RURAL TRANSPORT SERVICE INDICATORS:
Tanzania Country Report

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in collaboration with
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RURAL TRANSPORT SERVICES iNDICATORS

African Community Access Programme (AFCAP)
Project AFCAP/GEN/060
Developing Indicators for Rural Transport Services

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Cover photo
Motorcycle taxis taking passengers from a midi-bus stop
to villages away from the road at Yombo, Bagamoyo, Tanzania.
Cover photo and other photos © Paul Starkey

This project was funded by the Africa Community Access Programme (AFCAP) which promotes safe and sustainable access to markets, healthcare, education, employment and social and political networks for rural communities in Africa.

Launched in June 2008 and managed by Crown Agents, the five year-long, UK government (DFID) funded project, supports research and knowledge sharing between participating countries to enhance the uptake of low cost, proven solutions for rural access that maximise the use of local resources.

The programme is currently active in Ethiopia, Kenya, Ghana, Malawi, Mozambique, Tanzania, Zambia, South Africa, Democratic Republic of Congo and South Sudan and is developing relationships with a number of other countries and regional organisations across Africa.

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The International Forum for Rural Transport and Development (IFRTD) in conjunction with Paul Starkey was awarded a research contract by the African Community Access Programme (AFCAP) to develop and test indicators that can be used to assess how good rural transport services are at providing access for rural people. The envisaged outcome of the research will be appropriate rural transport services indicators that are tested and disseminated to the transport sector in various African countries.

The research aims to identify, develop, test and share rural transport services indicators relevant to the key stakeholders, including rural people, transport operators, regulators, planners, roads authorities and development agencies. This will be achieved using participative methodologies involving local stakeholders and sector experts.

The research team comprises:
Paul Starkey *(Team Leader)*
Peter Njenga *(Project Manager)*
Shedrack Willilo *(Tanzania Research Leader)*
Guy Kemtsop *(Tanzania Research Adviser)*
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Krishan Jayatunge *(Website and design)*
Juliet Ritta *(Kenya Research Assistant).*

The project website is http://www.ruraltransport.info/RTSi.

This document is one of three outputs prepared at the end of the first phase of research (April to September 2012):

- Work-in-progress paper
- Kenya country report
- Tanzania country report.

African Community Access Programme (AFCAP)
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Acronyms and abbreviations

AFCAP	African Community Access Programme
Aids	Acquired immune deficiency syndrome
eg	for example
GIS	Geographical information systems
GPS	Global positioning system
HIV	Human immunodeficiency virus
ICT	Information and communication technologies
ie	that is to say
IFRTD	International Forum for Rural Transport and Development
IMT	Intermediate means of transport
kg	kilogram
km	kilometre
m	metre
NGO	Non-governmental organisation
PMO-RALG	Prime Minister's Office Regional Administration and Local Government
RTS	Rural transport services
RTSi	Rural transport services indicator
SUMATRA	Surface and Marine Transport Regulatory Authority
UK	United Kingdom (of Great Britain and Northern Ireland)
USA	United States of America
USD	United States Dollar
USDc	United States Dollar cents
VEO	Village Executive Officer
VOC	Vehicle Operating Cost
WEO	Ward Executive Officer

1 Executive summary

This is the Tanzania country report of the AFCAP-funded project to develop indicators to 'measure' the adequacy of rural transport services (RTS) for meeting the access needs of rural people. Based on the research framework and the methodology developed, information was collected from a range of users (balanced for gender) along the three surveyed roads. The surveyed roads were Bagamoyo–Mlandizi (40km), Bago–Talawanda (20km) and Nala–Mindora (35km). The first two roads are located in Bagamoyo district in the Coastal region while the last road is located in Dodoma region.

Interviews were held with people who have used transport services in relation to agriculture, health, education and economic activities. Elderly and disabled people and those responsible for children were interviewed to learn of their particular transport issues. For each type of transport used, people were asked about prices, frequencies, predictability, reliability, convenience, capacity, seasonality, safety, security, accessibility, comfort and connectivity. The cost and convenience of transporting small (20-50 kg) and medium (200 kg) freight was ascertained from users.

Operators (and/or owners) of each mode of transport service were interviewed. Information was also collected concerning fares, frequencies, reliability, predictability, seasonality, safety, security and freight transport. The information was compared with that provided by users and discrepancies were investigated immediately. Detailed information was also obtained relating to operating costs and income, associations, regulation, incentives and disincentives.

Local regulating authorities and/or competent individuals (eg, village leaders, teachers and traffic police) were interviewed about compliance with technical, financial, operational, safety and environmental regulations. People with knowledge of the road and the appropriate sector were interviewed to assess how the road contributed to key development issues. These included agriculture, trade facilitation, health, maternal health, HIV/Aids, education, gender, disability, information technologies (including mobile phones), cultural heritage and the environment. Traffic counts were undertaken.

The key survey information for each of the three roads is summarised in three RTSi Road Reports included at the end of the document. At the start of each report, four tables summarise most of the statistics considered relevant for subsequent indictor development. These include key statistics about the road (including maps), traffic and transport services patterns (disaggregated for mode and showing service fluctuations), key operational statistics (costs, frequencies, safety, security, regulation compliance and development impact) and user satisfaction (disaggregated for gender). Four further tables include further information from the survey and these are complemented by numerous charts.

The surveys in Tanzania showed that the condition of the road, interconnectivity of rural hubs, agriculture and rural enterprise potential and closeness to main roads/hubs help to determine the type of RTS on a particular road. The main RTS on the Bagamoyo–Mlandizi road are motorcycles, minibuses and midi-buses. This road links two major hubs: Bagamoyo town and Mlandizi (a junction on the TanZam Highway). On the Bago–Talawanda road, motorcycles are the only public transport services. This road links a rural village hub (Talawanda) with a junction village (Bago) on the national road to Bagamoyo town. The RTS along Nala–Mindora road include one large bus, two minibuses and some motorcycles. This road links the Mindora rural hub to the Singida national road and thus to Dodoma town.

The surveys revealed that key concerns for the users include high passenger fares (especially for motorcycles), unavailability of medium freight (200 kg) transport services coupled with high charges, unpredictability of RTS, safety of the RTS particularly the motorcycles and the environment (noise level/dust/heat). Operators are concerned about road condition, disruption and inadequate access to capital/credit facilities. Regulators complained about low compliance with safety regulations (with issues of speeding, overloading, drivers' behaviour and little use of crash helmets). There was also limited attention to operational regulations (routes, loading levels) and environmental legislation

(emission and noise control). Development personnel were more concerned with the road maintenance as a key to facilitate agriculture and rural enterprises. Availability of mobile phone networks is seen as positive development that facilitates organising transport services and also people's financial affairs as people can send and receive money via mobile networks (eg, M-PESA).

Transport services could be improved through better road maintenance as road condition largely determines the type of RTS to operate on the road, fares, service frequency and travel time, all of which are important for rural development. Training and use of village leaders could lead to better regulation of motorcycles which are increasing and often the main form of RTS.

2 Introduction and background

This Tanzania country report derives from the first six months of work to develop indicators to 'measure' the adequacy of rural transport services for meeting the access needs of rural people. The AFCAP-funded project is being implemented by an IFRTD team led by Paul Starkey and Peter Njenga. The first project phase from April to September 2012, aimed to develop and test a methodology to acquire the information required to develop indicators. The team met in April 2012 to plan the research framework and participative survey methodology. It was decided that information for indicator development would be linked to specific roads. Data should be easy to obtain, relevant to key stakeholders, reliable, replicable and comparable. Researchers should obtain specific information from users, operators, regulators and development personnel. They should verify the accuracy of information during the survey by interviewing several people per stakeholder category and by observations and triangulation between the sources.

The agreed survey methodology involved surveying users, operators, regulators and development personnel. Various users were interviewed using small samples (balanced for gender) that were intended to be representative of the key stakeholders. As a result, interviews were held with people who had recently used transport services in relation to agriculture, health, education and economic activities. Elderly and disabled people and those responsible for children were interviewed to learn of their particular transport issues. For each type of transport used, people were asked about prices, frequencies, predictability, reliability, convenience, capacity, seasonality, safety, security, accessibility, comfort and connectivity. The cost and convenience of transporting small (20-50 kg) and medium (200 kg) freight was ascertained from users.

