IMPROVING SUSTAINABLE RURAL TRANSPORT SERVICES: CONSTRAINTS, OPPORTUNITIES AND RESEARCH NEEDS

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Abstract

Roads are not enough. People need rural transport services to access services and livelihoods. Governments are not adequately stimulating passenger and freight service development in rural areas. Services include buses, minibuses, trucks, pickups and intermediate means of transport (bicycles, motorcycles, three wheelers and animal power). Communities need safe, reliable, predictable and affordable transport services. Transport appraisal studies highlighted problems of low fleet investment, unreliable services and poor governance, with clear gender implications. Intermediate means of transport are increasingly important with new roles for motorcycles and three wheelers but challenging times for animal power. Climate change will affect services. New indicators are needed to measure the impact of road improvement and recommended initiatives on rural transport services.

1. INTRODUCTION

Rural transport services use motorised vehicles and non-motorised means of transport to carry passengers and/or goods for the benefit of people in rural areas. Sustainable rural transport services are crucial to social and economic development. Investment in better roads and infrastructure will be wasted unless there are also improvements in the transport services that operate along them. The economic justification of road improvements is often based on reducing transport operating costs, thereby increasing the affordability of rural passenger and freight services. However, to date insufficient attention has been given to describing and measuring the actual improvements in rural transport services.

For the overall benefits of improved rural transport infrastructure to be realised there is need to encourage the development of a range of complementary and competing transport services, small and large, short-distance and long distance, passengers and freight as appropriate for different rural contexts. There must also be agreed means to verify the improvements in rural transport systems.

This paper will introduce current thinking on rural travel and transport systems, and discuss the different types of rural transport service. Some key knowledge gaps will be identified and discussed and conclusions drawn. This paper, which focuses on African contexts, is intended to stimulate ideas on the issues that need to be addressed in order to improve rural transport services. It is hoped that some readers will be able to share ideas and start relevant initiatives that will lead to increased understanding among transport planners. The aim will be to have better, safer and more affordable transport services as well as appropriate indicators that can be used to demonstrate the benefits to all types of people of improved transport services, regulation and infrastructure.

2. UNDERSTANDING RURAL TRANSPORT SERVICES

2.1 The rural transport and travel approach

Over the last twenty years, 'Rural Transport and Travel' has increasingly become established as a research policy and knowledge area within the wider field of transportation planning. Based on several systematic household-based studies in African countries, notably in Makete District, Tanzania (Lema, 2007), it was demonstrated that roads by themselves cannot leverage the desired impact on social and economic development in rural areas.

One of the main reasons was the inability of developing economies to maintain expanded infrastructure. More profound reasons were the lack of clear interfaces between the livelihoods of local communities and the economic justification on which basis the roads were built. In particular, the studies highlighted the localised village level transport patterns (related to access to basic services) that were untouched by investments in new rural roads. The gendered division of transport labour was another dimension that challenged the assumption of gender-neutrality in the impacts of transport investments.

The conventional rural transport planning approach was based on a projected reduction in operating costs of transport services and an increase in transport services. However many new and upgraded roads did not stimulate major increases and improvements in transport services. Nor did they change the local livelihood patterns. The current transport planning approaches are still faced with similar dilemmas. However, since the publication of '*Roads are not enough'* (Dawson and Barwell, 1993), the problem is more clearly recognised, and networks such as the International Forum for Rural Transport and Development (IFRTD) have been working to promote discussion of the surrounding issues.

The key to having transport sector deliver on economic growth, increased social equality and the Millennium Development Goals requires a shift from the singular focus on the development of transport infrastructure to a broader view of transport for development. This requires the Rural Transport Services (RTS) component to be given greater policy prominence and research efforts commensurate to its importance.

In many developing countries, the transport sector receives a substantial part of the public sector budget, the bulk of which is invested in infrastructure. There is an assumption by governments and funding agencies that this will lead to cheaper quicker, more frequent and more reliable transport services. This assumption is seldom questioned, verified or measured in any objective way. Responsibility for achieving such goals is left to the private sector with varying degrees of regulation, enforcement, incentives and technical support. Few countries have a clear vision as to the transport service standards required to meet the economic and social needs of rural people. As a result, rural transport services in most developing countries are underdeveloped, unreliable and expensive, posing a serious impediment to reaping the benefits of network and/or road improvements.

2.2 Rural transport needs and basic access requirement

An important role of transport in delivering development outcomes in rural areas is the extent to which it improves access to supplies, services, facilities and

opportunities that are crucial to the livelihoods of communities (Njenga, 2003). Basic needs in rural areas include water, power, food, health services, education and employment. Rural communities need access to markets and may wish to participate in civic, religious and leisure activities.

