presentation and analysis of accessibility database.
   The output of an accessibility database and base maps as well as road map and road inventory were presented before a wide gathering of village and district level functionaries, officials and elected representatives, to give them a picture of the real access situation.
   Part 2: Training workshop on indicators and prioritisation.
   A three-day training workshop was organised for calculating village access problem using the indicators and formula, and identifying village priorities.

3. Calculating the Village Access Problem Indicators
   The use of qualitative and quantitative indicators is a common planning tool. Accessibility indicators show the difficulty or ease with which households have access to goods and services. Indicators are objective measurements of different levels of accessibility for different trip purposes in a village. Indicators are used to identify villages that are most affected in relation to basic needs and level of social and economic services.

4. Village priority setting
   IRAP calls for identification of action priorities for reaching services and facilities. After calculating sector-wide village access indicators and coming out with total problem score points for each sector by village, this step is to calculate priorities.

5. Preparation of problem maps
   Sector problem map: One map for each sector of the region is prepared showing village boundaries and coloured as per priority ranking. Combined problem map: This map shows problem score, problem rank of each village for all sectors in different colours.

Source: Pattanaik (2003)

STEP 1: A method of a-priori fund allocation from the centre for some of the resources. There needs to be established an agreed procedure to allocate fairly resources from the centre to the next level of the region. This could entail an equal distribution across all districts of 50% of the road fund or a distribution according to accessibility measurement for the whole region. Whichever approach is adopted there must be consultation with a wide range of representatives of road users, communities in the affected areas, politicians and other civil society representatives.

STEP 2: A method of drawing up an initial list of roads or routes to assess. This will involve both public consultation and technical analysis. Within a region, public consultation must take place with a wide range of stakeholders. Different communities can first nominate an initial list of roads for further discussion and assessment, so that every route considered will be a 'wanted' road. At this initial stage some engineering advice will usually be required to ensure that the routes chosen are broadly feasible from an engineering perspective. In addition a parallel technical exercise can be conducted that could look at levels of accessibility or poverty within different parts of the region to see where resources could be targeted. The ILO developed an approach that uses accessibility measurement as an analytical tool (see Box 8). In addition, engineering data on the quality of roads within different areas could usefully be used.

STEP 3: Public consultation Public consultation needs to be undertaken with district authorities and local communities to determine their problems, needs and priorities. The aim of the public consultation is to identify the problems that people perceive to occur from poor access. They will be able to add their own knowledge and experience to the technical information that has been already collected. At this stage the initial selection of nominated roads for assessment can be narrowed down to a final list of candidate roads for a more detailed technical investigation.

The public consultation stage is also designed to draw up a set of priorities for action. The public consultation should, in particular, involve groups that are not traditionally involved in decision-making, especially women, young people, and low-income communities who need to be involved as they are often most affected by the decisions made. There are a variety of tried and tested techniques that can be employed to engage the public.

STEP 4: Technical assessment exercise Technical assessments can be undertaken once a list of priorities (i.e. candidate roads) has been established through the public consultation phase. These include cost benefit analyses, engineering and social assessments. The Social Assessments explore in more depth the problems and issues raised by the public consultation exercise. More detailed accessibility analysis can be conducted to look at changes at a very local level specific to different communities and road links. Once this data has been collected and analysed, a technical priorities list can be established. This needs then to be taken back to public consultation.

At this stage 'social benefits' may be incorporated into cost benefit framework through inclusion of an additional benefit, derived from deliberately weighting the population to benefit from the road improvement by the unit change in transport costs involved. This is irrespective of the existing volume of travel. In the Ghana Feeder Road Prioritisation procedure social benefits were included in this way based on the transport cost savings (brought about by the road investment) associated with five return passenger trips per person year along the road. Additional benefits were also given in a similar way to those communities that were remote from health centres and remote from markets. The social assessments in Ghana had previously established that communities were most concerned about access to medical facilities and markets in their assessments of the need for improved transport infrastructure.

STEP 5: A further stage of Public consultation This second round of public consultation exercises should be designed to explain to a lay audience (from a wide range of stakeholders) what has been found in the technical assessments. Consultation should be seen as an iterative process to seek consensus on priority actions: seeking public views and analysing technical options, and then returning to the public to report on technical analysis before agreeing a way forward. While the guidance highlights two rounds of consultation, as many rounds as is necessary should be undertaken in order to secure consensus between the public involvement and the technical assessment.

STEP 6: Decision to implement improvements The next stage then involves a decision to act upon the agreed priority actions. The implementation of actions agreed between many stakeholders will maintain the confidence of those involved in reaching the priorities for action. There is also a need to allow everyone to be informed about progress towards implementing the agreed set of actions. Publicity may need to be used in this process, especially targeting those who could not be involved in the public consultation stages. Failure to implement the agreed actions will significantly damage the confidence of stakeholders in the merit of being involved in the process. They may not easily be involved in the process next time around.

