

WORLD BANK TECHNICAL PAPER NO.

Improving Rural Mobility: Options for Developing Motorized and Nonmotorized Transport in Rural Areas



Paul Starkey
Simon Ellis
John Hine
Anna Ternell

© 2002 The International Bank for Reconstruction and Development / The World Bank
1818 H Street, NW
Washington, DC 20433

All rights reserved.

1 2 3 4 04 03 02

Technical Papers are published to communicate the results of the Bank's work to the development community with the least possible delay. The typescript of this paper therefore has not been prepared in accordance with the procedures appropriate to formal printed texts, and the World Bank accepts no responsibility for errors. Some sources cited in this paper may be informal documents that are not readily available.

The findings, interpretations, and conclusions expressed here are those of the author(s) and do not necessarily reflect the views of the Board of Executive Directors of the World Bank or the governments they represent.

The World Bank cannot guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply on the part of the World Bank any judgment of the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

The material in this work is copyrighted. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or inclusion in any information storage and retrieval system, without the prior written permission of the World Bank. The World Bank encourages dissemination of its work and will normally grant permission promptly.

For permission to photocopy or reprint, please send a request with complete information to The Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA, telephone 978-750-8400, fax 978-750-4470, www.copyright.com.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, World Bank, 1818 H Street NW, Washington, DC 20433, USA, fax 202-522-2422, e-mail pubrights@worldbank.org.

ISBN: 0-8213-5185-0

ISSN: 0253-7494

Paul Starkey is an international consultant in rural transport and a Senior Visiting Research Fellow at the University of Reading; Simon Ellis is a transport economist in the international division at the Transport Research Laboratory Limited; Joh Hine is a transport economist in the international division at the Transport Research Laboratory Limited; Anna Ternell is a transport economist in the international division at Carl Bro a/s.

Cover photograph by Paul Starkey, Cambodia

Library of Congress Cataloging-in-Publication Data has been applied for.

CONTENTS

Foreword	iv
Abstract	v
Acknowledgments	vi
Overview	1
Rural Transport Is Crucial to Poverty Reduction	1
Efforts to Improve Rural Transport Services Must Consider Many Issues	1
What Should Be Done to Promote Rural Transport?	5
1. The Nature and Importance of Rural Transport	8
Rural Transport and Poverty Reduction	8
Patterns of Rural Transport	10
2. Issues Affecting Rural Mobility	12
Wide Range of Stakeholders	12
Critical Mass of Users, Operators, and Suppliers	19
Population Densities and Income Levels	20
Patterns of Adoption and Use of Transport Services	22
Complementary and Competitive Services	23
Issues Related to Cost	25
3. Promoting Rural Mobility	28
Importance of Inclusive, Participatory Methods	28
Financial Considerations	31
Regulatory Considerations	35
Complementary Options	40
Annex 1. Terms of Reference for a Country Study of Rural Transport Services	44
Annex 2. Three Contrasting Rural Transport Situations	49
Annex 3. Rural Transport Problems, Remedies, and Implementation Options	52
Annex 4. Options for Rural Transport Services	55
References	60

FOREWORD

Rural poverty is pervasive and difficult to address. Improving mobility can reduce rural poverty by facilitating women, men, and children to more readily access services (education, health, finance, markets), obtain goods and income, and participate in social, political and community activities. Mobility requires a combination of appropriate transport infrastructure, improved transport services, and affordable means of transport, both motorized and nonmotorized. This publication concentrates on the many and varied types of transport that provide that mobility such as bus services, freight trucks, bush taxis, transport animals, bicycles, or handcarts.

The authors stress the interdependence and complementarity of different means of transport, motorized and nonmotorized, large and small, urban and rural, land and water. They stress the need for an integrated approach to developing (and maintaining) infrastructure and transport services, with greater connectivity among transport systems (road, water, air, rail), types of service (long-haul, local) and operators (public, commercial, individual). Inevitably, this potentially involves a wide range of stakeholders on both the demand and supply side of transport services.

As a result, this publication will assist transport planners, governments, transport service providers, community organizations, donor agencies, and development practitioners in other sectors. It discusses options for creating an enabling environment to allow efficient and profitable rural transport and increased mobility for disadvantaged groups. It suggests a holistic approach to planning that involves all stakeholders, governments, transport operators, and users and encourages networking across geographical boundaries and sectors to maximize progress.

Improving Rural Mobility: Options for Developing Motorized and Nonmotorized Transport is one of four papers on rural transport developed by the World Bank's Rural Transport Thematic Group. The other three publications are:

- *Options for Managing and Financing Rural Transport Infrastructure.*
- *Design and Appraisal of Rural Transport Infrastructure: Ensuring Basic Access for Rural Communities.*
- *Developing Rural Transport Policies and Strategies* (in preparation).

John Flora

Director

Transport and Urban Development

ABSTRACT

Many inhabitants of rural areas in developing countries lack adequate and affordable access to transport infrastructure and services. Poor access to transport constrains economic and social development and contributes to poverty. Better transport services can stimulate economic activity and social improvement, leading to easier access and a virtuous circle that reduces poverty and improves the lives of poor rural residents. Improving rural people's access to essential services requires better mobility through transport infrastructure and services as well as the location, price, and quality of facilities. This report focuses on improving rural mobility by facilitating the provision of affordable means of transport and transport services.

There are many obstacles to cheaper, more efficient rural transport, and many factors influence efforts to promote rural transport services. Despite massive spending, many government and donor efforts to improve rural transport have not met the needs of rural residents. Moreover, the market has not provided transport services to areas with low demand and to the poorest and least mobile segments of the community. To deliver significant economic and social benefits, investment in transport must take an integrated approach. Rather than focus solely on expanding road networks, it should also pay attention to smaller roads, paths, and tracks; the use of private and commercial means of transport (motorized and nonmotorized); and the importance of transport hubs and markets. Transport planners need to take a holistic approach that involves all stakeholders in a participatory process of assessing needs within a clear policy framework based on the interdependence and complementarity of different means of transport. In addition, favorable policies and operating environments can enable the private sector and nongovernmental organizations (NGOs) to play important roles in new initiatives.

Pilot activities can be used to promote lower technology, intermediate means of transport, which can enhance local productivity in low-density, low-income areas. Planning efforts should consider the needs of women and disadvantaged groups. Monitoring and evaluation involving stakeholders are also important, as is local, national, and international networking. Based on these efforts, governments and project planners can take steps in three areas, financial, regulatory, and complementary, to promote increased ownership of intermediate means of transport and the private provision of rural transport services.

ACKNOWLEDGMENTS

The Rural Transport Thematic Group of the World Bank commissioned this publication, following an initiative of Jerry Lebo and Dieter Schelling. Danida (Danish International Development Assistance) provided trust funds for the work, and the Carl Bro Group (Denmark) was awarded the contract. Anna Ternell (Carl Bro) was responsible for coordinating the work. The detailed writing was undertaken mainly by Paul Starkey (Animal Traction Development and University of Reading, United Kingdom) and by Simon Ellis and John Hine of the Transport Research Laboratory (TRL), United Kingdom. Phil Fouracre of TRL assisted with initial editing and Meta Coquereaumont undertook the final editing.

This publication built on previous studies by Ellis and Hine (1998) and Starkey (2001b). Additional field studies were undertaken by the team to complete the paper. We would like to give particular thanks to colleagues in Cambodia, Cuba, Lao PDR, Nicaragua, Peru, and Vietnam, who assisted during professional discussions and field visits.

The first draft was titled “On the Move in Rural Areas: An Integrated and Inclusive Approach to Rural Transport Operations.” The issues raised in this draft were examined during a three-week e-mail discussion (involving 65 people from many countries) and a one-day workshop (attended by 33 people, including representatives of national transport forum groups from Africa, Asia, and Latin America). These activities were coordinated by Priyanthi Fernando of the International Forum for Rural Transport and Development (IFRTD) with funding from the British Department for International Development (DFID). In the light of the feedback from participants and reviewers, the publication was restructured with much editing and rewriting.

The authors would like to acknowledge the inputs of the many transport specialists who participated in the e-mail discussion and workshop and who reviewed the text. Detailed comments and technical feedback were received from Rajendra Aryal, Joaquín Caraballo, Jean-Charles Crochet, Ron Dennis, Priyanthi Fernando, Susanne Holste, John Howe, Christina Malmberg Calvo, Peter Njenga, Dieter Schelling, and Ranjith de Silva. Other colleagues supplied ideas during the discussions, workshops, and field visits, and we would like to thank them all for valuable input.

The authors would also like to thank all the other individuals and organizations that assisted this study and provided valuable ideas and feedback. They hope this cooperation will result in greater understanding, improved information exchange, and closer collaboration in this important area of development.

OVERVIEW

Poor access to transport in the rural areas of developing countries constrains economic and social development and contributes to poverty. Improving rural people's access to essential services requires improving mobility, through better transport infrastructure and services and attention to the location, quality, and price of facilities. Better mobility gives people better access to services (education, health, finance), markets, income-earning opportunities, and social, political, and community activities.

RURAL TRANSPORT IS CRUCIAL TO POVERTY REDUCTION

In many developing countries, rural transport infrastructure—the local roads, tracks, footpaths, and bridges used to access farms, markets, water supplies, schools, and clinics—is often in poor condition for some or all of the year. Transport services, both large-scale motorized means such as trucks, buses, pickups, and cars, and intermediate means such as handcarts, bicycles, motorcycles, and animal-drawn carts, are often inadequate and too expensive for rural inhabitants. In many areas village transport primarily means people walking and carrying.

While cost constrains the use of transport services, a lack of concentrated demand constrains the development of cheaper, more efficient services. Improving rural mobility to reduce poverty thus requires a combination of appropriate transport infrastructure and better transport services using affordable means of transport. This report focuses on rural transport services; two other reports in this series explore transport infrastructure.

EFFORTS TO IMPROVE RURAL TRANSPORT SERVICES MUST CONSIDER MANY ISSUES

Many government and donor efforts to improve rural transport have focused on expanding road networks, with little attention to sustainability, to the need to develop mobility on the roads, or to the needs and views of transport users, especially the rural poor. As a result, despite massive spending, such interventions have not met the transport needs of rural women and men for a wide variety of subsistence, social, and economic activities. Moreover, the market has not provided transport services to areas with low demand and to the poorest and least mobile members of the community.

Efficient rural transport systems involve complementary large- and small-scale transport modes. Intermediate means of transport are important for on-farm, within-village and village-to-market transport, and short trips within cities and periurban areas. Larger motorized vehicles are needed on routes with high demand, such as rural-urban links. Trucks and buses depend on local

feeder transport for consolidation and dispersal of passengers and goods, notably transport hubs (markets, village terminals, and truck parks).

In recent years, however, recognition has been growing that without an integrated approach to transport infrastructure and services, investment in transport is unlikely to bring commensurate economic and social benefits. Governments in developing countries are being encouraged to create favorable policies and operating environments, enabling the private sector and nongovernmental organizations (NGOs) to play important roles in new rural transport initiatives.

Still, there are many obstacles to cheaper, more efficient rural transport, and many factors influence efforts to promote rural transport services, including the wide range of stakeholders, the need for a critical mass of users, operators and suppliers, population density and income levels, and patterns of transport services adoption.

Needs of a Wide Range of Stakeholders Should Be Taken into Account

There are many stakeholders in rural transport services, with many different priorities and agendas. These stakeholders influence the provision, price, quantity, and quality of rural transport services. They should all be included when planning and implementing transport interventions. The main players are *users*, *operators*, and *regulators*.

Transport solutions should reflect the conditions, needs, and preferences of transport *users*. Important issues to examine when planning transport interventions include gender differences in transport needs, disadvantaged and other groups with special needs, occupation or task, population density and income, and tradition and culture.

There are gender differences in transport tasks and access to technologies. Transport programs have often neglected the special needs of women. Most transport is owned and operated by men. Gender power relations and unequal access to money restrict women's mobility. Women are empowered by greater mobility, and transport can cause gender roles to change.

Some means of transport are primarily for enhancing personal or household mobility. These reduce drudgery, save time, or increase income-generating options. They may also be used to provide informal transport services for neighbors.

Transport service *operators* include both public and private companies and individuals. Companies tend to operate medium-size and large vehicles, which require significant investment and organizational support. Individuals tend to invest in minibuses, pickups, and intermediate means of transport (including small tractors). Transport operators influence the transport sector mainly through their associations, which can affect the quality, quantity, and price of rural transport services for both motorized and nonmotorized vehicles. Where transport associations are politically and economically powerful and operate without real competition, rural transport becomes more expensive and less attractive to users. Associations are strong in representing their

members' interests but tend to overlook the wider interests of the transport users and communities they serve.

Transport *regulators* in developing countries tend to be weak, creating an unfavorable environment for transport services. Many traffic laws are inadequate for modern traffic and transport conditions, and many ministries of transport have limited resources and human capacity, making it difficult for regulators to monitor user requirements and provide an environment conducive to the provision of transport services. Local governments are responsible for laws regulating transport operators in the towns from which rural operations emanate. Transport terminals are typically owned by local governments and tend to be poorly maintained and managed. Local governments are also likely to control the number of vehicles and routes. But these powers may not be effectively applied, especially in areas where transport operators are politically influential.

Critical Mass of Users, Operators, and Suppliers Is Needed to Sustain Services

Means of transport, both motorized and nonmotorized, require supporting infrastructure for their manufacture, supply, and repair. It is difficult for a critical mass of users to develop without support services, while sustainable support services are unlikely to develop in the absence of a critical mass of users. Sociocultural inhibitions may constrain the use of certain means of transport until a critical mass of users makes them acceptable. For example, once enough women start to use bicycles and the benefits become evident, other women will find it easier to overcome the economic and social constraints to bicycle use.

Population Densities and Income Levels Affect Transport Demand and Supply

Patterns of transport demand and supply are often linked to population density and income levels in three broad categories. The first is low transport density in low-income areas, with few motorized vehicles or intermediate means of transport. A vicious circle of insufficient transport, users, and services impedes development. Such patterns are found in remote rural areas in Sub-Saharan Africa, Asia, and Latin America.

The second category has higher transport density in low- to medium-income areas and is associated with medium to high population density, irrigated agriculture, cash crops, efficient marketing systems, and nonagricultural employment. In such areas transport services have achieved a critical mass, making it easy to buy and maintain various means of transport. Such patterns are found in higher-income rural and periurban Sub-Saharan and North Africa, much of rural South and Southeast Asia, and some rural areas in Latin America.

The third category has low to medium transport density in high-income rural areas. Transport infrastructure is mostly good, and people use motorized transport regularly to go to work, clinics and hospitals, and markets; to visit friends and relatives; and to participate in social

events and religious functions. Such patterns are found in periurban areas around the world and in rural areas in the better-off countries of the Americas, Asia, Australasia, and Europe.

Patterns of Adoption and Use Reflect Local Conditions

Patterns of adoption and use of transport means vary widely, in part reflecting social, economic, and environmental factors and in part idiosyncratic features. Some means of transport (bicycles, motorcycles, pickups, trucks) may be widespread but vary greatly in concentration. Others (donkey carts, power tillers) may be clustered only in certain localities. National and local clusters and differences may be correlated with differences in population density, culture, infrastructure, income, policies, topography, climate, or crops and animals. The conditions that favor adoption should be understood so that more conducive environments can be created. Most means of transport spread as a result of small-scale private initiatives rather than formal government promotion campaigns.

Complementary and Competitive Services Are Important for Meeting Different Needs

Many complementary transport services are available with different but overlapping ranges, capacities, operating costs, payloads, speeds, durability, infrastructure requirements, aesthetic characteristics, foreign exchange requirements, and supporting services. Working together in a multimodal transport system, complementary means of transport can fulfill different market needs. The importance of complementary transport services is not always recognized, especially intermediate means of transport.

Transport services can be competitive as well as complementary. Remote rural areas with low agricultural production may have only a few multipurpose means of transport (animal carts, a few pickups, perhaps cycles), so any new means of transport has to compete for the small transport market. Animal-drawn carts may take transport work away from porters; pickups may take hire loads from carts.

Some Interventions Can Reduce Costs

Motorized transport services in rural areas are generally more expensive than equivalent forms of urban and intercity transport. The major contributing factors to the cost differences are related to vehicle operating costs (fixed and variable), low demand, and an uncompetitive operating environment. But there are ways to lower cost, as suggested by the big differences within and between countries in the price of transport. Competition between suppliers helps to keep down the price of vehicles, spare parts, and support services. Competition between operators sharpens their attention to transport performance and operating costs and encourages low-cost practices.

WHAT SHOULD BE DONE TO PROMOTE RURAL TRANSPORT?

Rural transport services must be actively promoted to turn the vicious circle of insufficient transport services and inability to pay for them into a virtuous circle of better transport services that stimulate economic activity and social improvement, leading in turn to easier access and more efficient transport services. Governments and NGOs should promote new means of transport in many low-density, low-income areas, and efforts should consider the needs of disadvantaged groups.

All rural transport interventions, whether sponsored by governments, NGOs, the private sector, or donors, should address the complete transport picture, looking at infrastructure and mobility as an integrated solution. Inclusive, participatory methods involving all stakeholders are essential to determine infrastructure priorities, appropriate locations for facilities, and suitable means of transport. Priorities should reflect local needs and economic development and social equity goals. Any conflicts of interest should be addressed transparently. Promotion and subsidies have little long-term effect unless the services being promoted are appropriate to the environment and to people's real and perceived needs.

Broad national and international networking is important because of the magnitude of rural transport problems, the number of stakeholders, and the need for diverse interventions. Also important are local formal or informal networks that bring together people who would not otherwise be linked and involve them in planning, implementation, monitoring, and evaluation. Stakeholders linked through networks can be particularly important in developing decentralized initiatives.

Based on this participatory process, governments and project planners can take *financial*, *regulatory*, and *complementary* actions to promote private provision of rural transport services.

Financial Considerations

Among the main financial considerations for transport policymakers and planners are credit and subsidies for transport vehicles, operating incentives to encourage the provision of services in rural areas, and mechanisms to strengthen private supply, distribution, and maintenance systems.

Credit can dramatically speed the adoption of means of transport, but access to credit is generally poor in rural areas, particularly for women. Repayment conditions for seasonal agricultural credit are seldom appropriate for purchasing means of transport. Transport programs can help local credit associations or agricultural banks develop medium-term products suitable for acquiring means of transport. The localized rural credit sometimes provided by targeted donor programs is often subsidized and lent for particular means of transport only. Care should be taken when extending credit and subsidies for specific means of transport, which can distort markets or fail to help the people who need it most. Subsidies can help launch new means of transport but are not always necessary or sustainable.

Creative solutions may be needed to ensure that remote rural areas in developing countries have adequate transport services. Subsidies may be the only way to establish rural transport services in poor areas with low density of demand. Subsidies or cross-subsidies may also be needed to maintain a minimum level of service on social grounds. Operating subsidies are a common solution in high-income countries and may be appropriate for some areas in developing countries. Price incentives to establish services based on new means of transport may also be helpful.

Another way to increase demand is to lower taxes and duties. But while reducing taxes and duties to reduce the capital costs of motor vehicles may dramatically increase the number of vehicles, it may have little effect on their availability in rural areas. The case is easier to make for lower taxes and duties on vehicles and parts used mainly in rural areas, such as tractors, or bicycles and other nonmotorized means of transport. Combining such measures with subsidies that lower the variable costs of operation (such as fuel costs) may persuade some operators that rural operations are worth undertaking.