Access in the context of transport is about reducing physical constraints to obtaining goods and services that may be reached or delivered using appropriate transport infrastructure and suitable transport services. Accessibility can be measured in time, effort and the cost it takes to get a required service. This depends on the availability of a suitable range of transport infrastructure (roads, footpaths, trail bridges, navigable waterways), the social and economic infrastructure from which rural communities derive services (schools, hospitals, markets, water sources) and affordable transport options for people and their loads. Rural people often have to spend much time and effort to access basic necessities. The reduction of isolation and inaccessibility are fundamental to poverty reduction (Starkey et al, 2002).

2.3 The spectrum of rural transport services

At the one end of the spectrum, the most basic means of transport is human transport: people walking and carrying loads between locations. Walking and human porterage is simple, cheap and efficient for short distances, difficult terrain, small loads and certain subsistence livelihoods. Walking and carrying can be the technology of choice for short distances and light loads. However, in some rural areas, the lack of infrastructure suitable for wheeled transport means that arduous long-distance transport has to involve walking and carrying, and crucial journey times of foot may exceed 24 hours, and examples of this can be seen in the hill regions of Lesotho, Nepal and Papua New Guinea.

At the other end of the spectrum are large-scale means of transport, including trucks, buses, minibuses, cars, trains, airplanes and large boats. 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-kilometre or per person-kilometre carried quite low, provided operations are efficient and capacity utilisation is high (Starkey et al, 2002). These means of transport are widely used for international transport and national inter-city services. Trucks, pickups, buses, minibuses, microbuses and cars are also used for rural transport, where the road quality and transport demand allows this. The motorised segment of rural transport services generally comprises old vehicles, many of which have been passed down from urban areas and inter-urban routes. These tend to operate from specific rural hubs (provincial and market towns and sometimes larger villages).

Between the extremes of no vehicles and large motorised transport services are a wide variety of intermediate means of transport (IMTs) that provide rural transport solutions (Starkey, 2001, 2002). These may be used for passenger and freight transport complementing the large-scale motorised services. Some IMTs use human or animal power including handcarts, bicycles, rickshaws, pack animals and animal-pulled carts. These are sometimes known as non-motorised transport (NMT). Others have small motors (motorcycles, three-wheelers, power tiller trailers). Equivalent water-based transport includes canoes, rafts and a range of small to large boats.

2.4 Distinguishing inter-city, peri-urban and rural transport services

The term 'rural transport services' (RTS) refers to motorised and non-motorised vehicles operated for the benefit of people in rural areas. Exactly, which technologies and which routes count as rural transport services is not always clear cut.

Bus and freight services on intercity routes pass through rural areas and may be used by rural people. However these are primarily intercity services that are part of the national hub and spoke system. Existence of some good inter-urban services passing through the countryside should not be confused with rural transport services. While these services may link some rural people to the cities, their economic justification (and vehicle quality) derives mainly from the inter-urban transport demand. The 'within rural areas' and the 'rural areas to city' transport fleets are likely to comprise older vehicles.

In some countries, there are extensive 'peri-urban' areas, whose economies are strongly linked to the nearby towns and cities. Some transport services in these areas are clearly peri-urban commuter services, with 'tidal' traffic flows, that link these areas with the urban centres. Other services seem to be 'peri-urban' providing a localised services that are neither clearly urban nor rural. In some middle-income countries, in growth areas around large African cities and along corridors of economic growth, there are large numbers of such 'peri-urban' services.

Motorcycle transport services are growing in importance in peri-urban areas, fuelled by easy access to inexpensive Chinese motorcycles and burgeoning populations on the fringes of major towns. This new development is also cascading into rural areas, influenced by excessive competition and regulation in towns, the availability of cheaper second-hand motorcycles and the clear transport service opportunities in suitable rural locations.

While it is clear that buses, minibuses, rural taxis and trucks for hire constitute rural transport services, some other services are less easy to define. Many government and NGO vehicles operating in rural areas are prohibited from carrying fare-paying passengers or goods, but in many cases they do. In some remote areas, the most common motorised vehicles are official 4x4s or private pickups that are not licensed as public transport vehicles. Their crucial (yet often unofficial and illegal) roles should not be ignored when understanding rural transport services.