STEP 7: History A record of the outcome of the public consultation, and the list of priority actions should be kept for future reference. While it may not be possible to implement all of the priority actions at the same time, they will still be seen as priorities as far as the stakeholders are concerned. When more resources become available, the previously agreed priorities can be used as the basis for deciding on further action. Retaining the list of priority actions from such a process could avoid spending the time and effort repeating the consultation process; however, it is always advisable to engage in more public consultation before further action is taken to ensure that priorities have not changed as a result of earlier actions.

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Appendix 1: Questionnaire A – Key informant questionnaire survey

To be administered to a gathering of 1 senior administrative leader, 1 teacher, 1 health worker, and 1 religious leader

Survey No. _____ Date _____ Interview duration _____

Enumerator_____ Interview location _____

1. Settlement

What are the settlement's boundaries? Area of km^2_____

What is the total population? _____ How many households? _____

How many: men_____ women _____ male youth° _____

female youth° _____ male children* _____female children*_____

°aged 12-18 years *under 12 years old

2. Village Topography

a) Describe the terrain along which the road passes: (tick one of the following)

Flat..... Rolling..... Hilly..... Mountainous.....

b) Describe the vegetation cover around the village: (tick one of the following)

Marsh..... Open..... Forested.....

Grassland..... Semi-arid.....

3. Local Accessibility

a) Distance to:

- main road? _____km
- main local town? _____km
- regional capital? _____km
- national capital? _____km

b) What is the distance to the nearest educational facilities and how many services are available in and around the settlement? (If educational facility in village, write 0 against km)

Type	Kindergarten	Primary	Secondary	Technical	Other
Km					
No.					

c) What is the distance to the nearest health facilities and how many services are available in and around the settlement? (If health facility in village, write 0 against km)

Type	Health post	Clinic	Hospital	Other
Km				
No.				

d) What is the distance to other facilities and how many services are available in and around the settlement? (If facility in village, write 0 against km)

Type	Market place	Place of worship	Police post	Local govt office	Other
Km					
No.					

4. Local Economy

a) Major occupations in settlement (list 4 main ones in order of importance with estimate of % of total population involved)

	Occupation 1	%	Occupation 2	%	Occupation 3	%	Occupation 4	%
Adult men								
Adult women								
Male youth								
Female youth								

b) What are the defining characteristics of the following income groups in the community? Indicate the income range that applies to each group:

- *High-income people*

- *Medium-income people*

- *Low-income people*

c) Major sources of local tax revenue (list 4 main ones in order of importance)

1.....

2.....

3.....

4.....

5. Description of Transport Intervention

a) Describe what type of road construction or maintenance activity has been undertaken in the last 10 years?

_____

_____

_____

b) Describe the characteristics of the transport intervention. Established:

• By whom? _____

• When? _____

• Where? _____

• How? _____

• Why? _____

• Funded by? _____

Nature of funding: Original outlay _____ Maintenance costs: _____

c) Describe the volume of traffic per day, and composition of vehicles using the road (motorised and non-motorised transport) for the following scenarios:

	BEFORE intervention	**AFTER intervention**	**CURRENT situation**
Indicative VOLUME OF TRAFFIC per day (Annual Average Daily Traffic) on the road			
COMPOSITION OF VEHICLES using the road (proportion of heavy vehicles, motorised and non-motorised transport, by mode)			

d) Describe the condition of the road and structures (bridges, culverts etc) for the following scenarios (before and after the intervention, and the current situation)

Rating:

-2	very bad
-1	bad
0	fair
1	good
2	very good

	Rating	Comments
BEFORE intervention		
AFTER intervention		
CURRENT situation		

6. Impact of Transport Intervention

What have been the advantages/disadvantages of the transport intervention for the settlement:

	Advantages	**Disadvantages**
In the first year?		
In the second year?		
In subsequent years until last year?		
Since last year?		

7. Differential Social Impact

How have different categories of people been affected by the transport intervention?

	Advantages	**Disadvantages**	**Score**
Adult men Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Adult women Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Male youth (12-18 yrs) Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Female youth (12-18 yrs) Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Male children <12 years Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Female children < 12 years Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			

-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10

-ve ***Neutral*** ***+ve***

8. Differential Economic Impact

How have different economic strata of people been affected by the transport intervention?