Operators (and/or owners) of each mode of public transport services were interviewed. Information was collected concerning fares, frequencies, reliability, predictability, seasonality, safety, security and freight transport. The information was compared with that provided by users and discrepancies were investigated immediately. Detailed information was also obtained relating to operating costs and income, associations, regulation, incentives and disincentives.

Local regulating authorities and competent individuals were interviewed about compliance with technical, financial, operational, safety and environmental regulations. People with knowledge of the road and the appropriate sector were interviewed to assess how the road contributed to key development issues. These included agriculture, trade facilitation, health, maternal health, HIV/Aids, education, gender, disability, information technologies (including mobile phones), cultural heritage and the environment. Traffic counts were undertaken on the roads to obtain estimates of traffic types and the passengers being carried (disaggregated for gender).

Further information on the research project and the methodologies used for surveying and analysis are provided in two work-in-progress papers that are available to download from the project website (Starkey et al, 2012a and 2012b).

This document provides the initial results obtained from three road-based surveys in Tanzania. The document highlights emerging issues that are presented from four different perspectives:

- User's perspectives
- Regulator's perspectives
- Operator's perspectives
- Overall development perspective.

The research on developing indicators is at an early stage. Nevertheless, the survey work on these Tanzanian roads has highlighted many issues concerning rural transport services relevant to local stakeholders. These are summarised and discussed in the following sections of this report. Statistics and observations relating to the particular roads are then presented in three RTSi Road Reports. While these are at the end of this document, they are integral components of this country report.

3 Overview of the three roads surveyed

3.1 Bagamoyo–Mlandizi Road, Coast Region, Tanzania

The Bagamoyo–Mlandizi road (40 km) is a gravel road located in the Coast Region of Tanzania. The road comprises a trunk road section and a regional road section thus the road is under the management of Tanzania National Roads Agency (TANROADS). The trunk road section starts at Bagamoyo town and traverses through flat and rolling terrain to Makofia (5.5 km) along the Bagamoyo–Makofia–Msata road (65 km) which is being upgraded to bitumen standard. From Makofia junction the Mlandizi road is a regional road that traverses lightly rolling terrain to Mlandizi town where it links to the TanZam Highway at Mlandizi junction (34.5 km).


Left and right: Midi-buses, minibus and motorcycles at the Yombo 'bus stop' and motorcycle hub


Left and right: Motorcycles providing feeder transport at the Yombo 'bus stop' and motorcycle hub

The trunk road section from Bagamoyo to Makofia junction is currently fairly poor gravel standard (but is due to be upgraded soon). From Makofia junction to Mlandizi junction (34.5 km) the road is good gravel standard. The major economic activity along the survey road is agriculture. Crops grown include rice, coconut, sorghum, maize, cassava and pineapples. Charcoal is also produced and sold.


Left: Bicycle transporting charcoal. Right: motorcycle transporting about 200 kg of freight

The transport services along the road based on a one day traffic count at Yombo (17.5 km from Bagamoyo town along the road) revealed the traffic volume as follows; 50 bicycles a day, 100 motorcycles a day, 15 minibuses a day and 10 midi-buses a day. There are also 10 trucks a day which are purely for freight transport.

3.2 Bago–Talawanda Road, Coast Region, Tanzania

The Bago–Talawanda road (20 km) is located in the Coast Region. This is a district road under the management of the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). The road starts at Bago village hub 43.5 km from Bagamoyo town along the Bagamoyo–Makofia–Msata trunk road (65 km). From Bago, the surveyed road traverses rolling, hilly terrain to Talawanda village hub (20 km).

Left: Motorcycle taxi on experimental section with concrete strips. Right: Bicycle and passenger.

The African Community Access Programme (AFCAP) has been funding a project on this road to demonstrate alternative surface options for low volume roads. These include sections of tarmac, gravel, concrete strips, packed stone and earth. Before upgrading, the road was hardly motorable even during the dry season. Currently, the road still experiences disruptions during the rainy season due to flooding at one water crossing. One section of packed stones has become so uneven it is difficult to pass, and so motorcycles use the shoulder and trucks use a bypass through the bush.

Failed road section of packed stone. Motorcycles now drive on the shoulder while trucks take a bypass through the bush

The major economic activity along the survey road is small-scale agriculture and livestock keeping. Crops grown include maize, sorghum, sesame, cassava, pineapples and various legumes. The production and sale of charcoal is economically important.

Left and right. Motorcycle taxis along the road

Transport along the road mainly involves walking, bicycles, motorcycles and occasional light charcoal trucks. After upgrading the road, a midi-bus started to operate daily services from Talawanda to Bagamoyo. Since February 2012, this has stopped. The owner said this was due to the financial difficulties of maintaining the bus on that road, and the poor condition of sections of the road, particularly during the rainy season. During a one-day survey of traffic carried out in May 2012, the only traffic was 50 motorcycles a day and 25 bicycles a day. On some days a light truck uses the road to collect charcoal.

3.3 Nala–Mbalawala–Mindora Road, Dodoma Region, Tanzania

This road is located in Dodoma Region in Dodoma Urban and Dodoma Rural Districts. This is a 35 km district road, managed by the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). The road starts at Nala which is 20 km from the city of Dodoma on the Singida road. The road traverses flat and gently rolling terrain to Mindora village which is 35 km from Nala.

Left: The large bus that operates on the road. Right: Donkeys are important for freight transport

The first 12 km section of the road from Nala to Mbalawala is of good gravel standard. Much of the subsequent 23 km section from Mbalawala to Mindora is a non-engineered earth road that is in 'poor' condition. There are some drainage culverts, and those near Mindora are being replaced. Due to the poor state of this second section of road, motorised transport services are considered unreliable and are disrupted for a period of 5 months during the rainy season.

Left and right: Motorcycle and bicycles used on the road

The major economic activities along the survey road are agriculture and livestock keeping. Crops grown include sorghum, maize, millet, sesame, groundnuts and sunflowers.

Left: Bicycle park at the secondary school along the road. Right: Disabled man with hand operated tricycle.

According to the traffic survey carried out in June 2012 at Mbalawala, the transport services along the road comprise 60 bicycles a day, 20 motorcycles a day and 1 large bus. Pack donkeys are quite widely used for freight transport along the road. The bus service has an informal timetable, but users say it is nonetheless unpredictable.

4 Key observations from the four survey perspectives

4.1 User perspectives

User perspective surveys were carried out on each of the study roads. A total of 178 users (105 male and 73 female) were interviewed. A total of 68 users (39 male and 29 female) of motorcycles, minibuses, midi-buses and trucks were interviewed around the Bagamoyo–Mlandizi road. For the Bago–Talawanda road, 34 users of motorcycles were interviewed (23 male; 11 female). On the Nala–Mindora road 76 users of motorcycles, minibuses and the bus were interviewed (43 male; 33 female). The numbers and gender of the users interviewed is illustrated in Fig. 1.

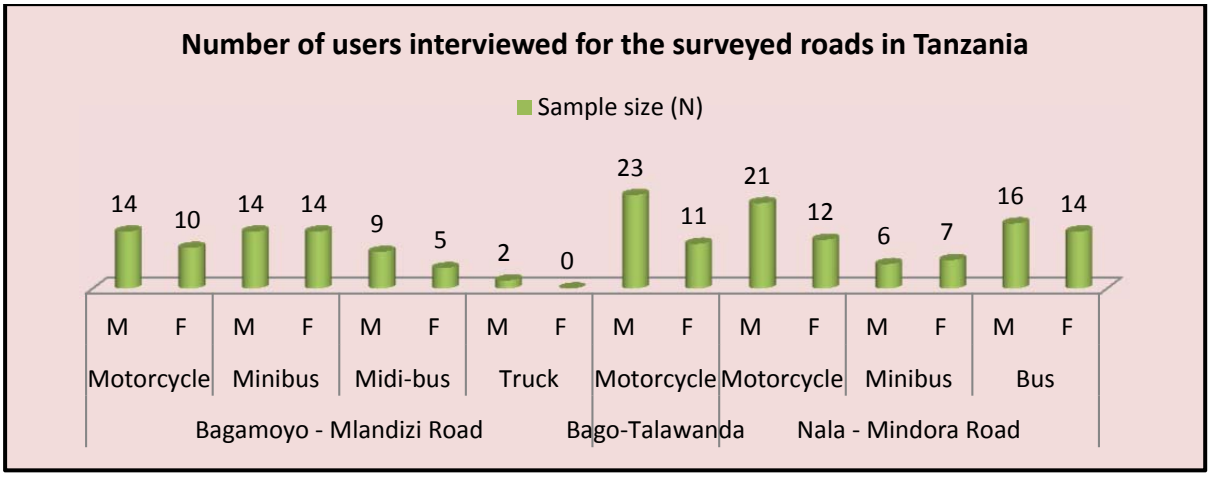


Fig.1: Number of users interviewed for the surveyed roads in Tanzania

The youngest respondent was a student of 16 years while the oldest were 70-year-old farmers. The user category interviewed included farmers, traders, disabled, elderly, students, health users, maternal health care and those using transport for employment, financial services and/or for socio-cultural or religious reasons.

