

3<sup>rd</sup> IRF International Silk Road Conference  
Xi'an 2004

## ROAD Networks at Provincial Level

Technical Session

4. Financing and Implementation.

# Country-specific Solutions for Provincial and Rural Road Networks

- the GTZ –experience -



by

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Technical Session 4  
Financing and Implementation

## FIRST PAPER ABSTRACT

### Country-specific Solutions for Provincial and Rural Road Networks

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#### General outline and contents

#### 1. Introduction

- a) The general growth aspect of the economy, goods and passenger transport and of transport sector financing
- b) Balancing NTHS, provincial and rural road financing

#### 2. Structure and definition of provincial and rural road networks

- a). Cost sharing between Car operators and Road owners
- b). Minimum Transport volume for roads
- c). Traffic density and appropriate paving standards
- d). Consequential costs of roads

#### 4. The three basic concepts for state transport sector financing

- a) Self financing by the user (US concept)
- b) Budget financing by different public funds (Europe)
- c) General State subsidization (traditional concept)

#### 5 The four main sources of transport sector financing (with country examples)

- a) fuel taxes (world-wide review, graph)
- b) vehicle taxes (cars and trucks) with Asian survey map, Indonesian car taxation and Indian local motorcycle taxes
- c) road tolls (in Germany , Austria and Switzerland)
- d) land development charges (Germany)

#### 6. CONCLUSION

- a) The economic User Pays Principle for cost coverage has to be applied country-wide and the revenues of the road users have to be fairly shared according to the sector principle (road family) between National, Provincial and Local level.
- b) Special attention must be given to rural roads which are so be cross-subsidised from the more trafficked roads (necessary political decision)

Note: Some GTZ books as International Fuel Prices ([www.zietlow.com/docs/engdocs.htm](http://www.zietlow.com/docs/engdocs.htm)) will be available for the audience as well as the Chinese edition of the GTZ-book on "International Fuel Prices"

Annex Selection of some graphs of the pdf-presentation

*Outline of Presentation, Technical Session 4***Country-specific Solutions for  
Provincial and Rural Road Networks****- the GTZ –experience -****1. Annex : Background. The Chinese Road Construction Program**

a) The PRC economy grew rapidly during the past decade, averaging around 10% per annum, and is expected to continue growing rapidly in the foreseeable future. Despite this good progress, the Government's fight against poverty is far from over. Average gross domestic product (GDP) per capita is about \$1,000. Living standards of millions of people in rural and urban areas, particularly in the western region, must be raised.

b) Economic growth has resulted in increasing traffic volume. The motor vehicle fleet is growing at 15-30% per annum, creating a huge demand for more road space. In 2002 the vehicle fleet totalled over 16 million trucks, cars, and buses; and 47 million other motorized vehicles. The privately owned fleet of motor vehicles increased more than 30 times in 1985- 2002, from 300,000 vehicles to 10 million. In 1990-2000 road traffic grew at 9.7% per annum for passenger traffic, and 5.9% per annum for freight. Road traffic accounted for over 55% of the total passenger traffic.

c). Roads are classified into expressways, and local (classes I-IV) and unclassified roads. The backbone of the network is the NTHS, a 35,000kilometer (km) system of interprovincial expressways and high-class highways to be constructed by 2010. Village and farm roads, which are normally either class -IV or unclassified, are the lowest level of the network.. In 2000 the Government adopted the Western Region Development Strategy to enhance economic development where most of the poor reside, and gives high priority to the road sector to promote economic growth and reduce poverty.