	Advantages	**Disadvantages**	**Score**
Wealthiest Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Middle-income Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			
Low-income poor Indicate the overall score: Positive (+10) Negative(-10) Neutral (0)			

9. Estimate of range and depth of impact:

a) Radius of influence: length/area _____km/km^2

b) Population impact: _____

-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10

-ve ***Neutral*** ***+ve***

Appendix 2: Guidance notes for focus group discussions

Sampling selection

The four key informants (senior administrative leader, teacher, health worker and religious leader) will be asked to help in organising three separate focus group discussions of adult women, adult men and secondary school students in each settlement. The focus group discussions (FGD) for each group should be carried out on separate days, and each FGD will be undertaken after Questionnaire B has been administered to participants:

- Day 1: Questionnaire A administered to key informants.
- Day 2: Questionnaire B administered to 20 adult women, and FGD undertaken with the same group of women.
- Day 3: Questionnaire B administered to 20 adult men, and FGD undertaken with the same group of men.
- Day 4: Questionnaire B administered to 20 secondary school students, and FGD undertaken with the same group of students.
- Day 5: Interviewing community service providers.

The focus group discussions should be participatory and not prescriptive. The FGDs comprise a series of semi-structured questions and recommended exercises to be used for enquiring about the community's perception of social costs and benefits attributed to transport interventions. The questions should be used to facilitate discussion and the focus group dialogue is not limited to the 10 questions in these guidelines. Please try and ensure that everybody present is given an opportunity to speak, and that one of the facilitators notes down a thorough description of proceedings, including interesting verbatim remarks by participants.

Facilitator's introduction to focus group participants

Begin the focus group discussion by building up a rapport with friendly conversation to 'break the ice' (although the participants will already be known to the facilitators). Reiterate who you are, who you are working for, what information you require and why you require the information.

- Stress that this research is being conducted to identify possible ways of resolving rural transport problems.
- It is important that the participants feel completely at ease during the FGD so they can discuss freely. Ensure that there are refreshments available during the session, and make sure that all the participants are given the opportunity to speak.
- There should be at least two facilitators present – one to lead the discussion and ask questions, and one to make thorough notes from the FGD – ensure that both facilitators are proficient in participatory techniques, and in any local dialects.
- The participatory visual exercises used in the FGDs (ie. Maps, ranking exercises etc) should be undertaken on flip chart paper using different coloured marker pens.
- The note taker should capture everything that is mentioned in the FGD and record the discussion clearly in English and with legible writing. Any visual exercises (ie. Maps and ranking exercises) should also be recorded on A4 paper, and the original flip chart papers kept as a record.
- The note taker should try and quote interesting verbatim remarks from participants, especially if they're highlighting a particular issue.
- The discussion should not last longer than 3 hours

- The guideline questions provided with these notes should be used to facilitate discussion, but the focus group dialogue is not limited to the 10 questions provided. Should other questions emerge from discussions, be sure to note any responses down on paper as a record.

- The questions provided will generate a lot of discussion. Hence, the FGD question sheets provide blank pages on which *ALL* notes should be recorded for each question. Ensure that all pages for each FGD are stapled together. If necessary, write on both sides of the paper, and if more paper is required, indicate clearly which question the notes refer to, and attach it to the question sheet.

- At the end of each FGD, thank the respondents for setting aside their time to answer your questions.

Any problems, unusual circumstances while interviewing, additional background information and other observations made that could be helpful for interpretation of the questionnaire should also be noted.

Ask the respondents if they have any Census data for the settlement, or if they have a map of the settlement and surrounding area. This will be useful for validating the data collected, and in facilitating the focus group discussions.

ADMINISTERING FOCUS GROUP DISCUSSIONS

REMEMBER! WRITE NOTES IN LEGIBLE ENGLISH, RECORD INTERESTING QUOTES, REPRODUCE PARTICIPATORY VISUALS ON A4 PAPER, GIVE EVERYBODY THE OPPORTUNITY TO SPEAK

Survey No. – Number each FGD question sheet for each group of adult women, adult men, and students, for each settlement sequentially ie. 1, 2, 3 etc.

Date – Date of interview as: day/month/year.

FGD duration – Indicate how long the interview took to administer in minutes.

Enumerator – Write your first initial and last name.

Interview location – Full name of settlement area as precise as possible.

QUESTION 1

- Start the focus group discussion by asking participants to draw a map of the community, indicating the key features and landmarks, along with the roads, tracks, rivers, schools, health centres, places of worship, and other facilities of note such as water and firewood sources, and location of farms.

- Use the map to discuss mobility in the community, indicating what modes of transport are used to travel to different locations and for different purposes, the frequency and duration of such trips, and the distance and cost.

- Ask whether there has been any road construction or maintenance activity in the past 10 years and note down what type of intervention has taken place.

- Where there has been a transport intervention in the last 10 years, ask participants to indicate what difference the intervention has had on facilities available in the community, and to draw differences in mobility patterns in the settlement, both before and after the transport intervention.

- Ask participants to discuss what benefits and constraints the intervention has had on the community.