4.1.1 Summary of user satisfaction for motorcycle transport services

Women and men were surveyed on their satisfaction with the different means of transport. For the motorcycle transport service, 14 (58%) men and 10 (42%) women were interviewed around the Bagamoyo–Mlandizi road, 23 (68%) men and 11 (32%) women were interviewed along the Bago–Talawanda road and 21 (64%) men and 12 (36%) women were interviewed around the Nala–Mindora road. Figure 5 shows gender disaggregated levels of satisfaction with passenger fares, journey times, service frequency and service predictability. Higher scores represent greater satisfaction. Across the three surveyed roads, users were dissatisfied with motorcycle passenger fares and the predictability of motorcycles services. However, in terms of journey time, users were relatively satisfied for the Bagamoyo–Mlandizi road and the Nala–Mindora road compared to Bago–Talawanda road. Across all the roads, men were relatively more satisfied with journey times than women. Users were also satisfied with the service frequency for the Bagamoyo–Mlandizi road followed by Nala–Mindora road with women being relatively more satisfied than men. Women were particularly satisfied by the availability (frequency) of motorcycle taxis on the Bagamoyo–Mlandizi road.

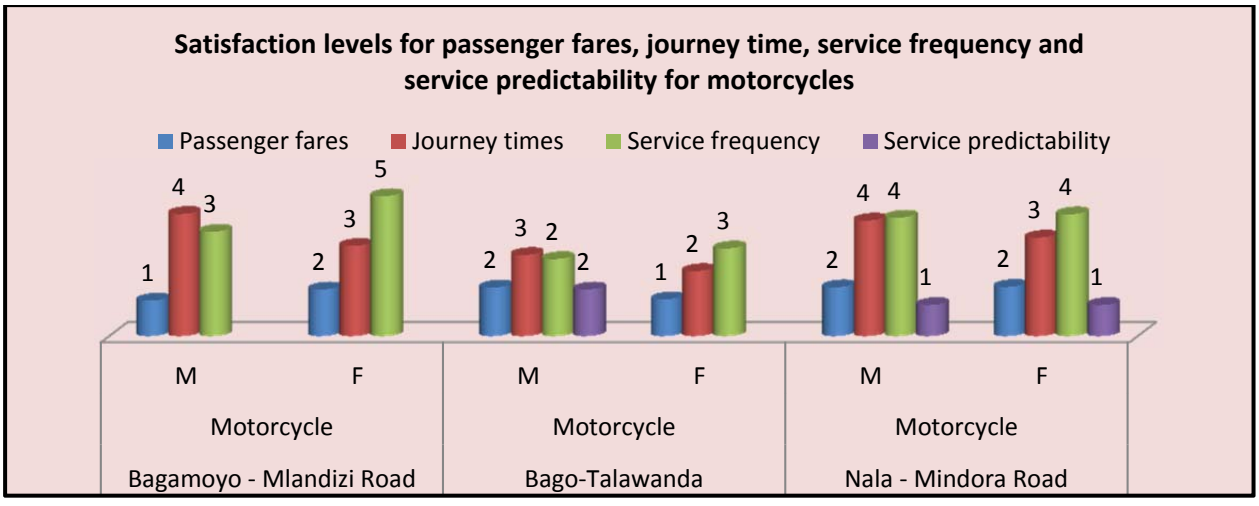


Fig. 2: Satisfaction levels for passenger fares, journey time, frequency and predictability for motorcycles

In terms of motorcycle freight characteristics, both men and women were satisfied with small freight availability, small freight handling and medium freight handling. However, both men and women were dissatisfied with medium freight availability and freight charges for both small and medium freight (Figure 3).

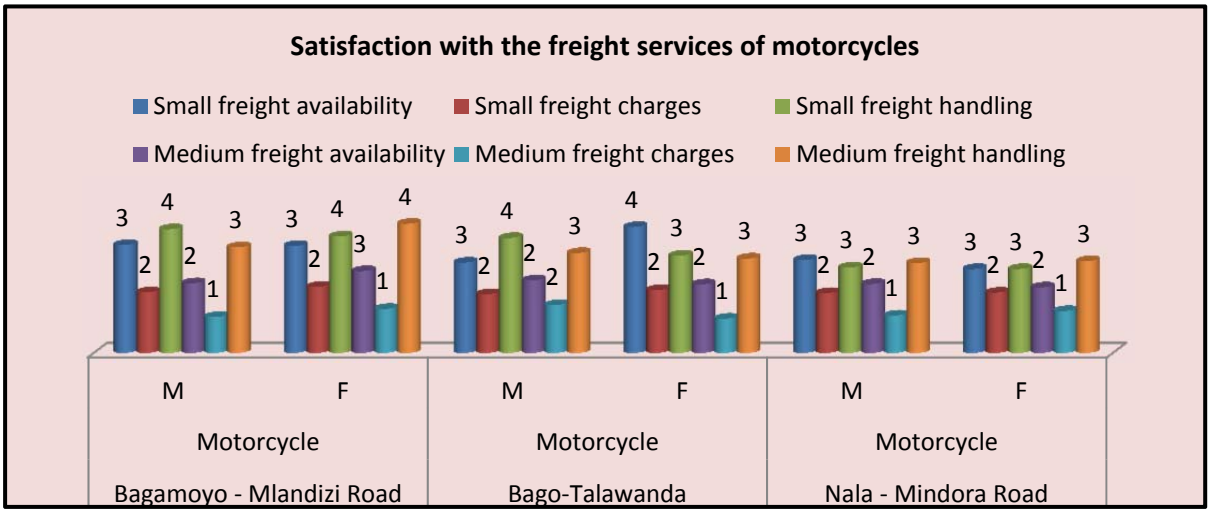


Fig. 3: User satisfaction with motorcycle freight services

Both women and men across the three roads were equally satisfied with the level of comfort in terms of motorcycle seat condition. Both men and women thought access was poor for vulnerable people (elderly or physically challenged people, for example those using mobility aids). Similarly, safety and the level of comfort in terms of the environment (noise levels/dust/heat) were considered to be very poor for both male and female passengers on motorcycles across the roads (Figure 4).

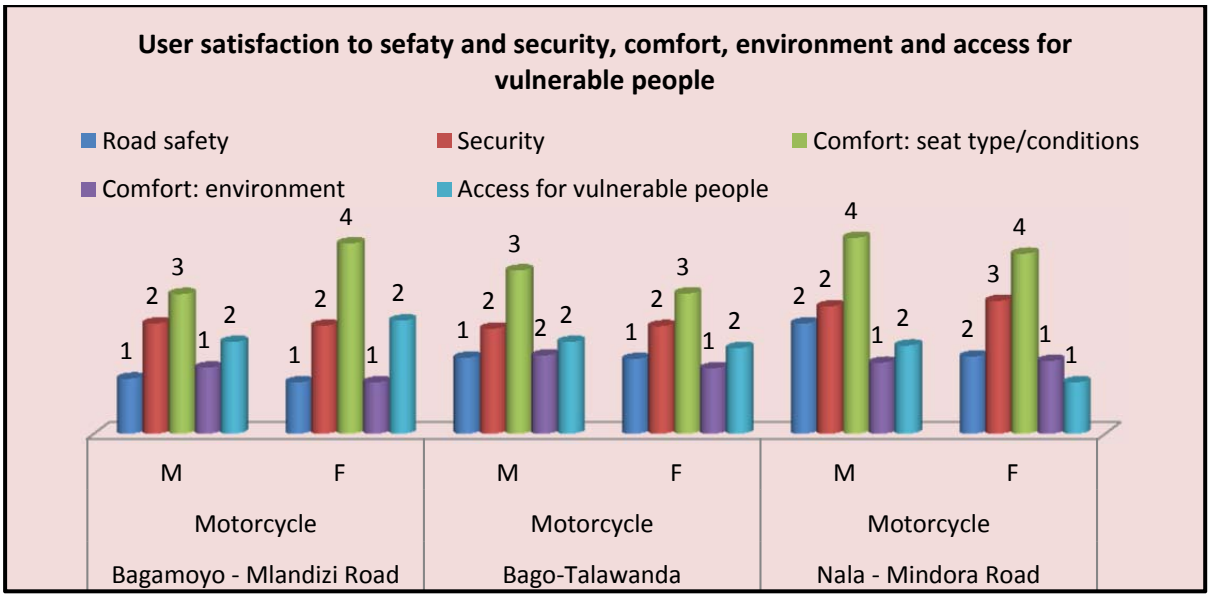


Fig. 4: User satisfaction to safety & security, comfort, environment and access for vulnerable