In some countries, there are important passenger and/or freight rural transport services provided by animal power (carts or pack transport). In Madagascar, caravans of traditional, wooden-wheeled ox carts carry produce and freight for several days, while passenger-carrying ox carts now are fitted with springs and pneumatic tyres (Starkey, 2004). In the Mouhoun Region of Burkina Faso, rural horse carts have their own routes, timetables and tariffs for passengers and freight (Sirpé, 2007). In Ethiopia, and other countries, pack donkeys and donkey carts, are used by individual farmers and also by traders and professional transporters.

Bicycles and motorcycles are also important technologies for individual mobility and transport services in rural areas. These have widely differing patterns of use in Africa. In Burkina Faso, there are very large numbers of bicycles and motorcycles. People often help their families and friends by carrying passengers and goods, but there are no bicycle taxi or motorcycle taxi services that transport passengers and freight specifically to gain income (Sirpé, 2007). In Zambia, bicycle taxis are extremely important, with some women hiring several bicycles to take them and their fish to

market, which may be over 50 km away (Musonda, 2007). In Uganda, Kenya and Tanzania, 'boda-boda' bicycle taxis, acting as passenger and freight services, provide young men with livelihoods (Awadh, 2007a, 2007b). In Cameroon and Nigeria, motorcycle taxis are increasingly important for rural transport, linking villages to the transport services operating on main roads (Kemtsop, 2007). Rural transport services based on motorcycles are also spreading in Rwanda, Uganda, Kenya and Tanzania, but have yet to develop in Lesotho, South Africa or Zambia. Hand carts and wheelbarrows are commonly used to provide very short distance transport services around markets, but there are examples where these may be used for journeys of several kilometres between villages and rural markets in Lesotho, Madagascar and Mali (Starkey et al, 2008).

It is clear that intermediate means of transport may be used by private entrepreneurs to provide specific rural transport services, and in some countries these are formally regulated. Other intermediate means of transport are used for personal mobility, but may well assist other people informally. It is therefore good practice to consider intermediate means of transport, as an integral component of rural transport services whether or not they are formally regulated to provide public transport services (Starkey, 2007).

2.5 Key characteristics of rural transport services

Most rural transport services in Africa are provided by private operators, but some are run by community organisations or parastatal corporations. In the 1960s, many African countries had parastatal bus companies, but now only a minority of countries (eg, Lesotho) have them. Some African countries, including Tanzania, have managed to retain regulated, private-sector, rural bus services, although the rural fleet is of declining quality (Awadh, 2007a, 2007b). In the 1960s, it was easier to operate and regulate rural bus services as there were few competitors. Now, with minibuses and other vehicles, it is difficult for buses to operate to a timetable, as 'parasitic' competing transport types can depart just before the designated bus and 'poach' waiting bus passengers while matching the bus fares. Buses have high operating costs and can seldom stand such haemorrhaging competition for long. If the buses cease to operate, the competitors do not need to match the bus fares and their tariffs may rise (Starkey et al, 2008; Haworth and Starkey, 2009).

In remote rural areas, rural transport services provide vital access between farms, villages and markets for the transport of people, agricultural inputs and produce and commodities required for rural livelihoods. The provision of transport services is largely demand-driven but the cost of operating transport services on low volume roads is often very high. Rural transport services often have to operate on poorly maintained, low-volume roads. It is cheaper to operate on well-maintained, high-volume roads and this is where there is more transport demand. Transport operators with good vehicles try to work on the better roads, and the poor rural roads are left to the worst vehicles. The combination of old vehicles and poor quality infrastructure increases vehicle operating costs. These costs are transferred to the service users and tend to be inflated because of the low density of demand. Surveys in four African countries noted the old age of the rural transport fleet, the high operating costs and the higher level of fares (per passenger kilometre and per tonne kilometre) than on nearby inter-urban routes (Starkey, 2008).

Many African rural transport services are uncompetitive, high cost and undiversified. In contrast, some Asian transport services are very competitive, low cost and have a high service frequency with diversified routes, aided by a high density of demand

(Ellis and Hine, 1998). Low density of demand for transport services in Africa, caused by low population densities is not conducive to an enabling operating environment, resulting in high costs of transport that deter farmers from cultivating more produce than can be transported to market at an affordable rate. For instance, African farmers receive only 30-50% of the final price of produce sold, compared to 70-85% in Asia (Ahmed and Hossain, 1990). Starkey et al (2002) noted that there were some high-density situations in Africa and some low-density situations in Asia, but the costs of inputs and services in Africa were almost invariably higher than in Asia.