Low use of intermediate means of transport in remote rural areas is often linked to a vicious circle of low supply and low demand. The first step in increasing availability is identifying and addressing the limiting factors, including shortages of capital, marketing systems, components and raw materials, or manufacturing facilities and skills. In many low-density areas, supply problems may be linked to the weak purchasing power of users, particularly women. Such situations can be overcome by providing credit, income-generating opportunities, or subsidies.

Regulatory Considerations

Effective transport services require adequate planning and regulation, particularly when it comes to interventions for low-density areas and disadvantaged groups. But regulators and planners in developing countries often have inadequate resources and staff, and transport interventions rarely address intermediate means of transport or use participatory processes or gender analysis. Moreover, progress is slow because planners fail to build on experience and lessons from other countries, and cross-sectoral collaboration is rare.

Effective regulation can support an efficient transport system through quantity controls (to match demand and supply), quality controls (to ensure safety for drivers, passengers and other road users, as well as environmental protection), and regulation of intermediate means of transport (including animal welfare issues). For rural transport the main regulatory issue is how to increase service quantity.

Rural communities are often a captive market for transport operators because they have little or no choice of service providers and few means of pressuring operators to change their practices or lower their prices. Communities can increase their bargaining power by establishing user groups to negotiate with operators and lobby the government. Transport operator associations often control the market for transport services, but they can also improve transport services. To do so, associations must be helped to see how their industry would be better served

by adopting different operating practices. In addition, governments and NGOs may facilitate the provision of technical and business training services for the owners and operators of vehicles, both motorized and nonmotorized.

Complementary Options

Promoting rural transport services also requires complementary actions to develop adequate interconnected infrastructure, encourage use of transport brokers and communications technology, create rural markets, and improve urban terminals. Rural mobility depends on good rural transport infrastructure (roads, paths, footpaths, bridges) as well as good, low-cost transport services. Training and capacity building may be required for local experts in key issues including intermediate means of transport, participatory processes, and gender analysis. Public education campaigns should present positive images of complementary means of transport. The priority in transport services in rural areas must be on maintaining basic year-round vehicle access for the types of vehicles likely to be operating. Quantity of access is even more important than quality.

In providing access to remote rural communities, road engineers and planners often try to minimize costs by avoiding redundancy, minimizing the number of links and length of road. One result is that rural feeder road networks have many dead-end routes. For transport operators, these routes cause higher costs and risks. Interconnected routes help maximize potential demand for transport services.

Efficient transport systems also rely on good communications for matching vehicles and loads. A good communication system enables effective transport broker services, whether for long-haul freight or for the irregular needs of rural communities. Most rural communities still have poor communications, but the falling cost of mobile communication devices should improve information exchange and increasingly complement road improvement schemes and transport services.

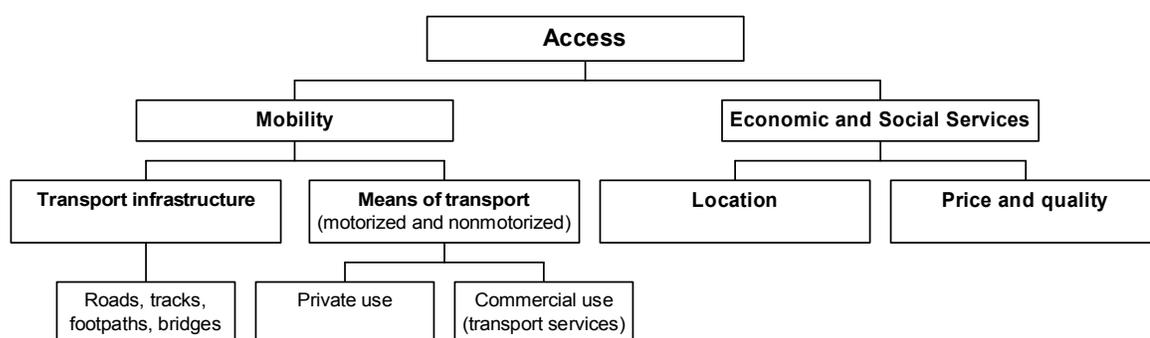
In a virtuous circle, efficient transport services promote efficient marketing systems, and rural markets promote efficient rural transport services under two conditions: the markets are close enough to rural communities that intermediate means of transport can be used, and rural people can sell directly in the markets without the need for traders and wholesalers. But in low-density areas populations and markets are dispersed, making for long average distances to market. If distances are too long, demand may be insufficient for vehicle transport services for some means of transport. In some countries much of the rural road network is planned around market centers to maximize the benefits of transport investments.

Planning of rural transport services should also take into account the facilities and location of urban bus and truck terminals. Most medium- and long-distance rural trips are to urban areas, and many of the motorized vehicles used in rural transport are owned, housed, and run from urban locations. Thus the ways that urban bus and truck parks are operated affect rural transport services.

1. THE NATURE AND IMPORTANCE OF RURAL TRANSPORT

Poor access to transport in the rural areas of developing countries constrains economic and social development and contributes to poverty. Improving rural people’s access to essential services requires improving mobility, through better transport infrastructure and services and attention to the location, quality, and price of facilities (figure 1).

Figure 1. Elements of physical access



Rural transport, the focus of this publication, involves *transport operations*, whether primarily *transport services* or *private transport*. Transport infrastructure and transport operations form rural *transport systems*. Mobility, for men, women, children, and goods, depends on the availability, affordability, and efficiency of such transport systems. Although mobility is not always productive, improved transport systems can increase accessibility, reduce poverty and isolation, and enhance social and economic development. Better mobility gives people better access to services (education, health, finance), markets, income-earning opportunities, and social, political, and community activities (box 1).

RURAL TRANSPORT AND POVERTY REDUCTION

In many developing countries, rural transport infrastructure—the local roads, tracks, footpaths, and bridges used to access farms, markets, water supplies, schools, and clinics—is often in poor condition for some or all of the year. (In some rural areas waterways and railways are also important elements of rural transport infrastructure, but they are not discussed in this report.) In addition, transport services, both large-scale motorized means such as trucks, buses, pickups, and cars and smaller-scale intermediate means such as handcarts, bicycles, motorcycles, and animal-drawn carts are often inadequate and too expensive for rural inhabitants. In many areas,

including most of Sub-Saharan Africa, much village transport still involves people walking and carrying.

Box 1 What are rural transport systems?

All communities require **access** to supplies, services, facilities, and opportunities. Basic needs include water, power, food, health services, education, and employment. People need access to markets and may wish to participate in civic, religious, and leisure activities. Accessibility can be measured in time, effort, and cost. It depends on infrastructure (availability of water sources, roads and bridges, schools, hospitals, markets) and available and affordable transport options for people and their loads. Poor rural people often have to spend much time and effort to access basic necessities, and the reduction of isolation and inaccessibility are fundamental to poverty reduction. Accessibility depends on **mobility** (ease and frequency of movement) and **proximity** (distance). Access may be improved by greater mobility and improved proximity to services (piped water, local health centers).

The most basic **means of transport** is human transport: people walking between locations and carrying things themselves. Walking and carrying are simple, cheap, and efficient for short distances, difficult terrain, and small loads. At the other end of the spectrum are large-scale means of transport, including trucks, buses, automobiles, trains, airplanes, and ships. These are generally designed for moving people and goods quickly over long distances with large loads. These technologies are intrinsically complicated and expensive. Nevertheless, economies of scale can make the cost per tonne-kilometer or per person-kilometer carried quite low, provided operations are efficient and capacity utilization is high.

Between these extremes is a wide variety of local transport solutions that are intermediate in scale and may involve different forms of lower technology. Often referred to as **intermediate means of transport**, they increase local transport capacity and reduce drudgery at relatively low cost. They are most commonly used for relatively short distances of up to 20 kilometers. Some are nonmotorized (handcarts, bicycles, animal-powered transport), while others have small motors (motorcycles, power tiller trailers). Equivalent intermediate water-based means of transport include canoes, rafts, and other small boats.

Rural transport depends on appropriate **infrastructure** (paths, roads, waterways, bridges, railway tracks, and their associated maintenance and traffic management systems). The infrastructure includes paths, trails, tracks, access or feeder roads, secondary roads, and primary trunk roads. These may vary in quality, depending on weather, season, construction, and maintenance, and some means of transport require certain infrastructure standards to operate effectively.

Operating on the transport infrastructure are a variety of means of transport carrying passengers and freight. These include trucks, pickups, buses, mini-buses, cars, bush taxis, animal-transport, motorcycles, tricycles, bicycles, and handcarts. These may be for **private** or **commercial use**. There is a continuum of arrangements between commercial hire and private use, with many local means of transport being used for both family purposes and informal hire.

While cost constrains the use of transport services, a lack of concentrated demand constrains the development of cheaper, more efficient services. Improving rural mobility to reduce poverty thus requires a combination of appropriate transport infrastructure and better transport services using affordable means of transport. This report focuses on transport services; two other reports in this series, *Options for Managing and Financing Rural Transport*

Infrastructure (Malmberg Calvo 1998) and *Design and Appraisal of Rural Transport Infrastructure: Ensuring Basic Access for Rural Communities* (Schelling and Lebo 2001), explore transport infrastructure.

PATTERNS OF RURAL TRANSPORT

Rural transport involves many types of movement for a wide range of purposes both within villages and beyond (box 2). The purpose of the travel may relate to the household (obtaining water, fuel, and food), agriculture (tending and marketing crops and livestock), or a wide variety of socioeconomic activities (education, religion, recreation, health, employment, income generation). Journeys may have multiple purposes. Different means of transport may be appropriate depending on infrastructure, purpose, distance, gender, and age.

Box 2 Village transport: The Mapendere family in Sachuru, Zimbabwe

Much rural transport takes place close to villages. External trips (motorized or nonmotorized) are fewer, but have economic and social importance. In one study in Aurora Province of the Philippines, 93 percent of rural travel was around the village, particularly for collecting water and firewood. The annual internal travel per household was the equivalent of 100 working days and 32 tonne-kilometers.

Rural transport is time-consuming. Family members have various needs and roles, with important gender differences. And motorized trips are typically infrequent. The travel patterns of the Mapendere family in Sachuru, Zimbabwe, exhibit some of these characteristics. From their village it is 20 kilometers (by motorable track) to the nearest gravel road and then 70 kilometers to Sanyati, a small, but growing market town. The family has no vehicles and so relies on walking and hired vehicle services. In and around the village the mother and daughter collect 20 liters of water twice a day in a 40-minute roundtrip. They collect firewood twice a week: the mother carries 25 kilograms and the daughter 10 kilograms, and the roundtrip takes just over an hour. School is an hour's walk each way. The hospital is a 12-hour walk. Once a month the mother hires a donkey to carry 60 kilograms of maize for the 12-hour trip to the nearest grinding mill. In the cultivation season the mother and father walk 30 minutes each twice a day to the fields. The children help on Saturdays. The father goes to Sanyati twice a year to buy maize and cotton seeds. He leaves at midnight, reaching the main road at 4 am to catch a bus and returning around midnight the following day. An ox cart is hired to transport the harvest from the fields to the village. To get the produce to market, someone from the village has to go to Sanyati to find a tractor or truck operator willing to come to the village.

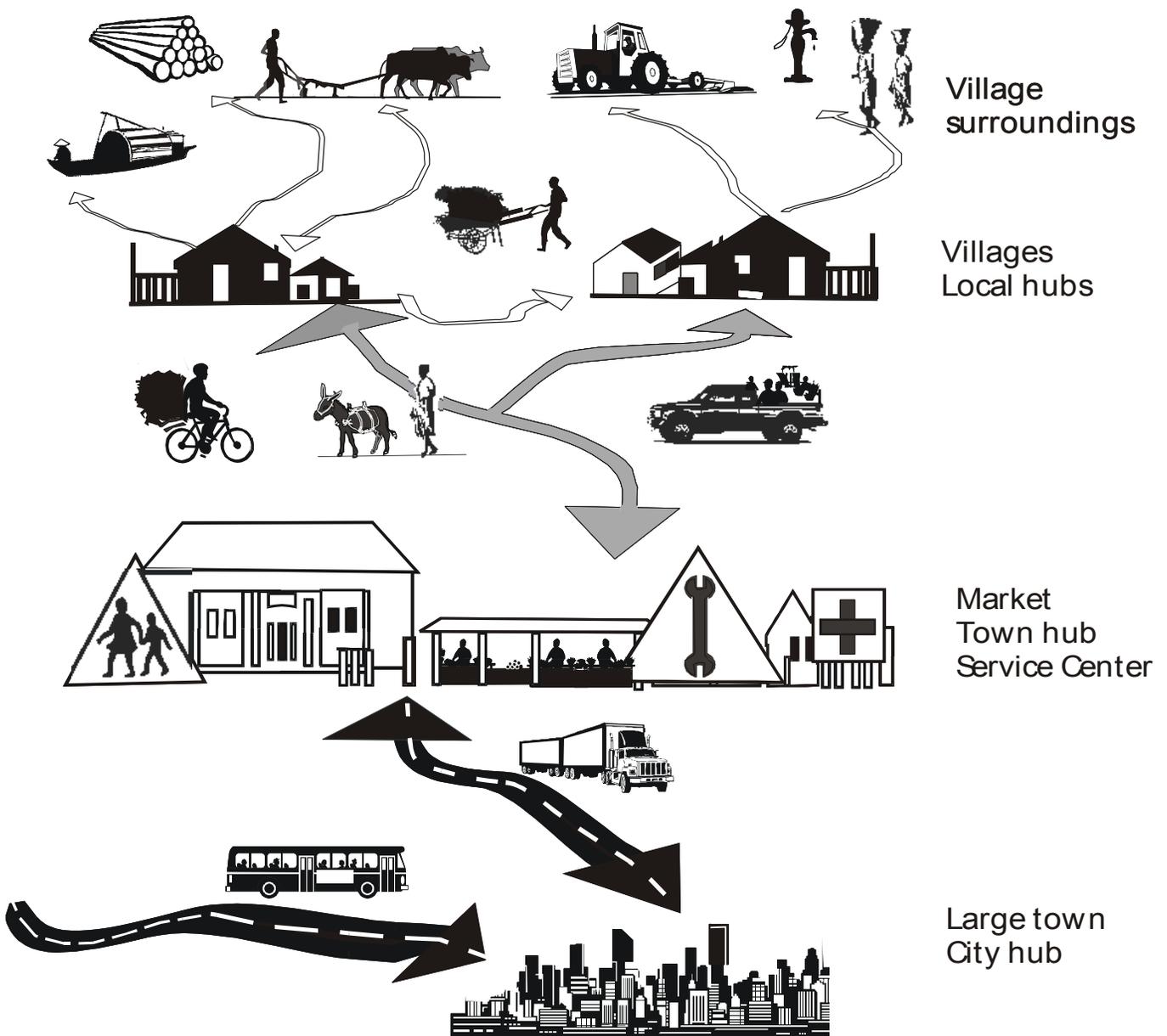
Source: Dawson and Barwell 1993; Ellis 1996.

Effective rural transport relies on a variety of means of transport to move passengers and goods, with the type and diversity depending on infrastructure, environmental conditions, users, and demand (figure 2). Most rural transport takes place in the vicinity of villages. Trips generally involve short distances and small loads carried on paths and tracks, typically for marketing, collecting water and firewood, and tending crops and animals. Intermediate means of transport

are ideal for such purposes but are not sufficiently promoted or supported by government transport planners, and they are expensive for poor rural people.

Out-of-village travel is less common but of enormous economic and social importance, including trips to and from distant farms and markets, employment opportunities, schools, health facilities, grinding mills, and friends and relatives. These trips involve longer distances and are more likely to involve intermediate means of transport or motorized transport services. But in many rural areas, walking and carrying may be used even over long distances. Motorized public and private rural transport services concentrate on routes from villages to market towns and from towns to cities, where there is greater demand and better infrastructure.

Figure 2 A rural transport system



2. ISSUES AFFECTING RURAL MOBILITY

Many government and donor efforts to improve access to rural transport have focused on expanding road networks, giving little attention to sustainability, the development of transport means and services on the roads, or the needs and views of transport users, especially the rural poor. As a result, despite massive spending on road construction, the interventions have not met the transport needs of rural women and men for a wide variety of subsistence, social, and economic activities to maximize their livelihoods. Moreover, the market has not provided transport services to areas with low demand and to the poorest and least mobile segments of the community. Many rural people, especially women, walk long distances every day carrying heavy loads of water, firewood, and grains, as well as agricultural produce and goods for marketing.

In recent years, however, recognition has been growing that without an integrated approach to transport infrastructure and services, investment in transport is unlikely to bring commensurate economic and social benefits. As a result, countries in Africa, Asia, and Latin America are giving more attention to smaller roads, paths, and tracks and to the use of intermediate means of transport. Several studies have stressed the importance of local transport solutions, with complementary infrastructure and transport services. Governments in developing countries are being encouraged to create favorable policies and operating environments, enabling the private sector and nongovernmental organizations (NGOs) to play important roles in new rural transport initiatives (Riverson and Carapetis 1991; Malmberg Calvo 1994b; Dawson and Barwell 1993; Connerley and Schroeder 1996; Howe 1997; Edmonds 1998; Ellis and Hine 1998; Starkey 2001b).

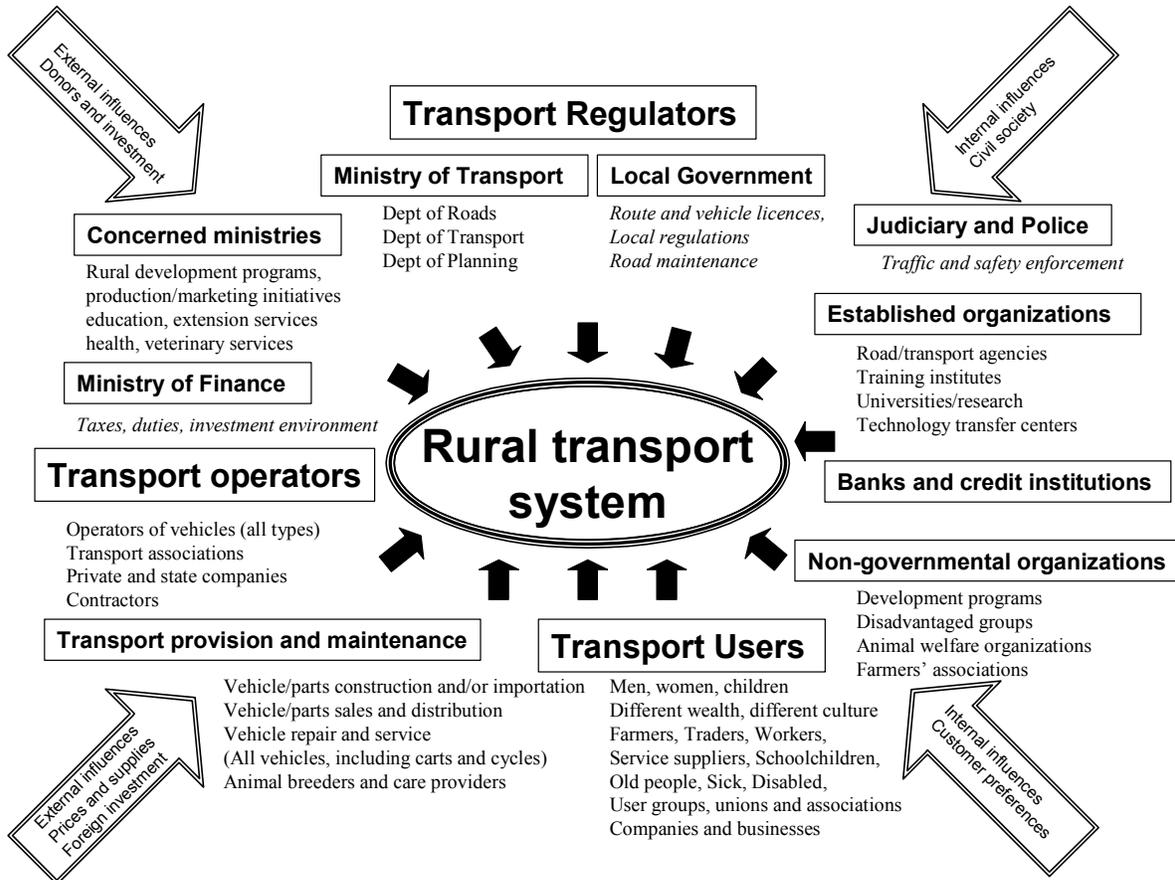
Still, there are many obstacles to lower cost and more efficient rural transport (see annex 3) and many factors that influence efforts to promote rural transport services, including the wide range of stakeholders; the need for a critical mass of users, operators, and suppliers; population density and income levels; and patterns of transport services adoption.

