



INTERNATIONAL ROAD FEDERATION
FEDERATION ROUTIERE INTERNATIONALE

IRF BULLETIN SPECIAL EDITION

RURAL TRANSPORT

VOLUME - 2



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This second volume of the IRF Rural Transport Bulletin, features a varied selection of articles highlighting the importance of rural access.

Today, roughly half of the world's population are rural dwellers. Of these, an estimated one billion people still do not have access to reliable transport, according to The World Bank's Rural Access Index. Communities throughout the developing world are deprived of all-weather roads – cutting them off from even the most basic social and economic services that could help them escape the poverty trap.

Even where basic infrastructure *does* exist, there is frequently an absence of sound asset management practices or affordable transport services offered by a competitive private sector.

Isolation caused by poor access to transport constitutes one of the leading inhibitors of economic progress throughout the developing world. Rural roads provide vital access to health, education, agricultural produce, trade and employment opportunities. By contrast, the impacts of inadequate mobility can be measured in terms of high maternal mortality rates, low school enrolment indicators and general hardship. It can, indeed, be forcefully argued that until the rural poor are brought into the mainstream of economic development, countries as a whole cannot prosper. In short, rural roads are key to achievement of the UN Millennium Development Goals.

When correctly situated in this wider development perspective, rural roads may be seen as the first link in a complex supply chain that is essential for maintaining a region's long term agricultural and food security objectives. Access to roads is often the single most important determinant of agricultural productivity – ahead even of soil quality. Yet, farmers delivering crops and livestock to nearby markets often have no choice but to rely on severely deficient, unclassified roads and the most rudimentary means of transportation. Poor or inappropriate transport raises their production and distribution costs, reduces their profit margins and limits their yields to what can be physically transported at harvest time and in good weather. The provision of basic road infrastructure and warehousing facilities make it economically

worthwhile to modernise production through mechanisation and the introduction of higher-yield crops – transforming rural villages into agricultural logistics hubs.

At its 2nd International Rural Roads Convention – held in Jinan City, China, from 24-26 October 2010, and attended by some 400 delegates drawn from 30 countries – IRF marked a major step forward in efforts to mobilise resources for the development of sustainable rural road transport on the Asian continent. It notably prompted calls for an innovative new cycle of international knowledge exchange initiatives, based on dynamically improved information dissemination mechanisms, enhanced opportunities for bilateral exchanges and continuous engagement with policy-makers aimed at supporting rural transport programmes as an integral part of national infrastructure policy and funding frameworks.

Achieving these goals can be made possible through the establishment of a pluridisciplinary Community of Practice committed to rural poverty reduction and to improving knowledge of rural transport issues and programmes across Asia. Drawing on the experience of senior-level practitioners and the international donor community, this initiative will not only help ensure that innovations and experiences are shared, but also provide an effective means of narrowing knowledge gaps, supporting new research, increasing opportunities for bilateral exchanges and raising the public profile of rural transport. It will, furthermore, serve as a practical, strategic model that may hopefully inspire replication in other parts of the world.

Already, the initiative has been formalised and submitted to the principal stakeholders, and we look forward to keeping you posted on progress in future IRF publications.

In the meantime, we hope you will enjoy reading this second volume of the IRF Bulletin on Rural Transport, and join with us in spreading the word about the global importance of the issues it addresses.

Sibylle Rupprecht

Director General - International Road Federation, Geneva



SOCIO-ECONOMIC BENEFITS

04

The Impact of Transport on Rural People: The Case of Dima Monastery

The Impact of Rural Transport on Socio-Economic Development in Nicaragua

Many Birds with One Stone: Enhancing Social Protection through Rural Roads Development

Socio-Economic Impact of the Roads 2000 Project in Nyanza, Kenya

ROAD SAFETY

15

Road Safety versus Mobility: The Dilemma of Managing Rural Transport in Africa

SHARING THE ROAD

17

The Impact of Motorcycle Taxis on Socio-Economic Development

MANAGEMENT

20

Leapfrogging from Rural Hubs to New Markets

Transport for Poverty Alleviation: An Approach in Bangladesh

Effective Policy for Planning and Management of Rural Roads

Rural Transport Infrastructure in India: Mapping Development with Achievement



SOCIO-ECONOMIC BENEFITS

The Impact of Transport on Rural People: The Case of Dima Monastery

Dr. Taye Berhanu

Executive Director, Ethiopian National Forum for Rural Transport & Development

Walking is the main mode of transport in rural Ethiopia. The case of Dima Monastery may be cited as representing the transport problems facing most of the rural areas in the country. In this part of Ethiopia, fetching water and fuelwood, washing clothes and taking baths, attending social gatherings during holidays, participating in cultural activities, visiting relatives and friends, taking part in political meetings and carrying out marketing all commonly involve walking long distances. Simply reaching a main road takes up to three hours on average and, even then, there is usually a lack of onward transport services. The country's deficient transport infrastructure has particularly limited the chances of the aged and people with disabilities to access resources. The poor – and it is the poorest of the poor who live in the Monastery – are made even more impoverished and disadvantaged by inadequate rural transport.

In such a context, transport can have multiple impacts – as has been the case of the transport problems affecting the Monastery, which is located about 315 kms from the capital city of Ethiopia, Addis Ababa. Dima is one of the oldest monasteries in Ethiopia. There are about 500 households around the Monastery, and about 200 residents – priests,



Monastery students carrying small plastic water jars, making repeated travels to satisfy household needs

monks, nuns, students and peasants – living within the church precincts. As churches in Ethiopia commonly serve as shelters, the St. George Church at Dima further hosts quite a number of aged women and men as well as other destitute people, including some with mental and physical problems.

One of the main problems the people encounter is lack of water. Women, youths and children shoulder the responsibility of fetching water for the Church community, which necessitates walking one to two hours over rough footpaths. The terrain is not conducive for any kind of traditional or modern transportation so water cannot, for example, be transported by donkeys. The only option water fetchers have is to carry containers on their shoulders or backs over long distances.

Since road construction is too expensive an undertaking to be considered by a small and financially weak NGO, the Ethiopian National Forum for Transport and Development opted to concentrate on identifying the most pressing needs and priorities of the community, with a view solving the social problems related to transport. In this regard,



Walking and driving a donkey on typical terrains/footpaths in highland Ethiopia.



water was chosen as a prime concern. Taking inspiration from the Chinese adage, “if the mountain does not move to you, you shall go to the mountain”, the Forum conceived a plan to pipe water in from a distant stream to alleviate the problem of shortages in the Monastery. The resultant water supply project was implemented with the support of the British Embassy in Ethiopia to give people in and around the Monastery access to water virtually on their doorsteps.

The water supply project has had both direct and indirect impacts on the lives of the people. The following illustrates the major achievements and/or positive effects of the project:

Direct Impacts of the Project

The saying ‘water is life’ was particularly close to the hearts of the Monastery community when water from the 4km distant stream first gushed on tap from the pipe. The joy of the community, especially the women, was beyond expression. At the inauguration ceremony, which took place in the presence of a representative of the British Embassy, the ‘pope’ of the region blessed the water and expressed his deep gratitude and appreciation to all those who had initiated and supported such a marvellous achievement – one that particularly alleviated the burden of women and children. The fatigue once associated with carrying water over long distances was over, and the time and energy saved could be used more productively.

The church took the opportunity to install a large garden of cabbage, carrots, maize and other vegetables and fruits. Idleness is minimised by assigning priests and followers to work in the garden and take care of the water pipes. It is now gratifying to see even older people engaged in gainful activity. The Church has also introduced an income-generating scheme by collecting Birr 1 (US\$ 0.06) per household, per year from those people living around the Church for the purposes of ongoing maintenance. Produce from the garden is currently relatively insignificant and primarily intended for church community consumption. This activity may well gradually develop, however, and sales of fruit and vegetables could ultimately provide another useful source of income.

Participation of the community for the common good

Residents of the surrounding area, mainly farmers, were mobilised to participate in the water supply project – motivated by their concern and recognition for the serious



Ditch digging

problems facing people in the Monastery. Indeed, many of the participants were not even direct beneficiaries. Rather, they were simply driven by their solidarity for the Monastery and the people living there. They organised themselves, shared the work programme on the basis of their own goodwill and initiative, and made their contributions in kind. This was an unexpected boost, as we initially feared that there could be no inputs from the community. It proved, however, that if people are properly informed, and convinced by the cause, they do not hesitate to make sacrifices.

Networking

The other prodigious impact was in terms of the benefits accruing to the underprivileged members of the community. These arose, notably, due to the networking among stakeholders triggered by the project. The local authorities, the principal of an elementary school, the head of a health post, the Head of the Monastery, and representatives of the community were all organised to work together throughout the implementation phase. It was subsequently learnt that this was the first such networking exercise in a social service development endeavour of its kind.

Creation of an Association

Furthermore, the networking activity has provided leverage for working towards a more ambitious, multi-faceted developmental strategy. The various key stakeholders have formed an association, named the Development Association of Dima and its Surroundings. Members of the Executive Committee travelled on foot and by bus to the district capital, which is situated about 150 km away, to get the new association formally registered as a legal entity. This was a most encouraging and selfless move on their part. They were motivated solely by the strength of their collective conviction regarding the paramount importance



Inauguration of project

of working together for the common good *per se* - and to rid themselves of the various social, economic and environmental problems they shoulder. A small water supply project has, thus, made an inspirational contribution in bringing them together.

Indeed, perhaps the most impressive aspect of the project has been the manner in which it has helped the beneficiaries in so many diverse ways, including the nurturing of collaborative focus and new ideas to alleviate water and other social and economic problems. The precious time saved daily on walking to collect water is now being used for more productive work. The stress and fatigue have been taken out of the task and the dependence of the aged, as well as those with disabilities, has been considerably lessened now that a ready supply of water is available closer to home.

Obviously, the Dima water supply project represents but one attempt to alleviate a transport-related problem – albeit it one that has made an important impact on the lives of the people concerned. It is symbolic of the wider range of ongoing transport issues that need to be comprehensively addressed. As long as such problems are allowed to perpetuate, no fundamental changes will benefit communities like those living in and around the Monastery. More succinctly, the realisation of the Millennium Development Goals, aimed at halving poverty by 2015, could be greatly advanced if, *inter alia*, the transport problems facing poor rural communities could be dynamically tackled so as to release and empower the potential of the people – as well as enable better utilisation and exploitation of available resources. Accessibility and mobility must be given due consideration going forward in order to achieve meaningful change and development progress.

The Impact of Rural Transport on Socio-Economic Development in Nicaragua

Jens Erik Bendix Rasmussen & Eva Broegaard
Ministry of Foreign Affairs, Denmark

A recent evaluation conducted in Nicaragua demonstrated clear positive economic and social impacts at community level flowing from investments in rural transport infrastructure. The projects were characterised by labour based methods and community involvement in planning, execution and maintenance; in close coordination with the municipalities concerned.