4.1.2 Summary of user satisfaction with minibuses

The Bago–Talawanda road had no minibus services but only motorcycles. Therefore the analysis of user satisfaction for minibuses is only based on the Bagamoyo–Mlandizi and Nala–Mindora roads. Along these roads, responses relating to minibuses were provided by 41 users of which 20 (49%) were men and 21 (51%) were women. The Bagamoyo–Mlandizi sample was 28 users of which 14

(50%) were men and 14 (50%) women. The Nala–Mindora sample was 13 users of which 6 (46%) were men and 7 (54%) women. Both genders expressed similar levels of satisfaction (medium satisfaction) with passenger fares, journey times, service frequency and predictability of minibus transport services along the Bagamoyo–Mlandizi road. However, on the Nala–Mindora, which had fewer services, both men and women were dissatisfied with service frequency (Fig. 5).

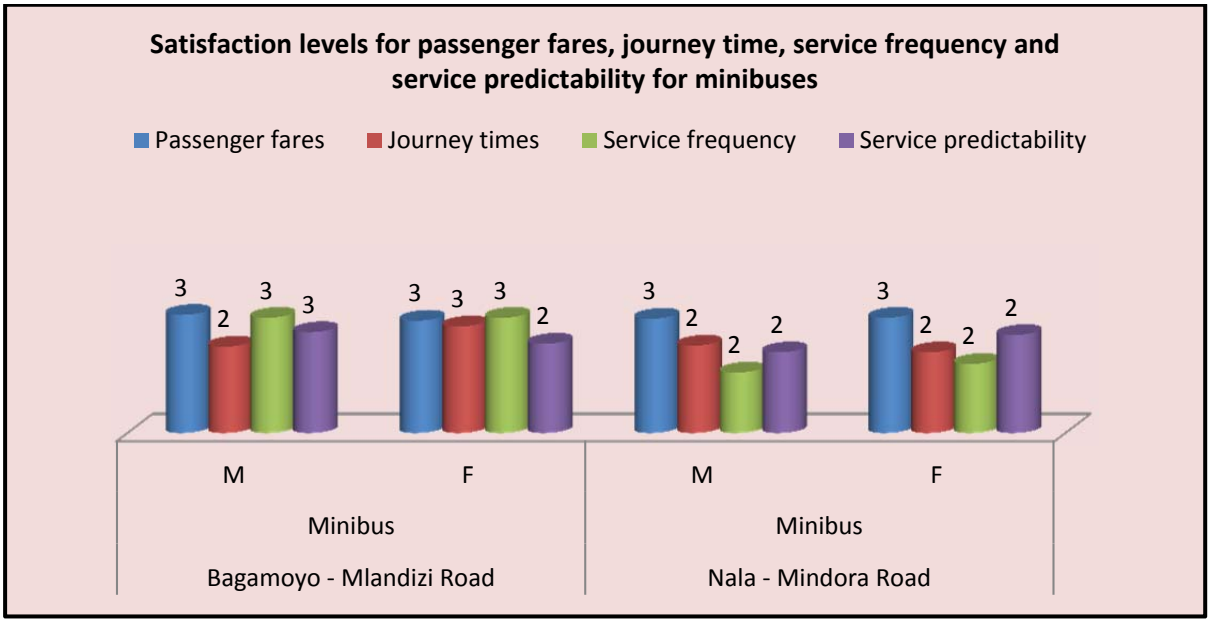


Fig. 5: Satisfaction for passenger fares, journey time, service frequency and predictability

In terms of freight characteristics, both male and female minibus users were dissatisfied with the medium freight availability and charges. Minibus users were medium satisfied with the availability of small freight services across the two roads. Along the Bagamoyo–Mlandizi road, men were medium satisfied with small freight charges while women were dissatisfied. For the Nala–Mindora road it was the other way round. Minibus users along the Bagamoyo–Mlandizi road were medium satisfied with small freight handling while along the Nala–Mindora road, women were medium satisfied while men were dissatisfied (Figure 6).

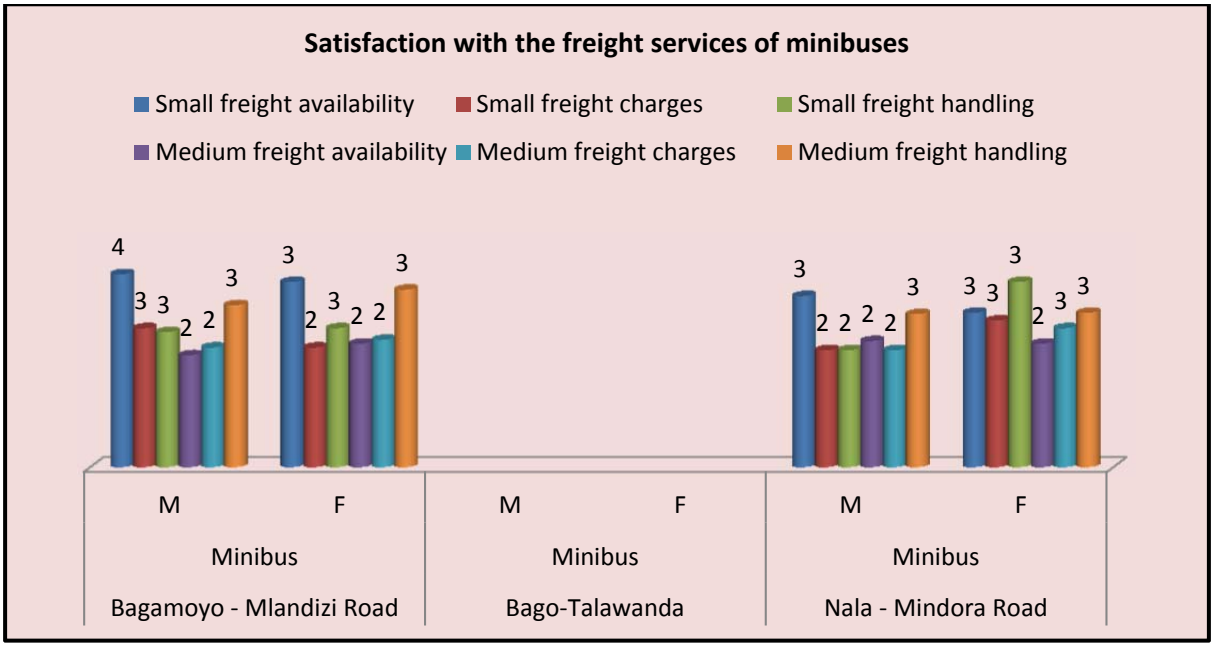


Fig. 6: Satisfaction with freight characteristics for minibus

There appeared to be no gender differences in relation to user satisfaction with comfort and safety. Both men and women were dissatisfied with the comfort in terms of seat space and condition. Users were medium satisfied with safety on the Bagamoyo–Mlandizi road while they were dissatisfied with the safety on the Nala–Mindora road. Both men and women were satisfied with the security of the Bagamoyo–Mlandizi road. On for the Nala–Mindora road women were satisfied while men were only medium satisfied (Fig. 7).