d) To remove major transport bottlenecks, the Government implemented a large. investment program of the road sector, totalling CNY924 billion during 1996-2000, compared with CNY242 billion during 1991-1995. The road network grew from 1.16 million km in 1995 to 1.76 million km in 2002, and expressways increased from 2,141 km to 25,200 km. The second stage of the road development program (2003-2020) will increase the network to over 3 million km, or 68,000 km annually. Expressways will increase to 70,000 km, or 2,650 km annually. In 2003 the Government launched 5,300 rural road projects, covering 78,000 km and costing CNY78 billion.<sup>1</sup>

e) Despite the huge amount of investment, the PRC's road transport network has many weaknesses, which are particularly evident in the poor rural western areas. Roads and traffic management fall under the responsibility of various agencies.<sup>2</sup> Information is not coordinated or exchanged. Expressways and class-I highways account for 3% of the total road network, and class-2 highways for 11 %. About 70% of the county and township roads are gravel or earth roads; 340 townships and 67,000 villages have no road connection. Public transport services (buses) are unavailable in 1,000 townships and 160,000 villages, most of which are in the western region (footnote 2). Expressways are built on the outskirts of key urban areas but connections to the city centre are insufficient. Roads without adequate traffic signals, signs, or markings constitute about 86% of the total network. Domestic market development has been hindered by the lack of transport integration and high logistics costs. For example, transporting grapes from Sichuan Province to Beijing costs more than importing them from Chile.<sup>2</sup>

## *XI'AN Conference: Road Networks at Provincial Level*

for 1 see: Ministry of Communications (MOC). 2003. Transport Statistics. Beijing.

for 2 see: World Bank. 2003. Trade and Transport: A Chinese Perspective. China Roads and Highways Conference. Beijing.

2. Three basic concepts for the financing of the transport sector are to be checked for its sustainability. The US concept of the “**road user principle**”, the socialist/communist concept of “**general state subsidies for transport**” as well as the West European concept of “**limited cross-subsidization within the transport sector**” have to be examined for its sustainable practicability

3. Financing urban roads and transport generally must create its own sources of revenues as there is – in nearly all cases - no other sector in the economy which could pay for it. The main sources of revenues are **the fuel taxes, vehicle taxes, road tolls and land development charges**, for which examples are given by pdf files.

4. Special attention should be paid to **alternative fuels (CNG etc.)**, as they may reduce the pollution effects of emissions resulting from conventional fuels. The effect on the taxation revenues in Europe is given in a special survey table.

5. Common problems with introducing sustainable funding sources are **public riots** following price rises (as in Lebanon, Indonesia and the Yemen), the rising **deficits of rail transport** all over the world and special financial issues with **Underground transportation**, which may exceed the limits of cross-subsidization.

In all countries special attention has to be paid to the **earmarking** of revenues. The **autonomy of a transportation undertaking** may in extreme cases cut transport costs even to the half.

### 6. General Conclusions:

Ecological sustainability must be founded on **financial viability as a basis** of the general sustainability of the transport system.

The **social market approach** with limited cross-subsidies seems to be the most promising approach, as long as subsidies – even with rising price trends – by a constant effort can be kept to a minimum.

The **user pays principle** may serve as a general guideline, but has to be supported by the **efficiency of private transport operators**.

Finally an **effective government** guaranteeing the juridical framework of the organization and implementation of a **financially and ecologically sustainable transport system**.

Annex: following



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## Country-specific Solutions for Provincial and Rural Road Networks