WIDE RANGE OF STAKEHOLDERS

There are many stakeholders in rural transport, with many different priorities and agendas. These stakeholders influence the provision, price, quantity, and quality of transport means and services and should all be included when planning and implementing transport interventions. The main players are users, operators, and regulators. Others include major institutional stakeholders in the public and private sectors (national government, local government, transport agencies, funding institutions, training organizations), transport vehicle suppliers (freight and passenger, large and small scale, formal and informal), suppliers of support services (manufacturers, importers, retailers, mechanics, and artisans), transport infrastructure contractors (large and small), professional unions and associations, and relevant NGOs (figure 3). Here the discussion

concentrates on the primary stakeholders in rural transport services: *users*, *operators*, and *regulators*.

Figure 3 Stakeholders in rural transport systems



Users

Transport solutions differ according to the conditions, needs, and preferences of transport users. Important issues to examine when planning transport interventions include gender, disadvantaged and other groups with special needs, occupation or task, population density and income (see “Population Density and Income Levels” later in this chapter), and tradition and culture (see “Patterns of Adoption and Use of Transport Services” later in this chapter).

GENDER. Most transport services are owned and operated by men, even in countries where women are the main transporters. There are gender differences in transport tasks and in access to transport services (box 3). Women are often responsible for carrying children and transporting water, firewood, crops, and grains for milling. In Sub-Saharan Africa women often spend 15-30 hours a week on transport activities, much more than men (Dawson and Barwell

1993). Girls may be kept out of school to help with gender-related transport and domestic tasks. Women's transport burdens are increased by the fact that they generally have fewer resources to pay for transport services and may find crowded public transport threatening or culturally unacceptable.

Box 3 Gender and transport services

Gender differences exist in the perception and use of many means of transport. A study in Uganda, for example, found that bicycles were perceived as prestigious, allowing men to travel faster outside the village and so facilitating trade. But many men and women felt that if women used bicycles, people would think they were acting like men. Men were suspicious about the implications of such liberated behavior, particularly for their wives. Moreover, bicycles designed for women were not widely available, and most women did not have enough cash or credit to buy them.

Bicycles can empower women and change their lives. A project in Tamil Nadu, India, in the 1990s introduced bicycles as part of a women's literacy campaign. The bicycles increased women's mobility, giving them quicker access to schools, hospitals, and markets. Gender roles changed as women undertook some previously "male" tasks such as marketing, taking children to school, and running errands. Bicycles allowed women to complete their tasks faster and easier, freeing time for other activities.

Such progress shows how transport programs can address gender imbalances. Outcomes are especially impressive when projects involve women in planning and when they target information, credit, and project activities to female transporters. For example, a project in a low-density region of northeast Tanzania introduced oxen, ox carts, donkeys, and donkey carts to address shortages of farm power and transport. As the project became more sensitive to gender issues, it became clear that although women had equal legal rights, they were underrepresented in decisionmaking at all levels of society.

Thus efforts were made to empower women by forming women's groups and targeting project activities and credit schemes to female farmers. Oxen tended to be owned and herded by men, and donkeys were not taken as seriously. Women therefore found it easier socially, financially, and practically to own and manage donkeys. Because women were responsible for most transport around the village, they benefited from the spread of donkey carts, which could be used to carry people, water, firewood, crops, forage for animals, and goods for trading.

Source: Malmberg Calvo 1992, 1994a; Rao 2001; Starkey and Mutagubya 1992; Starkey and Grimm 1994; Fischer 1994a, b; Makwanda 1994.

Means of transport are not gender neutral. Some are more suited to men than women. This may be because of biological differences (average size and strength), because of traditional gender roles for some transport tasks, or because of gender-based power relations that determine the cultural conventions of what women can and cannot do. Rural transport programs have tended to promote "standard" means of transport, which are almost invariably based on designs developed by and for men. In Tanzania women were dissatisfied with the design of wheelbarrows, which require two hands and so prevent the women from pushing the wheelbarrow and carrying a child at the same time.

In some societies certain traditional means of transport (oxen, horses, camels) and some more modern ones (bicycles, motorcycles, cars) have strong male associations. Gender power relations, reinforced by social traditions and unequal access to money, credit, and income-generating options, restrict women's use of such devices. But women generally aspire to greater mobility.

The problem of unequal gender access to transport is clearest in poor rural communities, where women's incomes are low and transport services are few. But because some poor women cannot afford to follow restrictive cultural traditions (as in Bangladesh), they sometimes have greater mobility than their wealthier counterparts (Matin and others 2001). In urban and periurban areas, where female employment is higher and transport is more readily available, gender inequality is less marked for cheaper forms of transport. In urban and periurban Vietnam women account for almost half of bicyclists and 30-40 percent of motorcyclists. In Lao PDR women ride more than 40 percent of the motorcycles. But in these and other countries, men drive most of the cars and pickup trucks.

Women are generally empowered by greater mobility and access to transport services, although male ownership of certain means of transport (cycles, handcarts, animal-drawn carts, power tillers) may indirectly benefit women if men and boys take over some of women's traditional tasks such as collecting water (Malmberg Calvo 1992, 1994b; ITSL 1998). And when women have better access to transport, they may take over tasks previously performed by men (Rao 2001).

Despite women's need for transport services and their clear under-representation among transport users, women have tended to be invisible to transport planners. Transport projects have often failed to address the needs of women as transport customers (Fernando 1997). Conventional transport planning has focused on road networks and the long-distance movement of produce, neglecting local transport solutions for short-distance transport, especially the needs of women. Few transport projects have incorporated gender analysis or taken into account that women have less access to information, capital, credit, cash incomes, and financially profitable transport activities.

Gender-sensitive design issues should be considered when assessing and promoting transport services (see box 3). Subject to local opinion, transport programs could promote unisex bicycles without crossbars, which can offer particular benefits to women and children. Similarly, some programs have found that donkeys can provide particular transport benefits for women (Starkey 1994, 1999; Fernando and Starkey 2000).

PEOPLE WITH SPECIAL NEEDS. Elderly, handicapped, and ill people and very young children have particular needs in transport services. Local transport solutions may be important for improving their quality of life (Clarke 1999). Standard intermediate means of transport and specialized devices such as hand-operated tricycles, wheelchairs, and simple ambulances (cycle-based, animal-based, motorcycle sidecars) may be useful. Motorized transport services should recognize

people with special needs and make appropriate adjustments. With increasing life expectancy and survival rates, such specialized users are likely to become more important.

OCCUPATION AND TASK. The work people do and the tasks they have to perform influence which transport solutions are most appropriate. The availability and cost of appropriate means of transport greatly influence a person's effort, productivity, travel time, and income.

Farmers have to travel to their fields, they need to transport inputs, and they have huge seasonal transport requirements at harvest time. Much farm-village transport involves walking and carrying along narrow paths. With improved tracks and transport technologies (animals, carts, tractor-trailers) farmers can carry heavier loads in a more timely way. Transporting crops to village markets and collection points often involves intermediate means of transport, to connect to the larger, motorized transport services needed to move produce to distant markets. Such motorized transport services may be unavailable after the harvest season, when crop prices are higher and farmers could get more for their crops if they could get them to market.

People who commute to work in the city, plantations, or mines may be able to access motorized transport services on main roads but may have to walk or ride to reach the transport route. People traveling for trading and marketing may have greater problems, particularly if they are carrying awkward loads (fish, vegetables). Transport services are most common and crowded at peak times and on routes with heavy demand. If people's occupations involve travel on other routes or at off-peak times, transport services may be infrequent and unreliable.

Infrequent, unreliable, and overcrowded transport services can impede access to employment opportunities and markets. Women and men without access to efficient transport services are often forced into less lucrative occupations and receive lower prices for their produce. Women often have to combine employment with responsibilities in the family or home, and they tend to have multiple tasks requiring transport. Fare structures geared to simple commuting may be expensive for those with complex journeys (school, market, work).

Operators

Transport service operators include both public and private companies and individuals. Companies tend to operate medium-size and large vehicles, which require significant investment and organizational support. Individuals tend to invest in cars, tractors, minibuses, pickups, and intermediate means of transport, driving themselves, employing drivers, or hiring them as needed.

ASSOCIATIONS. Transport operators influence the transport sector mainly through their associations (also called unions, committees, or syndicates), which can affect the quality, quantity, and price of rural transport services for both motorized and nonmotorized vehicles (box 4). Associations may be based on individual routes, types of vehicles used, geographic areas, or

entire countries. Companies and associations can be monopolistic or highly competitive. Where transport associations are strong, politically connected, and without real competition, rural transport is more expensive and less attractive to users. Associations often take responsibility for quantity licensing, route allocation, and fare setting. In addition, associations often lobby governments on behalf of members' interests and may provide support to members (such as arranging credit for purchases of vehicles and spare parts).

Box 4 The Ghana Private Road Transport Union

The Ghana Private Road Transport Union is an extremely powerful national transport association. It controls 80 percent of Ghana's truck parks and registers vehicles for different routes, charging a fee that depends on the route's profitability. Fares for passengers and goods are fixed, and 5-10 percent of the fares go to the union. The union also receives truck park entrance fees and collects a 3 percent income tax for the Internal Revenue Service. Loads acquired outside truck parks are also subject to the union's commission and income tax levy. Vehicles must wait in line at the parks, sometimes for one to two weeks. In areas where the union is especially strong, it controls the prices of local tractor transport and plowing. The union has sometimes prohibited hire services using intermediate means of transport from using the main roads. The union provides a range of social services for its members and sometimes supports maintenance of poor roads.

Source: Delaquis 1993.

Associations are likely to be bound by laws on cooperatives and unions that set out structures, procedures, obligations, funding, and the like. Larger associations often include a secretariat, local administrators, terminal staff (controllers and dispatchers), and sometimes, internal surveillance or policing staff. Associations are strong in representing their members' interests, as in Ethiopia, where the Donkey Owners Association was formed to improve working conditions and lobby for the rights of donkey owners relative to truck drivers.

Associations also have several weaknesses. They seldom substantiate their arguments through well-researched analysis, and they often overlook the wider interests of the transport users and communities they serve. Unlike a public or private company, an association has no strong power to cross-subsidize routes, encourage interchange between routes, or provide some semblance of an integrated network. An association may not even be able to enforce its own rules, and in-fighting is common.

PROFITABILITY AND INEQUALITY. Profitability is a crucial factor in the adoption and operation of means of transport. People select a particular means of transport because it generates income, saves time, or increases the efficiency of a profitable venture. Income-generating potential can be high in urban areas and around markets, and most transport services operate in these areas of high economic activity. Such concentrations occur despite clear needs (arguably more social than economic) for transport services in rural areas to reduce the drudgery and time required for household transport tasks.

Because the adoption of transport innovations can save time and create economic opportunities, it can result in greater economic and social inequality. Those able to profit from investments in transport have greater productive capacity, financial benefits, and social status than those without, who feel increasingly impoverished. The impoverishment may be relative (no actual change in circumstances) or absolute (those with transport may take away income-generating options or employment from those without). Since men are the main owners and operators of means of transport, gender differentiation often increases, with women increasingly marginalized.

Regulators

Transport regulators in developing countries tend to be weak, with inadequate capacity, creating an unfavorable environment for transport services. The authorities are likely to be government bodies (central, local, or both) such as a ministry of transport. The legal framework for rural transport consists largely of traffic acts and ordinances whose schedules and statutory provisions are overseen by the responsible minister. Other applicable laws may be associated with local government powers, company and union law, and government revenue generation (taxes and excise duties).

Traffic laws typically cover:

- Vehicle construction and use.
- Vehicle registration and licensing, including roadworthiness inspection.
- Licensing of drivers, including their qualification and instruction.
- Use of highways, including safety provisions.
- Police powers.
- Traffic offenses and penalties.
- Insurance requirements.

Many traffic laws are inadequate for modern traffic and transport conditions. Recent trends toward liberalization of transport services and the formation of road agencies have highlighted the shortage of resources and human capacity available to ministries of transport. For example, in 2001 in the Uganda Ministry of Works, Housing, and Communications, for every person assigned to work on transport planning and regulation issues, 20 people were assigned to work on road planning and engineering. In Ethiopia the Road Transport Authority is the poor cousin of the Roads Authority. Such arrangements make it very difficult for regulatory authorities to monitor user requirements and to provide an environment conducive to transport services.

Government powers to tax and impose duties on imports also affect transport operators, primarily through the prices of imported vehicles, spare parts, and fuels. Rates may be weighted to deter or encourage imports of certain types of vehicles.

Local governments are responsible for laws governing transport operators in the towns from which rural operations emanate. Transport terminals are typically owned by local

governments, which may have statutory obligations involving passenger safety and the maintenance of the terminals, and so impose levies on their use. But such terminals tend to be poorly maintained and managed, with local governments abrogating their responsibilities to the operators.

Local governments are also likely to control the number of vehicles providing transport services and their routes. But these powers may not be effectively applied, especially where transport operators are politically influential. Very little planning goes into route design. Route structures often evolve through trial and error and in response to fare levels, the availability of terminal space, and competition among drivers and among associations. Where local governments influence route planning, their actions may simply endorse the approaches that drivers have already adopted. One reason is that route planning based on analytical techniques is a complex undertaking, one requiring expertise that most local governments do not have.

Local governments may also be responsible for regulating intermediate means of transport, for example, on matters related to route licenses and conditions for the use of animal transport. But these regulations generally cover only urban and periurban areas. In rural areas, national and local governments tend to play a more limited role, although in some countries agricultural extension services may promote animal-drawn carts or tractors.

CRITICAL MASS OF USERS, OPERATORS, AND SUPPLIERS

Means of transport, both motorized and nonmotorized, require supporting infrastructure for their manufacture, supply, and repair. Sustainable support services are unlikely to develop in the absence of a critical mass of users, yet it is difficult for a critical mass of users to develop without support services (box 5). Thus early adopters have to obtain and maintain their means of transport without local technical support.

Once there is a critical mass of transport operators, support services start to become more widely available. In most towns in Africa, Asia, and Latin America mechanics and traders provide competing supply and repair services on the approach roads around markets and transport terminals. Eventually, harnesses, cart bearings, spanners, inner tubes, and fan belts start to be sold in village markets, making it easier to use and maintain rural transport services.

Sociocultural inhibitions may constrain the use of certain means of transport until a critical mass of users makes them acceptable. For example, nonmotorized means of transport such as simple handcarts may lack prestige. Some people may not wish to be seen on a bicycle taxi or tricycle. Women may consider it unseemly to use bicycles.

Once a means of transport becomes widely accepted, it is much easier for people to use it. Once enough women start to use bicycles and the benefits become visible, other women will find it easier to overcome economic and social constraints and begin to use bicycles, as happened in parts of Burkina Faso, Cuba, and Vietnam. But there are still many countries (or areas) where female cyclists are unusual (as in parts of Ghana, Guatemala, Guinea, India, and Malawi).

Box 5 The importance of reaching critical mass

Transport repairs in Madagascar

Most of the 850 families in the village of Anjanadoria, Madagascar, own an ox cart, but few own bicycles. Two village carpenters make and repair ox carts, but no one repairs bicycles because there is little demand, and the lack of repair facilities is one reason few people own bicycles. Bicycles needing repairs must be taken by ox cart 15 kilometers to the local market town, where artisans have established small repair shops.

Introducing ox carts in Guinea and Sierra Leone

To introduce a new means of transport, projects in Guinea and Sierra Leone placed a new ox cart in several villages. But many carts stopped being used after their first tire puncture. If the projects had concentrated the carts in a few villages, they could have encouraged the establishment of viable puncture repair services.

Innovative use of motors and motorcycles in Cambodia

Innovative transport systems have gained a critical mass of users in Cambodia. Small diesel engines and spare parts used in power tillers, pumps, and small boats are readily available, enabling transport innovations such as locally made “iron ox” road vehicles and motorized platforms that run on existing railways. In addition, a few people have started to use motorcycles to pull trailers that carry goods or up to 25 people. These relatively unorthodox intermediate means of transport have been copied many times and become accepted means of transport for rural transport services.

Source: Starkey 2000, 2001b.

When vehicles are in common use, many suppliers stock spare parts. But as vehicles age, they become harder to maintain because spare parts become scarce. And if the demand for artisanal support services drops, remaining users will find it increasingly difficult to sustain a particular means of transport. The declining use of wooden cartwheels in Mexico and horse collars in parts of Eastern Europe has reduced the number of artisans and their apprentices, reducing the sustainability of the means of transport that depend on these parts. A vicious circle may start when critical mass is lost.

POPULATION DENSITIES AND INCOME LEVELS

Most developing countries have some rural areas with high transport demand and others with low demand. For example, in Vietnam density is high in the countryside around Hanoi but low in the hill area just 200 kilometers to the west. Similarly, most countries in Africa and Latin America have low-density remote rural areas and high-density periurban areas. International comparisons are most useful if they compare the low-density or high-density situations in different parts of the world.