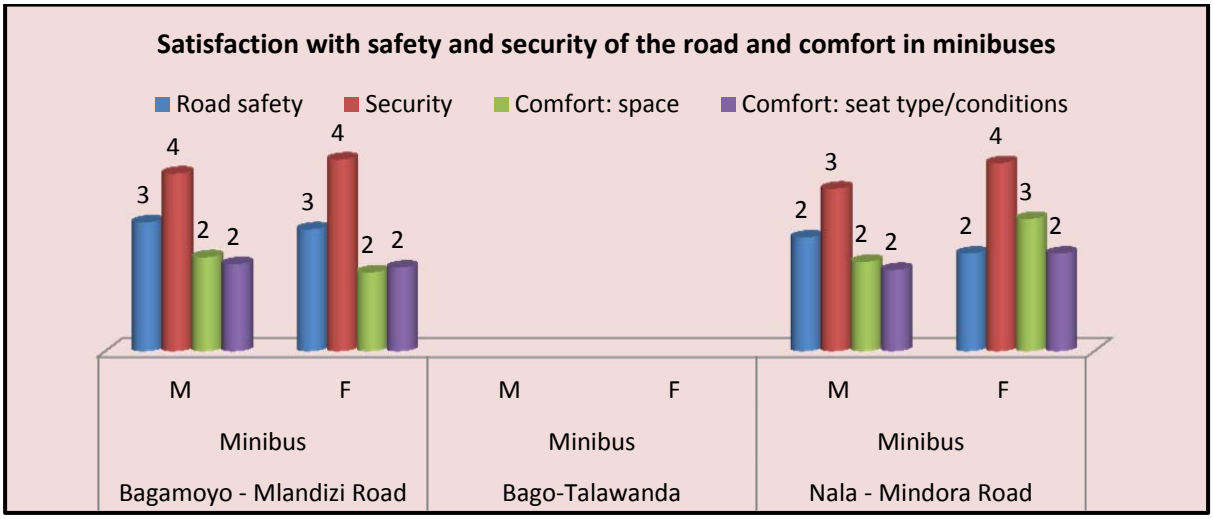


Fig. 7: Satisfaction with safety and security, and comfort for minibus

Both men and women across the two surveyed road indicated that minibuses had poor access and convenience for elderly and physically challenged people (eg, those using mobility aids such as sticks, crutches, frames or wheelchairs). Similarly, both men and women were dissatisfied with the minibus comfort in terms of the environment (noise level/dust/heat). Minibus users were dissatisfied with the comfort in terms of surrounding baggage.

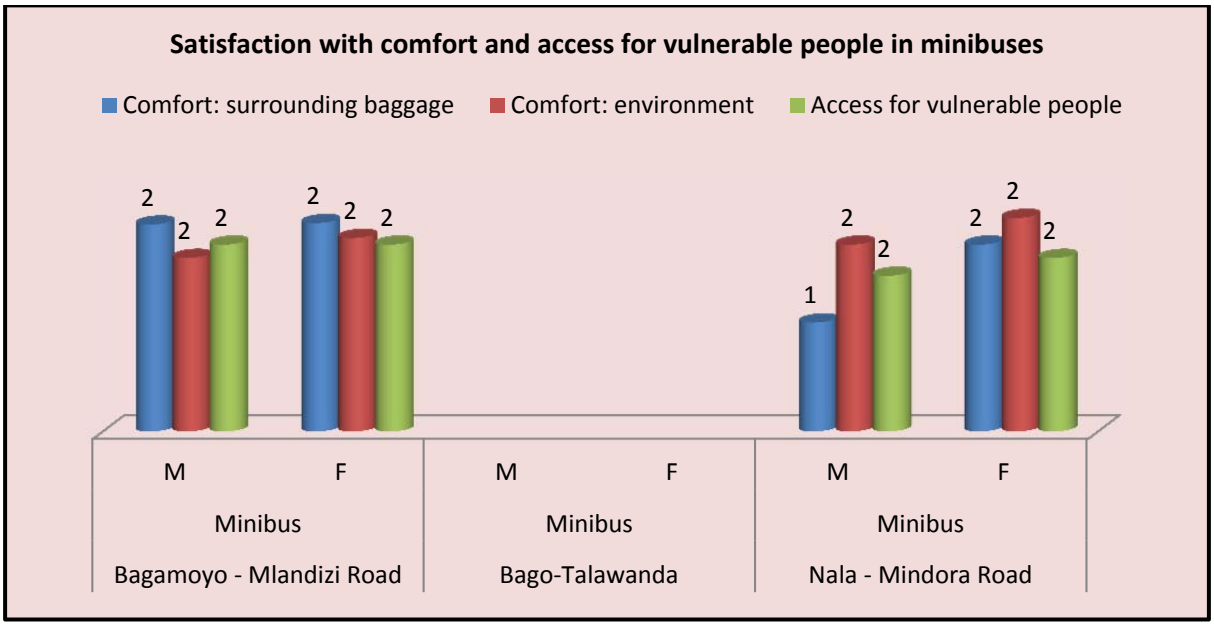


Fig. 8: Satisfaction with comfort and access for vulnerable for minibus

4.1.3 Overall assessment of all transport modes

Across the surveyed roads, all minibus users who were interviewed indicated they were dissatisfied with roadside waiting facilities as there were no bus shelters or other facilities. In terms of

intermodal connectivity, users across the surveyed roads are satisfied with the linking intermodal connectivity (connections to transport routes beyond the road). However, in terms of feeding intermodal connectivity (getting to the road from villages), RTS users along the Bagamoyo–Mlandizi road were satisfied. In contrast, along the Bago–Talawanda road users were medium satisfied and they were dissatisfied on the Nala–Mindora road, which had the low levels of motorcycle services. This suggests that motorcycles have an important role in facilitating the movement of people and goods to and from the road. They complement minibuses and midi-buses in facilitating timely links to the transport available at the major hubs (Fig. 9).

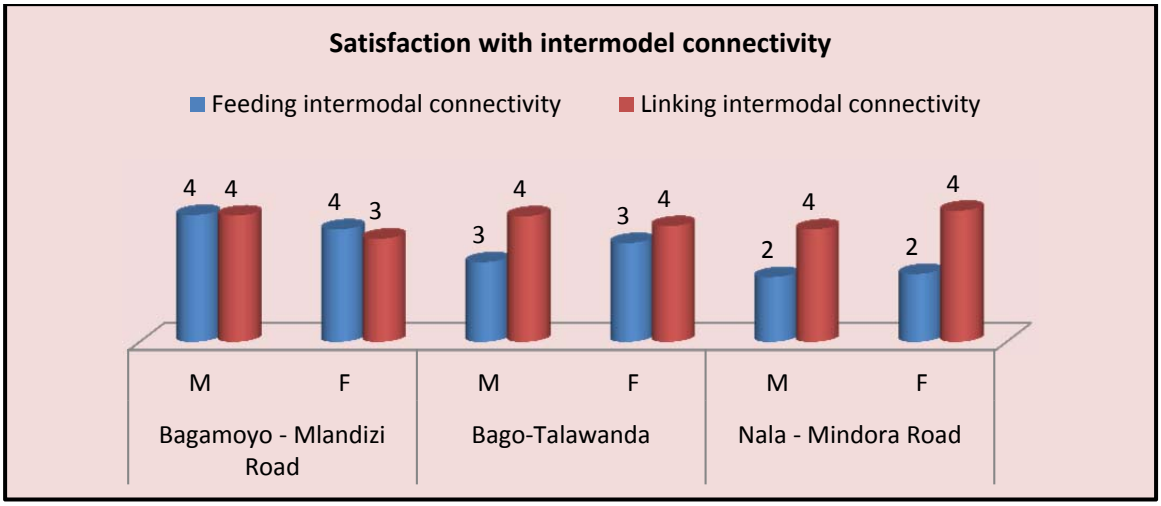


Fig: 9: Satisfaction to intermodal connectivity

4.2 Operator perspectives

A total of 14 operators were interviewed across the three surveyed roads in Tanzania. The Bagamoyo–Mlandizi road had three main forms of rural transport services: motorcycles, minibuses and midi-buses. Two operators were interviewed for each transport mode. All of them leased the vehicles from the owners. Motorcycles were the only transport services along the Bago–Talawanda road. Three motorcycle operators were interviewed of which two leased their vehicles and one was an owner-operator. The Nala–Mindora road had three main types of transport services: motorcycles, minibuses and a bus. The survey of operators in this road included three motorcycle operators (all owner-operators), one minibus driver and a one bus driver.