The evaluation used a quantitative double-difference approach, based on existing national data sets, covering households in similar communities with and without investments in improved transport access. This was combined with qualitative investigations to further explore the quantitative results, as well as additional issues.

Background

The agency for Danish International Development Assistance (DANIDA) has supported efforts to promote the transport sector in Nicaragua for twenty years. In the last decade, this has been in the form of a Transport Sector Support Programme (known as PAST). A major component has been investment in rural transport infrastructure at municipal level, comprising mainly roads, but also a number of wharfs, canals and footbridges, depending on the access situation. Support for capacity building among municipalities and communities has been emphasised. A total of 45 municipalities in three poor regions of Nicaragua - the North and South Atlantic Autonomous Regions (RAAN & RAAS) and Las Segovias - have received support. Over the period 2000-2009, approximately US\$ 22.4 million were invested, covering a total of 274,000 direct beneficiaries.

The following aspects characterised the projects: each municipality retained overall responsibility for the project and its periodic maintenance; labour intensive methods were applied using local materials; the beneficiary communities each contributed 5% of investment cost, in finance or in kind, and formed a committee responsible for the coordination of community participation in the



whole project cycle of planning, execution and routine maintenance. Project selection was based on a range of technical criteria, including feasibility of labour based methods, change in access, cost per capita and number of beneficiaries per kilometre. This latter was important for assessing whether the intervention would be maintainable by the local population.

Quantitative double-difference analysis is demanding with regard to both quantity and quality of data. Thus, it was crucial to the success of the evaluation that sufficient information was available to draw up a 'long list' of communities sharing observable characteristics at the time of the interventions - to enable due comparison and analysis between communities that received support (treatment communities) and those (comparison communities) that did not.

Importantly, the team benefitted from existing high-quality data from the National Bureau of Statistics. The evaluation was, therefore, able authoritatively to measure a range of socio-economic indicators (before and after the interventions) as well as match household data among both treatment and comparison communities. Due to data constraints, the econometrical analysis was only possible in Las Segovias. The qualitative investigation similarly compared treatment and comparison communities. The comparison between quantitative and qualitative findings helped ensure the validity of the qualitative findings across the three regions.



9,4 km road: Los Canales - La Manzanas

Economic Impacts

The analysis was able to demonstrate statistically significant impacts on important economic indicators – such as travel time, paid employment, connection to electricity grid and size of homes – as a proxy indicator for economic opportunities.

Whilst it is hardly surprising that construction of an all-weather access road to a community should significantly reduce travel times, it remains, nevertheless, a key evaluation finding. It notably signifies that improved access has actually been established, opening the way for improved contacts with the outside world and changes in development processes. Supplementary data highlighted increased traffic levels and the establishment of scheduled transport services in PAST communities.

PAST communities also showed a significant (17%) increase in the number of household heads in paid employment. New entrance to the labour market occurred mainly in agriculture, but employment gains were also observed in the construction sector. The qualitative analysis strongly supported these findings and confirmed that community members with experience in labour-based methods were finding employment in local municipal centres.

The qualitative investigation also revealed other indicators of economic development following improved access. For example, land value and the amount of land used for agricultural activities increased in PAST communities, but remained unchanged in comparison communities. Other benefits included more frequent, timely and less expensive contacts with markets and buyers for agricultural products, resulting in improved prices and changes in production patterns. The degree to which such benefits materialised, however, varied according to types of productive activity and connections further into the transport network.

Statistical analysis further confirmed that the average house size had increased significantly more in PAST communities than in the comparison communities. This is important since such investment can be seen as a proxy indicator for lower (transport) prices and/or improved resources. This was confirmed by the qualitative investigation.

Social Impacts

The qualitative investigation highlighted that a key social impact for beneficiary communities was improved access to health services, especially for emergency cases. It also found that greater transport access made a positive impact on the frequency of care visits from health personnel, and on the quality of health posts. Parallel improvements were not reported in the comparison communities. Similar positive impacts were identified in the field of education, with improvements in teacher attendance, more materials,



Vehicle bridge: Las Cruces – San Fernando

new or rehabilitated schools, and easier access to secondary schools outside the community.

Institutional Change: Capacity and Maintenance

At community level, the evaluation found that the training and community involvement associated with the programme increased local capacity, not only for the technical aspects of construction and maintenance but also with respect to organisation and interaction between the municipalities and other actors. Interestingly, the quantitative analysis revealed a significantly higher inflow of other development projects to PAST communities. The evaluation concludes that the combination of improved access for NGOs and other development actors, coupled with the increased capability of the communities, has helped bring about this change.

At municipal level, the evaluation found that PAST support in providing training and equipment for technical officers, social promoters, administrators and planners has been comprehensive and effective. This contributed to a continued dialogue with the project committees and has resulted in generally satisfactory levels of maintenance.



Meeting of Road Committee on the Los Canales – La Manzana Road

Formula for Sustainability

It is common experience amongst donors operating in the transport sector in developing countries – and more particularly in the road sector – that sustainability in the form of adequate routine and periodic maintenance is often difficult to achieve; even though this represents “bad economics”, through the risk of rapid loss of the original investment.

The experience of PAST in Nicaragua has shown that it is possible to address this challenge. According to the findings of the evaluation, the key factors in this respect are the long-term involvement and organisation of the communities and local governments concerned, coupled with capacity building and the demonstration of appropriate technical solutions. Short and long term planning, as well as raising awareness and resultant pressure from the populations who stand to lose out on benefits if the original investments are not maintained, were also highlighted as important. In this context, the experience of developing, implementing and maintaining PAST projects has both created capacity and deepened the relationship between communities and municipal governments; to the extent that officials are now more engaged in dialogue with communities, and communities are more articulate regarding their needs and responsibilities. This facilitates the task of both parties in fulfilling maintenance responsibilities - thus enhancing sustainability and the probability that the stream of positive benefits identified by the evaluation will continue in the longer term.

The full “Impact Evaluation of Danida Support to Rural Transport Infrastructure in Nicaragua”, including more information on methods and results, can be downloaded from www.evaluation.dk.

Many Birds with One Stone: Enhancing Social Protection through Rural Roads Development

Asfaw Kidanu

Chief Technical Advisor, Kenya Roads Project,
International Labour Organization

It has long been established that investment on infrastructure development can stimulate growth by injecting much needed cash into the local economy



and creating employment. In times of recession, many countries take deliberate steps to increase investment on infrastructure works in the hope of maintaining low unemployment rates, stabilising markets and jump-starting their economies. Such a strategy has been successfully applied by highly developed countries, like the USA and Germany, as well as by developing countries like China, India and South Africa. Many countries in Sub-Saharan Africa utilise infrastructure investment to drive employment creation and combat poverty. These choices have their foundation in the following four principal facts:

1. Infrastructure development works consume huge investment, which can be used to boost employment. Public infrastructure expenditure in most developing countries accounts for 40-60% of their annual budgets.
2. They are relatively easy to organise and yield results that are both immediate and visible.
3. Unemployment and poverty threaten the peace and stability of a country, and stifle long-term economic growth.
4. Government is a last resort employer. When all market forces fail to function, it is the obligation of governments to intervene, through policy and by undertaking strategic programmes to stabilise the situation.

Infrastructure investment is being increasingly used to address social imbalances and create opportunities for historically disadvantaged community groups (women,

youths and persons with disabilities), and as an interim employment-based social protection mechanism. These are achieved through the use of Employment Intensive Technology (EIT), which involves reorientation of public sector expenditure towards infrastructure (roads, urban drainage works, irrigation schemes etc.) and the use of more local labour and resources.

Experiences in several countries (including Kenya) have shown that employment intensive methods are generally cheaper and produce a well-engineered product. Provided they are well organised and managed, they also result in a speed and quality comparable to conventional machine-based methods. In addition, employment intensive methods promote the creation of productive employment for the rural and urban poor, as well as the development of local industries.

Kenya pioneered the use of EIT, and has been implementing successful employment intensive road projects since the days of the Rural Access Roads Programme (RARP) in the 1970s and the Minor Roads Programme (MRP) in the 80s. Both programmes provided much-needed access to rural communities, created employment and helped in stimulating the local economy in almost all parts of Kenya. These two programmes were followed by the Roads 2000 Maintenance Concept, which was specifically aimed at dealing with the prevailing maintenance backlog covering the entire road network of Kenya.





The Roads 2000 Concept is a road maintenance strategy that advances the use of the best possible combination of optimum labour force and equipment wherever technically and economically feasible, and where work can be delivered in a manner that is socially and environmentally responsible.

The Government of Kenya (GoK), with the assistance of key development partners, instigated this maintenance concept in the early 1990's and envisioned that it should be fully operational at national level by the turn of the century - hence the generic name "Roads 2000".

The Roads 2000 Programme represents the country's principal implementation strategy for road maintenance, and its main features include:

- The use of an optimum mix of labour and equipment
- Increased use of local resources
- Adoption of a network approach instead of the conventional link approach
- Provision of an employment-based social protection mechanism for marginalised sections of the community

The Roads 2000 concept has since been adopted in the Vision 2030 national development policy and acknowledged as a vehicle for employment creation and poverty reduction, particularly in relation to road infrastructure delivery. Several donor countries have also supported the Roads 2000 maintenance concept, recognising its potential for triggering local economic development and advancing social equality.

One of the strengths of the Roads 2000 approach is the promotion and observance of workers' rights, gender equality, environmental conservation and community participation. In short, it involves the provision of decent work for the masses of unemployed people in Kenya. The term "decent work" is often used to emphasise the fact that the Roads 2000 approach is not only about creating jobs. Rather it is concerned with:

- Providing jobs that beneficiaries willingly take up and are proud to participate in;
- Observing and ensuring workers rights and dignity;
- Ensuring equity and shared growth;
- Promoting community participation and giving marginalised communities a voice; and
- Planting the seeds of sustainable livelihoods through investment in seemingly short-term projects.

These objectives are in line with the national development aspirations of the GoK, and firmly anchor the Roads 2000 programme to the Millennium Development Goals (MDGs). The Roads 2000 programme is also in line with the priorities of Kenya's Decent Work Country Programme, supported by the International Labour Organization (ILO) – particularly with respect to employment creation, youth development, prevention of HIV/AIDS and expansion of social protection. The GoK, with the assistance of key development partners, has implemented several Roads 2000 projects in various parts of Kenya over the last five years. These projects are currently coordinated by the Kenya Rural Roads Authority (KeRRA), with ILO providing technical assistance. The main output areas of these projects include the improvement and maintenance of rural roads; provision of technical and managerial training to the staff of implementing agencies and emerging small-scale contractors; development of management tools; mainstreaming of rights-based planning; introduction of environmental conservation; and HIV/AIDS protection and prevention as an integral part of road project implementation.



