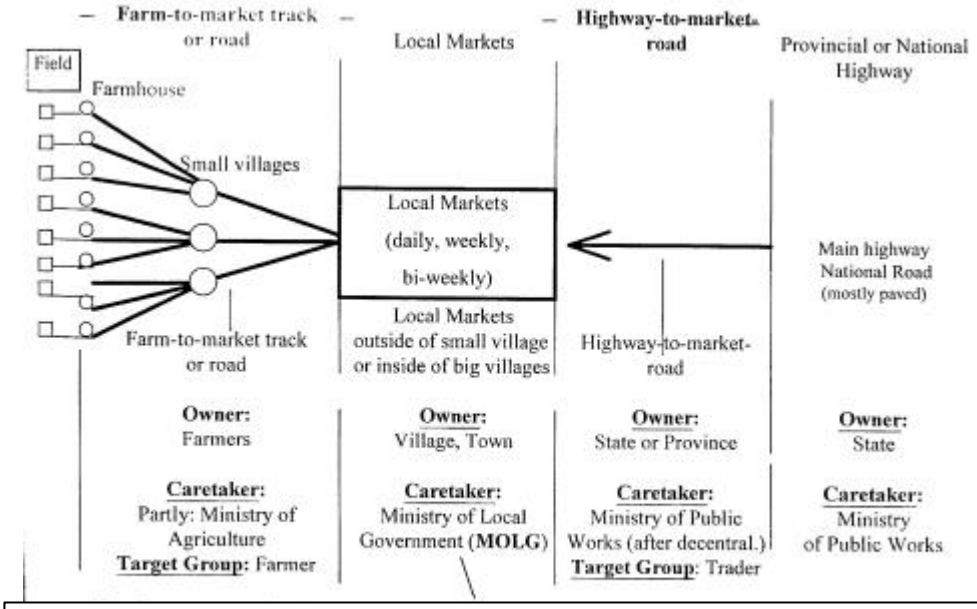
World Road Association
C20 Session

State of the Art on Rural Transport Planning, Development and Management

Stage Development, Finance and Legislation -
for
Rural Road Networks
in developing countries

- The GTZ Experience -

keywords: classification, financing, rural markets, participation



Rural roads: O W N E R – C A R E T A K E R - T A R G E T G R O U P S

by

Gerhard P. Metschies

Durban / South Africa 19 –25 October 2003

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Division 44,
Dag Hammarskjöldweg 1-5, 65726 Eschborn/GERMANY, http://www.gtz.de
Tel. ++ 49-6196-79-1354 Gerhard.Metschies@gtz.de

Abstract

Stage Development, Finance and Legislation -

For Rural Road Networks in Developing Countries - The GTZ Experience -

Rural roads in developing countries can generally be considered as the most neglected class of roads as **nobody wants them, neither the local ministries, nor foreign donors,** although they are vital in providing access to half of the population and for securing the food supply of the country in question.

Therefore - based on German **experiences in Bangladesh, Costa Rica, the Central African Republic, Ethiopia, Madagascar, Namibia, Nepal, Rwanda, Sierra Leone, Thailand and Zambia -** this paper identifies five crucial aspects of rural roads:

1. **Appropriate Standards** (stage construction and country-specific technical and economic classification), and
2. **Financial Aspects** (securing revenues and prioritising expenditure within a network and sector approach). Furthermore, the role of
3. **Rural Markets** and the importance of
4. **Local Participation** of the rural population is underlined, while
5. **Legislation for Rural Roads** (as in Ethiopia and Costa Rica) is necessary.