Transport services in developing countries are often regulated by unions, transport associations and other informal cartels who determine fares and routes. This is true of both motorised transport and IMTs. Cartels can reduce competition, leading to inefficient operating practices and under-utilised vehicles (idle vehicles waiting in turn). The queuing system restricts customer choice for quality and safety as the next vehicle is determined by the queue, not by customer preferences. In some instances, vehicles queue for days in urban centres while they fill up to capacity before they can depart for their rural destination (Ellis and Hine, 1998).

More appropriate regulation by national and district level government organisations and the private sector transport associations could increase service frequency and access for remote communities through route licensing, quantity controls and quality controls. If operators run to timetables, this increases service predictability and if departing vehicles are not always full, passengers along the route have more chances being transported (Witkiss et al, 2001). Service predictability is a key gender issue, as women are less likely to travel then men if a service is unpredictable (Starkey, 2008). Good regulation (by authorities or associations) can ensure that all routes are serviced by an appropriate number of vehicles. In Ethiopia, rural taxi associations ensure that operators have rotas that include both low density routes and the more lucrative, high-density routes (Starkey, 2008). Similarly, quality controls (enforced by authorities or associations) can prevent the overloading and operation of unroadworthy vehicles to reduce the incidence of road traffic accidents. Such measures are extremely difficult to regulate on remote rural roads and in areas where corruption is common.

3 RURAL TRANSPORT SERVICES: TRENDS AND KNOWLEDGE GAPS

3.1 Studies on rural transport services

There have been relatively few systematic studies on the state of all transport services in rural areas of Africa. Prior to 2002, it was normal for organizations such as the World Bank to consider ‘conventional’ motorised transport services (Ellis and Hine, 1998) separately from intermediate means of transport (Starkey, 2001). However, a World Bank-initiated study was specifically charged with integrating the two approaches (Starkey, Ellis, Hine and Ternell, 2002). This vision of integrated motorised and non-motorised rural transport was followed up in collaboration with the International Forum for Rural Transport and Development (IFRTD). This allowed professionals in Asia, Africa and Latin America to actively engage in the debate about what were the key issues affecting rural transport services (IFRTD 2003a, 2003b, 2004, 2005).

Following this initiative, the SSATP in 2005 commissioned a multi-disciplinary team to develop and test a methodology for the rapid appraisal of rural transport services in a pioneering study designed to explore the scope and nature of the rural transport

services problems. The study team designed and tested a methodology that was based on an understanding of the hub and spoke patterns of the rural transport systems. It involved participatory surveys stratified by hub system (provincial, market town and village hubs) and by remoteness (Starkey, 2007). Surveys were carried out in representative areas in four countries and led to numerous detailed observations on transport service types, costs, constraints and opportunities (Awadh, 2007a; Awadh, 2007b; Kemtsop, 2007; Musonda, 2007; Sirpé, 2007 ; Starkey, 2007 ; Starkey, 2008). The methodology has subsequently been adapted for use in Lesotho, Nepal and India (Starkey et al, 2008; MEH, 2009; WSP, 2010).

The various studies on rural transport services had some interesting findings, with many observations common to all areas surveyed. These included the 'poverty' of rural transport systems, the small size and old age of motorised transport fleets, poor safety standards and the great importance of intermediate means of transport. Some findings were specific to certain areas and these included new transport franchises, important water transport, motorcycle services and regulatory corruption. All surveys stressed the very low level of transport services on the market spoke roads linking villages to market towns (away from the inter-urban routes). They also noted the low capital value of the few, old vehicles operating in rural areas. In contrast, the high level of use of intermediate means of transport (depend on the country, mainly bicycles, motorcycles and animal transport), meant the total capital investment of these technologies was actually greater than the motorised fleets of buses, minibuses, trucks and rural taxis that were operating (Awadh, 2007a/b; Kemtsop, 2007; Musonda, 2007; Sirpé, 2007; Starkey, 2008).

The various studies produced some interesting observations on gender and transport. When travelling in rural transport, women may have some privileges, such as being provided with relatively safe seats (men may travel on roofs or holding on). However women are disproportionately affected by unreliable and unpredictable transport services, as given their responsibilities and status, women may decide not to travel, rather than risk being stranded. This affects the ability of women to sell produce at distant markets and to benefit from such trade. The gendered caring responsibilities require women more than men to travel to schools and health facilities. However, women have less access to means of transport and to funds to afford transport. Most transport owners and operators of transport services and intermediate means of transport are men. Women may find themselves in a vicious circle since, by having less access to transport, women have less access to potential solutions to their transport problems (information, credit, income-generating options). As ownership of transport devices (cars, motorcycles, bicycles, donkey carts) grows, women increasingly become users and beneficiaries of such transport. As the transport becomes more common, a critical mass of supporting services develops and the transport becomes easier to access (perhaps borrowed from male relatives). It then becomes increasingly acceptable and normal for women to use the technologies. In rural areas, it is quite unusual for women to ride bicycles when overall numbers of bicycles are low. As ownership increases, women's access to bicycles increases and quite quickly women start to make more and more use of bicycles. Bicycles can really empower poor rural women through increased mobility. They can act as 'levers of access' to economic, social and political opportunities. In some circumstances donkeys and motorcycles may also offer great benefits for women (Starkey, 2008).