Site workers undergoing an HIV/AIDS Test



Community Consultations

Significant progress has been made over the last five years in rolling out the Roads 2000 programme nationwide – with encouraging success stories including, among others:

- Improving more than 7,000 km of rural roads and putting them under maintenance.
- Generating about 4.4 million person days of employment (equivalent to about 20,000 full-time jobs).
- Injecting more than 1 billion Kenyan Shillings (US\$13 million) into rural Kenya through payment of wages.
- Reaching women and youth, who constituted upwards of 25% and 40% respectively of direct beneficiaries of the programme.
- Training 476 construction and maintenance contractors, 435 site supervisors and 235 implementing agency staff.



- Opening up development opportunities for emerging small-scale entrepreneurs.
- Actively featuring stakeholder participation in virtually all projects.
- Pioneering the use of low-cost, employment-intensive road surfacing techniques.

Roads 2000 projects have pioneered the adoption of a rights-based planning approach in rural infrastructure delivery. This has been achieved through involving the community as stakeholders in the entire programme cycle.

The community stakeholders have been organised and formed into Road Committees at district level to identify transport problems in their respective areas, assist the engineers in identifying and prioritising road works, monitor the implementation of works, and ensure the sustainability of programme benefits. The Committees have also played a facilitation and advocacy role for the implementation of Roads 2000 projects.

The main objective of the above participatory arrangements was to encourage local ownership, ensure accountability in the use of scarce resources and give a voice to the rural communities, who too often have no say on development activities in their own areas.

Through the above and more, the Roads 2000 programme has made a significant contribution towards the development of local economies and improving the livelihoods of communities within the programme areas.

The Roads 2000 concept is now fully integrated in the regular programme of the Kenya Rural Roads Authority, and other Roads Authorities are following suit. It is widely accepted as a valuable instrument for delivering road improvements and maintenance work, as well as providing employment-based social protection for the rural poor. Hence the title of this article: "... many birds with one stone" – invest in road infrastructure and get so much more! Indeed, very few other sectoral interventions have achieved wider coverage/scope in terms of social intervention (rights, gender, environment and HIV/AIDS etc.). Nor have they been able to create as much employment, or inject so much cash into the rural economy, as the Roads 2000 Programme. Furthermore, all these benefits are in addition to the basic provision of rural access, which is now increasingly being recognised as one of the basic human rights, and a major catalyst for local and national economic development.



Labour-based sealing-spotting and spreading of aggregate

Socio-Economic Impact of the Roads 2000 Project in Nyanza, Kenya

Farhad Ahmed, Masam Abedin & Dave Jennings

Respectively Director of Transport Economics, ITT Ltd., UK; Senior Consultant, Integrated Transport Planning (ITP), Birmingham, UK; & Project Director, ITT Ltd., UK

Kenya has been hitting the headlines in the last couple of years. In 2007/08, the country was plunged into chaos after the disputed election threw the nation's ethnic fissures into sharp relief. The fallout was dramatic. Over a thousand paid the ultimate price and over a hundred thousand were internally displaced. Although full-scale civil war was abated, further calamity was on the horizon as the country had to deal with the continent's other infamous enemy – nature. The drought of 2009 deprived the country of a bountiful harvest and the "El Nino" torrential rains washed away what remained.

In the backdrop, however, Kenya's heart was forever beating, and the country has survived this tumultuous period. Everyday life continued and people's dreams resurfaced; a testament to the African people's tenacity and the will to forge their own destiny. Life and daily activity continues and development projects, though disrupted, have been broadly pursued.

One project to have spanned this period of turmoil is the Roads 2000 Nyanza Project, implemented by the Kenya Rural Roads Authority (KeRRA) under the Ministry



of Roads. The programme is being part funded by the Swedish International Development Cooperation Agency (Sida) and has a target of bringing 75% of the road network (some 5,500 km) in the programme districts under routine maintenance after their improvement. The programme's financial outlay is Kenyan Shillings (KES) 1.83 billion (approximately US\$ 24 million). Nyanza is a province situated in the far west of the country, on the shores of Lake Victoria. It is one of the poorest provinces in Kenya, with an elevated infant mortality rate and a high incidence of HIV/AIDS.

ITT Ltd. has been acting as the Technical Assistance Consultants to the programme. The consultancy team is providing management support and technical advice to KeRRA to implement the programme. The road improvement and maintenance work is undertaken using employment intensive technology that engages local workers to carry out the majority of the work through local contracting companies. In order to ensure ongoing monitoring and evaluation of the programme, the Consultants fielded the authors as socio-economic experts to assess effects and impacts. The main points of the appraisal are summarised in this article.

The Study

A quasi-experimental study design was adopted which analysed the "before - after" (or longitudinal data) within a "with - without" format (cross sectional comparative framework) to estimate project effects against nine key indicators. The longitudinal comparison indicates the changes that have taken place between two different points in time (a 3-year period). The cross sectional analysis helps to simulate the counterfactual. This type of methodology is common in road improvement related development impact assessments.

Large amounts of data were collected across the years of the programme, and a great deal of effort has been made to keep a rigorous analytical and statistical control on the impacts reported. During the study period, there have been – in addition to the geo-political problems outlined in the introduction – a number of major influences affecting transport in Kenya. The use of motorcycles has increased dramatically and mobile phone banking (M-Pesa) has been introduced. These influences and their impacts are discussed in the main report, but require further study.

Overall Traffic

The road development programme contributed to a significant increase in the volume of motorised traffic. The table below shows that motorised traffic increased almost fivefold. However, no significant volume changes were observed for the non-motorised modes or pedestrians. Although there was a reduction of almost 50% in Non-Motorised Traffic (NMT) on the control roads, this was not found to be significantly different after subjection to statistical t-tests (at the 95% confidence interval).

Traffic Volume Changes

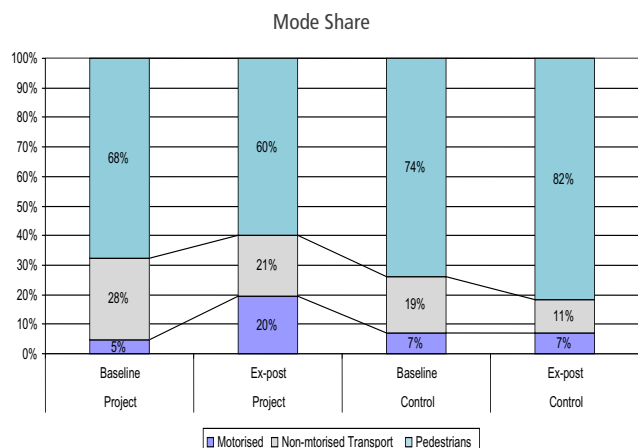
Traffic	Project Roads	Control Roads
Total	30%	-15%
Motorised	458%	12%
Non-Motorised	-4%	-49%
Pedestrians	15%	-6%

It is clear that the largest increase in traffic on the improved rural roads has been in motorised modes (458% increase). Travel for the purposes of work and business increased on improved roads.

Mode Shift

Evidence suggests that road improvement triggered a shift to motorised modes of transport. The proportion of motorised traffic in the control roads remained constant at 7% but increased from 5% to 20% in the project roads.

A large part of this increase is due to the proliferation of motorcycles. The reasons are mainly external to the programme and include the removal of the value added tax (VAT) in 2008 and increased market competition from cheaper brands from India and China.



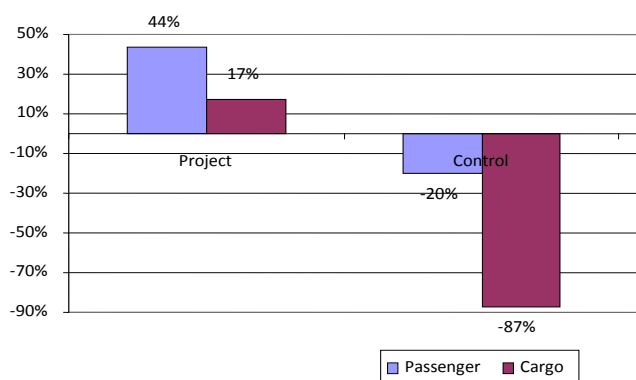


The ownership of motorcycles is restricted to the relatively better off sections of society, although all travellers benefit from the lower prices. The operators (not owners) are youths who find this an avenue for obtaining income. Still, the improved quality and increased maintenance on the project roads allows these intermediate means to be used to a much greater extent – and road safety issues are now becoming increasingly important.

Passenger and Cargo Volumes

With the road improvement, both passenger and cargo volumes increased – with motorised modes substantially increasing their share of passengers. The proportional change in passenger and cargo volumes between the baseline and ex-post surveys shows passenger numbers and cargo volumes increased by 44% and 17% respectively on the project roads; while the deterioration of the road condition on the control roads led to a 20% reduction. Cargo volumes increased by 17% on the improved roads and dropped 87% on control roads, again mostly attributable to a decline in the cargo transported by motorised means.

Proportional Changes in Passenger and Cargo Traffic



Passenger and Cargo Tariffs

The situation with passenger and cargo tariffs is difficult to interpret. While individual costs for particular journeys and some modes have reduced on project roads in real terms, overall average tariffs on improved roads have risen faster than prices on control roads.

Following transport improvements, the costs to users should reduce. In this case, however, actual average tariffs have increased. This could either be because transport operators have not passed the benefits on to consumers (due to monopoly or cartel behaviour) or because there has been an overall shift to more expensive modes of transport

Change in Passenger and Cargo Tariffs

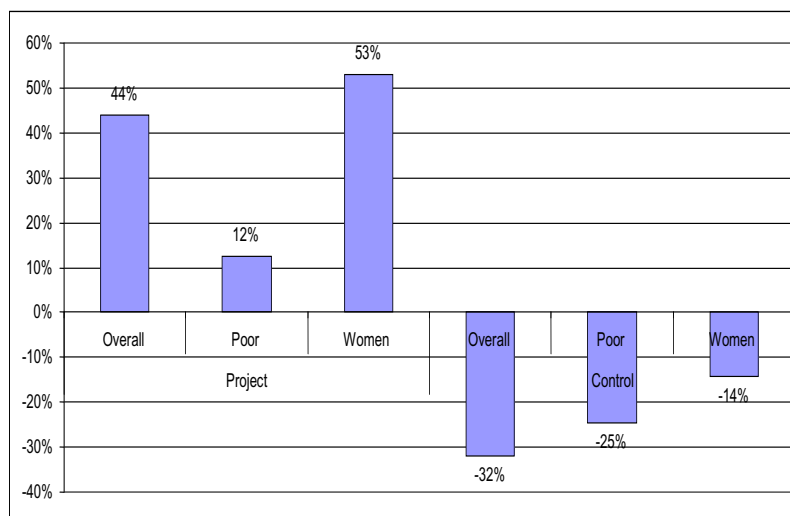
	Passenger	Cargo	Net mass movement
Nominal prices			
Project	59%	83%	67%
Control	89%	26%	58%
Overall	76%	55%	62%
Real Prices			
Project	15%	32%	21%
Control	36%	-9%	14%
Overall	27%	12%	17%

(e.g. from headloading to motorised). Indeed, we already know an overall modal shift to motorised transport has occurred. In addition, more detailed analysis of passenger and cargo tariffs indicates that there has been an overall reduction in tariffs for specific modes on the improved road corridors. While individual journey tariffs have come down, more people now travel by motorised modes on the improved roads – thus increasing the average cost of travel per km and cargo transport per tonne-km (ignoring the





Proportional Change of Travel by the Poor and Women



economic saving for the value of time). A greater variety of journeys and longer distances were recorded, with a higher proportion of journeys for the purpose of employment and business.