QUESTION 2

- On the same map, ask participants to record where people travel to maintain social networks both before and after the transport intervention. Ask questions about whether social networks are important to adult women, adult men and students, and the social trip-making characteristics:

  - Discuss why people make social trips – for what purpose, how frequently?

  - ***Who do the women visit? – friends, relatives, community associations, leisure activities, weddings, funerals***

  - ***Where do they travel? – inside/outside the settlement, urban/rural, distance travelled, mode taken, cost.***

  - ***Does the road make it easier to maintain social networks?***

  - ***What are the costs and benefits of maintaining social networks?***

- Ask whether the transport intervention has had any impact (positive or negative) on maintaining social networks.

- Make sure the map has been reproduced on paper (flip chart or A4).

QUESTION 3

- Ask the participants to discuss the defining characteristics of different income groups (high, medium and low) i.e. Type of housing construction – walls and roof, ownership of assets i.e. Bicycle, vehicle, area of land etc.

QUESTION 4

- After breaking the ice using the resource/social mapping exercise, and getting to know the community better, ask the participants to discuss what a typical mobility pattern is during a week day for each group (adult women, adult men and students).

- Undertake a mobility mapping exercise to establish trip distance, destination, frequency and modal choice of daily income and non-income earning activities presented in a schematic diagram. The chart should be drawn in a spider diagram format, with participants drawing arrows from their 'household' at the centre of the diagram in varying thickness and colour to denote frequency of trips and different transport modes respectively. The arrow points towards a drawing which represents a particular activity for which the journey has been made (e.g. Farms, river, market, women's group meeting).

- Ask the group to draw a mobility diagram for each income group (high/wealthy, medium and low/poor) to discern travel patterns between different economic strata.

- Using the mobility diagram, discuss how daily mobility varies for each income group in terms of trip purpose, distance, cost, mode etc.

- How has daily mobility changed over time – i.e. Last 10 years, has it improved or deteriorated?

QUESTION 5

- Ask the participants to describe the accessibility of the settlement before and after the road intervention and ask them to give a rating (0 to 4) to describe access to particular locations (health care, schools, markets, places of worship, leisure activities, other), and provide reasons.

- Complete the table and use it to discuss how and why accessibility has improved or deteriorated over time. Provide reasons for the rating in the appropriate column.

QUESTION 6

- Ask the participants to discuss how transport mobility has changed in the settlement over the past 5 years for each income group (high, medium and low).

QUESTION 7

- Ask the participants to describe how the transport intervention has affected people's mobility by income group.

- In the table provided, give a rating from -2 to +2 for the effect of the transport intervention on mobility.

- Complete the table and use it to discuss how and why the transport intervention has affected people's mobility by income. Write reasons in the 'comments' column.

- Under the category 'social benefits' ask participants to describe how the transport intervention has affected their livelihoods (general welfare, income generation, health, education, social networks etc).

QUESTION 8

- This question asks participants to discuss particular problems that affect their mobility and accessibility for different income groups. Facilitate discussion on mobility constraints in some detail, as this will provide information for the ranking exercise in Question 9.

QUESTION 9

- Continue the discussion about accessibility constraints from Question 8, and carry out a 'brainstorm' on the negative and positive effects of transport and mobility on the community, relating to all aspects of income generation, general health and welfare, and maintenance of social networks (friends, relatives, membership of community associations etc).

- After a period of discussion, undertake a ranking exercise to establish which 'indicators' of social benefits are most important to the community.

- **Preference ranking**: ask the group to vote for the most and least important effects of transport on the community, based on the previous discussion, and get consensus on the ten most important effects of transport.

- **Pairwise ranking**: this exercise enables the comparison of priorities of different individuals in the group. Use the set of preferences identified in the preference ranking to fill in the table given in Figure A1 (enlarge the table onto flip chart paper for the exercise). Write the set of preferences along the top row of the table and in the column with heading 'item'. For each pair of preferences, ask the participants to choose which is the most important to the community (more favoured preference) and to give reasons for their choice e.g. Health care vs. education. Mark down how many responses there are from the group for each preference in the column heading 'score' in the pairwise ranking matrix. Present a different pair and repeat the comparison until all the boxes under 'score' are filled. Then rank the scores, so that the preference with the highest score is ranked A, and so on. Figure A1 gives an example of pairwise ranking for reference.