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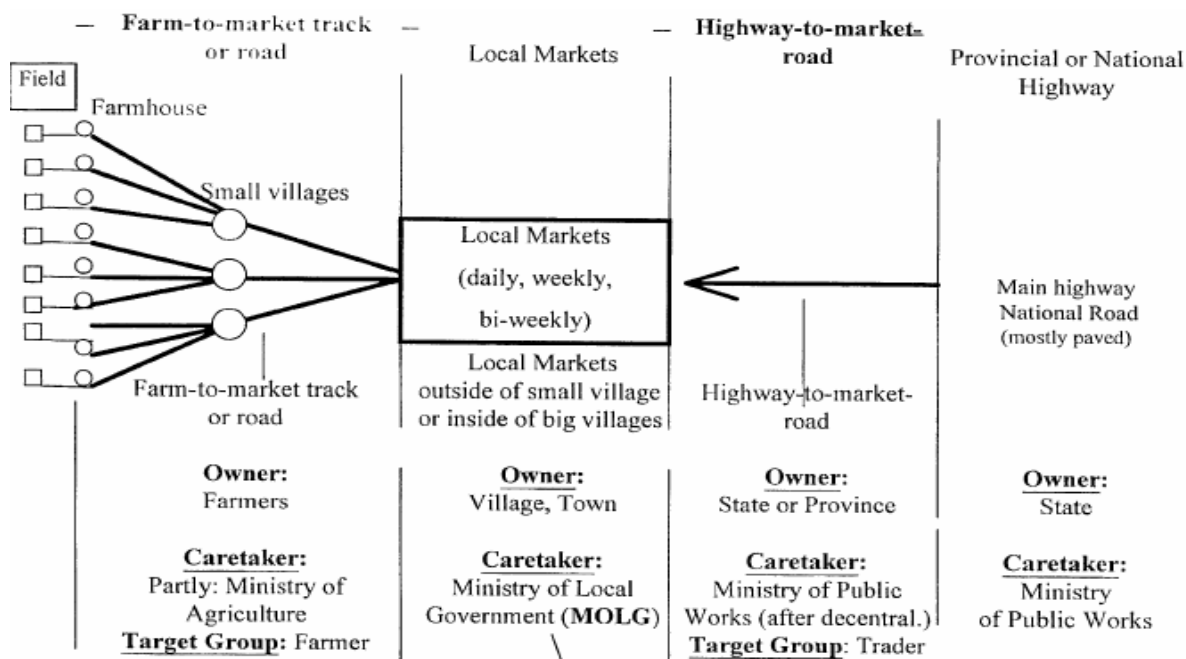


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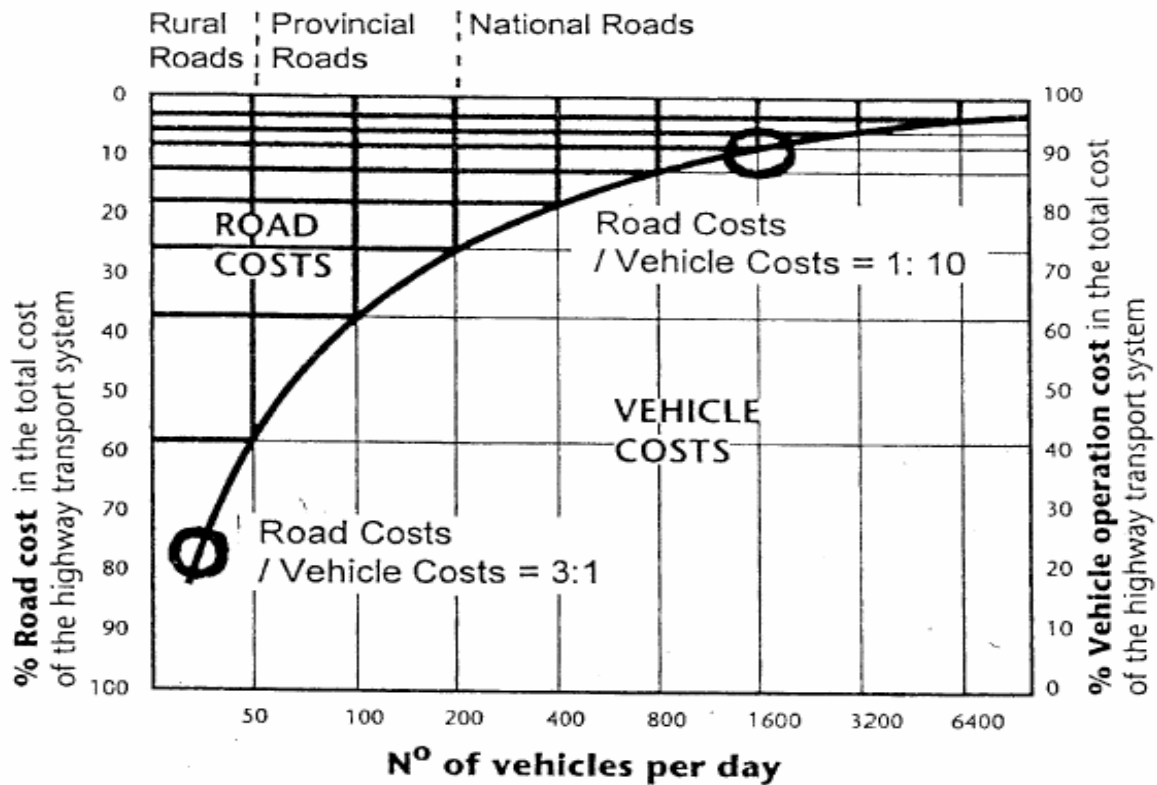