Distributional Impacts

More women travelled on the improved roads and the rate of increase in their number was higher than that of overall traveller numbers.

Such a high proportional rise in travel by women is both noteworthy and welcomed. Women play an important part in the provision of transport in rural Kenya. They bear responsibility for a number of transport-related tasks, including collection of water, taking agricultural produce to markets, post-harvest transportation of crops from farms to home, and taking children and the elderly to health centres/hospitals. Their increased mobility is, therefore, likely to correlate strongly with increased socio-economic development of the citizens of Nyanza province.

More poor people travelled on the improved roads. The poorer sections of the community have significantly increased their proportion of travel for employment and business purposes. This potentially reflects the increased economic opportunities now available.

Perceived Impacts

The opinion of the overwhelming majority of respondents was that road improvements had brought benefits to the people living within the road corridors. These benefits

included lower costs of transport, greater availability of transport modes and easier use of bicycles. However, respondents also acknowledged that the improved roads had brought some disbenefits. The top three disbenefits identified were more accidents on the roads, environmental degradation and increased access to drugs for young people. One interesting disbenefit highlighted by some respondents was an increase in domestic violence associated with the improved roads. Such topics lend themselves to further study and investigation.

Conclusion

The Roads 2000 Nyanza Programme has shown that, despite political and environmental problems, success is achievable given sufficient determination and resolute will. The programme to develop the roads was administered and executed on time, and the resultant effects were broadly positive. Traffic volumes increased and costs were reduced for each mode of transport. Vehicle ownership grew and the benefits to women were proportionally greater than for other members of society. The citizens of the improved areas were positive about the programme. Motorcycle proliferation was a marked feature, which characterised the latter part of the decade and will need to be incorporated into future transport considerations. There was a move to more polluting (motorised) modes of transport. The link between socio-economic development and motorisation remains, however, essentially a problem of the 21st Century, and was not an issue investigated or targeted as an objective of the Roads 2000 Nyanza project.



ROAD SAFETY

Road Safety versus Mobility: The Dilemma of Managing Rural Transport in Africa

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This article is a reflection on the special challenges of road safety in Africa's rural areas. It examines the complex relationship between the rural transportation system and national road safety rules and regulations, and explores the implications for rural livelihoods. It also examines recent efforts to mainstream rural concerns in road safety policy at national and regional levels, and provides insights on ways of cushioning negative impacts of enforcing road safety measures on rural mobility.

Poor road conditions, old vehicle fleets, excessive overloading and mixed traffic are major risk factors in rural areas

All the components of the rural transport system in most African countries – road infrastructure, vehicles, and road users – contribute significantly to road crashes. Generally, the continent's road transport network is inadequate compared to other regions of the world, notably in terms of density, distribution in relation to the population and quality. The situation is worse in rural areas, where existing roads are predominantly narrow, unpaved and in bad condition due to lack of regular maintenance. Many of these roads are very slippery during the wet season and thus dangerous for driving, especially those without side protection and constructed on terrain with steep hills and deep valleys. Some bridges are in a state of disrepair and dangerous for use by vehicles. In addition, encroaching vegetation has further narrowed numerous rural roads, making them unsafe for both drivers and pedestrians. Many of the existing paved roads are also very narrow and in bad condition. A number of African countries, such as Ethiopia, are implementing ambitious road sector development programmes to address some of these issues, and are already recording improvements in the coverage and quality of their networks. However, significant

reduction in rural road infrastructure gaps remains a long-term prospect.

Generally, African countries also have very old vehicle fleets. In Ethiopia, it is estimated that vehicles imported to the country are on average 20 or more years old, and that the age of the national vehicle fleet is 30 or more years. In Tanzania, the average age of vehicles is reported to be 15 years. Overall, it is the worst of these old vehicles that are used for providing transport services in rural areas. This is a direct result of the appalling condition of most rural roads, which raises vehicle-operating costs and discourages transport operators from using relatively new vehicles to provide services. To maximise profits, the few operators that serve rural areas tend to modify their vehicles to increase carrying capacity. Vehicles are also modified to withstand the rough conditions of rural roads. Such modifications may affect the structural integrity of the vehicle, thus creating enormous risks to the safety of drivers and passengers.

Overloading of vehicles is common in rural areas as a result of very low traffic levels. In a passenger survey undertaken in Cameroon for a type of vehicle designed for a maximum passenger capacity of five, 50% of the surveyed vehicles carried 8 or 9 passengers. It was observed that some of the cars carried up to 15 passengers. It was also noted that operators allowed desperate commuters to sit on the roofs of moving vehicles, which is dangerous as the roads are bad and some of the drivers are reckless.

Another phenomenon in rural areas that raises concern is that of mixed transport of people, goods and animals, notably cattle, in the same vehicle. This is mostly the case in cattle rearing areas, where movement of cattle along highways is also rampant and a major cause of crashes. In Ethiopia, animal strikes are actually reported as being one of the leading causes of road accidents. In general, mixed traffic is common in Africa's rural areas – with cars, motorcycles, bicycles, horse and donkey carts, as well as pedestrians all sharing the same narrow pavement. In Tanzania, efforts are made to erect signs indicating cattle crossing locations, but these signs do not last for long due to road furniture vandalism. The resulting absence of such signs exposes drivers to serious problems at cattle crossings.



Wildlife crossing roads in rural areas also endanger drivers and passengers, in addition to the animals themselves.

Recent efforts to improve rural road safety are encouraging

Efforts are ongoing at national and regional levels to improve rural road safety in Africa. For instance, fences have been constructed and are regularly maintained along roads such as the N4, which links Maputo in Mozambique with Witbank in South Africa, to prevent animals from entering the carriageway. Overhead bridges have also been constructed to facilitate the movement of pedestrians and, in some cases, cattle. Furthermore, telephones, linked with ambulance and emergency services, and other relevant authorities, have been installed along the N4. In Ethiopia, road safety consciousness in rural areas is increasing as a result of targeted awareness raising campaigns. Regional transport bureaus and traffic police are also controlling excess loading of public transport vehicles.

At the regional level, the Economic Commission for Africa (ECA) has spearheaded efforts to mainstream the special needs of rural areas in Africa's road safety agenda. In that regard, the Commission and several partners organised the African Road Safety Conference in Accra, Ghana, in February 2007, during which the specificities of rural road safety were extensively discussed. The Conference noted that road safety dimensions in rural areas were different from those in urban areas. It recommended that First Aid training be provided to rural drivers and villagers; that community data collection systems should be introduced; mixed transport regulated; and support provided for research on issues related to rural transport safety.

ECA has developed a framework for monitoring and evaluating progress in implementing the recommendations of the Accra Conference. This framework was adopted at a seminar organised in 2009 by the Commission, in collaboration with the FIA Foundation for the Automobile and Society. It provides the following performance indicators for measuring progress in rural transport safety: percentage (%) reduction of rural road users involved in fatalities; % reduction in animal strikes; and % of countries with community data collection systems.

But road safety measures should be comprehensive and should not threaten the livelihoods of the rural population

Strict enforcement of national road safety rules and regulations would adversely affect mobility in rural areas. For instance, applying roadworthiness standards would disqualify most public transport vehicles in rural areas from operating because they are likely to be below national standards. However, taking these vehicles off the road would further compound the mobility problem in rural areas, as the supply of transport services is already quite low. Therefore, enforcing roadworthiness standards in rural areas would have a negative impact on the livelihoods of the population if this were not accompanied by other measures such as improving the condition of the roads with a view to attracting better vehicles. Similarly, preventing overloading of vehicles would severely constrain rural mobility if the supply of transport services were not increased.

Overall, given the choice between mobility and safety, most rural dwellers will choose mobility, which in most cases is necessary for their livelihoods and even survival. This is illustrated by their willingness to take desperate measures such as sitting on the roofs of moving vehicles or sharing the same space with animals. Therefore, for a rural road safety programme to be effective and accepted by local communities, it should be comprehensive and not at the expense of mobility. This calls for research into developing methodologies for determining the optimal mix of road safety measures in rural areas – one that minimises the negative impacts on mobility. Such research should take into consideration factors such as the demand and supply of transport services, the availability of alternative modes of transport and the state of road infrastructure.



SHARING THE ROAD

The Impact of Motorcycle Taxis on Socio-Economic Development

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Numbers of motorcycles (including mopeds and scooters) are increasing rapidly in many countries, often due to imports of inexpensive Chinese models. Motorised three-wheelers are also slowly increasing. Motorcycles offer many benefits for rural people – providing greater access, mobility and employment opportunities. As motorcycles increase, niche markets arise spontaneously for motorcycle transport services. The profitability of motorcycle taxis often leads to rapid expansion. Transport authorities and local governments are often unprepared for the regulatory implications of motorcycle taxis and prohibit them. There is need for greater understanding and constructive regulation of these services.

Rural and urban transport patterns

The pattern of motorcycle adoption and motorcycle taxi services varies greatly between and within countries. Countries with rapid adoption of motorcycles include the very different socio-economic settings of Afghanistan, India, Indonesia, Vietnam, Colombia, Haiti, Benin, Nigeria and Rwanda. Countries with little use of motorcycles, and with similarly contrasting situations, include the USA, Cuba, South Africa, Ethiopia, Gabon and Fiji. Developing countries with little present use should prepare for possible rapid expansion. Tanzania had few motorcycles in 2005, but conditions seemed appropriate (Starkey, 2008) and, by 2009, motorcycle taxis had started in several towns.