Table 1: Number and type of operators interviewed

Road Name	Motorcycle		Minibus		Midi-bus		Bus		Total
	Owner	Operator	Owner	Operator	Owner	Operator	Owner	Operator	
Bagamoyo - Mlandizi	0	2	0	2	0	2	0	0	6
Gago - Talawanda	1	2	0	0	0	0	0	0	3
Nala - Mindora	3	0	0	1	0	0	0	1	5

The motorcycle operators on the Bagamoyo–Mlandizi road and Bago–Talawanda roads were paying to the owners daily charges of TZS 5000 (USD 3) and TZS 6000 (USD 3.7) respectively. Minibus operators on the Bagamoyo–Mlandizi road leased their vehicles and paid TZS 55,000 (USD 34) a day to the owners. On the Nala–Mindora the system was different, as the driver was retained by the owner. He was expected to pay over all the fares, which often amounted to just TZS 15,000 (USD 9) having paid for the day's fuel. This huge difference in apparent minibus operating income could be explained by the state of road condition and the income earning possibilities (number of trips per day and catchment population along the route). On the Bagamoyo–Mlandizi roads, minibuses make up to three return trips a day while in along Nala–Mindora roads the minibuses only make one return trip. Moreover, operators revealed that on the Nala–Mindora road there were up to three

months a year with no service and up to six months of disrupted services. On the Bago–Talawanda road there is about one month with no service and three months with disrupted services. In contrast, the Bagamoyo–Mlandizi road is in much better condition with year-round services, of which only thirty days a year of disrupted services.

Fares per kilometre were much higher for motorcycles than for minibuses. The motorcycles fares for the Bagamoyo–Mlandizi road were USDc 21 per kilometre (that is twenty-one US cents). Motorcycle fares were USDc 22 per kilometre on the Bago–Talawanda road and USDc 24 per kilometre on the Nala–Mindora road. The fares were therefore higher on the poorer roads which are also the roads with fewer motorcycles. Therefore the fare differences might be associated with the poor road or the limited competition. For minibuses, midi-buses and the bus, the fares for the three transport types and roads were similar at about USDc 3 per kilometre (Fig. 10).

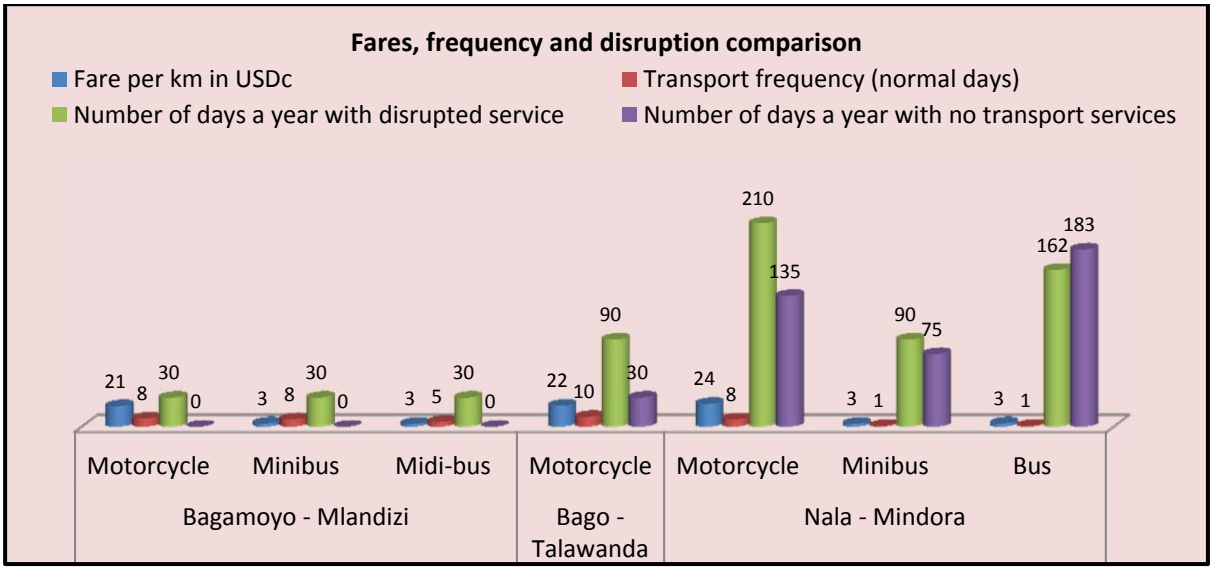


Fig. 10: Fares, service frequency and service reliability

Based on the survey findings, the operators face challenges relating to access to capital, security of the road and regulatory issues. Difficult access to working capital was a concern on all the surveyed roads. Security was a great concern along the remote Nala–Mindora road, but it was not an issue on the remote Bago–Talawanda or the busier Bagamoyo–Mlandizi road. Most transport operators expressed concern about regulatory issues which included check points, barriers, enforced safety regulations relating to loading levels, crash helmets, seat belts and restrictions on operating hours and routes of operation. However, these were regarded as relatively weak disincentives on the Bagamoyo–Mlandizi and Bago–Talawanda roads. They were considered very strong disincentives on the Nala–Mindora road. While the road itself has little regulation, the routes go on to Dodoma along the Singida trunk road where there are several traffic police checkpoints and a weigh bridge. Regulatory incentives (eg, subsidies, tax relief, flat-rate tax and route allocation) are not considered very important, but they are generally considered higher for buses and mini-buses than motorcycles (Fig. 11).

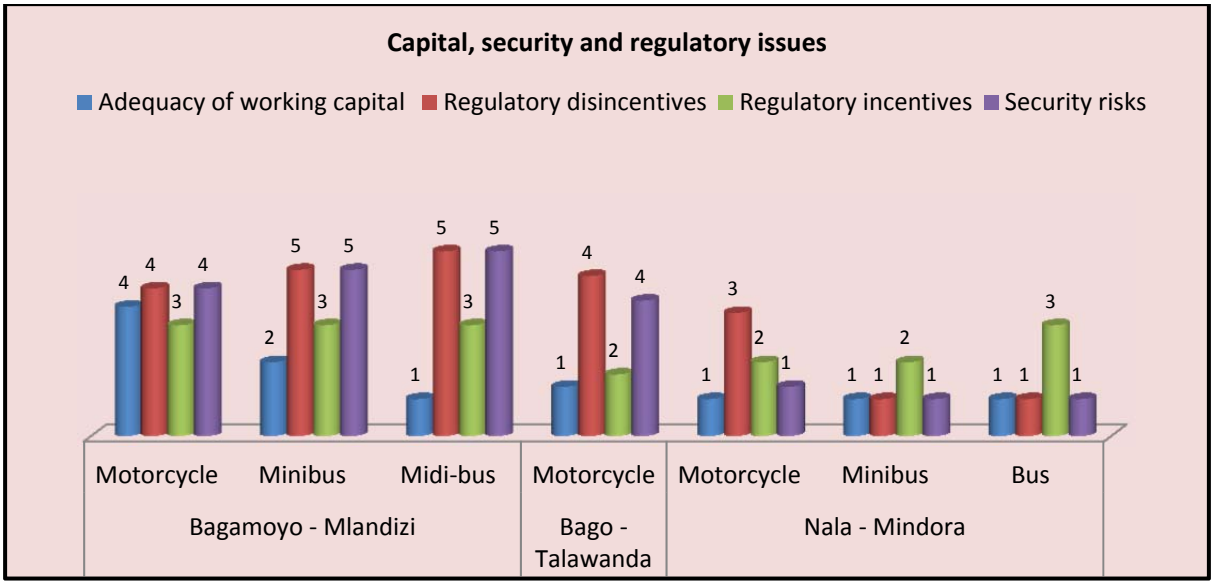


Fig. 11: Capital, security and regulatory issues

4.3 Regulator perspectives

Eight people were interviewed to provide their opinions on the regulator's perspective. On the Bagamoyo–Mlandizi road two people were interviewed, the Ward Executive Officer (WEO) and a traffic police officer. On the Bago–Talawanda road three people were interviewed, the village secretary, a head teacher and a traffic police officer. Similarly, on the Nala–Mindora road, three people were interviewed, a head teacher, a traffic police officer and a Ward Executive Officer. The traffic police were responsible for enforcing vehicle and traffic regulations and have good understanding about the operators' compliance with regulations. At village level, head teachers are generally aware of issues of relating to compliance with vehicle regulations as they often travel by public transport to town hubs on school business (salaries, meetings). Village leaders are also suitable people to interview as they have to travel regularly by public transport and are generally aware of various regulatory issues.