Patterns of demand and supply for rural transport services are often linked to population density and income levels in three broad categories:

- *Low transport density in low-income areas.* Low population density is associated with low transport density, with few motorized vehicles and few intermediate means of transport. A vicious circle of insufficient transport, users, and services impedes development. Choice of transport services is severely limited by high costs and low profitability. People in rural areas, particularly women, are left with a heavy transport burden to meet their subsistence needs and are isolated from essential economic and social services. Walking is the most common way of traveling, and some goods are even transported long-distances on foot (more than 40 kilometers). Regular motorized transport services are often 5-20 kilometers (or more) from people's homes. People have little cash and so make very limited use of motorized transport. Those who can afford it use it mainly to carry harvested produce from the village. Motorized transport is rarely used to travel for social purposes. This pattern is found in remote rural areas in Sub-Saharan Africa, Asia, and Latin America and in most mountainous areas in many parts of the world.
- *Higher transport density in low- to medium-income areas.* Medium to high population density, irrigated agriculture (reducing seasonality), cash crops, efficient marketing systems, and nonagricultural employment are associated with higher transport density. In areas with these characteristics transport services have achieved a critical mass, making it easier to buy and maintain motorized and nonmotorized means of transport. Although travel by foot is common, there is much greater access to intermediate means of transport than in the low-density category. Many people own bicycles. Transport services are readily available at low to medium cost. People tend to visit the local market regularly and to use motorized transport for carrying harvested produce. People are more likely to have surplus cash to pay for motorized transport if they have something to trade at market. Motorized transport is also used to go to hospitals, for occasional social visits, and for longer distance passenger movements (more than 20 kilometers). Transport services may be less than five kilometers away. Buses, minibuses, trucks, and trains are used for long-distance transport. This pattern is found in higher-income rural and periurban Sub-Saharan and North Africa, much of rural South and Southeast Asia, and some rural areas in Latin America.
- *Low to medium transport density in high-income rural areas.* Some areas of low to medium transport density are associated with low to medium population density with strong urban-rural connections. People generally receive income from paid employment, small informal businesses, or capital-intensive agriculture. Transport infrastructure is mostly good, and people use motorized transport regularly to go to work, clinics and hospitals, and markets; to visit friends and relatives; and to participate in social events and religious functions. People generally have access to bicycles and sometimes to motorcycles and tractors. Long-distance trips are made by bus, minibus, or train. Primary school children walk or cycle to school, although journeys to secondary school at the beginning and end of the term or on weekends may be made by motor vehicle. This

pattern is found in periurban areas around the world and in rural areas in the better-off countries of the Americas, Asia, Australasia, and Europe.

PATTERNS OF ADOPTION AND USE OF TRANSPORT SERVICES

Patterns of adoption and use of transport services vary widely, in part reflecting social, economic, and environmental factors and in part idiosyncratic features. Some means of transport spread slowly, others rapidly, and some are never adopted in particular areas. In some areas different means of transport may coexist for years, while in others one rapidly replaces another. The most stable patterns are found with traditional intermediate means of transport made by artisans, such as ox carts (Ramaswamy and Narasimhan 1984). The fastest changing patterns occur with mass-produced means of transport such as bicycles and motor vehicles.

Some means of transport (bicycles, motorcycles, pickups, trucks) may be widespread but vary greatly in concentration. Others (donkey carts, power tillers) may be clustered only in certain localities. National and local clusters and differences may be correlated with differences in population density, culture, income, topography, climate, or crops and animals. Motorcycles are usually associated with richer and higher density areas, bicycles with flatter and medium-income areas. Cultural differences may explain why sales of women's bicycles are much lower in western Burkina Faso than in the rest of the country (Sifa 2001). Some local concentrations may result from promotional initiatives (by local factories or suppliers, operator cartels, or government projects) or from differences in local economic conditions (such as the density of transport demand), policies (such as prohibitions), or infrastructure (such as road improvements or provision of cycle routes).

When the conditions that favor adoption are understood, more conducive environments can be created. Most means of transport spread as a result of small-scale private initiatives rather than formal government promotion campaigns. Examples include the widespread use of ox carts in Asia, pack donkeys in Ethiopia, horses in Latin America, motorcycles in periurban environments, and pickup trucks in rural areas worldwide. Some means of transport spread spontaneously even across political borders through the work of local traders: tricycles from Peru to Bolivia, three-wheel motorized tuk-tuks from Thailand to Lao PDR, donkey carts from Senegal to Guinea-Bissau, mopeds from Burkina Faso to Togo, and school buses from the United States to Latin America. Bicycle taxis, first used at the border between Uganda and Kenya, have subsequently spread widely within both these countries (see box 6).

For such spontaneous adoption to work, there has to be transport demand and a favorable environment. What cannot be known is how many other cases of spontaneous adoption might have taken place had the environment been more conducive. Making environments more conducive requires identifying the conditions that favor the use and spread of different means of transport—the topic of chapter 3.

Box 6 *Boda boda* bicycle and motorcycle transport services

In the 1960s some young men started to use bicycles to help carry people and goods at the border crossings between Uganda and Kenya. These border bicycle taxis became known as *boda bodas*. A convenient means of transport for short distances, the *boda bodas* spread to many areas of Kenya and Uganda, providing employment opportunities for large numbers of unemployed youths.

Although the cost per kilometer was higher than that of communal buses, *boda bodas* were much cheaper than motor taxis and provided convenient door-to-door service. In the 1990s the bicycle *boda bodas* were complemented by small motorcycles, which were faster and could travel longer distances. By 2000 there were an estimated 200,000 bicycle *boda bodas* and 70,000 motorcycle *boda bodas* in Uganda. *Boda boda* operators have formed associations to support members and to stabilize conditions and fares. In 2001 the Ngware Bicycle Transporters of Kenya were awarded the Colin Relf Memorial Award for innovative work in rural transport.

Source: Howe 2001 and IFRTD 2001b.

COMPLEMENTARY AND COMPETITIVE SERVICES

Complementary Services

Many complementary transport services are available with different but overlapping ranges, capacities, operating costs, purchase prices, payloads, complexity, weights, speeds, durability, infrastructure requirements, aesthetic characteristics, energy sources (human, animal, electricity, petroleum), foreign exchange requirements, and supporting services (mechanical, artisanal, veterinary, financial, informatic, traditional skills). Some of the options and their requirements are summarized in annex 4.

Complementary means of transport can work together, fulfilling different market needs. Large-scale motorized transport is seldom cost-effective for short distances and small loads. The first and last links of transport systems and marketing chains involve local collection and distribution, so it is common to use two or more transport services for one journey. For these feeder services intermediate means of transport are likely to be appropriate, convenient, and affordable (see box 7).

This complementary, multimodal basis of rural transport can be seen throughout the world. It is most clearly illustrated at hubs where local transport systems meet long-distance vehicles such as buses, trucks, trains, airplanes, and boats (see figure 2). Passengers and goods arrive and leave on a wide variety of smaller motorized or nonmotorized vehicles, including carts, bicycles, motorcycles, animals, taxis, pickups, minibuses, and small boats.

The importance of complementary transport services is not always recognized. Some authorities have tried to discourage simple local transport solutions (handcarts, animals, cycle rickshaws, motor tricycles), viewing them as old-fashioned and inferior or contributors to congestion. But all countries have complementary niches for such intermediate means of transport as bicycles, animals, wheelbarrows, delivery carts, farm trailers, and special transport

vehicles for the old, the young, and the handicapped, so local transport solutions need to take them into account.

Box 7 Intermediate means of transport

In rural areas intermediate means of transport are often kept for individual use, with occasional lending or hiring. But in some cases intermediate means of transport are maintained primarily for hire, particularly around rural markets and in urban and periurban areas. Small-scale transport services are particularly common in South Asia and Indochina, including both nonmotorized (rickshaws in Bangladesh and India, cycles in Cambodia and Vietnam) and motorized means of transport (tuk-tuks in Thailand, auto-rickshaws in India, motorcycles in Cambodia). Where there are high concentrations of transport services using intermediate means of transport, the operators generally form formal or informal associations.

Promotion and financing of intermediate means of transport are often undertaken by small organizations (projects, NGOs, the private sector). Analysis and user experience have shown the potential profitability and affordability of such programs. Still, the lack of transport services in many rural communities often reflects a lack of financial viability, especially for motorized services. Organizations and projects need to be realistic about the likely economic benefits of various transport services.

Around the world, multimodal transport systems include complementary land-, air-, and water-based transport services. While airports are recognized transport hubs, often with expensive rail and road connections, the complementarity between rural road and water transport tends to be neglected. In many countries boats provide important feeder and long-distance transport services on inland waterways and coastal areas.

Competitive Services

High economic demand for transport (such as around markets and transport hubs) creates potential for high diversity of complementary means of transport, each offering certain combinations of cost, load, speed, and convenience. In remote rural areas with low agricultural production, there may be only a few multipurpose means of transport (animal carts, a few pickups, perhaps cycles). Among the reasons for this lack of diversity are overall transport demand, availability of cash and credit, seasonality, critical mass (see above), information flows, supplies and services, promotion, and sociocultural factors. Any new means of transport has to compete for the small transport market, and so transport services can be competitive as well as complementary. Animal-drawn carts may take transport work away from porters; pickups may take hire loads from carts.

ISSUES RELATED TO COST

There are big differences within and between countries in the price of transport. These disparities suggest that in many parts of the world there may be interventions that could lower costs. The per kilometer cost is always likely to be higher for rural transport than for national, regional, or urban transport because of lower demand, shorter distances, smaller vehicles, and poorer roads. But there is still considerable scope for improvement. Studies of short-distance rural transport (less than 30 kilometers) have found that costs are two to two and half times higher in some countries than in others for a variety of vehicles including animals, tractors, power tillers, pickups, and trucks. Most of the cost differences are related to vehicle purchase and operating costs and the market for transport services, as well as interactions between them. (Some of these issues are highlighted in box 8 on long-distance freight transport, though the lessons are the same for rural transport vehicles.)

The costs of operating a vehicle include fixed costs (capital cost of the vehicle, interest payments, insurance, and other overheads) and variable costs (repairs, fuel, routine maintenance, tires). The impact of fixed costs on total operating costs depends on use: the higher is the level of use, the lower is the burden of fixed costs. The biggest components of vehicle operating costs are the vehicle's cost, use rate, routine maintenance, and fuel costs. All these components are affected by the market for transport.

Substantial price differences for the same product can persist for long periods in different national markets. Exchange rates and taxes can disguise the differences, however. For example, car prices in the United Kingdom have been higher than in the rest of Europe for more than 20 years. Recent publicity has indicated that for certain models prices might be 60 percent higher in the United Kingdom than in the cheapest European market.

Vehicle use rates strongly affect vehicle operating costs. For example, tractors are used more than twice as much in Pakistan as in Ghana and 30 percent more than in Sri Lanka (table 1). There are similar differences in animal-based transport: an ox cart operates five times longer in Pakistan than in Zimbabwe.

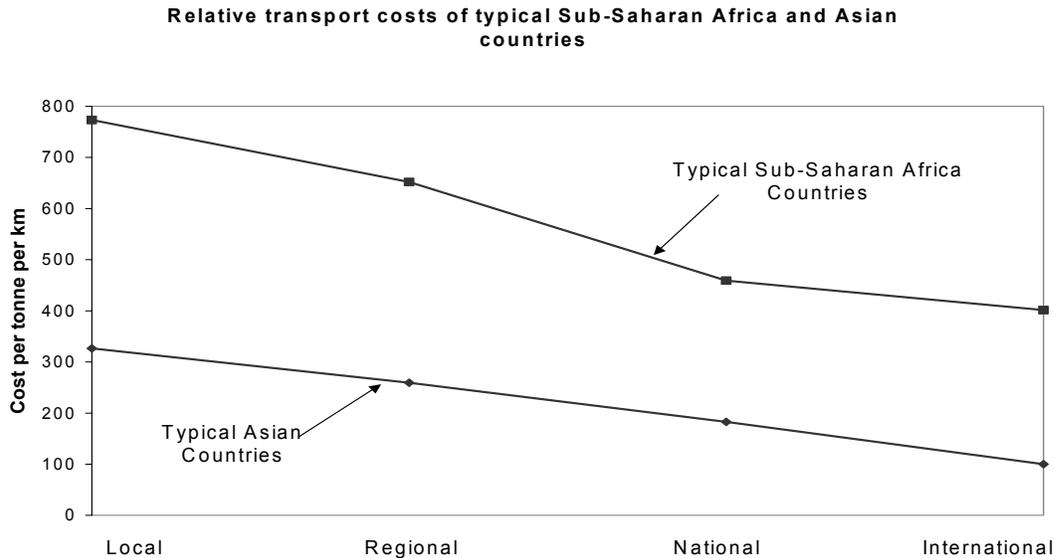
Table 1 Levels of use for different vehicles in various countries

<i>Vehicle</i>	<i>Thailand</i>	<i>Sri Lanka</i>	<i>Pakistan</i>	<i>Zimbabwe</i>	<i>Ghana</i>
Pickup (kilometers/year)	61,000	-	44,000	-	29,000
Tractor (hours/year)	-	1,440	1,900	750	800
Power tiller (hours/year)	500	740	-	-	400
Ox cart (hours/year)	-	875	2,000	400	-
Donkey cart (kilometers /year)	-	-	4,600	1,600	-

Source: Ellis 1996.

Box 8 Freight transport costs in different countries

Detailed studies have found that freight transport costs are up to five times higher in Sub-Saharan Africa than in many Asian countries (see figure). There are also big differences between countries on the same continent and between different types of movement in the same country. Short-distance local and rural transport is at a particular disadvantage. In Zambia, for example, it is cheaper to import maize from Zimbabwe than to transport the produce from Zambia's rural areas.



A number of factors explain Africa's high transport costs:

- Poor condition of transport infrastructure.
- Low use rates, the result of low density of demand and monopolistic transport unions that ration demand at bus and truck parks.
- Poor vehicle operations and maintenance practices, a result of poor driver training and knowledge.
- High vehicle and part prices, a result of limited competition among suppliers.

Because of these factors, African transport operators pay more. An operator of a two-axle truck in Tanzania, for example, pays about seven times more for tires than do drivers in Indonesia and Pakistan, and several times more in capital costs. Fuel, maintenance, and overhead are also more expensive in Tanzania.

Source: Adapted from Rizet and Hine 1993 and Hine, Ebden, and Swan 1997.

Routine maintenance is vital to the efficient operation of motorized and nonmotorized vehicles. Day-to-day care prevents the premature wearing of moving parts and slows component failure, keeping repair bills lower. Likewise, good husbandry prolongs the economic life of transport animals.

For motorized passenger and freight vehicles, fuel costs often account for 10-40 percent of operating costs. Vehicle operators are highly sensitive to fuel costs, so transport charges often rise with fuel prices. In setting fuel levies and taxes, it is important to consider the effect on the

cost of transport to consumers, particularly in remote rural areas. Although some countries try to adopt uniform fuel pricing, there can be big differences between urban and rural areas. For example, in Zambia fuel prices can be 20 percent higher in rural districts than in Lusaka.

Although low demand or small markets can contribute to low vehicle use and high vehicle and parts prices, so can an uncompetitive operating environment. Competition encourages low-cost practices in many ways. Competition makes owners aware of all aspects of their vehicles' performance and operating costs. Similarly, competition can help keep vehicle and parts prices low because customers can choose among suppliers. Transport associations set rules for member that often lead to uncompetitive practices (options for tackling this problem are provided in chapter 3).

3. PROMOTING RURAL MOBILITY

Active promotion is required to turn the vicious circle of insufficient transport means and services in rural areas and inability to pay for them into a virtuous circle of better transport stimulating economic activity and social improvement, leading to easier access and more efficient transport means and services. The continuing problems of rural transport in many low-density, low-income areas of Africa, Asia, and the Americas suggest the need to promote additional means of transport. Where transport technologies are being adopted in higher-density areas, promotion targeted at disadvantaged groups may be justified.

IMPORTANCE OF INCLUSIVE, PARTICIPATORY METHODS

All rural transport interventions should address the complete transport picture, looking at mobility as an integrated solution along with complementary transport infrastructure and means of transport. Inclusive, participatory methods involving all stakeholders are essential to determine infrastructure priorities, appropriate locations for facilities, and suitable means of transport. A recent review of efforts to promote local transport solutions (Starkey 2001b) highlights the importance of participatory processes in planning, implementing, and evaluating promotional programs. Promotion and subsidies have little long-term effect unless the transport means being promoted are appropriate to the environment and to people's real and perceived needs (box 9). Programs often have disappointing outcomes when they promote specific transport means (rather than a range of options) and fail to distinguish between aspirations and realistic economic possibilities.

Setting Priorities

Promoting rural transport services to meet the needs of rural areas thus first requires setting priorities in light of needs and resources. Resources must then be mobilized at the national, provincial, and community levels. Policymakers and project planners need to understand and resolve conflicting demands, focusing resources on areas where improvements are most important for economic development or social equity. Needs assessments should take into account poverty reduction criteria, and planning should take a gender-sensitive approach and consider issues important to disadvantaged groups.

In assessing stakeholder needs, planners should involve as many transport users and service providers as possible to understand their diverse perspectives and preferences (box 10). Some preferences may be incompatible, and conflicts need to be addressed transparently and equitably. Collaboration between stakeholders should be encouraged from the outset. National

networks, linked to international networks, can provide stakeholders with more options and should be an integral part of transport planning.

Box 9 Cycle trailers for women in Ghana generate euphoria, then disappointment

Trailers pulled by bicycles exist in small numbers in most parts of the world, but nowhere are they common. Cycle trailers increase the weight and volume that can be safely carried by a bicycle. They are also detachable, allowing the bicycle to be used normally. During the 1990s cycle trailers were promoted by development projects in India, Sri Lanka, and elsewhere, but they never achieved critical mass. In northern Ghana cycle trailers were promoted for use by women, but they proved inappropriate and have not been widely adopted.

1987: Consultants recommend promotion of cycle trailers in Ghana, suggesting potential demand for 36,000. The Transport Rehabilitation Project, supported by the World Bank, initiated a pilot project.

1991: Bulk quantities of cycles and trailers were supplied by two NGOs. Generous subsidies and credit terms were designed to encourage rapid adoption by women. The first users were described as “ecstatic.” Two workshops in Tamale were given assistance to start commercial production.

1992: The World Bank published initial project experiences as a positive case history: “Rural women have been the main beneficiaries. Reception of these...trailers has been enthusiastic.”

1993: A consultant reported that the cycle trailers were not popular with women. The main reasons: they were expensive and did not work well on village footpaths.

1994: A Ghanaian researcher concluded that cycle trailers were an inappropriate means of transport and that the initiative was a failure. The trailers were not strong enough to carry large loads and were heavy to pull when loaded. Most women did not own or use bicycles. Most important, a normal bicycle was more flexible and capable of carrying significant loads, and was half the price of a bicycle and trailer combination.

2000: In northern Ghana, men were rapidly adopting bicycles. However, no cycle trailers were being manufactured and none were in regular use by men or women. Despite the lack of adoption of cycle trailers, some of the early optimistic reports were still in circulation, and transport professionals in several countries (including Ghana) were under the mistaken impression that this cycle trailer project had been successful. One case history disseminated at this time still stated: “Women have taken enthusiastically to bicycles and trailers.”

Source: Howe and Barwell 1987; World Bank 1992, 2001; Salifu 1994; Starkey 2001b, c.

Transport planners should also survey existing services and resources through some type of participatory rural appraisal (sample terms of reference for such a study are provided in annex 1), working with target groups to choose interventions appropriate to the local environment and transport constraints. Density of demand, income levels, infrastructure provision, regulations, and culture significantly affect the level, price, and type of transport services provided.

Prioritization in terms of demand density will depend on policy objectives. Short-term political and economic objectives tend to favor high-density areas. But objectives of poverty reduction, social equity, and long-term development warrant interventions in low-density areas. The challenge for transport programs is to identify and support the most appropriate

interventions that can be undertaken by different stakeholders. In cases where low- and high-density conditions coexist, mixing and matching will be required to find the right combination of interventions for each.