Other observations and recommendations included:

- The rural transport services appraisal methodology developed allow authorities to quickly obtain a reliable picture of transport service and ways of

overcoming key constraints that can be used for evidence-based decision-making.

- Improving roads is not sufficient to ensure reliable and predictable services and local collaboration and participative planning involving all types of transport users, operators and regulators is necessary to ensure consolidated transport demand that can allow profitable transport operations.
- Intermediate means of transport, particularly bicycles and motorcycles, are sometimes 'invisible' to policy-makers but are extremely important in helping rural women and men to increase their productivity and quality of life.
- Transport is not gender-neutral and the need to increase access to intermediate means of transport and predictable motorised rural transport services should be addressed as important gender-related issues that can empower rural women.
- National and local governments policies should stimulate greater, better, safer and more dependable rural transport services, regulating for appropriate standards while encouraging the private sector to provide good services. Small initiatives and incentives can have a profound affect on rural transport and the lives of rural women, men and children, reducing poverty, stimulating economic growth and meeting the millennium development goals (Starkey, 2008).

Based on these surveys and studies, and subsequent observations in many countries, the authors have identified various significant trends, issues and knowledge gaps in rural transport services that should be of interest to practitioners, researchers and policy makers in the transport sector. It is hoped that these, and other topics, can be addressed to ensure informed decision making and better policy environments. In highlighting these particular topics requiring attention, the authors are not negating the importance of other key issues, including safety, security, rural waterways, transport for disabled people and disadvantaged groups, transport for particular services and sectors (health, education, agriculture), gender and transport and participatory planning for rural transport services.

3.2 Increasing use of motorcycles in Africa

Motorcycles are increasing rapidly in many African countries, partly due to reduced import duty and the availability of inexpensive Chinese motorcycles. The practical and policy implications of this have not yet been well documented and shared.

In some locations, motorcycles now account for the majority of vehicles in traffic counts. Motorcycles are able to operate on poor roads, and can often pass when four-wheeled vehicles are blocked by mud, water or landslides. Rural motorcycle taxis carry men, women and children and their goods and link poorly-served villages with traditional transport services on main roads. Some are owned for personal transport but many are used for transport services, providing young men an attractive way of earning a living in urban and rural areas.

The pattern of motorcycle adoption in Africa is very uneven. Some African countries have significant experience of motorcycle use (Burkina Faso, Nigeria, Cameroon, Rwanda). Spontaneous adoption (with motorcycle taxis services) has recently started in Uganda, Kenya and Tanzania. Other countries (including Ethiopia, Ghana, Lesotho, South Africa and Zambia) have very little motorcycle traffic at present but they may need to consider the implications of possible rapid spontaneous adoption in the coming years.

Motorcycles and motorcycle taxis present many problems of safety, regulation and enforcement. In Kenya for example, motorcycles have overtaken midibuses and minibuses (known as 'matatus') as the leading cause of road accidents. In June 2010, 180 motorcycles were primarily responsible for accidents, compared to 148 matatus. Between January and June, some 223 motorcycle riders and their passengers were killed in accidents in Kenya in the same period. Similar concerns on issues of safety have been echoed in Tanzania where injuries from motorcycles are taking more and more bed spaces in hospitals. In some countries, including Cameroon and Rwanda, there have been attempts to improve safety and security through practices such as high-visibility vests with large driver numbers. In some circumstances, motorcycle operator associations improve safety through self-regulation.

The intrinsic profitability of motorcycle services has led to private financing models in several countries including Cameroon, Colombia, Rwanda and Tanzania (Starkey, 2008). These allow the owners (often local business people or civil servants), the operators, the passengers and the support services all to benefit, creating a critical mass, momentum of rapid adoption and employment for operators, suppliers and supporting services. It also leads to an active second-hand market causing diversified adoption and more widespread ownership and maintenance services.

While the proliferation of motorcycles presents a versatile, private sector driven model for development of reliable and regular transport services, it poses a number of practical and policy dilemmas in the areas of safety and security of passengers, and environmental impacts resulting from greenhouse gas emissions.