The respondents suggested that on all three roads motorcycles had very little compliance with technical regulations or tax and financial regulations. Officials in the Surface and Marine Transport Regulatory Authority (SUMATRA) revealed that motorcycles regulation only started in January 2012. There is little enforcement of regulations in rural areas as SUMATRA does not have available staff. There are on-going discussions as to whether village leaders could be involved in the enforcement of regulations.

In general, rural transport services do little to comply with safety regulations (speed, overloading, drivers' behaviour, use of safety belts and crash helmets), operational regulations (timetables, routes and loading levels) or environmental legislations such as emission and noise control. The traffic police do little enforcement on rural roads and tend to be inconsistent. Operators' compliance with insurance is high for the larger vehicles. This is partly due to the fact that these vehicles generally travel to and from urban hubs where regulation enforcement is higher (Table 2).

Table 2: Summary of regulatory perspective

Means of transport	Bagamoyo - Mlandizi				Bago - Talawanda	Nala - Mindora			
	Motorcycle	Minibus	Midi-bus	Truck	Motorcycle	Motorcycle	Minibus	Bus	Truck
Vehicle technical compliance	1	2	2	4	1	1	2	1	3
Vehicle fiscal compliance	1	3	4	5	1	1	3	4	4
Insurance compliance	2	5	5	5	1	1	4	4	4
Operational compliance	1	1	2	1	1	1	1	1	1
Safety compliance	1	2	2	3	1	1	1	1	1
Environmental compliance	1	1	1	2	1	1	1	1	1
Regulatory planning framework	1	3	3	3	1	1	3	3	3
Safety of the road	2	2	2	2	1	1	1	1	1
Un-weighted average	**2**	**2**	**2**	**3**	**1**	**1**	**2**	**2**	**2**

4.4 Development perspectives

A total of 11 people were interviewed to provide opinions on the development perspective. On the Bagamoyo–Mlandizi road, four people were interviewed: a Ward Executive Officer (WEO), a medical doctor, and two head teachers. On the Bago–Talawanda road three people were interviewed, a WEO, a head teacher and a health officer. On the Nala–Mindora road, four people were interviewed: a head teacher, a nurse, a Village Executive Officer (VEO) and a WEO. The health workers were able to give opinions on how the various type of transport meet the needs of patients and the operations of the various health services. Village leaders (VEO, WEO) are regularly involved in discussions within communities that address development issues such as constraints to rural enterprises, agriculture, and medical sector. Head teachers tend to have had good understanding of various rural challenges, including education and the empowerment of young people. Therefore, the people consulted together are thought to have provided relevant and authoritative assessments of development perspectives.

Rural transport services have a major role in ensuring the rural agricultural sector can obtain farm inputs and market farm produce. How well smallholder farmers benefit from transport services depends on the number, capacity and mix of services and the state of the rural roads. The respondents felt that motorcycles play an important role in facilitating agriculture and rural enterprises across the surveyed roads. Despite being uncomfortable and inappropriate for some sick people, motorcycles are particularly useful for those seeking medical attention. Along the Nala–Mindora road, the nearest health facility to Mindora is 7 km away and the road is only served by one daily bus (when the road is in reasonable condition). In this case, motorcycles are the main transport mode to reach the hospital although the number of motorcycle taxis is small. On all three roads, the motorcycles were considered to have an important development impact. On the Nala–Mindora road, motorcycles were given the highest un-weighted average 'development score' and on the Bagamoyo–Mlandizi their score was only slightly less than that of minibuses. The survey results indicate that the use of mobile phones is very important to help rural transport operations across the surveyed roads, particularly for motorcycles (Fig. 12).

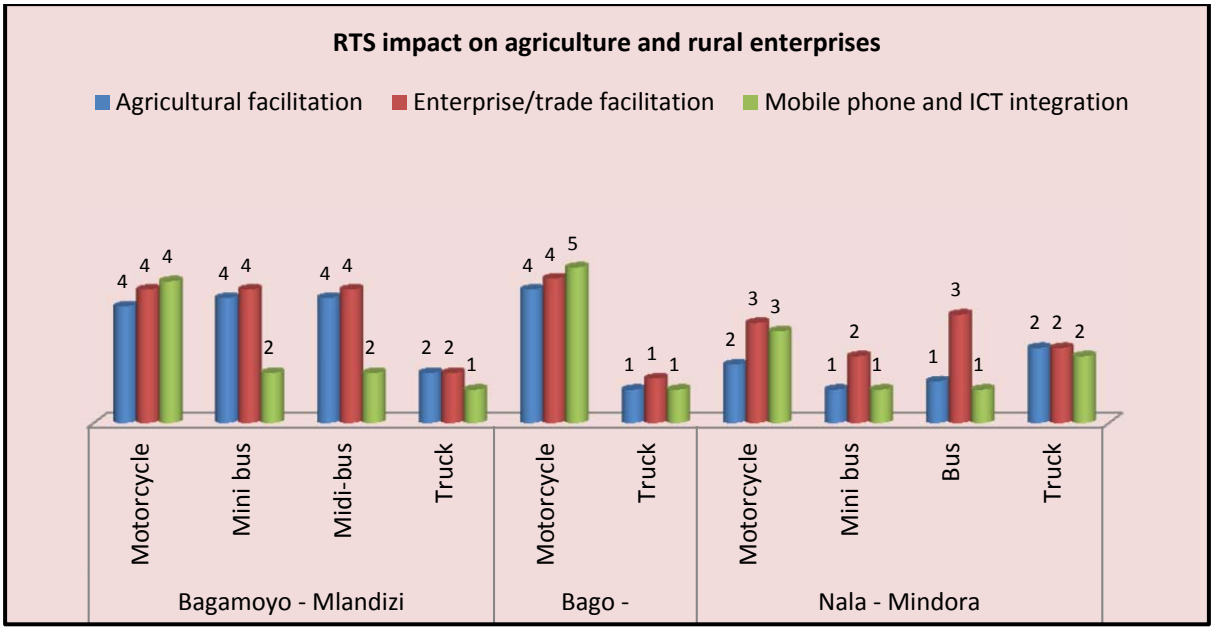


Fig. 12: RTS Impact on agriculture and rural enterprises

Although motorcycles are considered risky in terms of accidents, they are considered very important for supporting the advance of young people, particularly young men. Nevertheless, transport services provided by motorcycles are much more expensive than other RTS modes, and this is a constraint to students, teachers and others. Regular minibuses and midi-buses (as on the Bagamoyo-Mlandizi road) are particularly good at assisting the education sector. On the Bago–Talawanda road, motorcycles are the only motorised rural transport services, and despite their cost, they are considered supportive of the education sector. Table 3 summarises all the development opinions relating to the three surveyed roads.

Table 3: Development perspectives opinions for the surveyed roads

Means of transport	Bagamoyo - Mlandizi road				Bago - Talawanda		Nala - Mindora road			
	Motorcycle	Minibus	Midi-bus	Truck	Motorcycle	Truck	Motorcycle	Minibus	Bus	Truck
Women's empowerment	2	4	4	1	3	1	2	3	3	2
Minority group empowerment	3	3	3	1	3	1				
Disabled people's empowerment	3	4	4	2	2	2	1	1	2	1
Young people's empowerment	5	3	3	1	4	1	3	3	3	3
Maternal health needs	3	4	3	1	3	1	4	2	2	1
Medical service transport	4	4	4	1	4	1	2	1	2	1
Education-related transport	2	4	4	2	4	1	2	1	2	1
Un-weighted average	3	4	3	1	4	1	**2**	**2**	**2**	**2**
Cultural impact	3	3	3	3	3	3	3	3	3	3
Environment impact	3	3	3	3	3	2	3	3	3	2
HIV/Aids impact	4	4	4	3	4	2	3	3	3	3
Un-weighted average	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**

5 Conclusions

The surveys of the Bagamoyo–Mlandizi (40 km), Bago–Talawanda (20 km) and Nala–Mindora (35 km) roads have helped to define some of the emerging characteristics of rural transport services in Tanzania. Transport services along these roads vary greatly and to some extent depend on the condition of the road, the interconnectivity of the various rural hubs, agriculture and rural enterprise potential and proximity to main roads and urban hubs. The Bagamoyo– Mlandizi road has motorcycle, minibus and midi-bus transport services. The Bago–Talawanda only has motorcycle transport services. Despite the poor state of the Nala–Mindora road, a large bus operates along it, connecting the rural area to Dodoma town. Motorcycles and minibuses also operate on this road.