Box 10 Choosing means of transport with rural women in Madagascar

In Manakara, Madagascar, the NGO Lalana developed a pilot project to help rural women acquire intermediate means of transport. Initially, Lalana planned to introduce small numbers of wheelbarrows, rickshaws, and tricycles. But discussions with the women identified infrastructure as a limiting factor. On narrow, steep paths no viable alternatives to head loading could be identified (there were no donkeys in the area). On wider paths and tracks possibly affordable means of transport included animal-drawn carts, wheelbarrows, handcarts, and cycles.

Animal-drawn carts were not used in the area, however, and were relatively expensive and complicated for individual women. And although men used wheelbarrows to transport wood, women considered them expensive. Still, 20 wheelbarrows were loaned to assess their value for women's transport tasks.

But if paths are wide enough, two-wheel handcarts are better than wheelbarrows, offering greater stability and higher load capacity with less discomfort. Although the prices seemed high, the women were interested in the two-wheel handcarts used in West Africa. It was suggested that 20 handcarts be provided on credit to assess their viability.

The women were also interested in tricycles and in the load-carrying potential of bicycles. Some women in Manakara rode bicycles, but tricycles are not used by women or men anywhere in Madagascar. Elsewhere, tricycles generally become established in urban areas by male operators, then spread to periurban and rural locations and use by women. The women agreed that it was better to start with bicycles, and 20 were introduced to help create a critical mass of users. The bicycles should have a more sustainable impact than the five tricycles initially planned. In addition, a pilot project was developed for an urban location to investigate the potential for tricycles in Madagascar. If the project succeeds and a critical mass develops, tricycles may be introduced to Manakara and eventually to surrounding villages.

Source: Lalana 2000; Starkey 2001a.

In determining priorities for interventions to improve rural transport, planners should assess:

- Level of economic demand for transport (relating to household budgets and opportunities for production, marketing, and employment).
- Costs of means of transport and operating inputs.
- Competition in transport markets.
- Existence of a critical mass of users and service providers.
- Type and quality of infrastructure.
- Availability of a range of appropriate and affordable means of transport.
- Policies, regulations, and government budgets.
- Impact of culture and gender relations on demand and use patterns.

Implementing Programs and Pilot Activities

Once interventions and intended beneficiaries have been decided, pilot activities can be targeted to promote intermediate means of transport (motorized or nonmotorized) to enhance local productivity and complement longer distance motorized transport services. Involving stakeholders in monitoring and evaluation is also important, and findings should be widely shared to expedite learning and progress. The results of monitoring and evaluation of transport programs in different areas or countries can benefit all programs.

Encouraging Networking

Because of the magnitude of rural transport problems, the number of stakeholders, and the need for diverse interventions, broad national and international networking should be encouraged. So should local formal or informal networks (transport forums, national or provincial steering committees), which link disparate groups of people and involve them in planning, implementation, monitoring, and evaluation. Interactive exchanges through correspondence, visits, and workshops should facilitate constructive criticism, which is vital for learning, improving programs, and developing effective policies. Linking programs and organizations in different areas and countries provides mutual benefits, allowing stakeholders to learn of different rural transport options. Collaborative monitoring and evaluation can yield numerous benefits.

Promotion of rural transport services thus requires an inclusive, holistic approach that involves all stakeholders in a participatory process of assessing needs within a policy framework. Based on this process, governments and project planners can take steps in three areas to promote private provision of rural transport services: financial, regulatory, and complementary actions.

FINANCIAL CONSIDERATIONS

Among the main financial considerations for transport policymakers and planners are credit and subsidies for transport vehicles, operating incentives to encourage the provision of services in rural areas, and mechanisms to strengthen private supply, distribution, and maintenance systems.

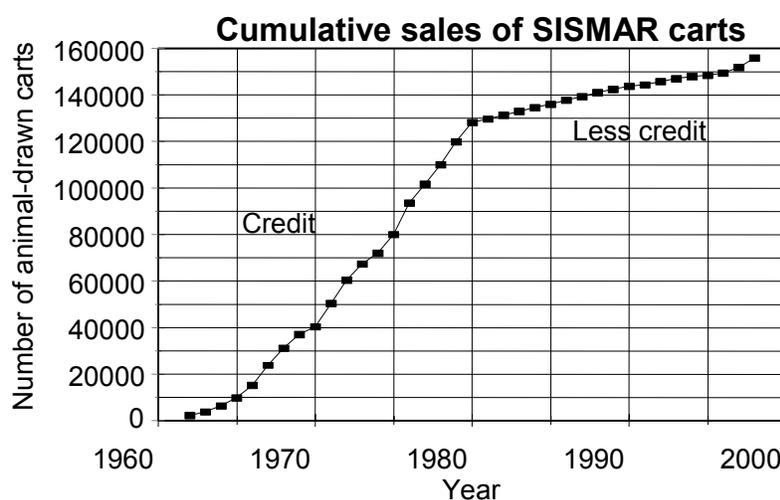
Credit and Subsidies

Where even the simplest of transport technologies can represent a significant portion of a poor person's annual income, the availability of credit is an important component in encouraging adoption and the move toward critical mass. Credit interventions are most likely to be required when transport interventions are intended for poor people and rural residents. Where possible, credit facilities should be available to meet appropriate need whether for motorized or nonmotorized vehicles.

Credit can dramatically speed the adoption of intermediate means of transport. The pattern of growth in sales of animal-drawn carts in Senegal (box 11) and Zambia shows how, in the absence of institutional credit, cart sales slowed.

Box 11 Large-scale cart production in Senegal affected by credit policies

The spread of animal-drawn carts in Senegal is associated with the wide availability of good axles and components and the availability of credit. In 1960 Siscoma built a factory to manufacture carts. But with government support, the Sismar Company was formed in 1981 to take over and diversify the factory and agricultural implements in Senegal. Sales were high in the 1960s and 1970s, boosted by agricultural credit schemes. The sudden termination of credit in 1980 caused sales to fall dramatically, leading to Siscoma's bankruptcy.



Since 1960 Sicoma/Sismar has sold more than 150,000 carts. It has also supplied separate axles and components. Sismar carts are strong but relatively light and easy to pull, and their design has been copied by many other manufacturers in the region. Sismar carts and their clones have a critical mass of users, making it easy for traders to stock spare parts and for artisans to provide repair services. In many other countries in Africa and Latin America, the adoption of carts has been constrained by a lack of credit and a shortage (in rural areas) of appropriate axles.

Source: Havard and Faye 1988; Sismar 1999; Starkey 2001b.

Access to credit for vehicle purchases varies considerably. In Pakistan credit from extended family networks and from other agents in the freight business helps maintain the efficiency of motorized transport services. Credit is made available on a hire-purchase basis. Although effective interest rates vary widely, the average is about 20 percent (inflation is about 8 percent), and the rate of default appears to be low. Elsewhere, organizations have used credit to improve access for users with few resources. Innovative credit schemes have enabled women with little cash to own various means of rural transport.

In rural Sub-Saharan Africa, however, access to credit for transport is almost nonexistent, from formal or informal sources. Where credit is available, it is usually associated with targeted donor programs offering subsidized loans for particular means of transport. Some loans for expensive means of transport (such as tractors) have been made to groups, but the programs have had limited success.

Agricultural credit programs are seldom designed to provide loans for transport purchase, and seasonal agricultural loans are unlikely to be large enough nor the terms long enough for the purchase of means of transport (motorized or nonmotorized). One cost-effective way of increasing credit for transport would be to increase cooperation between agricultural and transport agencies, allowing resources from the transport sector to be “piggy backed” onto agricultural credit programs. A good model is Thailand’s Bank of Agriculture and Cooperatives, which lends for a variety of agricultural and transport machinery. This concept could be expanded to bicycles and animal carts.

Providing credit for specific means of transport can distort markets, however. Users may opt for the means of transport being promoted with credit rather than something that better meets their needs. The same lessons apply to subsidies. Subsidies can help launch new means of transport, but they are not always necessary or, in the case of unsuitable means or transport, sustainable (see box 9 on the experience with cycle trailers in Ghana). Subsidies tend to distort markets, and alternative means of transport may be unfairly disadvantaged. Subsidies on expensive formal sector and imported products create unfair competition with cheaper informal sector and indigenous products.

Operating Incentives

Creative solutions may be needed to ensure that remote rural areas in developing countries have adequate transport services. Operating subsidies are a common solution in high-income countries and may be appropriate for some areas in developing countries. Other solutions may include price incentives (through the tax system) to establish services based on new means of transport.

Indirect subsidies are widely used by government, donor projects, private firms, public projects, and NGOs. These include subsidies for training, preparing for manufacture (costs of tools and jigs), and pricing the initial outputs as if they had benefited from the economies of scale of large-scale production. Vehicle producers do not initially try to recover product development costs. Early models, produced by expensive small-batch production techniques, are costed as if they were part of larger runs with materials and components obtained in bulk. In pilot marketing arrangements, distribution costs and the value of staff time and travel needed for early product support and promotion are not reflected in initial prices.

Subsidies may be the only way to establish rural transport services in poor areas with low density of demand. Subsidies or cross-subsidies may also be needed to maintain a minimum level of service on social grounds. High-income countries have used a variety of transport subsidies to ensure passenger transport services at reasonable fares. The U.K. government has

used fuel subsidies for buses and bus grants for rural routes. Some local authorities have provided specific route subsidies.

In developing countries most transport subsidies have been designed to protect (richer) urban populations from higher prices. Because rural transport is more informal and largely supplied by the private sector, rural transport operators have not received as many direct operating subsidies as their urban counterparts.

One way to implement operating subsidies is to license a number of routes together and require operators to bid competitively for the market. Groups of operators could be encouraged to form companies to bid on routes. Route frequencies, fares, and subsidy amounts would be made explicit during bidding and negotiations. Operators could compete to supply the service, specifying the minimum subsidy they would need to operate the route. Where direct competition is not possible, efficiency can be increased through a contract to supply the service. Competition occurs before the contract is signed and when the contract is up for renewal. This approach provides an alternative to detailed regulation. Lower fares and tariffs and regular service would encourage an expansion of the market since greater certainty would lead to greater use (for crop marketing, job seeking, and so on).

One drawback to this approach is that once the bid is accepted and service begins, further competition may be curtailed. Furthermore, to guarantee service on routes with low demand, the operator may require protection from competition on profitable high-demand routes. In rural locations this may be hard to enforce, however.

Subsidizing services does not always help the people who need it most. The main beneficiaries are usually the richer segments of the population, who are the most frequent travelers. Although this is unlikely to be a problem when subsidizing specific services to remote rural populations, it can be an important consideration where one overall subsidy is provided to a network of suburban and rural routes.

In the current environment, subsidies are unlikely to play a large role in rural transport services. But they should be examined as a solution to providing transport to remote locations where there is no regular service or where service frequency is measured in weeks or months.

Another way to increase demand is to lower taxes and duties, since the adoption of means of transport is strongly influenced by cost. It is much more costly to operate vehicles in rural areas than in other areas. Infrastructure is poor, distances are long, demand is dispersed, and incomes are low.

Reducing the capital costs of motor vehicles by reducing taxes and duties may dramatically increase the number of vehicles but may not have much effect on their availability in rural areas. But combining such measures with subsidies that lower the variable costs of operation may persuade some operators that rural operations are worth undertaking. Fuel is a major component of variable costs. Relief from taxes and duties on spare parts would also provide incentives to rural operators, but it may be difficult to target benefits to rural operators.

The case for reductions in taxes and duties on vehicles (and spare parts) used mainly in rural areas is easier to make. Such measures can be used to promote intermediate means of transport; for example, imported bicycles, cart axles and related materials (new or used) could be exempt from import duties and taxes. When Pakistan and Sri Lanka adopted such policies, the number of tractors and power tillers used for transport increased considerably.

Supply, Distribution, and Maintenance Systems

Low use of intermediate means of transport in remote rural areas is often linked to a vicious circle of low demand and low supply. There are many cases of improved supply of vehicles and spare parts stimulating demand and leading to more rapid adoption.

The first step in increasing availability is identifying the limiting factors. These may be components and raw materials (local or imported), manufacturing facilities and skills, design of transport vehicles, capital availability, or marketing systems. Each may have to be addressed.

In some cases supply shortages can be overcome by training artisans. But in many cases that will not be enough. Technical training may need to be combined with credit and training in marketing and managing a small business.

In many low-density areas, supply problems may be linked to the weak purchasing power of users, particularly women. Suppliers will not invest in manufacturing or stocks if they do not believe there is an economic market. In such situations, increasing rural purchasing power through credit programs, income-generating schemes, or subsidies should stimulate both demand for and supply of transport services.

The private sector could be used to source low-cost vehicles from around the world. Means of transport and spare parts have different prices and specifications around the world, and these significantly influence operating costs and transport charges. Major savings could be achieved by importing local transport solutions such as bicycles, because mass-produced imports are available for a fraction of the price that a small local industry can achieve. Imports could also limit the power of the monopolistic vehicle dealers found in some countries. Local assembly of cheap imported components is also an option.

REGULATORY CONSIDERATIONS

Transport services require planning and regulation to operate effectively, particularly in the case of interventions for low-density areas and disadvantaged groups. But regulators and planners often lack resources and staff. Insufficient information and understanding can be key constraints to coherent, effective rural transport policy and regulation. Transport interventions rarely address intermediate means of transport or use participatory processes or gender analysis. Progress is slow because planners fail to build on earlier experiences and lessons from other countries, and cross-sectoral collaboration is rare.

Regulating Transport Operations

Liberalization does not necessarily mean abolishing all regulations and controls. At its most effective, liberalization helps harness competitive forces to provide market-oriented services under quantity and quality controls designed to reduce constraints to entry and make the sector more responsive to the market. In some countries, however, liberalization has led to the abolition of effective regulations, to the detriment of the traveling public and transport operators.

There are four main areas where effective regulation can support an efficient transport system:

- Quantity controls to ensure a reasonable matching of demand and supply.
- Quality controls to ensure minimum safety levels for passengers and other road users, as well as adequate environmental protection.
- Regulation of intermediate means of transport, including issues of animal welfare.
- Regulation to ensure fair competition and guard against the formation of strong cartels that prohibit entry or collude on price and routes.

In urban areas quantity controls involve limiting the number of vehicles and operators allowed to operate on routes and throughout the network to avoid excess capacity and to prevent operators from competing only on the most lucrative routes. By contrast, the main issue for rural transport is how to increase service frequency. When operator associations impose quantity controls, even rural areas may be affected because the controls restrict the routes on which vehicles may travel and artificially restrict supply by enforcing queuing for passengers and loads. The result is infrequent service and vehicles so overloaded that they often do not stop to pick up new passengers. Governments may need to intervene to increase service frequency by stopping the practice of queuing for loads.

Quality licensing is also required in a liberalized environment, to protect passengers from overloaded and nonroadworthy vehicles. Licensing is also a way to ensure that operators have adequate passenger insurance. Overly stringent quality licensing, however, may improve vehicle safety at the expense of reduced service frequency or higher fares.

In contrast to the weak regulation of motorized transport services, there is sometimes excessive control over intermediate means of transport. Some transport authorities prohibit certain modes of transport that they perceive to be backward. This was said to be the case with the banning of cycle rickshaws from Calcutta (India) and Jakarta (Indonesia), animal transport and cycle rickshaws from Islamabad (Pakistan), horse taxis from Addis Ababa (Ethiopia) and Bamako (Mali), and donkeys from parts of South Africa (ITDP 1996; Starkey 1995).

It is common for nonmotorized vehicles to be banned from major roads because of safety risks. Regulation of intermediate means of transport should cover basic safety devices such as reflectors. More important, intermediate means of transport can be improved through planning and appropriate infrastructure (Guitink 1996; Vidanpathirana 1999; Litman and others 2000). The creation of separate lanes or routes for bicycles and other small or slow-moving vehicles can be particularly valuable. Bicycle lanes are found in cities around the world, from Amsterdam to

Beijing. In Bamako a recently constructed road bridge and its access roads have separate pedestrian pavements and cycle lanes. Some Indian cities have separate lanes for pedestrians, cycles, rickshaws, and motor vehicles.

Such infrastructure has important planning and cost implications, as well as social and economic benefits. Attention to social and poverty reduction criteria ensured that international credit for the Jamuna road bridge in Bangladesh was made conditional on the inclusion of lanes for intermediate means of transport.

Protecting the welfare of transport animals requires a combination of education, legislation, and enforcement. Some countries have animal welfare laws, but few have active enforcement systems. Cuba recently introduced legislation to protect animals while promoting efficient, regulated transport services (box 12). People need to be convinced of the value of animal welfare and safety, with consistent enforcement to ensure compliance. Nongovernmental animal welfare organizations have an important role in highlighting issues and lobbying for enforcement.

Box 12 Regulation of animal-powered and cycle-based transport services in Cuba

During the 1990s, Cuba experienced a resurgence in horse-drawn transport services and a proliferation of tricycle taxis. Private individuals operated most of these without any regulatory framework. Resolution 97 of the Ministry of Transport of 24 March 1997 decreed that transport operation licenses were required for persons offering transport services (passenger or freight) using horse-drawn carriages and carts and human-powered bicycles and tricycles. Ox carts were not included. By 2000, licenses had been granted for 16,000 animal-drawn vehicles including 6,000 four-wheel carts (mainly freight transport) and 10,000 four-wheel buses and carriages (mainly passenger services).

To obtain a license, the vehicle had to have an inspection of road-worthiness and the owner had to have a valid civil responsibility insurance policy. Operators of horse-drawn vehicles also had to produce certificates confirming legitimate ownership of the animals and their good health. Animal protection was included in the regulations: only horses between 3 and 20 years old could be used, and the maximum permitted load was 8 people or 500 kilograms of cargo for each horse or mule used.

Source: Valdés 2001.

Regulators can also play an important role in ensuring a level playing field for operators and in monitoring the quality and price of services. A regulatory authority can guard against anticompetitive practices and take action against them once legislation has been put in place.

Regulation can contribute to efficient transport systems only if there is effective enforcement and the planning information needed for sensible interventions. This requires adequate resources and cooperation between relevant authorities. If there is to be effective regulation to meet user need, there will have to be considerably more emphasis on strengthening the capacity of ministries of transport.

Increasing Operator Efficiency

THE BARGAINING POWER OF TRANSPORT USERS. Rural communities are a captive market for transport operators because they have no choice of service providers and no means of pressuring operators to change their practices or lower their prices. Communities can increase their bargaining power by establishing user groups to negotiate with operators and lobby the government. User groups might include local government representatives, community leaders, farmers groups, cooperatives, and marketing people. Such groups need to be informed about what they can realistically expect from rural transport service providers.

TRANSPORT ASSOCIATIONS AND A COMPETITIVE ENVIRONMENT. Increased competition can increase vehicle use, operational efficiency, and customer satisfaction. Transport associations, unions, and informal cartels often control the market for transport services by setting fares, routes, and commission charges and requiring queuing for loads. This setup often leads to underused vehicles and inefficient operating practices.

But while transport unions and associations can cause distortions in the market for transport, they have important roles to play. They can:

- Represent the interests of rural transport operators and passengers.
- Promote safer, more comfortable rural transport.
- Train rural operators in vehicle maintenance and business management.
- Lobby government to recognize the importance of intermediate means of transport.
- Lobby government to grant price incentives to rural operators (such as tax rebates on fuel).
- Allow members to set prices according to their operating costs and not dictate fares, while ensuring that exploitation is not occurring.