- **Matrix ranking**: this exercise identifies the reasons for local preferences as defined above by ranking them against particular criteria. Discuss with the participants what criteria are important to them with regard to accessing indicators of social benefits (i.e. Cost, availability, time, distance etc). Use the set of preferences identified in the preference ranking to fill in the table given in Figure A2 (enlarge the table onto flip chart paper for the exercise). Write the set of criteria along the left hand column of the table, and write the set of preferences along the top row. Ask the participants to choose which criteria is most important for each preference, and give each criteria a score (rank criteria from best to worst – if there are 5 preferences, 1 = worst and 5 = best). Repeat for each set of preferences and criteria, and then rank the scores, so that the criteria with the highest score is ranked A, and so on. Figure A2 gives an example of matrix ranking for reference.

- This ranking exercise should be accompanied by in-depth discussion of the issues, and at the end of the exercise there should be consensus amongst the group as to the 'preference' and 'criteria' which are most important to the community.

- At the end of the session, make sure that the group are in agreement as to the 'preference' and 'criteria' which are most important to the community.

- Keep a clear record of the ranking matrix tables and any discussion that accompanied them.

QUESTION 10

- Finally, ask the groups what transport improvements the community would suggest for the area, with reasons, and whether they have mobilised the community to undertake their own road maintenance in the past, or whether they would consider doing so in the future.

PLEASE THANK THE INTERVIEWEE FOR GIVING UP THEIR TIME TO ANSWER YOUR QUESTIONS

Walking (Preference 1)	**Bicycle** (Preference 2)	**Ox-cart** (Preference 3)	**Bus** (Preference 4)	**Car** (Preference 5)	**ITEM**	**SCORE**	**RANK**
	Bicycle	Ox-cart	Bus	Car	**Walking** (Preference 1)	**0**	**E**
		Ox-cart	Bicycle	Car	**Bicycle** (Preference 2)	**2**	**C**
			Ox-cart	Car	**Ox-cart** (Preference 3)	**3**	**B**
				Car	**Bus** (Preference 4)	**1**	**D**
					Car (Preference 5)	**4**	**A**

Figure A1 Pairwise ranking example – preference of transport mode

CRITERIA/ITEM	**Walking** (Preference 1)	**Bicycle** (Preference 2)	**Ox-cart** (Preference 3)	**Bus** (Preference 4)	**Car** (Preference 5)	**TOTAL SCORE**	**RANK**
Cost (Criteria 1)	5	2	4	1	1	**13**	**D**
Energy (Criteria 2)	2	1	1	2	2	**8**	**E**
Time (Criteria 3)	3	4	2	3	3	**15**	**C**
Distance (Criteria 4)	4	3	3	4	4	**18**	**B**
Comfort (Criteria 5)	1	5	5	5	5	**21**	**A**

1 = Worst criteria 5 = Best criteria

Figure A2 Matrix ranking example – preference of criteria

EXAMPLE QUESTION GIVEN IN FOCUS GROUP DISCUSSIONS

7) *Describe the effect of the transport intervention on people's mobility (by income group)*

Rating:

-2	*very bad effect*
-1	*bad effect*
0	*no effect*
1	*some improvement*
2	*very good improvement*

Mobility Effect	***Wealthy***	***Medium***	***Poor***	***Comments***
Mobility Benefits				
a) Frequency of transport				
b) Reliability of transport				
c) Accessibility of place				
d) Cost of transport				
e) Distance				
f) Speed				
g) Safety				

Social Benefits	***Wealthy***	***Medium***	***Poor***	***Comments***
h) Livelihood Enhancing (specify)				
i) Life Prolonging – health (specify)				
j) Life Enhancing – education/human capital				
k) Socially Enhancing (specify)				

Appendix 3: Questionnaire B – Household questionnaire survey

		Enumerator	
Survey No.		Interview Location	
Date		Interview Duration	
FAMILY SURNAME			

Q1 HOUSEHOLD SIZE/LOCATION HISTORY

No. Resident HH members		Years HH in present location	
No. of Absent HH members		Were you born at this location?	
Non-family:		Previous residential location	
Lodgers		Reason for location change	
Live-in servants			

Q2 HOUSEHOLD COMPOSITION (list members' in order of age beginning with HH Head, Wife, etc)

MARK* Spokesman	FIRST NAME (optional) list members' names in order of age beginning with HH Head, Wife, etc	WHERE RESIDENT H-in HH OR-other rural OU-other urban OF-other foreign				Months AWAY	RELATION to HH Head	SEX	AGE	BIRTHPLACE (District)	Year of ARRIVAL	ETHNIC GROUP	EDUCATION LEVEL attained	CASH-EARNING ACTIVITY	CASH EARNING for: 0 - None E- earner F- family E+F - both O - other			
0		H	OR	OU	OF										E	F	E+F	O
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

Q3 AVERAGE HOUSEHOLD EARNINGS AND EXPENDITURE FOR LAST YEAR (read out lists before asking respondent to answer)