Within countries, the adoption of motorcycles and motorcycle taxis is variable, but with clear patterns. Initial adoption starts in urban and peri-urban areas where imported motorcycles arrive. Here, there are funds to purchase them and economic transport demand. Once a critical mass of motorcycle users and supporting services develops, adoption becomes easier, and prices fall in



Motorcycles successfully crossing riverbed in Timor-Leste



response to competition. This stimulates adoption in other towns, peri-urban areas and large villages. Motorcycles then start to play important roles in rural transport. Examples of urban/periurban motorcycle taxis spreading into rural areas occur in Colombia, Cambodia, Nepal, Vietnam, Burkina Faso, Cameroon and Nigeria.

Impacts on rural access and mobility

Transport services between villages, market hubs and district centres in many developing countries are provided by 'rural taxis' (minibuses, 4x4s, pickups) and intermediate means of transport (motorcycles, bicycles, animals). Motorcycles are increasingly important. They are now the most numerous vehicles on some rural spokes in Colombia, Indonesia, Nepal and Timor-Leste. Motorcycles can operate on poor roads, passing road blocks caused by mud, water or landslides. Rural motorcycle taxis carry men, women and children, and their goods, to link poorly served villages to conventional transport services on main roads. Motorcycle taxis in rural communities benefit women, children and disadvantaged people through emergency and routine transport to health care and other services.

Motorcycle taxi passenger fares and freight tariffs are significantly higher per kilometre than rural taxis (Starkey, 2008). Their comparative advantage is their availability and flexibility as they transport passengers immediately to their destinations.

The profitability of motorcycle services led to similar private financing systems in Cameroon, Colombia, Rwanda and Tanzania. These systems allow all to benefit – the owners (often urban-based traders and civil servants), the operators (who rent the motorcycles), the passengers and the support services. This creates a critical mass and builds the momentum for rapid adoption of motorcycles and supporting services. The funding system allows private urban capital to fund rural transport improvements (Starkey, 2008).

Motorised three-wheelers also benefit rural communities, although most provide urban and peri-urban transport. They have greater load-carrying capacity than motorcycles and are safer (particularly when transporting more than one passenger). They are not, however, as manoeuvrable as motorcycles for crossing rivers or skirting landslides. In some countries, including Colombia and Cambodia, motorcycles with trailers (four wheels in total) provide transport services

but these are rare compared to motorcycle and three-wheeler services.

Gender and employment issues

Women and men can ride motorcycles and benefit from the mobility they provide. However, for socio-economic, gender-power and cultural reasons, men are generally the main owners of transport devices. Accordingly, most motorcycles are owned and operated by men. In some countries, including Laos, Vietnam and Burkina Faso, many women own and ride motorcycles, but seldom are 30% of urban motorcycles driven by women and the rural percentage is much lower.



Motorcycle taxi carrying two women passengers and their goods in Cameroon

Almost all motorcycle taxis are operated by men. They offer young men attractive livelihoods while stimulating employment in the supply and maintenance services. As motorcycle taxis are replaced regularly, second-hand markets enable greater, diversified adoption and higher maintenance service demand. Employment is stimulated by the economic benefits of passenger mobility and marketing opportunities. Motorcycle taxis enable some women entrepreneurs to travel rapidly to and from markets. Minibuses and three wheelers offer greater load capacities but motorcycles may be more available and timely.

Impact on safety and implications for regulation

Motorcycles and motorcycle taxis present many problems of safety, regulation and enforcement. Young men operating motorcycle taxis are often risk-takers. Motorcycle taxis are also risky due to poor consideration by other road users, their lack of user protection, and their instability when balance is impaired (by potholes, loads, speed, knocks or alcohol).



Motorcycles operating between a small town and main road in Colombia, including motorcycle taxis (carrying helmets), personal users and a motorcycle trailer.

In many countries, crash helmets are compulsory but enforcement may be patchy. If crash helmets are only enforced for drivers, passengers may remain at risk, particularly young children. Some women passengers refuse helmets due to hairstyles. In Colombia, some motorcycle taxi drivers ride with helmets on their arms – being unconvinced but ready to comply if stopped!

High-visibility vests, marked with large driver numbers, were successfully introduced in Cameroon, Colombia and Rwanda. Fear of identification by police reduces dangerous driving and visible numbers encourage public support of regulation through reporting. In Colombia, some authorities require clear numbers on crash helmets to reduce accidents and motorcycle crime.

Motorcycle taxi operators often form associations to reduce competition problems and maintain standards and fares. Some associations become restrictive, anti-competitive cartels but others self-regulate to implement safety measures.

Some authorities ban motorcycle taxis for safety reasons. However, motorcycle taxi operators and users generally consider that the socio-economic benefits justify the risks – as there are many competing risks relating to health, livelihoods and mobility. Attempts to ban motorcycle taxis are often localised and short lived as services can restart easily. Bans in Colombia stimulated demonstrations in support of motorcycle taxis. Enforcement is problematic when drivers and passengers claim they are friends or relatives. Authorities in Colombia restricted motorcycle

passengers to relatives (blood or marriage) – which proved unpopular with motorcycle taxis, and young lovers!

Human behaviour causes many motorcycle accidents, so education and awareness campaigns, supported by consistent, fair enforcement, are appropriate. Local people and transport associations can stimulate compliance with regulations. Motorcycle taxi operators should compete on issues of safety. In some circumstances, promotion of three-wheelers could improve transport capacity, comfort and safety.

Conclusions

Informal, demand-driven, private sector initiatives have led to popular motorcycle taxis services in many countries that have improved rural transport at no direct cost to governments or transport authorities. Governments have gained revenues from taxes on imports, fuel, licenses and personal tax liabilities. The main problems have been safety and security issues.

The socio-economic issues surrounding motorcycle taxis need attention. Studies in different countries should document the advantages and constraints of motorcycle taxis to inform debate and policy formulation. Countries with many motorcycle taxis should exchange experiences and develop guidelines for effective regulation aimed at promoting socio-economic benefits and acceptable safety standards. Countries without motorcycle taxis should anticipate possible rapid adoption and prepare appropriate regulatory frameworks. Motorised three-wheelers should also be reviewed as public service vehicles.

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MANAGEMENT

Leapfrogging from Rural Hubs to New Markets

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Poverty in developing countries is predominantly rural and its alleviation can be best achieved through agricultural growth. Thus, the improvement of agricultural marketing is the key to rural poverty alleviation. This requires not only well maintained roads and good transport services, but also logistical chains, telecommunications facilities and intermediate means of transport. This article, based on a World Bank paper (Sieber, 2009), shows how, with an integrated planning approach, appropriate structures may be created that improve market access for smallholder farmers and thus alleviate rural poverty.

Agricultural markets in developing countries have a dualistic structure – with a ‘traditional’ sector focusing on food staples and traditional export products; and modern markets for high value foods, such as fresh fruits and horticultural and dairy produce. While the first sector is dominated by ‘traditional’ transport activities, modern markets require modern supply and logistic chains.

Inefficient ‘traditional’ freight transport

Presently, traditional rural freight transport is primarily related to the evacuation of agricultural produce from the fields to domestic and international markets. The first mile is conducted on local paths and tracks, mainly by headloading, which is the most expensive means of transport (Sieber, 1999). Inefficiencies currently dominate rural transport operations in many developing countries, especially in Sub-Saharan Africa: Bad roads, low quality and unreliable services, monopolistic transport markets and high charges are the most important problems.

Since bad market access hampers development, rural roads generate strong impacts on agricultural production and marketing, and thus contribute to poverty alleviation. However, roads are not enough due to their rather permissive character, so transport services and modes have to be taken into account as well. Intermediate Means of

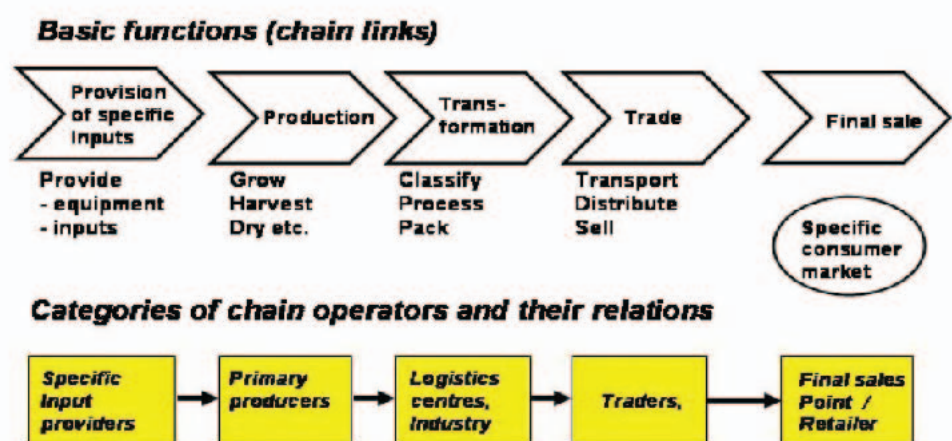
Transport (IMT) can reduce transport costs significantly, if multimodal transport chains are used. While IMT can efficiently carry small quantities on local infrastructures, trucks operate cost efficiently over longer distances, on good roads and when fully loaded. The multimodal approach uses the comparative advantages of each mode in the transport chain from the field to the market (Sieber, 1998). Thus, the promotion of IMT for multimodal transport is an essential component for the improvement of rural freight transport.

New opportunities through emerging agricultural markets

Flowers from Kenya, cherry tomatoes from Senegal, green beans from Niger, organic cucumbers from China are offered more and more in the supermarkets of industrialised countries. A tremendous growth in world food trade has been observed over the past decade. Exports of horticulture, livestock, fish, cut flowers and organic products now make up 47% of all developing country exports; far more than the 21% for traditional tropical products such as coffee, tea and cotton.

Additionally, in many developing countries, a rapid rise in the number of supermarkets since the 1980s has determined the structure and logistics of agricultural markets. In Latin America, supermarkets are buying 2.5 times more fruits and vegetables from local producers than all the exports of produce from the region to the rest of the World. Future agricultural markets in middle-income countries will be dominated by supermarkets; while in poorer countries they are still in their infancy.

The new markets create diversified opportunities for developing countries, not only to supply high-value produce, but also to carry out value-adding processes such as washing, pre-packing, mixing, labelling and bar coding. Consequently, many new economic activities may be undertaken within developing countries; thus increasing the rural value added dimension. For example, in Bangladesh, when exporting French beans, more value is added through transport, handling and packaging than by the original farming activities. The new paradigm that emerged from such developments on the world market was that, if producers were more closely linked to their



Basic features of an agricultural Supply Chain

markets, they would increase their revenues and improve their livelihoods.