3.3 Increasing use of three-wheelers in Africa

Motorised three-wheelers (also known as autorickshaws, tuk-tuks and tempos) have long been a feature of cities and rural roads in some parts of Asia, including China, India and Bangladesh. They are a relatively new form of transport in Africa. Many countries have no policies or strategies for safely and efficiently integrating and regulating this form of transport to improve the mobility of people and their goods and foster economic development and improved access to health, education and other services. Three wheelers generally start to work in towns, where there is economic demand, and a it is easier to develop a critical mass of operators, users and support services. Indian-made Bajaj three-wheelers are now operating in Dar-es-Salaam and some other cities. Some of the Chinese-made three-wheelers imported into Africa are based on motorcycle designs and have larger wheels than the Bajaj, making them suited for both urban and rural transport. In some small towns and rural areas in Ethiopia, such three-wheelers have replaced some horse-carts. Operators of conventional taxis, motorcycle taxis and horse-drawn carts may object to the competition provided by three-wheelers. To date, most three-wheelers are still operating in towns, but the Asian experience suggests they could become part of peri-urban and rural transport service provision.

Some authorities regard three-wheelers as an unnecessary technology that may cause congestion around transport terminals and markets. A few authorities see three-wheelers as a way of modernising transport by allowing the replacement of 'old-fashioned' horse-drawn vehicles. Three-wheelers can complement other transport services, providing low-cost mobility as well as important employment. Regulatory issues include routes, loading levels, driver behaviour, safe road sharing, integration with other forms of transport and loading facilities at rural markets and transport terminals. Women and children are among the main beneficiaries as three-

wheelers provide local transport that is safer and more modest than motorcycle-taxis, more flexible than buses and cheaper than conventional taxis.

3.4 The governance and regulation of rural transport services

Issues of governance and regulation are critically important to the development of efficient, safe and affordable rural transport services. The governance environment affects competitiveness, frequency and service quality, affordability, security and safety.

Governments generally leave transport services to the private sector, with varying degrees of regulation, enforcement, incentives and technical support. Some transport service regulations can improve service standards and stimulate constructive competition. Other regulations are inappropriate and can marginalise operators and/or passengers due to unrealistic specifications, loading levels, terminal locations, price ceilings or transport numbers/mix. Official regulations may be poorly enforced, due to inertia, inefficiency and/or corruption. Corruption at various levels can affect the operating costs of transport services. In Cameroon, an example was documented where 38% of the operating costs of a minibus were attributed to payments made to officials to allow the operator to easily pass control barriers (Kemptsop, 2007; Starkey, 2008). Inevitably, the passengers pay this through their fares.

Transport operators form associations to protect their own interests. These may fix prices, set conditions for market entry (with operator limits), control queuing for loads and provide assistance for members in difficulties. The associations range from benign self-regulatory bodies that improve the efficiency of the industry to anti-competitive cartels that inhibit progress and increase tariffs. The transport associations may be closely linked to local authorities (transport regulators, police, politicians and judiciary) and may unduly influence decisions relating to vehicle inspections, fares, route allocation, fines for non-compliance and market competition.

Where governance is poor (within transport ministries, local/national authorities, transport regulators, enforcement authorities and/or transport association) the costs of transport increase and service quality, frequency and safety decrease. Where governance is good, with authorities and associations working together for progress, tariffs are reduced, vehicle quality improves, service frequency is increased and safety is enhanced, benefiting all users, particularly women. Creative competition within and between transport associations can lead to better services, reduced costs and even internal cross-subsidies between high-volume and low-volume routes. It is therefore important to promote and achieve good governance in the regulation and operation of rural transport services.

3.5 The implications of climate change for rural transport

Climate change is an emerging issue that has implications for the types of rural transport services that are likely to develop in the future. Climate change has a bearing on both infrastructure requirements as well as transport technologies

Governments are starting to address the needs for climate change mitigation through lower-carbon transport systems (infrastructure and transport services). As most of the land transport carbon footprint comes from cities and inter-urban national roads, emphasis will be on these transport systems. In many countries, 80-90% of vehicles operate in urban areas and on inter-urban routes. Climate change adaptation measures will inevitably concentrate on protecting areas of high population density

and strategic national roads. Weather extremes (and higher infrastructure specifications to resist them) will increase the cost of building and maintaining national roads.