The challenge is how to convince associations that their industry would be better served by adopting different operating practices. This can be done by:

- Fully involving associations in discussions on how to increase the efficiency of transport services, explaining how the efficiency savings will benefit both operators and customers.
- Explaining how increasing vehicle use and improving vehicle maintenance can reduce operating costs.
- Providing training for operators that includes vehicle maintenance and simple business management techniques. Funds for training programs could be channeled through associations to encourage ownership.
- Informing passenger groups and other transport users of the potential benefits of a more deregulated market and of the exercise of political influence.
- Explaining the value of more professional vehicle services (box 13).

Study tours could be arranged to allow stakeholders to learn from the experiences of others (box 14).

Box 13 Increasing the professionalism of the transport industry

Urban taxis in Peru

Large numbers of taxis, poor customer service, and heavy congestion led the municipality of Lima to improve the professionalism of its taxi service. It introduced licensing, vehicle inspections, standard taxi markings, and 95 official taxi stations. The municipality also provided discounted spare parts, free breakdown services, and better credit facilities, as well as a three-year training program that covers public relations, English language skills, first aid, and tourist information. These efforts have resulted in considerable benefits for taxi drivers, raising their incomes by 50 percent.

Rural trucks in Zambia

Zambia's Transport and Public Association draws its members from private truck operators who drive mainly from provincial and district centers to rural areas. The association encouraged its members to put seats and canopies on the backs of their trucks to increase passenger comfort and safety and helped members obtain new, more efficient vehicles and provide good service. Because of Zambia's queuing system, however, these vehicles often wait their turn behind old, uncomfortable, and unsafe vehicles.

Source: Ellis 1997.

Box 14 Competition influences rural transport in Cameroon

Competition can lead to better, safer, and cheaper rural transport. Surveys in southern and northern Cameroon found that motorized rural transport and interurban transport were cheaper in the north. In Muyuka District (south) passenger fares were between 53 percent (for 10 kilometers) and 370 percent (for 200 kilometers) higher than in Ngoundere District (north).

In Ngoundere operators form transport agencies that operate from specific bus parks and have strict rules on vehicle quality. A technical committee inspects the 32-seat buses before allowing them to operate. If enough passengers complain, drivers can be fired. Competition is stiff because local mayors allow several agencies to operate from their towns. In just two years transport charges dropped 40 percent.

In Muyuka operators form transport syndicates, which operate like the agencies but without competition. Vehicles are generally overloaded cars in poor condition, all operating from the same bus park. While many factors may explain the differences between the north and the south, the lack of competition may be especially important.

By using networking, the key stakeholders in Cameroon could be sensitized to the different approaches. Study tours could be arranged to allow the different operators, syndicate representatives, officials, and user representatives to see and discuss how motorized transport systems can be organized.

Source: Lisinge 2001.

TRAINING AND SUPPORT SERVICES. Training and capacity building are needed to develop intermediate means of transport, participatory processes, and gender analysis. Education and media promotion efforts can increase acceptance of bicycles, animal power, and other nonmotorized means of transport. In addition, studies should be conducted on user needs and transport constraints, and national and international networks should exchange knowledge, ideas, and experiences. The International Forum for Rural Transport and Development (IFRTD) is an international network that assists such information exchange (IFRTD 2001a).

Getting the most out of efforts to improve rural transport services requires an educated workforce that understands the business of operating a vehicle. Vehicle operators and owners require training in three basic areas:

- Vehicle maintenance and operations, explaining the benefits of routine maintenance and slow running.
- Business management, increasing awareness of vehicle operating costs and the importance of long-term planning and making drivers responsible for keeping records and finding business.
- Customer service, which is especially important in a competitive environment, where customers have a choice of transport services.

For vehicle operators to have confidence in their ability to provide a service, they must have access to repair services. Rural areas need small-scale enterprises to repair and maintain vehicles and where appropriate to make spare parts and modify vehicles. These entrepreneurs will also need training in technical and business skills.

COMPLEMENTARY OPTIONS

Promoting rural transport services also requires complementary actions to develop adequate interconnected infrastructure, encourage use of transport brokers and communications technology, create rural markets, and improve urban terminals.

Interconnected Infrastructure

Rural mobility depends on good rural transport infrastructure (roads, paths, footpaths, bridges) as well as good, low-cost transport services. Two previous publications in this series provide in-depth analysis of appropriate design standards and a framework for improving the management and financing of rural roads and tracks (Malmberg Calvo 1998; Schelling and Lebo 2001). For transport services in rural areas, the priority must be maintaining basic year-round access for the types of vehicles likely to be operating. The quantity of access is even more important than the quality.

In providing access to remote rural communities, road engineers and planners often try to minimize costs by avoiding redundancy (having more than the minimum number of links and length of road on a road network). One result is that rural feeder road networks have many dead-

end routes. The end may occur at a town or village or at a natural obstacle such as a river or mountain. Some dead-end routes exceed 100 kilometers, as in the northern and eastern provinces of Zambia. For transport operators these routes pose a higher risk of low load factors and revenues than routes with redundancy. The costs of a breakdown are also higher.

The benefits of providing interconnected routes increase as the length of road increases. Interconnected routes help maximize potential demand for transport services. There is less chance of poor load factors, and rural communities can respond to a wider range of market opportunities. With through routes, traffic volumes will increase because of greater demand and because operators can travel a route looking for customers with less risk of an empty return journey. And with a higher number of transport operators using a route, competition in the provision of transport services is more likely to become established.

Transport Brokers and Communications Technology

Efficient transport systems rely on good communications to match vehicles and loads. Good communications are particularly important in low-demand areas, where it is not viable for operators to travel on the off chance that they will pick up a load. Most rural communities have little or no communications with the outside world, but as the costs of mobile communication devices fall, these devices will complement road improvement schemes and transport services.

A good communications system makes possible effective transport broker services. To be most effective, a brokerage service needs a nationwide network of brokers who are in continual contact with transporters and clients. Although transport brokers have traditionally met the needs of long-haul vehicles, rural communities with infrequent vehicle service needs could contact brokers when they require transport.

Provision of Rural Markets

There is a synergy between marketing and rural transport (box 15). Efficient transport services promote efficient marketing systems, and rural markets promote efficient rural transport services under two conditions:

- The markets are close enough to rural communities that intermediate means of transport can be used.
- Rural people can sell directly in the markets without the need for traders and wholesalers.

Markets bring together goods and people, concentrating demand for transport (box 16). In low-density areas populations and markets are dispersed, making for long average distances to market. If distances are too long, people are less likely to make market trips, and demand may be insufficient for viable transport services for some means of transport. Thus in countries such as Bangladesh and Cambodia much of the rural road network is planned around market centers to maximize the benefits of transport investments.

Box 15 Ox carts, transport demand, and marketing in Zambia

Between 1985 and 1994 a project introduced ox carts in a remote, low-density area of northwest Zambia. During participatory appraisal surveys, farmers identified marketing as a key constraint to agricultural development and lack of local transport as a constraint to marketing. Thus the project established rural market depots and introduced ox carts, suited to local conditions, so farmers could transport maize to the depots. Farmers adopted carts quickly, aided by extension and credit. The income from maize sales and cart hire enabled repayment of the loans.

The marketing depots and ox carts boosted economic growth in the area, further stimulating transport demand. More maize was grown, providing more work for the ox carts, and farmers marketed more fruits and vegetables. Many other goods were also transported; carts collected water and firewood and sometimes acted as ambulances. Some people used their carts to trade between villages, increasing the circles of trade and marketing. By 2001, 10 years after the end of significant donor support to the project, ox carts had become a regular part of rural life and in some ways had achieved critical mass. However, oxen and ox carts were expensive, and shortage of credit limited cart production and sales, so that the number of new carts in use was quite low.

Source: Starkey, Dibbits, and Mwenya 1991; Löffler 1994; Lukungu 2000.

One of the most effective ways farmers have of getting the best price for their produce is selling it directly to final consumers at rural or urban markets. Traveling wholesalers, traders, and large public or private marketing companies reduce farmers' bargaining power. Direct marketing by farmers limits the power of marketing cartels. Farmer markets should be encouraged close to urban transport terminals, where farmers can sell their produce without being disadvantaged or harassed.

Importance of Urban Terminals

Rural and urban transport are inextricably linked. Rural transport planning should take into account the facilities and location of urban bus and truck terminals. Most medium- and long-distance rural trips are to urban areas. Many of the motorized vehicles used in rural transport are owned, housed, and run from urban locations. Thus the way that urban bus and truck parks are operated has a profound effect on rural transport services.

As noted, in many parts of the world transport unions and cartels control urban and rural bus and truck parks to restrict competition and keep fares high. Because of high charges for parking and loading in Phnom Penh, Cambodia, for example, some long-distance bus parks have been established far outside the city. As a result people pay extra to use motorcycles, motorcycle trailers, and other means of transport to travel the 10-15 kilometers from the city center to out-of-town bus parks. This setup is inefficient, expensive, and contributes to congestion. Efforts to improve urban terminals should involve operators and urban authorities, taking into account the implications for both urban and rural transport.

Box 16 Transport costs, agricultural development and impact of rural markets

High costs for transporting commodities short distances can impede agricultural development and reduce household profits. If family labor is used to carry goods from fields to roadsides or villages, there are opportunity costs in time and effort. If labor is hired, there are out-of-pocket costs. There is also evidence from many countries that crops remain unharvested, or are spoiled after harvest, because of an inadequate supply of vehicles at harvest time. Better transport lowers the costs of getting produce to markets, increases efficiency, and reduces crop waste. For example, it is often assumed that a 1 percent increase in farmgate prices leads to a 1 percent increase in production (an agricultural supply elasticity of one). Thus if the cost of transporting goods to an urban market is equivalent to 30 percent of farmgate prices, a 20 percent reduction in transport costs (if passed on to the farmer) is equivalent to a 6 percent increase in farmgate prices, leading to a 6 percent increase in agricultural output. Ensuring more efficient rural transport services and vehicle operations (in the various ways discussed elsewhere in this publication) should lower transport costs for agriculture, industry, and personal movement.

Weekly markets in Mali

Much rural transport in Mali is associated with weekly markets. Villages and towns have regular market days, with each market serving a group of villages, most within 30 kilometers. Villagers usually walk to their market or use intermediate means of transport, though some motorized services go around villages on market days to transport people and goods. Traders use motorized and intermediate means of transport to travel between markets, which can be 50 kilometers apart.

Low density of markets and centralized transport service in Zambia

Zambia does not have the same system of nearby weekly markets as Mali. Formal rural markets are scarce, distant, and concentrated at district centers. In the low-density eastern and northern provinces the average distance to market is 40 kilometers. Large companies dominate agricultural marketing, sending large trucks to deliver inputs and pick up produce. This pattern takes away potential work from local transporters and contributes to the vicious circle of low demand and infrequent, expensive transport services.

Increasing the density of markets with periodic mobile markets in Honduras

In the municipality of Guinope in Honduras, the nearest market was 60 kilometers away in the capital, Tegucigalpa. Although horses and ox carts were widely used for local transport, the market was too far away for most people. As a result people had to rely on traders to sell their produce. Communities felt that they were being exploited and so created periodic mobile markets that were advertised on the radio. As a result markets were within reach of intermediate means of transport, allowing direct contact between farmers and buyers.

Source: Ellis and Hine 1998.

ANNEX 1. TERMS OF REFERENCE FOR A COUNTRY STUDY OF RURAL TRANSPORT SERVICES

This annex provides generic terms of reference for a study on rural transport services and intermediate means of transport. The details should be adjusted to the circumstances of the country or area being studied.

BACKGROUND

These terms of reference focus on a survey of rural mobility in a particular country or region with the aim of developing a strategy or interventions to improve rural transport services. They set out a situation analysis, including the actual use of and the assessed demand for rural transport, try to identify constraints to the provision of rural transport solutions, and develop a strategy to mitigate these constraints in order to promote affordable transport solutions for the rural poor. The survey should address the whole range of transport provision relevant to the area, including motorized and nonmotorized means as well as transport services and private transport.

COUNTRY CONTEXT

The lack of rural transport solutions is frequently identified as a major constraint to rural development. Transport services and infrastructure are often poor or lacking, and planners generally have not taken an integrated approach to the problem. They have traditionally focused on improvements to transport infrastructure, usually roads, as the principal remedy, on the assumption that private initiative would respond to the resultant demand for mobility. However, there are often problems that impede the development of this private initiative, so the supply and quality of transport services are unsatisfactory. Evidence from development projects funded by the World Bank and other donors shows that good roads do not necessarily mean good transport services. Indeed, it is common to see good quality roads used mainly by pedestrian and nonmotorized means of transport in developing countries.

Government policy and regulation of the market for transport services as well as transport associations and unions might impede the provision of rural transport services. Often an urban-rural imbalance can be observed. Queuing for loads at truck parks on certain urban or interurban routes with a scarcity of services on rural routes is common. As government interventions in transport services have declined, private cartels have sometimes taken their place, creating significant distortions in transport markets. This combined with other factors leads to three to

five times higher transport charges in Africa than in Asia. Lower charges would increase the effective demand for transport services from rural communities.

Private transport services such as bicycles, carts, animals, and motorbikes are often underused by the rural poor and the most vulnerable, including women, who, in many parts of the world, have the main responsibility for transporting goods. Use is limited partly by sociocultural factors, high costs, and lack of supply, maintenance, and spare-parts in rural areas. Lowering taxes on transport vehicles has been shown to increase the number of vehicles, while promotional efforts such as credit, awareness raising, and training have increased their use.

OBJECTIVE OF THE STUDY

The principal objective of the study is to identify the problems in rural mobility in a country or region that are hindering development and to develop a strategy that can alleviate these problems. The study will be used by policymakers, task managers, program officers, community planners, and nongovernmental organizations (NGOs) to enhance the provision of transport services. The situation in the area should be outlined and a plan of action described that details who is responsible, the proposed timeframe, and potential pitfalls.

SCOPE OF WORK

The study will survey the current situation in rural mobility, transport services, and means of transport within and outside the specific region or country to draw lessons from similar cases. The study should consider different transport solutions based on conditions and potentials and should integrate transport services and infrastructure, though the interventions should focus on the means of transport. Due to various standards of roads and population density on a specific route, the study must also consider the linkages between motorized and nonmotorized transport. The study should present the rationale and justification for improving rural mobility and review its contribution to the objectives of increasing agricultural productivity and rural welfare and to facilitating access to economic and social services.

The report could be divided into three sections. The first would examine the existing situation to increase the understanding of prevailing conditions of use, supply, and demand in rural transport, means of transport available, laws and regulations, tradition and culture, and so on. The second section would highlight the constraints and problems in the provision and use of rural transport. The third section would outline a strategy for undertaking programs and activities to promote and develop rural mobility. The strategy should identify and address the players who can contribute to the development of transport services, such as communities, government, operators, manufacturers, donors, institutions, and NGOs. A number of issues should be addressed under each section; the major ones are mentioned below.

Part 1 Situation Analysis: The Nature of Rural Mobility (Means of Transport and Infrastructure)

This part is an assessment of the variety of transport services in the area and people's access to these and the existing and planned road infrastructure (including larger roads as well as smaller paths and footbridges) and responsibilities for constructing and maintaining it.

- Assess access to facilities and the needs and preferences for transport solutions.
- Identify transport users. Assess demand patterns and any seasonal variations.
- Describe gender and cultural conditions affecting transport needs and usage.
- Analyze affordability and economical options for transport services (income and distribution, available credits and subsidies to purchase vehicles or use services, cost of vehicles, spare parts, maintenance and services, ownership, and so on).
- Assess community awareness and capacity for transport options and potential.
- Review the process of identification, planning, and initiation of transport services; participation of communities and the public and private sectors; involvement of donors, NGOs, and government departments; and impact of policies affecting the sector. Identify stakeholders and their roles.
- Describe the organization of rural transport services by identifying stakeholders, users, operators, cartels, regulatory authorities, and the management of rural transport services.
- Describe the legal framework for the transport sector (such as taxes and duties on vehicles and services).
- Review the rural transport policy (if any) and its implementation.
- Assess the economic efficiency and profitability of transport services including transport costs, vehicle operating costs, and socioeconomic disadvantages or benefits of existing transport options.
- Describe the supply, after-sales services, and maintenance facilities available for the transport sector.
- Analyze safety and environmental problems related to existing transport solutions.
- Study other options to improve accessibility, such as rural markets, health clinics, and other facilities.

Part 2 Problem Analysis: Analyze Problems Related to the Existing Transport Situation

- Access to transport services.
- Affordability and economical options.
- Gender and cultural hindrances.
- Community's degree of empowerment and participation in local government planning.
- Local and national awareness of transport options.
- Local initiatives.
- Transport operations.

- Reasons for lack of services and vehicles, road infrastructure, affordability and critical mass.
- Supplies of vehicles and spare parts and characteristics of the marketing systems.
- Lack of or unfavorable laws and regulations.
- Institutional arrangements and involvement of stakeholders in decision-making.
- Rural markets, access to facilities, infrastructure type and condition.
- Safety and environmental problems.

Part 3: Recommendations

Proposed Strategy for Improving Availability of Transport Means and Services

PROMOTION OF PRIVATE OWNERSHIP OF MEANS OF TRANSPORT

- Outline options for appropriate rural transport services and show how complementarity and diversity can improve rural mobility.
- Provide guidance on appropriate spending for transport services in relation to people served, tonnage handled, increased income from sales, and so on. Consider economical options to enhance affordability and use of transport among the poor (including credit, subsidies, taxes and duties).
- Propose ways to adopt participatory planning and empowerment and explain the benefits.
- Propose ways to enhance human capacity and awareness and to stimulate local initiatives.
- Propose interventions to address gender and cultural obstacles to make transport available to those in need.

PROMOTION OF TRANSPORT SERVICES

- Consider ways to improve the supply and distribution of vehicles and maintenance.
- Consider ways to improve effective demand.
- Outline options for improving safety and environmental conditions.
- Consider economical options to promote transport use (credit, subsidies, taxes, duties).
- Outline options for institutional arrangements and stakeholder involvement.

OTHER OPTIONS

- Consider alternative ways to improve access (rural markets, relocation of facilities, provision of infrastructure).

ESTIMATED CONSULTANT'S INPUT

The consultant's first task will be to draw up an initiating memorandum detailing the questions to be examined, the work methodology, and work schedule. The memorandum will be discussed

and agreed before the beginning of the study. It is expected that the study will require a total of [insert variable] person-weeks. The team should include a transport economist, rural transport specialist, and social scientist.

The consultant will report to [insert client's name]. The consultant will present the initiating memorandum to the client and the task team leader before starting the substantive part of the work. The preliminary and final reports will be reviewed by the client and the task team leader. Comments will also be sought from professionals and institutions with experience in transport, planning, and rural development.

REPORTING REQUIREMENTS

A preliminary report will be produced one month after commencement of the study. A draft final report should be produced two weeks after completion of services. The final report must be provided two weeks after reception of feedback. The consultant will produce [insert variable] copies of each report as well as a diskette of the final report.

ANNEX 2. THREE CONTRASTING RURAL TRANSPORT SITUATIONS

Note: This highly simplified table is designed to illustrate some contrasting features of rural transport services. In reality there is a continuum of conditions. Different areas and situations have their unique characteristics that cannot be directly compared.