Supply chains and modern transport logistics

The emerging agricultural markets for high value products entail severe impacts on marketing, procurement processes, quality control, warehousing, packaging, logistic chains and transport. For such products, modern supply chains are necessary – covering upstream processes, such as the provision of inputs, as well as downstream transport logistics from the producer to the final consumer (Figure 1). Thus, they call for high-quality transport services that, in turn, require major investments in facilities, transport equipment and management capacity.

In order to satisfy the demand from customers and adhere to quality standards, produce has to undergo a number of processes, such as pre-cooling, pack line operations, ripening, degreening and labelling. A well-equipped and hygienically maintained infrastructural base is a pivotal support element of the chain. The technological level must be appropriate to the needs of the target market and the length and complexity of the chain. For simple chains, such as where the producer is within hours of the market, a simple infrastructural base consisting of packing and well-ventilated transportation facilities is adequate. For longer, more complex chains, packing houses, cooling systems and logistical infrastructure – such as refrigerated transportation, storage/warehousing and containerisation, supported by appropriate logistical operations – are required.

Pre-cooling prior to shipment is needed to prevent quality loss and wilting. Cooling is not a domain reserved

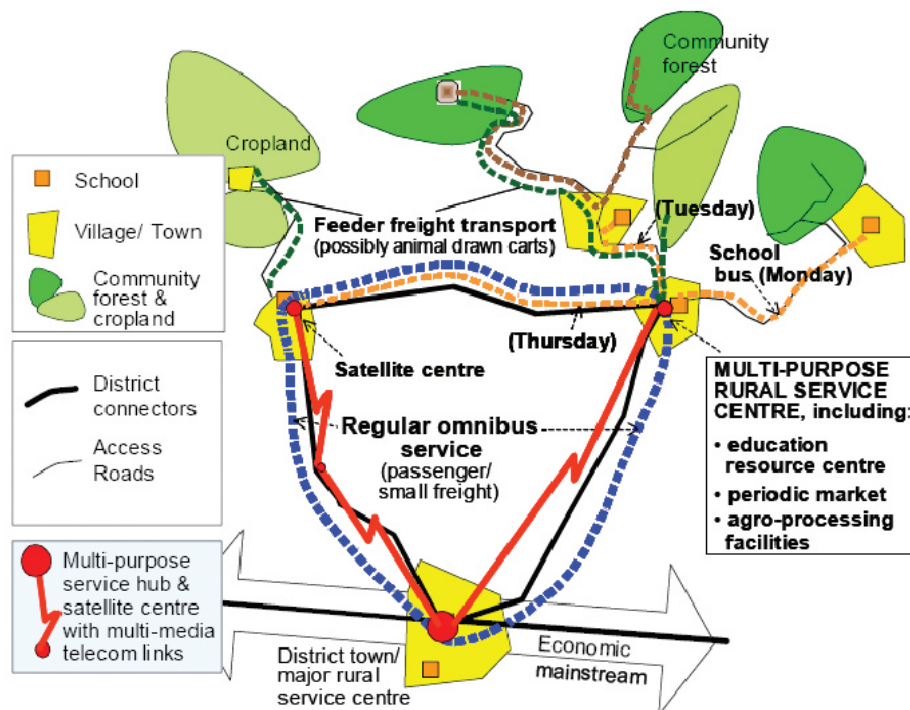
exclusively for the high-tech sector. Appropriate cooling technologies, such as the solar assisted cooling chamber depicted in Figure 2, might provide low-cost solutions in poor areas. The evaporative cooler shown can prolong the life of fresh fruit by two to three weeks.



Appropriate cooling technologies in Low-Income Countries

A new concept for regional and transport planning

How can modern supply chains be implemented in a traditional rural transport market? The answer is through an integrated regional planning approach that encompasses disciplines such as agriculture, logistics, manufacturing, transport and business development. On the regional level, conventional and modern transport chains may be



The concept of rural Central Locations in the Master Plan of South Africa

planned using the approach of 'basic access' provided by multimodal transport, embedded in the concept of central locations and combined with modern communication infrastructures.

In this concept, central locations form a hierarchical system of rural development nodes, as shown in Figure 3, which is derived from the Master Plan in South Africa. Over the first mile, agricultural produce is transported by IMT, using low-cost tracks and roads. The hubs are used to tranship cargoes onto motorised goods vehicles, from where they travel on well-maintained rural roads. The rural hubs are placed in central locations that function as buying points or local markets and provide communication and agricultural extension services for rural producers. In these rural hubs, facilities for modern supply chains – such as cooling, refrigeration, processing and packaging – may be provided. Superior centres provide additional transport hiring or brokering services. For regional planning, an interdisciplinary approach and the involvement of stakeholders, especially the private sector, is a must.

Multimodal basic access, combined with telecommunications, the development of central locations and modern supply chains, enable poor farmers to leapfrog from rural hubs to new markets and, thereby, escape the poverty trap.

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Transport for Poverty Alleviation: An Approach in Bangladesh

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Bangladesh is one of the few countries in the world where a full range of transport modes serves the needs of the economy and people. It has a vast network of highways and rural roads, a railway system, inland waterways, two seaports, maritime shipping, and civil aviation services, including a national airline.

From an initially low-level transport endowment, Bangladesh has made significant strides towards developing a modern transport system. Most of the improvements have occurred in the road sector, which now boasts an impressive 274,000km network.

In 1984, the Government of Bangladesh outlined its rural development strategy, which focused on the development of physical infrastructure around roads, markets and storage facilities. Since that time, a range of mechanisms, including basic irrigation, have helped to accelerate economic growth and reduce poverty.

Bangladesh remains primarily a rural society, with about 80% of the population living in rural areas. Although rural Bangladesh is poor, it has a highly active local cash economy – in which mobility and trading are of crucial importance.

Strategic Planning

Rural transport is, therefore, of vital significance to poverty reduction – and poor access to transport in rural areas considerably constrains economic and social development. Accordingly, the Government's rural development programme, which originated in the 1960's, was conceived as an instrument for fostering agricultural production as well as economic growth. The rural development model emphasised the formation of co-operatives and the integration of support services provided by government departments. The model had four major elements:

- A two-tier Co-operative System, comprising the Krishak Samabaya Samity (KSS) and the Thana¹ Central Cooperative Association (KCCA)
- A Rural Works Programme (RWP)
- The Thana Irrigation Programme (TIP)
- The Thana Training and Development Centres (TTDC)

Institutional Framework

Bangladesh's Local Government Engineering Bureau (LGEB) – which grew out of the previous Works Programme Wing (WPW) - was created in October 1984, and subsequently upgraded as the Local Government Engineering Department (LGED). The LGED currently has a permanent team of just over 10,250 engineers and staff, working under the executive authority of a Chief Engineer. 87.8% of the team is mobilised at the grassroots level, and the LGED is now one of the prime engineering organisations engaged in the development of rural transport infrastructure in Bangladesh.

Rural Transport Infrastructure Development Activities

The country's road network may be broken down into the following main categories: National Highways; Regional Highways; and Zila, Upazila, Union and Village roads.² Rural transport infrastructure activities are focused on the improvement of Upazila, Union and Village roads. Activities include the construction of bridges and culverts; development of growth centres and rural markets; tree planting on embankments; and routine maintenance of earth roads, as well as paved roads and structures.

Planning Tools and GIS

In the early 1980s, distinct plans were developed with respect to Upazilas and Unions and used as tools for planning and prioritising rural roads, bridges and culverts, and market development.

LGED has further developed digitised maps (scale 1:500000) covering sub-district administrative units throughout the country. These enable ready access to key information such as the geographical locations of road networks and other important features. The maps and road inventories also serve as basic planning tools for rural road development, and are updated every year by the dedicated Geographic Information Systems (GIS) unit at headquarters level.



Implementation

Considerable emphasis is placed on community/beneficiary participation in infrastructure planning, implementation and maintenance. Development planners increasingly acknowledge the importance of this dimension for maximising the impact of rural infrastructure. Infrastructure that does not represent the hopes and aspirations of the community will not tend to be fully adopted or used by the local people. As a consequence, the community will be reluctant to share responsibility for its maintenance.



Construction work on approved schemes generally involves the following modes of implementation: Contractor; Project Implementation Committee (PIC); and Labour Contracting Society (LCS).

From a governance standpoint, key features covering the various project phases typically include: planning; participation; road master plans; financing; procurement; quality control; environmental considerations; financial management; auditing and monitoring; institutional strengthening/capacity building; Information and Communications Technologies / Geographical Information Systems / Management Information Systems (undertaken within LGED); employment generation; gender mainstreaming; and socio-economic monitoring and evaluation.

The ongoing maintenance of roads and bridges/culverts is being given increasing importance as a project component, and this dimension is ensured through allocations from the Revenue Budget of the Government of Bangladesh (GOB). Maintenance activities are classified as routine, periodic, emergency, or for the purposes of rehabilitation or covering backlog.

There is also firm emphasis on labour-based technology, i.e. the use and management of locally available human and material resources for the construction and maintenance of infrastructure. One of the key advantages of this is that local people are employed and trained in construction work and maintenance, thereby developing their vocational skills. In this respect, the objectives are: (a) to engage the workforce directly in a labour intensive area, (b) reduce poverty, (c) minimise costs and (d) reduce the time span for construction (as work can proceed directly, using readily available labour and light equipment). All operations can be efficiently undertaken in this manner, including earthworks, haulage, placing, levelling, aggregate breaking, mixing, placing, connecting, and so on.



Local people and road users can also have an important role to play in raising awareness, demonstrating the importance of road improvement/maintenance policies, enforcing the regulatory framework, strengthening accountability and participating in road management. To be effective, however, they need to be organised into road user associations, and should be encouraged to work closely with both road agencies and the Government.



NGOs are actively engaged in various LGED infrastructure projects – initiating and executing community development



programmes that directly benefit the poor. The types of activities covered typically include: group mobilisation; life skills education (group savings, planting and caring for trees etc.); credit/income generation; and beneficiary training/capacity building (group accounts management; participatory leadership development; awareness and ownership building; gender awareness).

A dynamic gender equity strategy provides guidance aimed at ensuring that men and women have equitable input in the planning and management of LGED projects – and that both sexes benefit equally from the overall programme.

Environmental and climate change issues are, today, being increasingly talked about throughout the world. For its part, LGED had already begun mainstreaming these concerns from as early as 1994 in its rural roads development activities. With respect to each sub-project, environmental considerations are taken into account in the relevant bill of quantities, and duly reflected in the work executed by the contractor. LGED has developed an Environment Framework as well as an Environment Code of Practice Manual to guide environmental supervision and monitoring.

Furthermore, numerous studies have been conducted on the development impacts of improved transport and trading infrastructures. The results of these studies are summarised in the table below:

Development Impacts

Cost Savings

- Motorised Transport (MT) increased by 360%, while Non-Motorised Transport rose by 242%.
- Freight carried by MT went up 98% on average.
- Transport costs were reduced by one third for both MT and NMT.
- Travel time declined by about 30%.
- Vehicle Operating Costs went down by 7% for MT and 10% for NMT.