### Structure and definition of provincial and rural road networks



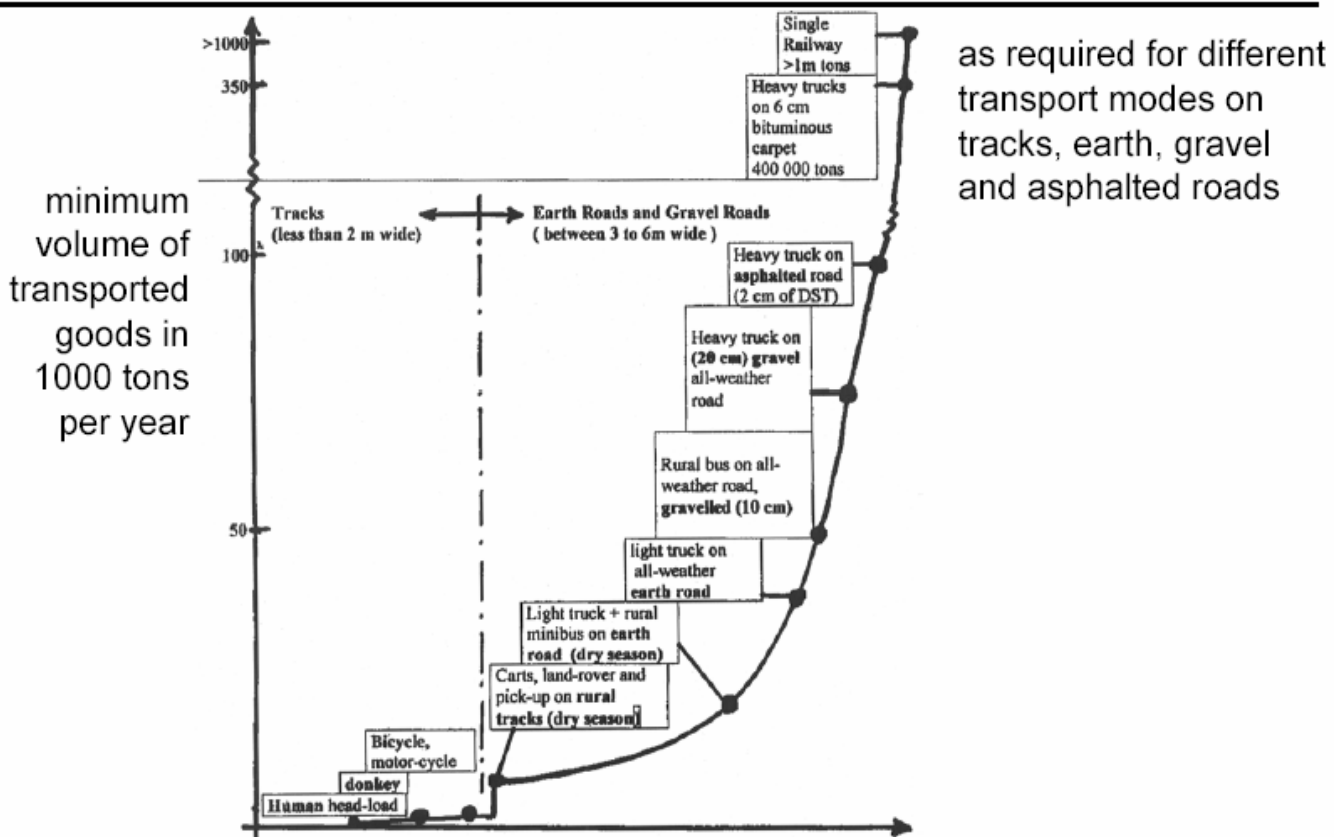
**Note:** In some countries the competencies of MOLG have been extended to cover also Farm-to-market tracks and the Market-to-highway roads (mostly without of the necessary resources)