Feature	Low density of transport in low-income areas <i>(Relatively unfavorable conditions)</i>	Higher density of transport in low-income areas <i>(Relatively favorable conditions)</i>	Low to medium density of transport in high-income areas <i>(High-income comparison)</i>
Population and income characteristics	<p>Low to medium rural population density</p> <p>Land plentiful, but not necessarily fertile.</p> <p>Agriculture based largely on traditional subsistence crops or extensive livestock</p> <p>Little non-agricultural employment and generally low incomes.</p> <p>Low density of basic services: water, health, education and markets</p>	<p>Medium to high rural population density</p> <p>Little available land.</p> <p>Agriculture involves basic food and cash crops, possibly with irrigation.</p> <p>Diverse rural services serving population and some non-agriculture income.</p> <p>Higher density of basic services: water, health, education and markets</p>	<p>Low to medium rural population density with strong urban-rural connections.</p> <p>Mainly market-based, mechanized agriculture, with many external inputs</p> <p>High incomes, including non-agricultural income.</p> <p>High density of basic services: water, health, education and markets</p>
Transport characteristics	<p>Poor transport infrastructure</p> <p>Low vehicle ownership</p> <p>Low diversity of transport services</p> <p>Intermediate means of transport expensive</p> <p>Transport services infrequent and high cost</p> <p>Transport for 'domestic' tasks (water and fire wood) often lacking</p> <p>Water-based transport may be essential in some localities</p>	<p>Adequate transport infrastructure</p> <p>Medium to high ownership of intermediate means of transport, including motorcycles</p> <p>High diversity of transport services</p> <p>Intermediate means of transport quite cheap</p> <p>Transport services quite available and of low to medium cost</p> <p>Intermediate means of transport may be used for 'domestic' tasks (water/firewood).</p> <p>Water-based transport may be important in some localities</p>	<p>Good transport infrastructure</p> <p>Moderate to high levels of ownership of motorized vehicles and/or intermediate means of transport</p> <p>High diversity of transport services</p> <p>Transport services quite available in areas of high population</p> <p>Cost of rural transport variable, and highly dependant on demand</p> <p>Families seldom need transport devices for water or fuel</p> <p>Water transport seldom important</p>

Feature	Low density of transport in low-income areas <i>(Relatively unfavorable conditions)</i>	Higher density of transport in low-income areas <i>(Relatively favorable conditions)</i>	Low to medium density of transport in high-income areas <i>(High-income comparison)</i>
Areas where applicable	Most rural areas in Sub-Saharan Africa Remote rural areas in Asia (Lao PDR, northwest Vietnam, northeast Cambodia, Mongolia) Remote rural areas in Latin America (Bolivia, northern Peru) Mountainous areas in many parts of the world.	Most periurban areas in Sub-Saharan Africa, North Africa. Fertile rural areas in South and Southeast Asia Periurban areas in the poorer Latin American and Asian countries. High potential highland plateau areas	Periurban areas in the richer Latin American and Asian countries. Large-scale farming belts in Africa Most rural areas of Europe and North America
Examples of specific problems	Isolation from essential social and economic services and marketing options Overcrowding and poor safety Most people lack transport and are isolated due to infrequent and relatively unaffordable transport services Unviable transport operations due to high costs and low economic demand Lack of competition and a regulatory framework in the transport sector Unavailable and/or unaffordable local transport solutions Low use of intermediate means of transport, particularly by women Lack of rural transport strategy and support Poor development of complementary water-based transport systems	Overcrowding and poor safety High pollution Lack of transport coordination Poor legal framework and enforcement Intermediate means of transport not included in the organizational framework Users of intermediate means of transport marginalized by other vehicles Disadvantaged people (elderly, disabled, unemployed) may find transport unsuitable and/or unaffordable Lack of rural transport strategy and support	Rural transport services unviable due to dispersed population and/or high use of private vehicles. Disadvantaged people (elderly, disabled, unemployed) lack transport and are isolated due to infrequent and relatively high cost transport services Users of intermediate means of transport marginalized by other vehicles Lack of rural transport strategy and support

Feature	Low density of transport in low-income areas <i>(Relatively unfavorable conditions)</i>	Higher density of transport in low-income areas <i>(Relatively favorable conditions)</i>	Low to medium density of transport in high-income areas <i>(High-income comparison)</i>
Examples of possible interventions to be considered by transport professionals	<p>Inclusive, participative planning and management techniques involving all stakeholders</p> <p>Subsidies (rural funds)</p> <p>Fundamental reform of transport services sector (strategies, liberalization, taxes and duties), public-private partnerships, competitive tenders for routes and/or areas.</p> <p>Promotion and financial support/credit for production and/or purchase of intermediate means of transport.</p> <p>Development of well-positioned markets</p> <p>Training in the whole sector, including vehicle maintenance</p> <p>Route planning</p> <p>Road spot improvements</p> <p>Combined transport (goods and passengers)</p> <p>Labor-based road works</p>	<p>Inclusive, participative planning and management techniques involving all stakeholders</p> <p>Special routes/lanes for slow-moving vehicles (cycles, animal carts)</p> <p>Improve safety, environment and transport efficiency through better coordination of relevant stakeholders, suitable legal framework and enforcement of regulations</p> <p>Training in the whole sector, including vehicle maintenance</p>	<p>Inclusive, participative planning and management techniques involving all stakeholders</p> <p>Subsidies for rural transport services</p> <p>Transport telematics</p> <p>Improved information systems</p> <p>Combined transport (goods and passengers)</p>

ANNEX 3. RURAL TRANSPORT PROBLEMS, REMEDIES, AND IMPLEMENTATION OPTIONS

Note: This is not a definitive list, but an example of the types of issues that national programs may identify.

Problem	Possible remedies	Implementation options
Transport provision is not user or poverty focused	Increase dialogue and inclusion	Use more inclusive and participative techniques in developing plans, actions and strategies.
	Take a more holistic approach to transport planning	Take a cross-sector approach involving a number of different ministries. The principles and practices of Integrated Rural Accessibility Planning (IRAP) Sustainable Livelihoods Framework analysis may be helpful.
	Incorporate a poverty-focused approach to transport interventions	Plan transport interventions within the wider context of livelihoods, resources, knowledge and rights.
	Address gender imbalances and create greater gender awareness	Incorporate gender analysis in rural transport planning and all interventions.
	Define the transport needs of rural people	Use participatory techniques, focus groups, workshops and interactive surveys to define the different transport needs of rural women, men and children
	Consider special needs and concerns of women	Plan for the special transport needs and concerns of women, including access, design, security, transport routes and schedules
	Consider the special requirements of children	Plan for the transport needs of rural school children and students
	Consider disadvantaged groups	Plan for the special transport requirements of the elderly, disabled or minorities
	Improve small-scale infrastructure in villages (local paths, tracks, footbridges)	Initiate village infrastructure programs and add upgrading of paths and tracks components to conventional infrastructure projects
	Improve basic access through spot improvement	Increase year-round access by targeted low cost spot improvement programs
	Increase overall access by adopting more appropriate standards	Maintain more rural roads year-round by adopting appropriate (lower) standards (low volume roads require only single lane running width)
	Undertake more rigorous monitoring and evaluation	<i>See 'Weak institutions and capacity' below</i>
	Train planners in participatory processes	<i>See 'Weak institutions and capacity' below</i>
Link users and stakeholders through networking	<i>See 'Weak institutions and capacity' below</i>	

Problem	Possible remedies	Implementation options
Low density of demand	Amalgamate available demand	Promote systems of amalgamating loads by coordinating approach across a number of different central and local government authorities
	Increase feeder transport devices	Promote intermediate means of transport. <i>See 'Poor vehicle diversity' below</i>
	Develop new, well-located markets	Improve marketing systems and carefully plan the location of markets
	Improve intermodal links	Identify and improve transport interchanges (such as where waterways and land-based transport meet)
	Increase efficiency of vehicle utilization	Plan for greater interconnectivity in transport routes
	Stimulate information flows	Maximize returns from existing transport through multisector initiatives using information technologies to identify demand and access markets efficiently
	Stimulate additional demand	Introduce programs to stimulate synergy between transport and the rural economy, including enhanced agricultural production and employment creation
	Introduce labor-based road construction and maintenance	Labor-based programs (paid through savings on conventional machinery and fuel costs) can increase rural incomes and transport supply and demand
	Consider rural transport subsidies if access and mobility below minimum standards	Consider direct or indirect subsidies for uneconomic service routes and intermediate means of transport, although subsidies may distort the market
	Stimulate demand through lower costs	<i>See 'Poor competition and poor quality service' below</i>
Poor vehicle diversity	Encourage promotion and use of intermediate means of transport	Apply a coordinated approach with many devolved initiatives involving several ministries, NGOs and the formal and informal private sectors
	Encourage transport use of agricultural power	Promote transport uses (in appropriate circumstances) of animal traction, power tillers, and tractors through ministry of agriculture and NGOs.
	Expand credit provision for purchasers	Work with existing agricultural credit schemes, providing funds for medium-term loans suitable for transport purchases
	Improve credit schemes for suppliers	Work with programs assisting small/medium enterprises to ensure credit and management advice for makers and suppliers of intermediate means of transport
	Improve the image of intermediate means of transport	Supply clear multimedia information to transport planners and educational establishments. Provide better media coverage
	Assist critical mass	Concentrate resources (promotion, demonstrations, media, credit, subsidies) to help critical mass of users and services to develop
	Encourage diversity and promote alternatives	Encourage a coordinated approach to providing information and increasing diversity involving several ministries, NGOs and the formal and informal private sectors

Problem	Possible remedies	Implementation options
Poor competition and services	Work with unions, cartels, associations and political leaders against restrictive practices	Use education, training, and incentives to encourage more competitive practices
	Encourage broadly based user groups	Encourage formation of user groups to campaign for improvements and to balance the power of the transport operators
	Encourage rising standards through collaboration between operators and user groups	Organize joint study tours with operators, users and local officials to see alternative systems of managing demand. Networking collaboration.
	Promote good, competing urban hubs	Use education, training, and incentives to work with political leaders and local authorities to allow good and competing transport terminals.
	Increase professionalism to cope with increased competition	Offer broad range of technical and commercial management training to animal-handlers, drivers, technicians and managers.
	Address corruption as factor in service provision	Use a light, coordinated approach to encourage transparency and open debate of the issues, to reduce problems caused by local corruption, which affect transport costs and quality
Weak institutions and capacity	Include transport service targets and elements in infrastructure programs	Ensure transport planners develop integrated strategies which include addressing rural transport service issues
	Strengthen regulatory and planning authorities	Provide technical assistance support and training to Ministry of Transport
	Broaden professional capacity in transport fields	Broaden existing training courses and conduct in-service training (for all sectors) to include intermediate means of transport, water transport issues, etc.
	Strengthen professional capacity in non-transport fields	Train transport professionals and planners (all sectors) in participatory processes and gender analysis
	Promote more rigorous monitoring and evaluation	Encourage realism and self-criticism in transport programs (all sectors). Support to south-south cooperation in program monitoring and evaluation
	Support active national networks	Support the establishment and activities of broadly based national networks or transport forum groups that encourage debate of the issues and the interaction and collaboration of stakeholders
	Promote international networking exchanges	Support international networking activities, including study tours, workshops and development of resource publications

ANNEX 4. OPTIONS FOR RURAL TRANSPORT SERVICES

CARRYING, WHEELBARROWS, HANDCARTS, AND TROLLEYS

Although humans can carry loads of 50 kilograms (kg) for short distances, loads of 10–20 kg are more normal. The comfort of carrying these can be increased with simple technologies such as poles, shoulder yokes, or backpacks. Carrying is flexible, requires little infrastructure, and is the transport means of choice for light loads and very short distances. It may be the only realistic option in difficult environments (such as those with mud, slopes, streams, or dense vegetation).

Simple wheeled devices such as wheelbarrows, handcarts, and trolleys increase human transport capacity. Depending on the environment (ground surface and slope), these can comfortably carry 50–100 kg. Balanced handcarts (with most weight on the wheels) are more comfortable than wheelbarrows with one forward wheel. Wheelbarrows can operate on smaller paths but need two hands to operate them. Carts, barrows, and trolleys are easy to load and park and are good for short or intermittent journeys (itinerant selling, collecting, or delivering). They are generally used for short distances (100–2,000 meters).

BICYCLES, BICYCLE TRAILERS, SIDECARS, AND TRICYCLES

Bicycles are the most available, affordable, and flexible means of transporting people and small loads over short distances, and they are increasingly common in rural areas. In some countries bicycles have important functions for carrying other people (family, friends, hire) and small loads (up to 100 kg). Bicycles do not need elaborate infrastructure but work best in flat areas with hard surfaces. While long journeys are possible, bicycles are mainly used for distances of 1–10 kilometers. Bicycles may be fitted with load-carriers or additional seats (for children or adults). For very large loads, bicycles may be pushed, not ridden. In Vietnam bicycles fitted with folding side platforms and rods to balance the handlebars and saddle carry extraordinary volumes and loads.

Detachable cycle trailers can increase the weight and volume that can be safely carried by a bicycle. Although examples can be seen in many countries (Cambodia, Denmark, United States), they are not common. Recent attempts at rural promotion have been disappointing. In some countries, including Cuba, Lao PDR, and the Philippines, bicycle sidecars are used to transport people and goods.

Tricycles also increase the weight and volume that can be safely transported. They may have two wheels at the front (as in Peru) or behind (the cycle rickshaws of the Indian subcontinent). Although tricycles are mainly used in urban areas, they may be used in rural areas

to carry people and goods. Tricycles have achieved critical mass in several Asian and Latin American countries, but they are not yet used widely in Africa.

Transport means	Indicative characteristics					Important requirements			
	Cost price (\$ relative)	Load (kg)	Speed (km/hr)	Range (km)	Cost/tonne /km ^a (\$ relative)	Foreign exchange	Animals and vet services	Mechanics	Good roads or tracks
Carrying/head load	0	20	5	10	1.50	Low	None	Low	Low
Sledge	10	100	4	3	0.80	Low	High	Low	Low
Wheelbarrow	30	100	4	1	0.40	Low	None	Low	Low
Handcart	60	150	4	5	0.35	Low	None	Low	Medium
Pack donkey	60	80	7	20	0.70	Low	High	Low	Low
Bicycle	100	60	10	20	0.60	Medium	None	Medium	Medium
Cycle rickshaw	170	150	8	15	0.45	Medium	None	Medium	High
Donkey cart	300	400	6	15	0.60	Medium	High	Medium	Medium
Horse cart	500	1000	7	15	0.60	Medium	High	Medium	Medium
Ox cart	500	1000	5	10	0.20	Medium	High	Medium	Medium
Motorcycle	900	100	50	50	1.30	High	None	High	Medium
Power tiller trailer	5000	1000	10	15	0.70	High	None	High	Medium
Pickup	12000	1200	80	200	0.70	High	None	High	High
Light truck	60000	12000	80	200	0.50	High	None	High	High

Note: These are order-of-magnitude, indicative figures only. The costs, prices, loads, speeds, and distances vary greatly with the country, the people, the environment, the infrastructure, and the vehicles or animals. It is not uncommon for the means of transport listed here to carry much greater loads and to travel much longer distances. The figures are simply indications of what is commonly achieved.

a. These numbers are very approximate. They are highly sensitive to assumptions on costs, loads, and distances and are estimated for five-kilometer trips.

Source: Starkey 2001b; cost per tonne/kilometer mainly from Crossley and Ellis 1996.

ANIMAL POWER

Animal transport is common and increasing in many parts of the world. Animals are generally privately owned and provide transport services for the family as well as for hire. Many different animals can be used for riding, as pack animals, and for pulling sledges, carts, and wagons. Different species have different advantages and disadvantages. They include oxen (available and strong, but slow and expensive), cows (multipurpose), and buffalo (strong but sensitive to heat). Horses (strong but delicate) are fast transport animals, most common in temperate, subtropical, and highland areas. Donkeys (small but cheap) are found mainly in semiarid areas. Mules, camels, llamas, elephants, and dogs have more specialized transport niches. Animals can be used singly or in teams, providing a wide range of transport capacities, from 50 kg (single small pack animal) to 5,000 kg (wagon pulled by two or more oxen, horses, or mules). Animals are most commonly used for trips of 1-10 kilometers, but longer journeys are possible.

Animal transport is often appropriate and affordable in rural areas, where feed resources are available and the animals have multiple functions. Animal-drawn carts can carry significant loads between fields, farms, and villages even if tracks are poor. Carts may be expensive relative to rural incomes, but maintenance is simple and affordable. Carts are mainly used in flat areas, while pack animals provide important mobility in hilly areas.

MOTORCYCLES AND THREE-WHEELERS

Motorcycles, mopeds, and scooters are expensive relative to rural incomes but provide convenient, fast, and flexible transport for passengers and small amounts of freight. Transport services based on motorcycles are increasing in most developing countries, particularly in urban and periurban areas.

The transport capacity of motorcycles can be increased by the use of a sidecar or a trailer. They can also be adapted to make three-wheelers for carrying passengers and goods. In the Philippines motorcycle sidecars commonly carry six or more people. In Cambodia motorcycle trailers may carry more than 10 people, or over 500 kg, without major modification (or safety devices). In much of Asia, three-wheelers based on motorcycle technology provide urban and rural transport services. These have basic covers to protect passengers and goods from the weather. Although motorcycles can be used on poor tracks, motorcycle trailers and three-wheelers require good roads without steep slopes.

TRACTORS, POWER TILLERS, AND UTILITY VEHICLES

Four-wheel agricultural tractors are complicated machines, specialized for traction in poor terrain. They can pull trailers with more than five metric tons on very poor tracks. Tractors are expensive but may benefit from preferential agricultural duties. Tractors are most important for short distance (1-5 kilometer) transport in agriculture, road maintenance, and forestry. Due to the scarcity of other transport options in rural areas, tractors may be used on roads as multipurpose vehicles for longer distances.

In South and Southeast Asia trailers pulled by two-wheel agricultural tractors (power tillers) are becoming increasingly important for rural transport (1-10 kilometers). Farmers can use them profitably in irrigated rice systems, with additional uses for family transport and transport hire. Trailers may also be used mainly as transport services, partly because of preferential taxes and duties on agricultural equipment. In flat areas, trailers can transport more than 20 people. Night transport with power tillers is a recognized hazard in many countries. The use of power tillers has been tried in several countries in Africa and Latin America, but they are generally unsuitable for conventional, rain-fed cropping systems, and there has been a problem of reaching a critical mass of economically viable units.

In Southeast Asia local entrepreneurs make cheap small trucks using a diesel engine fitted into a scrap chassis. These are known as *itaen* (Thailand), *koyun* (Cambodia), and *congong* (Vietnam), which means “iron oxen,” the name first used for power tillers. They have few refinements (or safety features), and no two vehicles are identical. Some small workshops make more than 100 a year. Transport entrepreneurs generally operate them, carrying building materials, goods, and people in rural and periurban areas.