Education

- Faster rate of increase in the numbers of teachers in educational institutions.
- A similarly significant rise in the number of female teachers were observed.
- Notable improvement in the rate of female student enrolment.

- Total enrolment went up from 19.4% to 29.4%, while female enrolment increased from 12.9% to 31.7%.
- The numbers of students dropping out went down by 14%.

Health

- Increases in the numbers of visits by patients to healthcare centres in project areas; with female patient visits growing at a faster rate. This demonstrates the positive impact better developed roads can have on access to essential health services by female patients.
- Significant growth in doctors' attendance at rural hospitals.

Agriculture

- Average yields per hectare of various food and cash crops increased by 6%.
- Farm-gate and home-based sales both increased, by 50% and 65% respectively.
- Average roadside land prices have risen by 278%.

These findings may be further viewed in the context of encouraging overall economic development and achievement in Bangladesh. The Economic Survey-2007 & Study reveals that, since independence, GDP has tripled (from US\$ 224 in 1971 to US\$ 599 in 2008); food production has similarly tripled; the rate of population growth has declined (from 2.9% in 1974 to 1.4% in 2006); the literacy rate has increased from 23% to 67%; child mortality has fallen substantially; the incidence of poverty has been reduced, from 51% in 1995-96 to 40% in 2005; and gender parity has been achieved. In short, Bangladesh is currently well on track to becoming a Middle-Income Country by 2020.

This steady progress is symbolised by the country's commendable efforts to promote the socio-economic development of its rural areas through the provision of appropriate transport infrastructure.

1. A Thana is a former administrative division of Bangladesh, corresponding to a sub-District. It has subsequently been superseded by Upazila Parishads (see note 2).

2. Rural local government in Bangladesh is currently divided into four tiers: Zila (District) Parishads; Upazila Parishads; Union Parishads, and Gram (Village) Parishads.



Effective Policy for Planning and Management of Rural Roads

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Rural Roads (RR) generally represent the lower end of road standards in a country's road classification system. They are often neglected, even though more than 80% of the population (as in Africa) or more than 60% of the overall population (as in Asia) still live in rural areas.

Experience has shown that traditional concepts and approaches may not always lead to lasting success in terms of addressing such a country-wide problem. In particular, the 'basic needs' approach of individual RR projects at local and donor level often lacks a stable source of funds, as well as the organisation of a sustained programme of maintenance.

Modern concepts, therefore, have to start from the top, and involve the political will of the President and his Finance Minister from the outset, before permeating "downstream", where the relevant bureaucracy is duly empowered to overcome the two main bottlenecks to successful RR projects by securing finance and organisational capacity.

At the government level, therefore, a number of basic decisions may be necessary:

Firstly, a so-called 'road sector approach' may be needed. In other words, RR should be considered part of the overall road transport system of the country (avoiding notions of "ownership" on the part of other Ministries, such as Agriculture, the Interior, etc.). A decision of the Prime Minister in this respect may be binding over other Cabinet Ministers.

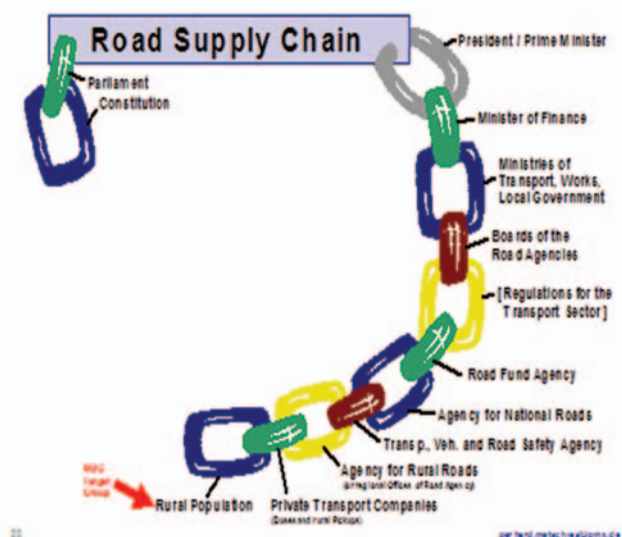
Secondly, the basic self-financing principles of the road sector have to be secured. These include the famous fuel tax rule that the equivalent of 10 U.S. cents per litre should be earmarked for road maintenance (agreed, for instance, at the African Transport Ministers Meeting in Bamako in 2006). Already today, the fuel levy may attain 10 Euro cents per litre in some countries; and a proportion of this revenue should be devoted to covering expenses related to the rural

roads network. For example, if – in the spread of road fund expenditures – 20% to 25% could be allocated to RR (i.e. earmarking 2 to 3 Euro cents per litre of fuel tax), it could solve the most pressing financial problems currently facing this sector (see figure 1).

Usage of the Road Maintenance Fund (mostly based on Fuel Tax Revenues as Road Fee)		
20% - 25% Rural Roads	70% Interurban Roads	10% Urban Roads

Thus, more rigid and systematic expenditure allocations could secure effective financing for RR, as well as ensure a more certain and reliable basis for detailed forward planning, notably with respect to (often neglected) decisions regarding the timing and nature – preventive, current or periodic – of the maintenance that needs to be executed.

Thirdly, the existing institutions for national and regional road systems (Road Fund Agencies and Roads Agencies) may be complemented by a dedicated Rural Roads Agency (figure 2). Such a central organisation normally has responsibility for providing the necessary know-how, planning and cost control, as well as technical standards, bridge plans and so on. It may be progressively decentralised, or substituted, as and when the requisite technical engineering and permanent organisational competence comes into place locally. Later on, modern asset management systems may be introduced with respect to all rural road investments in order to secure transparent investment costs for each individual road, in the form of road history files. Thus, reliable institutions are an essential pre-requisite for sustainably resolving the organisational dimension of the rural roads issue.





Fourthly, appropriate road standards should be applied. Rural roads must fit into the economic and social environment of the individual country. No internationally agreed standards for rural roads currently exist – even the very term, ‘rural road’, lacks a clear definition. Thus, a rural road in Central Europe (e.g. according to German standardisation) may carry an axle load of 10 tonnes, allowing heavy agricultural harvesting plants access to the fields, while in the least developed countries the term might commonly refer to an earth path, running over natural ground, equipped with a culvert at a water crossing. The level of economic development not only influences motorisation, production and transport volumes but also limits the state budget and the size of the country’s sustainable road network.

A detailed cost/benefit analysis – as applied to national roads – is not, however, generally suited or recommended for rural roads. Therefore, a general orientation (as established by the German Agency for Technical Cooperation, GTZ, using data from 15 different developing countries) may be useful. As may be seen from figure 3, the GTZ model uses the World Bank’s standard classification (2005), which divides the countries of the world into 5 economic categories: Least Developed Countries (LDC), which refers to countries having a GDP of up to US\$ 350 per capita (p.c.), e.g. Ethiopia; Low Income Countries (LIC), with a

GDP of up to US\$ 745 p.c., e.g. Ghana; Lower Middle Income Countries (LMIC) with a GDP of up to US\$ 2,975 p.c., e.g. The Philippines; Upper Middle Income Countries (UMIC), GDP of up to US\$ 9,260 p.c., e.g. Romania; and High Income Countries (HIC), GDP of up to US\$ 40,000 p.c. or more, e.g. Korea.

With respect to each economic class, approximately five technical road standards are shown with crosses on the table, with the lowest in each case indicating the relevant definition of ‘rural road’. Thus, the technical RR standard for an LIC category country (e.g. Ghana) would, according to the GTZ general orientation, be an ‘earth road’ with ‘pick-up’ services, having an average vehicle density of up to 35 vehicles per day.

The left-hand column of the table shows ten classes of roads for motorised transport, starting with a ‘way’ – which corresponds to a vehicle density of 6 vehicles per day (Average Annual Daily Traffic) – and moving up to a ‘turnpike’ carrying over 30,000 vehicles per day. Another column gives the relative road construction costs of each category, rising from a drained ‘earth road’ which may only require approximately 5% of the construction cost of a standard road (which in the table is represented by an EU community road with an 8 cm bitumen mix).

A comparison of existing road standards in different groups of countries

Traffic Density, Paving Standards and Relative Road Construction Costs in relation to annual GDP					Annual Gross Domestic Product per capita in US \$ (GDP)				
					0 - 350 \$	350 - 745 \$	745 - 2975 \$	2975 - 9260 \$	over 9260 \$
					Least Developed Countries	Low Income Countries	Lower Middle Income Countries	Upper Middle Income Countries	High Income Countries
Average Annual Daily Traffic (AADT)	Road Name	Allowed Single Axle Load	Type of Road Construction	Relative Road Construction Costs	LLDC	LIC	LMIC	UMIC	HIC
over 30000	4 lane turnpike	over 10 ton	asphalt concrete 22 cm	10					X
15000 - 30000	EU national road	over 10 ton	asphalt concrete 18 cm	8				(X)	X
5000 - 15000	EU provincial road	over 10 ton	asphalt concrete 14 cm	4			(X)	X	X
1000 - 5000	EU district road	over 10 ton	asphalt concrete 10 cm	2			X	X	X
400 - 1000	EU community road	over 10 ton	asphalt concrete 8 cm	1 (100 %)		X	X	X	X
120 - 400	2cm asphalt on gravel base	over 10 ton	double surface treatment 2 cm	0.4	X	X	X	X	
70 - 120	gravel road	over 10 ton (heavy trucks)	20 cm base of CBR > 30	0.2	X	X	X	X	
35 - 70	gravelled road	over 5 ton (light trucks)	20 cm base of CBR > 30	0.1	X	X	X		
15 - 35	earth road	over 1.5 ton (pick-up)	CBR > 20	0.05	X	X			
6 - 15	way	4 wheel drive	natural ground	0.02	X				
0 - 6	trail	non-motorized transport	-	-					

Note: Normally each country has 5 official road standards.

Data by GTZ Roads &



While many exceptions to the general rules shown in figure 3 are, of course, possible, the table may, nevertheless, be useful – for example, whenever the frequent question of asphaltting rural roads arises. In this context, the table indicates that the asphaltting of rural roads in LLDC countries is a subsidy burden, which outstrips the possibilities of the country concerned. It may be noted in passing that, in cases where rural roads have been asphalted in densely populated areas of Asia, they may be more appropriately classified as ‘district’ or ‘regional’ roads if they carry local traffic of more than 120 vehicles per day.

It is evident from the table that the technical level of road standards is improving in parallel to economic growth. This may notably be seen with India, which, at a GDP level of more than US\$ 1000 p.c., may already be planning for the next development step.