The paper comes to the conclusion that these **key problems concerning rural roads can be solved** if they are properly identified[1] and approached:

1. As shown in the **Nepal** example, rural roads may be built in a **four-year stage-construction programme**, starting from local footpaths and cycleways for non-motorised transport (strictly following the main goal of integrating the rural population into the money economy and providing access to rural markets)
2. As shown in the **Kenyan** example (of gravelling rural roads leading from the rural markets to the main roads), earth and gravel roads must be **built to economic standards**, which constitute the frame conditions for the technical standards.
3. As shown in the **Ethiopian**, **Zambian** and **Rwandan** examples, the financing of rural roads can be secured if approximately 25% of the national Road Fund or a net
   two US cents tax per litre of gasoline and per litre of diesel
   are earmarked for rural roads[2].
4. However, tangible results for rural roads may only be achieved if a strict priority-setting in economic terms is followed, as is generally applied in the road sector, i.e.
   - **Blackfield projects** (i.e. maintenance and most urgent "black spots") with an internal rate-of-return (IRR) of **40%** or more are considered first,
   - **Brownfield projects** (i.e. rehabilitation and improvement of existing roads) with an average IRR of **20%** are executed second, and
   - **Greenfield projects** (i.e. construction of new projects and additional alignments) with an average IRR of **10%** are built last.
5. To ensure access of the rural population, the right placement and **organisation of rural markets** is crucial, specifically in LLDC countries, where transport costs from the fields and farm houses to the rural markets and collection points (10 km on average) are often as expensive as the subsequent motorised trucking costs (an average of 250 km).
6. Given the special need for **maintenance of rural roads**, which cannot be organised or supervised by the central administration, a high degree of **local participation** and a sense of local responsibility are needed.
7. Summarizing the **GTZ experience of sustainable success** in rural road projects, three main factors can be identified, as per the following formula: the success of rural roads is a product of **Financing** times **Organisation** times **Local Participation.**

[1] Following the structural denomination of the cover page of this paper.
[2] In view of the fuel prices in Sub-Saharan Africa, this may be achieved even in LDC countries by appropriate government action.

Stage Development, Finance and Legislation -
for
Rural Road Networks in Developing Countries - The GTZ Experience[3] –

Poverty reduction strategies are a key element in development policies all over the world; within these, **access to the rural poor** via rural roads is an indispensable precondition to alleviating the poverty of the majority of the population.

This paper is based on long-standing German **experience with rural road projects in Bangladesh, Costa Rica, the Central African Republic, Ethiopia, Madagascar, Namibia, Nepal, Rwanda, Sierra Leone, Thailand and Zambia.**

1. Stage Development and Classification

1.1 Green roads in Nepal

In **Nepal** the German GTZ and Swiss SDC created the **GREEN ROADS PROGRAMME** in isolated mountainous regions. In a framework of a locally and commonly-agreed District Transport Master Plan (DTMP), local labour leads to a sense of **ownership** of the local roads based on **a four-year** step-by-step **programme** for each intended rural road connection:

- In the first year, a local **footpath** is laid,
- in the second year, a **cycleway 2.5 m** wide is laid,
- in the third year, this is enlarged to a **4 m** wide **track for pickups**, until
- in the fourth year, the **rural road** – now **4.5 m** wide on the mountainous slopes – is made passable for **minibuses and light trucks**.

The costs on average amount to **€15,000 (1.03 million NRs)** per km, 65 % of this being spent on local labour. By contrast, similar roads built by the central government (DoR) using urban equipment-based contractors cost approximately **€50,000** (3.4 million NRs) per km.

The **annual maintenance costs** are calculated as 2% p.a. of the construction costs for current routine maintenance plus 2-3 % for periodic surface improvement, which for earth roads is only 5 years. Periodic maintenance by outside firms that are insufficiently controlled but under central government contract may, on the other hand, cost up to three times as much.