CARS, PICKUPS, AND MINIBUSES

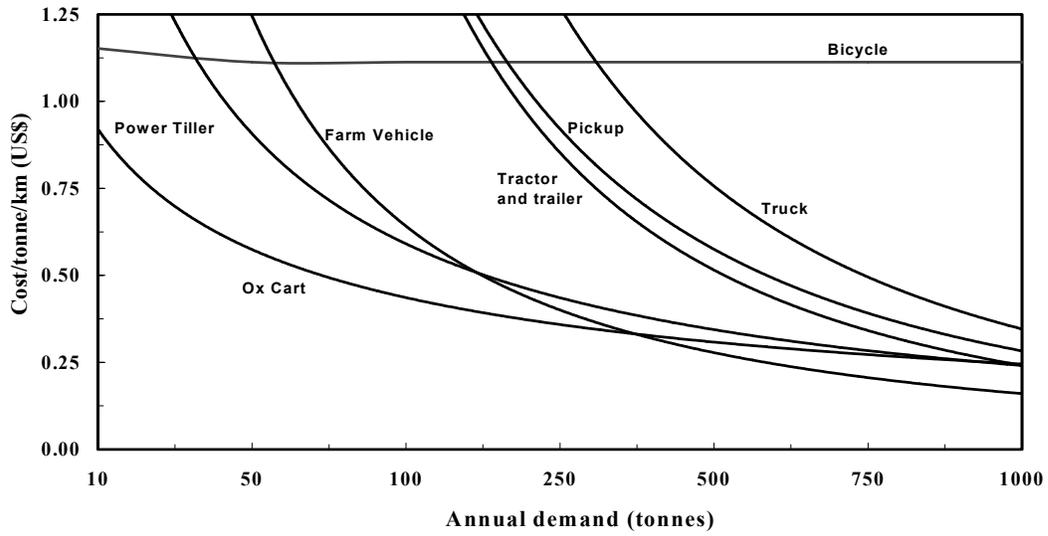
Pickup trucks with load capacity of 1 metric ton and the ability to carry a dozen passengers in comfort (and many more if necessary) are versatile vehicles widely used in rural transport. They are used mainly for medium- to long-distance travel (10-200 kilometers). Pickups used in rural transport services may be fitted with passenger-carrying benches and load-carrying roof racks. The size, speed, and flexible load potential of pickups, and their ability to cope with poor roads throughout the year, make them well suited to the long-distance transport needs of small, dispersed communities. Cars (bush taxis) and minibuses fill similar niches in periurban and rural areas but do not have the same ability to cope with bad roads. Minibuses are becoming increasingly common for transporting passengers and small loads in areas where roads are well maintained.

LARGE BUSES AND TRUCKS

Large trucks (5-30 metric tons) and buses (30-60 passengers) are most cost-effective when carrying full loads over long distances (20-200 kilometers). They are not always as suitable for rural transport because demand is dispersed, making it difficult to attain a reasonable load factor. Trucks have a very seasonal demand in rural areas (with peaks around harvest time). Buses can be viable on interurban, periurban, and high-density routes, but they may be inappropriate for poor, dispersed rural communities. As rural production, affluence, and transport demand rise, large trucks and buses become increasingly important as the cheapest transport options for consolidated loads.

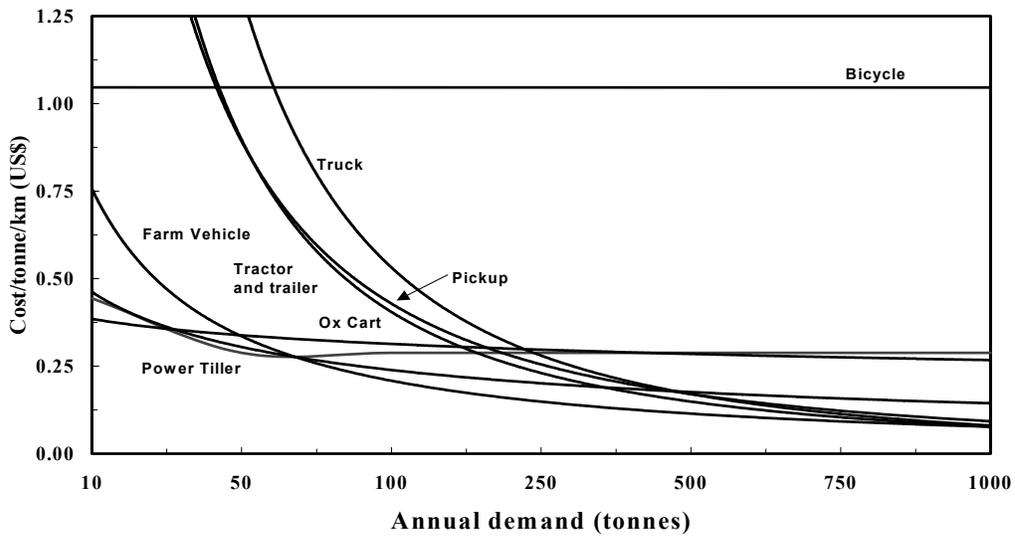
Figures A1 and A2 show how some of the vehicles described compare in terms of costs for given distances and demand levels. Each vehicle has a cost advantage at some combination of distance and demand. For short distances and low overall demand, bicycles are cost-effective for light loads and ox carts for heavier loads. Large trucks become cost effective for the longest distances and highest demand levels.

Figure A1 Vehicle operating costs for 10 kilometer distance and varying demand



Source: Authors.

Figure A2 Vehicle operating costs for 50 kilometer distance and varying demand



Source: Authors.

REFERENCES

- Airey, T., and I. Barwell. 1991. "Report on Interim Analysis of First Village-level Survey in Zambia: Village-Level Transport and Travel Surveys and Related Case Studies." IT Transport Ltd, Ardington, U.K.
- Barwell, I. 1996. *Transport and the Village: Findings from African Village-level Travel and Transport Surveys and Related Studies*. World Bank Discussion Paper 344. Washington, D.C.
- Clarke, N. 1999. "Considering Wheelchair Riders as Transport Users." In *Meeting Transport Needs with Intermediate Modes of Transport*. Colombo, Sri Lanka: Lanka Forum of Rural Transport Development. ISBN 955-8233801-3
- Connerley, E., and L. Schroeder. 1996. "Rural Transport Planning: Approach Paper." SSATP Working Paper 19. World Bank, Sub-Saharan Africa Transport Policy Program, Washington, D.C.
- Crossley, P., and S. Ellis. 1996. *A Handbook of Rural Transport Vehicles in Developing Countries*. Silsoe College, Cranfield, United Kingdom, and Transport Research Laboratory, Crowthorne, U.K.
- Dawson, J., and I. Barwell. 1993. *Roads Are Not Enough: New Perspectives on Rural Transport Planning in Developing Countries*. London: Intermediate Technology Publications. ISBN 1 85339 191 3
- Delaquis, M. 1993. "Vehicle Efficiency and Agricultural Transport in Ghana." MSc thesis. University of Manitoba, Department of Engineering, Canada.
- Edmonds, G. 1998. *Wasted Time: The Price of Poor Access*. Geneva: International Labour Office.
- Ellis, S. 1996. "The Economics of the Provision of Rural Transport Services." Ph.D. thesis. Cranfield University, U.K. 1997. "Rural Transport Services in Zambia." RTTP case study. World Bank, Rural Travel and Transport Program, Washington, D.C.
- . 1997. "Rural Transport Services in Zambia." RTTP case study. World Bank, Rural Travel and Transport Program, Washington, D.C.
- Ellis, S. D., and J. L. Hine. 1998. "The Provision of Rural Transport Services: Approach Paper." SSATP Working Paper 37. World Bank, Sub-Saharan Africa Transport Policy Program, Washington, D.C.
- Fernando, P. 1997. *Balancing the Load: Gender Issues in Rural Transport*. London: International Forum for Rural Transport and Development.
- Fernando, P., and P. Starkey. 2000. "Donkeys and Development: Socio-economic Issues." In P. Starkey and D. Fielding, eds., *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa. Wageningen, the Netherlands: Technical Centre for Agricultural and Rural Cooperation. ISBN 92-9081-219-2. [www.atnesa.org]

- Fischer, R. 1994a. "A Note on the Use of Donkeys for Rural Road Maintenance in Tanga Region, Tanzania." In P. Starkey, E. Mwenya, and J. Stares, eds., *Improving Animal Traction Technology*. Wageningen, the Netherlands: Technical Centre for Agricultural and Rural Cooperation. ISBN 92-9081-127-7
- . 1994b. "Transfer of Animal Traction Technology: Lessons from Project Experiences in Zimbabwe, Cameroon and Tanzania." In P. Starkey, E. Mwenya, and J. Stares, eds., *Improving Animal Traction Technology*. Wageningen, the Netherlands: Technical Centre for Agricultural and Rural Cooperation. ISBN 92-9081-127-7
- Guitink, P. 1996. "Strategic Planning for Non-motorized Mobility." Transport Note OT-4. World Bank, Washington, D.C. [<http://www.worldbank.org/html/fpd/transport/publicat/td-ot4.htm>]
- Havard, M., and A. Faye. 1988. "Eléments d'analyse de la situation actuelle de la culture attelée au Sénégal: perspectives d'études et de recherches." In P. H. Starkey and F. Ndiamé, eds., *Animal Power in Farming Systems*. Vieweg for German Appropriate Technology Exchange. Eschborn, Germany: GTZ. ISBN 3-528-02047-4
- Hine, J.L., and J. Rutter. 2000. "Roads, Personal Mobility and Poverty: The Challenge." Paper presented at a workshop on transport and poverty alleviation, 13 June, World Bank, Washington, D.C.
- Hine, J. L., J. H. Ebdon, and P. Swan. 1997. "A Comparison of Freight Transport Operations in Tanzania and Indonesia." TRL Report 267. Transport Research Laboratory, Crowthorne, U.K.
- Howe, J. 1997. *Transport for the Poor or Poor Transport? A General Review of Rural Transport Policy in Developing Countries with Emphasis on Low-income Areas*. Geneva: International Labour Office. ISBN 92-2-110473-7
- . 2001. "Boda boda: Uganda's rural and urban low-capacity transport services." Sustainable Livelihoods, Mobility and Access Needs Report for Department for International Development, U.K. in collaboration with Makerere Institute of Social Research, Makerere University, Uganda.
- Howe, J., and I. Barwell. 1987. *Study of Potential for Intermediate Means of Transport*. vols. 1 and 2. Report prepared for the World Bank and Ghana Ministry of Transport. Ardington, U.K.: IT Transport Ltd.
- Howe, J., and P. Zille. 1988. *The Transport Demands of Small-farm Households in Africa: A Synthesis of IT Transport Research*. Ardington, U.K.: IT Transport Ltd.
- IFRTD (International Forum for Rural Transport and Development). 2001a. "Report 1999-2001." International Forum for Rural Transport and Development, London, U.K. [<http://www.ifrtd.org>]
- . 2001b. "Twice the Success: Colin Relf Award 2001." *Forum News* 9:2. International Forum for Rural Transport and Development, London, U.K. [www.ifrtd.org]
- ITDP (Institute for Transportation and Development Policy). 1996. "Jakarta's Non-motorized Modes 'Living Dangerously.'" *Sustainable Transport* 6 (summer): 8-10.
- ITSL (IT Sri Lanka). 1998. "Cycle-Based Transport Project Completion Report." Colombo, Sri Lanka.

- IT Transport. 1996. "Promoting Intermediate Means of Transport: Approach Paper." SSATP Working Paper 20. World Bank, Sub-Saharan Africa Transport Policy Program, Washington, D.C.
- Kauffman, S. 1993. "A Review of the Poverty Alleviation Components within a Feeder Roads Program." Ministry of Transport, Northern Region Pilot Scheme, Accra, Ghana.
- Lalana. 2000. *Promotion de moyens intermédiaires de transport pour les femmes Antemoro dans la zone de Lokomby, Sous-Préfecture de Manakara, Province de Fianarantsoa, Madagascar*. Dossier pour requête de financement. Antananarivo, Madagascar.
- Lisinge, R. T. 2001. "Transport, Sustainable Livelihoods and Travel Patterns in Rural Cameroon." TRL Limited, Crowthorne, U.K.
- Litman, T., R. Blair, W. Demopoulos, N. Eddy, A. Fritz, D. Laidlaw, and H. Maddox. 2000. "Pedestrian and Bicycle Planning: A Guide to Best Practices." Victoria Transport Policy Institute, Victoria BC, Canada. [<http://www.vtpi.org>]
- Löffler, C. 1994. "Transfer of Animal Traction Technology to Farmers in the North Western Province of Zambia." In P. Starkey, E. Mwenya, and J. Stares, eds., *Improving Animal Traction Technology*. Wageningen, the Netherlands: Technical Centre for Agricultural and Rural Cooperation. ISBN 92-9081-127-7
- Lukungu, N. J. 2000. Personal communication. Muzama Crafts Ltd, Manyinka, Zambia.
- Makwanda, A. C. 1994. "Women and Animal Traction Technology: Experiences of the Tanga Draft Animal Project." In P. Starkey, E. Mwenya, and J. Stares, eds., *Improving Animal Traction Technology*. Wageningen, the Netherlands: Technical Centre for Agricultural and Rural Cooperation. ISBN 92-9081-127-7
- Malmberg Calvo, C. 1992. "Case Studies on Intermediate Means of Transport and the Role of Women in Rural Transport." SSATP Working Paper 3. World Bank, Sub-Saharan Africa Transport Policy Program, Washington, D.C.
- . 1994a. "Case Study on Intermediate Means of Transport: Bicycles and Rural Women in Uganda." SSATP Working Paper 12. World Bank, Sub-Saharan Africa Transport Policy Program, Washington, D.C.
- . 1994b. "Case Study on the Role of Women in Rural Transport: Access of Women to Domestic Facilities." SSATP Working Paper 11. World Bank, Sub-Saharan Africa Transport Policy Program, Washington, D.C.
- . 1998. "Options for Managing and Financing Rural Transport Infrastructure" Technical Paper 411. World Bank, Washington, D.C. ISBN 0-8213-4248-7
- Matin, N., M. Mukib, H. Begum, and D. Khanam. 2001. "Spatial Mobility and Women's Empowerment: Implications for Developing Rural Transport in Bangladesh." In P. Fernando and G. Porter, eds., *Balancing the Load*. London: Zed Books.
- Pankaj, T. 1991. "Designing Low-cost Rural Transport Components to Reach the Poor." *Infrastructure Notes Transport RD-3*. World Bank, Transportation, Water, and Urban Development Department, Washington, D.C.
[www.worldbank.org/html/fpd/transport/publicat/td-rd3.htm]

- PTMR (Programme de Transport en Milieu Rural). 1999. "Résumé exécutif de l'atelier national 10-12 mai, 1999, Antananarivo." Ministère des Travaux Publics, Antananarivo, Madagascar.
- Ramaswamy, N. S., and C. L. Narasimhan. 1984. "India's Animal-drawn Vehicles." Indian Institute of Management, Bangalore, and Department of Science and Technology, New Delhi.
- Rao, N. 2001. "Cycling into the Future: The Experience of Women in Pudukkottai, Tamil Nadu, India." In P. Fernando and G. Porter, eds., *Balancing the Load*. London: Zed Books.
- Riverson, J. D. N., and S. Carapetis. 1991. *Intermediate Means of Transport in Sub-Saharan Africa: Its Potential for Improving Rural Travel and Transport*. World Bank Technical Paper 161. Washington, D.C.
- Rizet, C., and J. Hine. 1993. "A Comparison of the Costs and Productivity of Road Freight Transport in Africa and Pakistan." *Transport Reviews* 13 (2): 151-65.
- Ruthven, O., and M. Koné. 1995. "Bankass, Mali." In *Changing Places? Women, Resource Management and Migration in the Sahel*. London: SOS Sahel.
- Salifu, M. 1994. "The Cycle Trailer in Ghana: A Reasonable but Inappropriate Technology." *African Technology Forum* 7 (3): 37-40.
- Schelling, D., and J. Lebo. 2001. "Design and Appraisal of Rural Transport Infrastructure: Ensuring Basic Access for Rural Communities". Technical Paper. World Bank, Washington, D.C. ISBN 0-8213-4919-8
- Sifa (Société Industrielle du Faso). 2001. "Production et distribution de vélos en milieu rural cas de la Sifa (Société Industrielle du Faso)." Paper presented at a Groupe Forum National du Burkina seminar on gender and transport, 3-5 April, Ouagadougou, Burkina Faso.
- Sisay, Zenebe, and Tilahun Fekade. 2000. "The Role of Donkey Pack Transport in the Major Grain Market of Addis Ababa." In P. Starkey and D. Fielding, eds., *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa. Wageningen, the Netherlands: Technical Centre for Agricultural and Rural Cooperation. ISBN 92-9081-219-2 [www.atnesa.org]
- Sismar. 1999. Personal communication. Dakar, Senegal.
- Starkey, P. 1994. "Donkey Utilization in Sub-Saharan Africa: Recent Changes and Apparent Needs." In M. Bakkoury and R. A. Prentis, eds., *Working Equines*. Rabat, Morocco: Actes Editions.
- , ed. 1995. *Animal Power in South Africa: Empowering Rural Communities*. Gauteng, South Africa: Development Bank of Southern Africa. ISBN 1-874878-67-6
- . 1998. *Networking for Development*. London: International Forum for Rural Transport and Development. ISBN 1-85339-430-0.
- . 1999. "Transport Using Animal Power: Some Key Issues for Asia." In *Meeting Transport Needs with Intermediate Modes of Transport*. Colombo, Sri Lanka: Lanka Forum of Rural Transport Development. ISBN 955-8233801-3.
- . 2000. Personal observations during field visits. Animal Traction Development, Reading, U.K.

- . 2001a. “Aide mémoire de la mission de 16 février-8 mars 2001” Ministère des Transports et de la Météorologie, Programme Sectoriel des Transports, Antananarivo, Madagascar.
- . 2001b. “Local Transport Solutions: People, Paradoxes and Progress.” SSATP Working Paper 56. World Bank, Sub-Saharan Africa Transport Policy Program, Washington D.C.
- 2001c. Personal observations during field visits. Animal Traction Development, Reading, U.K.
- Starkey, P., and J. Grimm. 1994. *The Introduction of Animal Traction in the Tanga Region, Tanzania*. Eschborn, Germany: GTZ.
- Starkey, P., and W. Mutagubya. 1992. “Animal Traction in Tanzania: Experience, Trends and Priorities.” Ministry of Agriculture, Dar es Salaam, and Natural Resources Institute, Chatham, U.K.
- Starkey, P., H. Dibbits, and E. Mwenya. 1991. “Animal Traction in Zambia: Status, Progress and Trends.” Ministry of Agriculture, Lusaka, and IMAG-DLO, Wageningen, the Netherlands.
- Valdés Ríos, H. 2001. “Public transport services using animal power in Cuba”. Centro de Investigación y Desarrollo del Transporte, La Habana, Cuba. [www.recta.org].
- Vidanpathiranage, J. 1999. “The Importance of Including Intermediate Modes of Transport in Highway Designing in Sri Lanka.” In *Meeting Transport Needs with Intermediate Modes of Transport*. Colombo, Sri Lanka: Lanka Forum of Rural Transport Development. ISBN 955-8233801-3.
- World Bank. 1992. *Poverty Reduction Handbook*. Washington, D.C.
- . 2000. *World Development Report 2001/2001: Attacking Poverty*. New York: Oxford University Press [www.worldbank.org/poverty/wdrpoverty/report/index.htm].
- . 2001. “Rural Transport in Ghana.” In *Gender in Agriculture: A World Bank Learning Module*. Washington, D.C. [www.worldbank.org/gender/module/cases/transprt.htm]