% Monthly Total Household Earnings from		% of Household Expenditure/Month on:		Estimate your EXPENDITURE relative to other people in this area per month (tick one)		HH's Living Standard Experience (over 10 years) (tick one)	
Agricultural production		Food		Very high		Great improvement	
Self-employed Trading		Rent		High		Some improvement	
Self-emp'd service sector work		Transport (fuel & public transport)		Medium		Stable	
Regular salaried employment		Utilities (water, gas, elect)		Low		Some deterioration	
Casual wage work		Schooling		Very Low		Great deterioriation	
Rent		Medical					
Remittances		Clothing					
Pension		Remittances					
Other (specify)		Social					
ABSOLUTE TOTAL		Other (specify)					
		ABSOLUTE TOTAL					

Q4 LOCATION/MOBILITY OF YOUR INCOME EARNING OR STUDY?

WHERE does most of your income-earning work or study primarily take place?				SITUATION 5-10 years ago		
In Your Locality:		Outside Your Locality:		Main work/study activities 5 - 10 years ago (in order of importance)	COMPARED with 5 - 10 YEARS does your State of employment/study now involve:	
Home-based		In a rural area		1)	Much greater mobility	
In the neighbourhood		In an urban area		2)	Somewhat greater mobility	
Within locality but distant		In both urban & rural areas		3)	Roughly the same	
Your work/study usually takes place in how many locations daily?				4)	Somewhat less mobility	
Average Commuting time from home to work/school (minutes)				5)	Far less mobility	
Main transport mode for home-work/school commuting				6)	Didn't work/study 5-10 years ago &/or now	

Q5. TRANSPORT REQUIREMENTS INSIDE/OUTSIDE THE VILLAGE (FOR THE LAST YEAR)

	Destination		Roughly how many journeys (*round trips*) made per month?	Time taken for *one way trip* (minutes)	Distance for one way trip (Km).	Cost of journey for one way trip (dong) If none, write "0"	Duration of stay at destination (hours)	Who makes these trips? Tick for men (M), women (W), boys (B) and/or girls (G)				Mode of transport (See Key)
								M	W	B	G	
INCOME GENERATION	Travel to farms	Farm 1										
		Farm 2										
	Collection of farm inputs											
	Transport of harvest											
	Travel to market: To sell											
	To buy											
	Travel to town											
	Travel to formal employment											
	Travel to informal employment											
HUMAN CAPITAL	Travel to grinding mill											
	Education: Primary											
	Secondary											
	Tertiary											
	Health – travel to: Health post											
	Local clinic											
	Hospital											
OTHER	Use of post office/ public telephone											
	Other (please state):											
	1.											
	2.											

Key: 1 Walk, 2 Bicycle, 3 Motorcycle, 4 Car (owned by household), 5 Transport operator, 6 Bus, 7 Truck, 8 Boat, 9 Animal cart, 10 Tractor, 11 Other,

	Destination	Roughly how many journeys (*round trips*) made per month?	Time taken for *one way trip* (minutes)	Distance for one way trip (Km).	Cost of journey for one way trip (dong) If none, write "0"	Duration of stay at destination (hours)	Who makes these trips? Tick for men (M), women (W), boys (B) and/or girls (G)				Mode of transport (See Key)
							M	W	B	G	
COMMUNITY ASSOCIATIONS	Farmers group/co-operative										
	Religious meeting										
	Women's group										
	Village committee										
	Burial society										
	Parent Teacher Association (PTA)										
	Credit association										
	Other (please state)										
	1.										
	2.										
SOCIAL VISITS	Weddings										
	Funerals										
	Visiting friends										
	Visiting relatives										
	Place of worship										
	Leisure activities										
	Sport activities										
	Other (please state):										
	1.										
	2.										

Key: 1 Walk, 2 Bicycle, 3 Motorcycle, 4 Car (owned by household), 5 Transport operator, 6 Bus, 7 Truck, 8 Boat, 9 Animal cart, 10 Tractor, 11 Other,

Q6. OWNERSHIP AND ACCESS TO MEANS OF TRANSPORT/COMMUNICATION? (specify total number in each column).

Non-motorised Transport Means

Means of Transport	Ownership		Access
	W	NW	
Pack animal/donkey			
Animal cart			
Handcart			
Wheelbarrow			
Bicycle			
Other non-motorised vehicles (please specify)			
1.			
2.			
3.			

Motorised Transport Means

Means of Transport	Ownership		Access
	W	NW	
Motorcycle			
Car			
Pickup			
Lorry			
Bus			
Tractor			
Power tiller			
Other motorised vehicles (please specify)			
1.			
2.			
3.			

Communication Means

Other	Ownership		Access
	W	NW	
Home phone			
Mobile phone			
Fax			
Radio			
Television			
Email (office or home)			
Other means of Communication			
1.			
2.			
3.			