# Vehicle (road user) costs vs. rural road costs



[Cost curve of Graph from CEPAL „Roads“, page 26]

# Minimum transport volume



as required for different transport modes on tracks, earth, gravel and asphalted roads

## Consequential Costs of Roads

(in % of the actual new construction costs per year)

Road Typ	Financial Costs*	Current Maintenance Costs	Periodic Maintenance Costs	Total Operational Costs	Total Consequential Costs
per year in percent of the actual new construction costs					
(1)	(2)	(3)	(4)	(5) = (3) + (4)	(6) = (2)+(5)
<b>Asphalt**</b> 200,000 US \$ / km for > 120 veh./day	5.5 % 30 years	0.5 %	(every 10 years) 1.0 % p.a.	1.5 %**	7 % p.a. (LLDC 1.5%)
<b>Gravel</b> 40,000 US \$ / km for > 60 veh/day	6.5 % 20 years	1.5 %	(every 7 years) 3.0 % p.a.	4.5 %	11 % p.a. (LLDC 4.5%)
<b>Earth</b> 10,000 US \$ / km for > 15 veh/ day	8.0 % 15 years	4.5 %	(every 5 years) 6.5 % p.a.	11.0 %	19 % p.a. (LLDC 11%)
<b>NOTE</b>	Interest 3 % + Repayment = Constant Annuity during total lifetime	Routine + Spot improvement	In some DCs periodic main- tenance (repair) is left to donors as EU	Securing operational costs Road Funds (2 <sup>nd</sup> generation) may be introduced.	For EU-associated ACP and LLDC countries financial costs born by EU***

EU paid for EU-roads since 1960
EU-counterpart funds or Rural poverty reduction funds
EU paid for all roads since 2002

\* for DCs + LLDC only interest rate 2.5% resp. 0.75% \*\*\*)

\*\* NOTE: If no maintenance for asphalt is carried out for 13 years, costs of 13 x 1.5% = 20% are saved, but REHABILITATION is necessary for 50%.

\*\*\* NOTE: DCs = Development Countries, Asphalt = 2 cm double surface treatment (as for African National Roads)  
ACP = Africa, Caribic and Pacific countries, LLDC Least Developed Countries,  
EU = European Development Fund / EU.Road Policy of EU-Brussels

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## Traffic density and appropriate paving standards

Traffic density*	General denomination	(Single) axle load allowed	Technical dimensioning	Country groups				
				IC	EC	MIC	LDC	LLDC
>30000	4-lane turnpike	>10 ton	asphalt concrete 22 cm	X				
15000 – 30000	European national road	>10 ton	asphalt concrete 18 cm	X	(X)			
5000 – 15000	European provincial road	>10 ton	asphalt concrete 14 cm	X	X	(X)		
1000 – 5000	European district road	>10 ton	asphalt concrete 10 cm	X	X	X		
400 – 1000	European community road	>10 ton	asphalt carpet 8 cm	X	X	X	X	
120 – 400	asphalted (2 cm) on gravel base	>10 ton	double surface treatment 2 cm		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)	30 cm base of CBR >30			X	X	X
15 – 30/35	earth road	1.5 ton (pickup)	CBR >20				X	X
6 – 15	way	4-wheel drive	fords, natural ground					X
<6	trail	NMT	-					

\* Vehicles per average day

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## Local participation a crucial factor

The right combination of 3 factors:

- Central government funding,
- a centrally organized legal framework, and
- local participation

evidently contribute to success. Therefore, the following formula may be defined as a general rule:

Success of rural roads should be seen as the product of:

**Financing X Organisation X Local participation.**

If only one of these factors is reduced to zero, the result may be failure.

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