To obviate a potential ‘inaccuracy’ in figure 3, it should be recalled that India uses, among others, ‘lump sum’ criteria for its rural roads: incorporating 4 five-year plans into a 20-year master plan for rural roads – covering first all villages with more than 3,000 inhabitants (followed, in later master plans, by villages of more than 1,000 inhabitants) targeted to be connected to the tarred Provincial Highway network.

Fifthly, maintenance requires local participation. Even though, in most cases, the general financing of rural roads has to be secured by central government, local participation remains crucial for sustained success. This is especially due to the massive need for maintenance of rural roads, which has to be organised locally and can never be successfully undertaken by central institutions. Thus, local funds are needed too, albeit often limited to the provision of local labour.

In conclusion, generally viable solutions for the RR issue are at hand. A co-ordinated governmental approach, focusing on finance and organisation, may be best suited for achieving much-needed, lasting success in the rural roads sector.

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Rural Transport Infrastructure in India: Mapping Development with Achievement

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Throughout the world, rural areas are the home of three in every four people living on less than US\$1 a day. In view of the new poverty line of \$1.25 a day that was announced by the World Bank in 2008, and the fact that over three billion people throughout the globe live below that amount, it is obvious that the number of rural people living under poverty is set to go up even further. A majority of these rural poor is situated in developing and Least Developed Countries (LDC), where the agricultural sector plays a dominant role in driving the rural economy. Given that income flows are uncertain in most developing and LDCs, on account of the uncertainties of nature, it follows that appropriate minimisation of the valuation of time in agriculturally driven rural economies is central to poverty reduction. Such aims can be achieved through improvements in rural transport infrastructure and means.

Research findings indicate that aggregate elasticity of agriculture in poor countries is higher with respect to non-price factors than to price factors (Creightney, 1993). Improvement of infrastructure, an important non-price factor, appears to have an upper hand in yielding bigger increases in production. Hence, transport improvements are considered indispensable for rural development and poverty reduction. Appropriate development of rural transport infrastructure entails increases in economic efficiency and lowering of costs and prices, as well as ensuring meaningful access to social and economic opportunities.

The Indian Scenario

The importance of transport in the rural setting has been recognised by the Government of India as a basic means for sustaining agricultural growth and, with it, the rural economy. With the recent emergence of India as an economic powerhouse, these efforts received a boost through the institution of a Road Development Plan, known as Vision: 2021, to help guide the Central



and State Governments in developing the country's road infrastructure to adequate standards. The document included meticulous strategy proposals for rural connectivity through all-weather roads. District-wise planning of roads for all villages with 100 or more inhabitants by the end of 2010 was undertaken. Table 1 presents the breakdown of targets for village connectivity by all-weather roads pursuant to Vision: 2021.

Table-1:
Vision: 2021 – Targets for Connectivity of Villages

Villages (population categories) to be connected by all-weather roads	Target Year
Villages with population above 1000	2003
Villages with population between 500-1000	2007
Villages with population below 500	2010

Source: Final Report; Working Group on Rural Roads in the 11th Five-year Plan; Planning Commission, Govt. of India

The Target

By the end of 1999, it was estimated that the length of rural roads to be built was 1.162 million kilometres, for ensuring connectivity of 0.29 million villages. At the outset of the new Millennium, the Government of India constituted a National Rural Road Development Committee (NRRDC) to ensure connectivity of all rural habitations. The status showed that almost all villages with a population of over 1,500 were already connected; about 86% of villages with 1,000–1,500 inhabitants and 43% of villages with a population of less than 1000 were connected by all-weather road facilities. However, ensuring 100% connectivity of villages, as per Vision: 2021, clearly necessitated a phased approach. Accordingly, a special rural road development programme, known as 'Pradhan Mantri Gram Sadak Yojana' (PMGSY) was launched in December 2000, with the objective of connecting the remaining unconnected habitations in a phased manner. The unit for connectivity was changed from 'village' to 'habitation'¹ in order to provide more people with accessibility. It was planned to connect all habitations with populations of 500 and above in plain regions, and of 250 and above in hilly, desert and tribal areas. At the time of the programme launch, about 330,000 habitations, out of a total of 825,000, were lacking all-weather accessibility. However, in accordance with a detailed survey undertaken, the government finally declared that about 173,000 unconnected rural habitations

Table-2:
Estimated Road Length and Funds Required for New Connectivity as per PMGSY Norms

Habitation Population Group	Number of Rural Unconnected Habitations	Length Required (Km)
1000+	59,855	133,949
500-999	81,466	161,955
250-499	31,451	69,901
Total	172,772	365,805

Source: Final Report; Working Group on Rural Roads in the 11th Five-year Plan; Planning Commission, Govt. of India

were to be connected through 365,000 km of new road connectivity (Table 2).

Achievements of the Five phases of PMGSY

The period of implementation of the five phases of the PMGSY scheme (up to 2005) fell mostly within the Government of India's 10th Five-Year Plan (2002-2007). Thus, an estimate of the connectivity status available for the year 2006 provides some insights into the degree of implementation. It showed that, out of a total of 172,772 habitations, a mere 33% of approvals for connectivity had been granted. In reality, however, only around 16% of the targeted habitations had been connected through all-weather roads. The details of these habitations from the perspective of population are given in Table 3.

Table-3:
Connectivity Status under PMGSY (as at October 2006)

Population Category	No. of Eligible Habitations	No. of Habitations covered by project approved	No. of Habitations Connected
1000 & above	59,855	28,361	16,081
500 & above	81,466	21,942	8,602
250 & above	31,451	6,335	2,620
Total	172,772	56,638	27,303

Source: Final Report; Working Group on Rural Roads in the 11th Five-year Plan; Planning Commission, Govt. of India



This gap between approved and actual rural connectivity necessitated urgent recognition of the slippage time involved, and corrective action. The resultant strategy, called the 'Bharat Nirman' ("Building India"), was a new business plan that initially projected the provisioning of full rural connectivity within the span 2005 to 2009, as phase VI (Bharat Nirman Phase I) of the PMGSY scheme. Over this time, plans were framed to provide connectivity through all-weather roads to 0.066802 million habitations. Thereafter, the programme was to be continued beyond 2009 as Phase II. The extent of connectivity foreseen involved the construction of 738,621 km of roads. Of these, 24.33% were to be completed within the period corresponding to the 10th Five-Year Plan, 48.43% in the 11th Plan Period, and the remainder in the 12th Plan period (Table 4).

Table-4:
Length of Rural Roads: Targets and Achievements under the PMGSY/Bharat Nirman Programme (length in km)

Length	Target for Completion within 10th Five-Year Plan	Expected Target for the 11th Five-Year Plan	Balance: Target for the 12th Five-Year Plan
New Connectivity	95,960	165,244	104,601
Upgrading	83,757	192,464	96,595
Total	179,717	357,708	201,196

Source: Final Report; Working Group on Rural Roads in the 11th Five-year Plan; Planning Commission, Govt. of India

Despite the optimistic projections, the widening gap between targets and actual road construction is highlighted by the latest available figures for connectivity given in Table 5. These show that only about 26% of the targeted habitations were actually connected, leaving a huge shortfall on expectations.

Table-5:
Targeted against Actual Connectivity of Habitations in and up to 2009-10

Target Habitations to be connected during 2009-10	Total Habitations connected during 2009-10	Total Habitations connected up to 2008-09
13,000	3,344	31,924

Source: Final Report; Working Group on Rural Roads in the 11th Five-year Plan; Planning Commission, Govt. of India

Reasons for Underachievement

Various reasons were attributed for this underachievement. The most prominent among these are:

- Deficiency of funds for financing
- Under-utilisation of funds and procedural delays
- Acute shortages of contractors for undertaking rural works (considered a critical impediment in certain States)
- Lack of incentives to attract private participation
- Weaknesses in Government systems, structures and institutions at various levels of governance (State and Central).

Amongst these, shortage of financial resources proved to be the major constraint. As a panacea, the Planning Commission of the Government has suggested alternative financing models. The framework of Public-private Partnership (PPP) that has been working well in the development of urban infrastructures merits serious consideration in this regard.

1. A habitation is a distinct cluster of houses existing in a compact and contiguous manner with a local name. A village may have one or more than one habitation.

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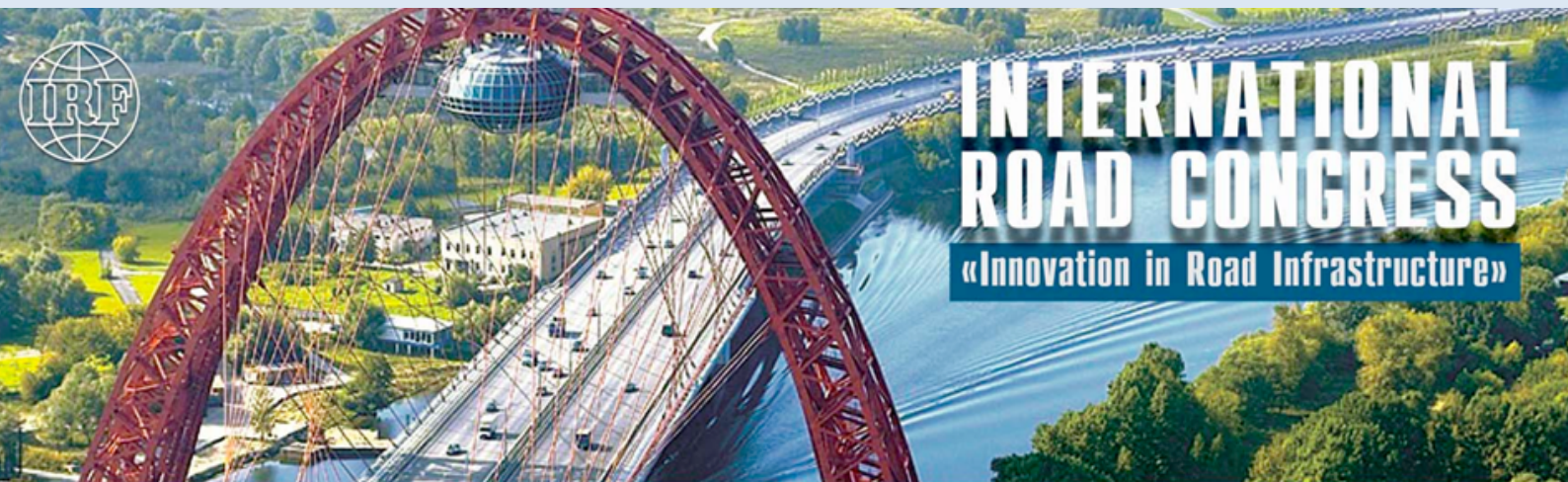
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