1.2 Classification of rural roads in a country-specific approach

GTZ distinguishes **five country-specific standards** for rural road networks related to:

(1) **LLDC** Least Developed Countries, GDP < 250 US $ (e.g. **Ethiopia, Nepal, Rwanda)**
(2) **LDC** Less Developed Countries, GDP >250 US $ **(e.g. India, Madagascar)**,
(3) **MIC** Middle Income Countries**,** GDP < 800 US $ **(e.g. Thailand/ Costa Rica/ Namibia)**,
(4) **EC** Emerging Countries, GDP >3,000 US $ (e.g. **Mexico, Hungary)** and
(5) **IC** Industrialised Countries, GDP > 12,000 US $ (e.g. **Germany, France, etc.)**

The table below leads to **the following conclusions**:

1. The **design** and **construction standard** – and the average traffic to be expected on the rural road network (farm-to-market roads, market-to-highway roads and even on the provincial highway) – are generally dependent on economic factors, i.e. **on the GNP per capita level**[4] of the country group.
2. Rural Roads as farm-to-market roads **range from non-motorable trails** (for porterage and animal transport in LLDC countries) **up to fully-fledged paved roads** suitable for agricultural machinery in industrialised countries (IC).

[3] Further details may be downloaded from the GTZ/IRF homepage at http://zietlow.com/docs/engdocs.htm

3. Government (Ministry of Public Works/Transport and Ministry of Local Government) intervention in terms of commitment, judicial ownership and financial responsibility (commonly termed **gradual integration into the so-called "classified road network")** is dependent on the country's general administrative capacity, which also expands with the level of economic development.

Rural road standards - a general orientation[5] for country groups and traffic density:

Traffic density of vehicles / average per day[6]	General denomination of road standard	Allowed axle load for a single axle	Standard and technical dimensions	IC	EC	MIC	LDC	LLDC
> 30 000	4-lane turnpike	> 10 ton	Asphalt/Concr.22 cm	X	-	-	-	-
15 000- 30000	European national road	> 10 ton	Asphalt/Concr.18 cm	X	(X)	-	-	-
5 000-15 000	European provincial road	> 10 ton	Asphalt/Concr.14 cm	X	X	(X)	-	-
1 000- 5 000	European district road	> 10 ton	Asphalt/Concr.10 cm	X	X	X	-	-
400-1 000	European Community road	> 10 ton	Asphalt carpet 8 cm	X	X	X	X	-
120 - 400	**Asphalted (2cm) on gravel base** (African national road)	**>10 ton**	**Double surface treatment (2cm)**		**X**	**X**	**X**	**X**
70 -120	**Gravel road**	**>10 ton** (heavy truck)	**20 cm base of CBR > 80**		**X**	**X**	**X**	**X**
30/35 - 70	**Gravelled road**	**5 ton** (light truck)	**30cm base of CBR >30[7]**			**X**	**X**	**X**
15 - 30/35	**Earth road**	**1.5 ton** (pickup)	**CBR > 20**				**X**	**X**
6 - 15	**Path**	**4-wheel drive**	**Fords, natural ground**					**X**
< 6	**Trail**	**NMT**	**-**					

X = existing standard

2. Financing: Sector Approach, Priorisation, Road Funds and Rules of Thumb

2.1 The transport sector approach

The **transition** from the former **single project** approach **to** the **countrywide sector** approach is a worldwide trend which has also been adopted recently by the EU for the association countries in co-ordination with the Road Maintenance Initiative of the World Bank. The full version of the sector concept also includes the revenues of the sector, which form the basis for an **economically defined transport sector.**

2.2 The road fund solution

On the way to the commercialisation of government activities, the road fund secures a stable flow of funds for all classes of the whole **"family" of roads**, including the non-self-supporting **"baby roads"** (rural roads) which are in fact cross-subsidised by the **"parent roads"** (national and provincial roads).

[5] The price ratio between neighbouring road standards may be assumed as around 1:2.5.
[6] Figures for industrialised countries are given for comparison purposes only (taken from German RSTO standards).
[7] California Bearing Ratio (CBR), as used for the 30 cm thickness of the base course material in forest areas. In Sahel countries, CBR > 60 (laterite) may be available for a 12 cm base. In mountainous regions, the crushed rock material of CBR >80 for a 10 cm of the base course may be sufficient.