Transport systems in rural areas are already suffering from inadequate maintenance. Climate change and weather events will increase the requirements for investment in the provision and maintenance of rural infrastructure (roads, bridges, paths, footbridges and quays) and transport services (buses, trucks, rural taxis and intermediate means of transport). National policies to maintain strategic inter-urban routes may inadvertently reduce funding for rural transport. Climate change will increase rural poverty directly and indirectly due to natural disasters, reduced road quality, increased transport costs and reduced health levels associated with less food security, poorer water supplies and fewer livelihood options. There is need to understand and address the many and complex implications of climate change.

3.6 The need for animal power in modern transport systems

Animal power is widely used around the world for agriculture and transport. It is increasing in sub-Saharan Africa, where it assists sustainable farming, crop-livestock integration and the transport and marketing of agricultural produce. In North Africa, horses and donkeys remain important for rural transport (four million donkeys). In Ethiopia, five million donkeys provide pack transport. Donkey carts are few but increasing. Horse carts are declining due to motorised three wheelers. In West Africa, animal traction is expanding. Work oxen in francophone West Africa increased six fold in the past 50 years, from 350,000 to two million. Donkeys are increasing in numbers (4.5 to 6.3 million in the past decade) and geographical area as the 'donkey line' moves southward (Starkey, 2010). In Madagascar, 300,000 ox carts remain important for transport. Animal traction is gradually increasing in East Africa, notably in Tanzania (one million work animals) and Uganda. Donkey carts are increasing. In Southern Africa, animal traction for agriculture and transport is widespread, and is being promoted in some countries, including Namibia (Starkey, 2010).

A recent study (Starkey, 2010) noted the following trends and observations:

- People replace animals with motor power (pickups, motorcycles, three-wheelers) where it is available, affordable, profitable and socially acceptable. This explains the trends in the more accessible areas of developing countries.
- People replace human-powered transport with animals when they are available, adapted to the environment, affordable, profitable and socially acceptable. This explains animal transport expansion in sub-Saharan Africa.
- People retain labour-saving animal power, when it is profitable and socially acceptable and when there are no easy alternatives available. This explains the persistence of animals for transport in North Africa, Ethiopia and southern Africa, but young people influenced by media images may not consider animal power to be socially acceptable.
- As climate change stimulates extreme weather, transport animals may prove increasingly important for access following natural disasters. Drought resistant donkeys may have wider applications.
- Public sector investment in animal transport research, education, training and promotion has declined in recent with little international research or support.
- The world's media increasingly portrays animal power as old-fashioned and uses animal transport to illustrate poverty and under-development rather than possible solutions for reducing current poverty.

The expansion in animal powered transport in Africa in the twentieth century was stimulated by cotton companies and development projects. Donkey carts and oxcarts are profitable but 'pump priming' is needed to establish a critical mass of users and support services. Donkey carts expansion in West Africa and oxcart increases in Malawi and Zambia were linked to credit availability (Starkey, 2001).

Issues relating to animal transport include comfortable, affordable harnesses, appropriate cart designs and pack saddles, improved welfare and the safety and security of transport animals. Most issues can be resolved locally, using inputs from other countries, provided there are adequate information sources and networks. Unfortunately, these are declining due to low national and international support.

The biggest constraint to animal transport in Africa, and the world, is its poor, old-fashioned image that affects all stakeholders. Farmers are aging and the outmoded image may cause young people to reject animal power. The image inhibits national authorities and aid agencies from treating animal transport as a serious modern option, complementary to human and motor power. Animal power is absent in curricula, making future policy formulation difficult. Politicians and officials often focus poverty reduction debates on replacing animals with motors rather than the benefits that animals bring. For people who can afford motor power, declining animal power is not a problem. People currently struggling with human power (as evident in Ethiopia and most African countries) may be unable to benefiting from animals due to poverty and the lack of project-led facilitation of adoption.

For example, in South Africa, a book about empowering rural communities was produced with a cover showing a smiling woman entrepreneur with a donkey carrying drums of water (Starkey, 1995). A South African politician called this an insulting, negative image: the community needed tapped water, not donkey transport. The politician's aspiration for water pipes was reasonable, but her dismissal of the existing solution was inappropriate. She failed to appreciate that the donkey reduced drudgery and poverty by replacing human work with animal work. It did not prevent authorities from investing in piped water. Fifteen years later, history was repeated as a South African political leader condemned Mpumalanga authorities for 'taking people backwards' by providing donkey carts for water transport (SAPA, 2010). The politician considered the donkey carts as an 'insult' rather than a solution to the immediate problems of water transport.