W – Working
NW – Not working

Q7. a) What are your major transport problems?

b) How could these transport problems be solved?

Q8. Describe what type of road construction or maintenance activity has been undertaken in the last 10 years

Q9. Rank from -10 to +10 how much you think the transport intervention has contributed to the following (circle the figure and indicate the score):

																					Score
Social benefits	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	

a) Reason

Monetary benefits	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	

b) Reason

Environmental benefits	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	

c) Reason

Total score =

Q10. Describe what type of non-transport intervention has been undertaken in the last 10 years

_____

_____

_____

_____

Q11. Rank from -10 to +10 how much you think the non-transport intervention has contributed to the following (circle the figure and indicate the score):

																					Score
Social benefits	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	

a) Reason _____

_____

Monetary benefits	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	

b) Reason _____

_____

Environmental benefits	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	

c) Reason _____

_____

Total score =

Appendix 4: Mapping and ranking exercises

Social / Resource mapping: Maps can be used to identify the comparative location and importance of different resources within an area. Social maps can be used to locate land-use, houses, services and infrastructure within an area. Maps can be used as a visual stimulant, to identify the parameters faced by local people and to facilitate discussion about the importance people place on infrastructure and transport service provision etc.

Source: National Environmental Secretariat (1990)

Ranking and scoring techniques: Used to assess people's expectations, beliefs, attitudes, preferences and opinions. Ranking and scoring means placing something in order:

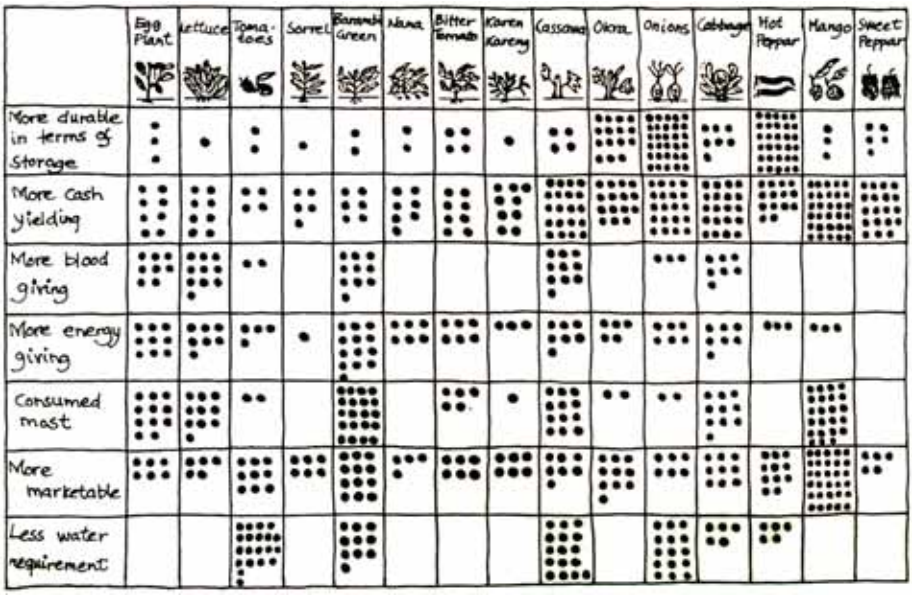
- Ranking: putting in order.
- Scoring: weighting differences.

A useful tool to be used in generating basic information which helps to focus further questioning. In a transport context, ranking and scoring techniques are useful for obtaining information such as journey origin and destination, journey mode, journey purpose, frequency and cost etc.

Matrix ranking: Matrix ranking involves listing key criteria (which have been predetermined by the community) down one side of a matrix table, and the measure by which they are judged, gained from informal discussion or pairwise ranking, across the top. Each element is then considered in terms of each criteria and a score is given on the basis of each criteria. This method can be undertaken to establish local perceptions of efficiency for different transport modes in relation to their cost, frequency, availability, energy and time consumption.

Wealth ranking: Wealth ranking enables villagers to divide households in the community according to economic and other 'well-being' categories including animal ownership, type of house, size of family, farm size and bicycle or ox-cart ownership etc. This helps identify target group members for projects, specifically the poorest sections of a society. Differences in wealth and well-being affect peoples' perceptions and coping strategies. It is important to understand this prior to further appraisal or planning.