The road fund allocations (mainly from fuel taxes and vehicle taxes) for different classes of roads comprise the national roads (around 65%), rural roads (around 25%) and main city roads (10%). Fixed proportions of expenditures are therefore established for the economic road network of the country (for best practice, see the road fund solution in Ethiopia[8]).

2.3 Prioritisation of expenditures

Experience has shown, however, that the creation of a road fund may be useless if spending priorities are not set economically. In order to most successfully contribute to the economic growth of the country, maintenance projects should have priority over rehabilitation projects, which themselves have priority over new construction (so-called **second generation of road funds**).

2.4 Rules of thumb for road financing by fuel taxes

General rules of thumb have proven to be useful in the political debate as regards the mass media, as well as for general discussion at cabinet level between ministries of works and ministries of finance:

- **two US cents** per litre fuel tax – according to the 20-25 % proportion of the road fund – are needed to maintain the **rural roads** in most countries. **Such a levy per litre of gasoline and diesel[9] may "do the trick"** of **financing neglected rural roads.** This cross-subsidisation of rural roads **within the "family of roads"** has proven to be the best solution for the financing of these roads, which are crucial for rural development.

3. Rural Markets - Centres of the Transport Chain

The graphic on the cover page defines **local markets** as the **central changing points**, where three types of ownership intersect:

- ownership of the transported goods,
- ownership of the transport vehicles, and
- ownership of the roads leading to the main highway.

This is particularly important as in most cases regarding less developed countries (LDC), the rural market constitutes the transition **from** a **subsistence** to a **cash-crop economy.**
Often rural markets are combined with public facilities like **schools, health stations**, churches/mosques, assemblies/sporting places and administrative posts.

4. Local Participation

Contrary to common belief, **local participation** in rural roads cannot be taken **for granted.** Sustainable local participation, especially in least and less developed countries, is **the end point rather than the starting point[10]** of development. As the Indian example shows, the active participation of local communities (*panachyats*) may take generations to achieve clear sustainability.
Whereas a self-help approach in financial terms for the construction of new rural roads is in most cases unfeasible in monetary terms[11], **local participation** is **indispensable for the maintenance** of rural roads: out of the overall road network length, taking Asian countries as an example, **more than 70% are typically rural roads**. No central administration is able to concentrate on each detail of such a network, especially as most rural roads have a short lifespan and need periodic maintenance of their surface every five years at the latest.
Therefore, sustainable success requires the correct combination of the following **three factors:**

- **central government funding,**

[8] Cf. GTZ advisory project with the Ethiopian Roads Authority (ERA). Details of the Ethiopian legislation for the Ethiopian Road Fund and its board may be downloaded from the Internet: www.zietlow.com/.
[9] International fuel prices are published at http://www.worldbank.org/urbtrans.htlm or http://www.Zietlow.com/documents, and are also published in the WB/UNDP's "World Economic Indicators."
[10] This has also proven to be true in other aspects of local infrastructure, for example school and health station buildings.
[11] The average construction costs for rural roads are US $ 20,000/km or 2 kg gold/km (or 15 kg gold for the average length of 7.5 km rural road), which are far beyond local means.

- **a centrally-organised legal framework, and**
- **local participation.**

In other words, if it only takes the absence of one of these three factors for the total result to end in failure.

5. Legislation in Costa Rica and Ethiopia

Rural roads have been given legal status in **Costa Rica** (**law on rural roads**, "Decreto No. 30263-MOPT" of 5 March 2002). Influenced by the **GTZ pilot project** within the Ministry of Public Works and Transport, it was decreed that 25 % of the fuel levy be reserved for rural roads. Furthermore, local participation is guaranteed by a technical roads unit (three employees; initially paid by central government) at local district level, advised by a local district roads committee (consisting of seven unpaid members from the civil society).
Similarly in Ethiopia, again influenced by a local GTZ advisory project, a Road Fund Law with special provisions for rural roads has been adopted by Parliament.
These two examples show how combined efforts of several years regarding rural roads were eventually crowned by success.