What is needed is national and international support for a positive image of animal power and its contribution to development. There is a need to provide information to national authorities, educational systems and the media explaining the benefits of animal transport in a modern world. This is unlikely to be a popular idea for international and national agencies supporting rural transport. It could however be important for millions of poor people who could benefit from animal power in the coming years. It depends whether poverty reduction objectives are sufficiently serious within development agencies to risk the possible ridicule of supporting what some people consider a backwards technology.

4 ASSESSING THE PERFORMANCE OF RURAL TRANSPORT SYSTEMS

4.1 The need for indicators

This paper has alluded to the need to take a holistic view of rural transport and travel, and especially the need to have policy and investment perspectives that give regard to both infrastructure and service development. In concluding this paper, we would like to highlight the potential to develop an instrument for benchmarking the performance and services standards of rural transport services. This could

complement or build upon the Rural Access Indicator that has been developed and promoted by the World Bank (Roberts et al, 2006).

Indicators are needed in order to measure or assess progress, and make comparisons between different areas and situations. Indicators need to be representative of the crucial components of topic being assessed. There must be a realistic possibility of measuring or assessing the indicator in a reasonable time span and without excessive resources or effort. They need to be responsive to changes, so that it is possible to judge progress (or lack of it) within a reasonable time frame.

4.2 Rural Access Indicator

The current Rural Access Indicator (RAI) estimates the percentage of the population living within two kilometres of a motorable road (Roberts et al, 2006). While it is useful to have such an indicator included in national and international statistics, there are several acknowledged limitations to this indicator. The existing indicator does not take into account the existence of topographical barriers such as rivers and hills that impede safe and comfortable travel to the nearest road, even if it is within two kilometres of the population. Furthermore, the transport indicator does not respond easily to important changes in transport infrastructure (foot bridges, better road quality) only to the presence or absence of motorable roads (and this changes little over the years).

A more profound weakness of the RAI is that it does not measure people's access to transport services: there is no difference in the access indicator between a road with no transport services and one with regular services. This shortcoming in the computation of the access indicator could make rural transport services a blind spot in transport policy making. It does nothing to stimulate the design of viable interventions that could have an important impact on access due to improved transport services.

However, for social and economic development, it is transport services on the roads that link people with services and livelihood options. Transport services are important for economic growth and for rural women, men, children and the disadvantaged to access social services (notably health and education) and livelihoods.

4.3 Rural Transport Service Indicators

There are few initiatives to improve transport services. This is partly because of a lack of understanding by planners and regulators of what constitutes efficient and sustainable transport services. There are no clear indicators or measures to describe desired levels of rural transport services, how to compare different routes or catchment areas and to describe how they change in relation to investments, incentives, regulation and enforcement.

At present, in many African countries, there are often regular, predicable and affordable transport services on intercity routes. Away from main roads, transport services are more expensive, less regular and often unreliable. Rural taxis may wait for full (or overfull) loads, mixing passengers and freight, with low levels of safety and comfort. Intermediate means of transport (animals, bicycles, motorcycles, three-wheelers) may provide important feeder transport to complement the long-distance services. These may suffer from poor comfort and/or safety and unregulated prices.

There is need to develop and test various rural transport services indicator options, based on the identified constraints and opportunities. As far as practicable, these should be easy to measure or estimate and be responsive to changes in transport services. A range of provisional indicators may be required to reflect the reality from different perspectives. These could be subsequently developed into valuable planning tools for national governments and their supporting development agencies.

5 CONCLUSIONS

Good roads and bridges are fundamental to rural transport, but their economic and social value and impact depends largely on the rural transport services that operate on them. Rural transport services are diverse, in terms of their technologies (trucks to bicycles), the loads carried (different types of people, different types of freight) and their social and economic importance. While most people would agree that rural transport services are important, there are often few (if any) proactive policies and strategies for improving them. There is need for informed policy, but there is often a gap in our understanding of how governments can stimulate and regulate the private sector (formal and informal) to make transport services better (more efficient, more affordable, more frequent, more capacity, more comfort, more safety, etc). The authors have highlighted areas where there are both existing knowledge gaps and much potential for sharing lessons of good practice between countries, including climate change, governance and various intermediate means of transport.

In many countries, rural transport services remain a neglected area for research, and there is scope for rigorous studies, supported by good networking exchanges and targeted dissemination of the lessons to ensure more informed policies in the coming years. In order to assess the impact of the research and improvements in rural transport services brought about by better roads, new transport types, incentives or improved governance, various agreed measures or estimates are required. These should act as indicators of transport service quality, quantity and suitability for the various rural stakeholders, and how services change over time.

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KEYWORDS

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