Matrix Ranking

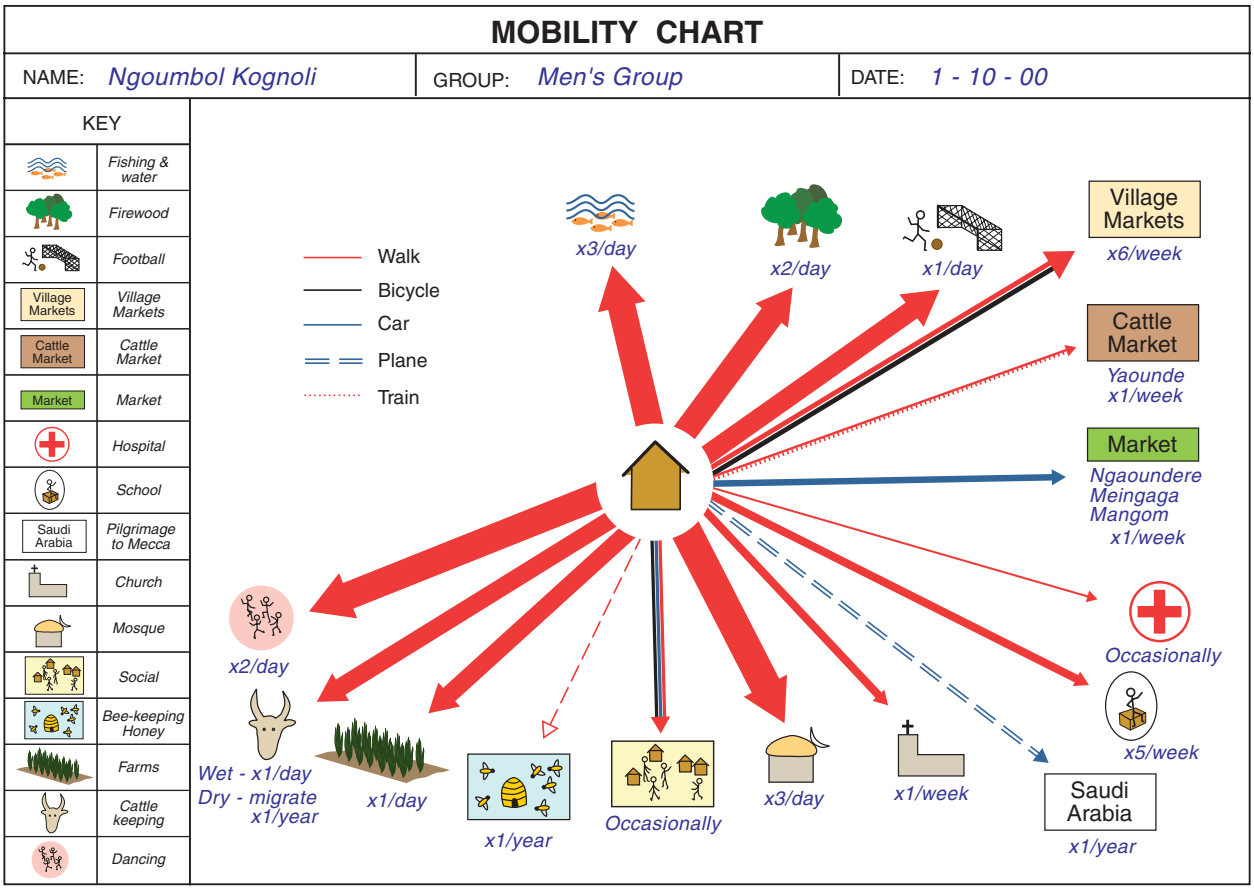


Source: ActionAid (1992)

Pairwise Ranking

Walking (Preference 1)	**Bicycle** (Preference 2)	**Ox-cart** (Preference 3)	**Bus** (Preference 4)	**Car** (Preference 5)	**ITEM**	**SCORE**	**RANK**
	Bicycle	Ox-cart	Bus	Car	**Walking** (Preference 1)	**0**	**E**
		Ox-cart	Bicycle	Car	**Bicycle** (Preference 2)	**2**	**C**
			Ox-cart	Car	**Ox-cart** (Preference 3)	**3**	**B**
				Car	**Bus** (Preference 4)	**1**	**D**
					Car (Preference 5)	**4**	**A**

Mobility charts: a tool utilised for discerning trip distance, destination, frequency and modal choice of daily income and non-income earning activities presented in a schematic diagram. The chart can be drawn as a spider diagram, with participants drawing arrows from their 'household' at the centre of the diagram in varying thickness and colour to denote frequency of trips and different transport modes respectively. The arrow points towards a drawing, which represents a particular activity for which the journey has been made.



Source: Davis (2001)

WEB-BASED TOOLS FOR PARTICIPATORY APPROACHES

http://www.fao.org/Participation/ft_princ.jsp

http://www.worldbank.org/participation/tools&methods/partmethods.htm

http://www.chronicpoverty.org/CPToolbox/Index.htm

http://www.eldis.org/manuals/toolspart.htm

http://www.ids.ac.uk/ids/particip

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A guide to pro-poor transport appraisal
The inclusion of social benefits in road investment appraisal

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