Several concerns have been raised by different stakeholders. The key concerns for the users include the high passenger fares especially for motorcycles, unavailability of medium freight (200 kg) services coupled with high charges, unpredictability of RTS, safety of the RTS particularly the motorcycles and the environment (noise level/dust/heat).

Operators are more concerned with the road condition as they greatly influence vehicle operating costs and profit margins. Disruption due to the weather and road conditions is a key concern to operators. For example, on the Nala–Mindora road, the bus fails to operate for much of the rainy season, with up to six months with no services. Its operator complained that if heavy rains come when the bus is at Mindora village, it can be blocked there for months and unable to operate on other routes as the road becomes completely impassable. Access to capital/credit facility is another major concern to operators for operating RTS.

Regulators are concerned by low compliance with safety regulations (speed, overloading, drivers' behaviour, use of safety belts and crash helmets), operational regulations (timetables, routes, and loading levels) and environmental legislation such as emission and noise control.

Development personnel are also concerned with the road maintenance as it impacts on the availability and mix of RTS which are crucial to facilitate agriculture and rural enterprises. The availability of mobile phone networks is crucial in rural areas as they facilitate organising transport services for all sectors, including agriculture. The mobile phones are providing or facilitating small scale financial services so that rural people can send and receive money via mobile networks. The services include M-PESA from Vodacom, Tigo-PESA from Tigo, ZAP from Airtel and Easy-PESA from Zantel.

With the indicators discussed, it is possible to consider interventions that could improve the transport services. Road maintenance appears to be the key as it has a major influence on the fares and the types of RTS that operate. Improving road maintenance could lead to improvements in vehicle quality/age, the frequency of services and the travel time which would increase user satisfaction levels. It would also attract and stimulate other economic activities. Motorcycles are increasing rapidly and are becoming major part of rural transport service. On some roads they are the only public transport service available. Improved motorcycle safety could be achieved through training operators and the use of village leaders to promote compliance with regulations.

6 References

Starkey P, Njenga P, Odero K, Kemtsop G, Willilo S and Mbathi M, 2012a. Rural transport service indicators: work in progress paper, July 2012. International Forum for Rural Transport and Development (IFRTD), London, UK for Crown Agents, Sutton, UK. 56p. Available at: http://www.ruraltransport.info/RTSi/resources/resource_documents.php

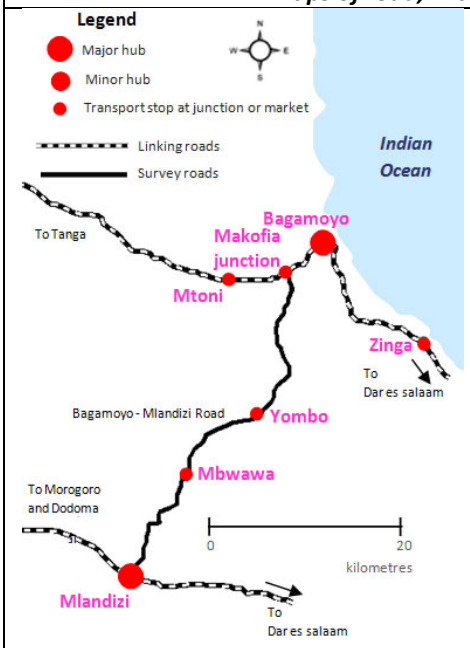
Starkey P, Njenga P, Odero K, Kemtsop G, Willilo S and Mbathi M, 2012b. Rural transport service indicators: work in progress paper, July 2012. International Forum for Rural Transport and Development (IFRTD), London, UK for Crown Agents, Sutton, UK. 67p. Available at: http://www.ruraltransport.info/RTSi/resources/resource_documents.php

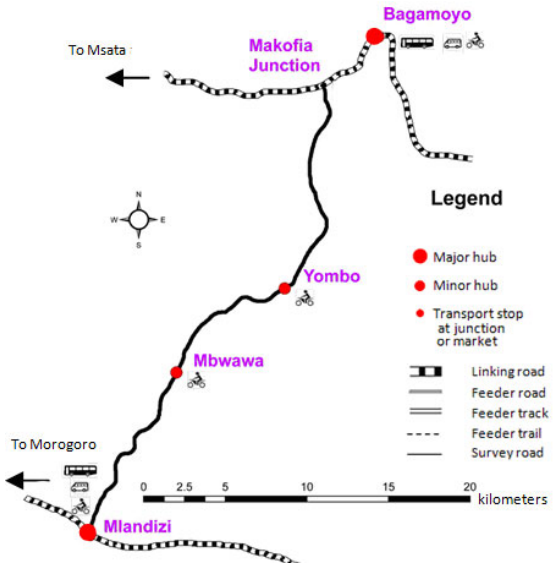
7 RTSi Report of Bagamoyo–Mlandizi Road, Coast Region, Tanzania

Prepared by: Shedrack Willilo. Date: 19 September 2012

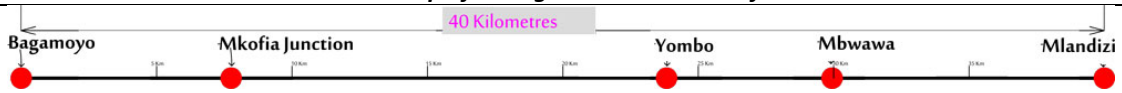
Part 1: Summary tables

Table 1. Road information			
Road name: Bagamoyo–Mlandizi			
District, Region and Country: Bagamoyo, Coastal, Tanzania			
Road type: Graded gravel road	*Responsible authority: TANROADS/PMO-RALG*		
Road start location: Bagamoyo town	*GIS:*		
Road finish location: Mlandizi town	*GIS:*		
Road length:40 km	*Catchment population* [1]		
Road quality and condition from different perspectives			
Road authority [2]	*Operators* [3]	*Development* [4]	*Safety* [5]
wip	★★★☆☆	★★★☆☆	★★★☆☆
Summary of road geography and socio-economic situation			
The first 5.5 km of the Bagamoyo-Mlandizi are part of the Bagamoyo-Msata trunk road. At Makofia junction, a good graded gravel road provides a link to Mlandizi, a transport hub on the main TanZam highway that links Dar-es-Salaam with Morogoro. The road transverses through lightly rolling terrain and the main economic activity of the area is smallholder agriculture.			
Maps of road, with context and hub and spoke connections			





Schematic map of 'straightened' road with features



GPS elevation track *(metres above sea level, same horizontal scale)*

GPS speed track [6] *(same horizontal scale)*

Description of hub and spoke patterns

Bagamoyo is a district market town and transport hub. Mlandizi is a transport hub on the main highway. Minibuses and midi-buses connect these hubs, and provide transport services for communities along the road. Motorcycle taxis also provide transport services, with hubs at 'bus stops' at Yombo and Mbwawa.

Intermodal connectivity *(one to five stars, the more stars the better)*

'Feeding' [7]	*User satisfaction* [8]	★★★★☆	*Development impact* [9]	★★★☆☆
'Lnking' [10]	*User satisfaction* [11]	★★★★☆	*Development impact* [12]	★★★☆☆

Table 2. Traffic and transport along road *(work in progress)*

Daily traffic flows					**Fleet**	**Passengers and small freight**						
	Normal	*Busy*	*Disrupted*	*Impassable*	*No of vehicles operating on road*	***Trip transport*** *normal day per vehicle*		***Daily transport*** *normal day all vehicles*		***Annual transport*** *adjusted for traffic fluctuations*		***Change*** *in past year*
						Pax (no)	*Frt (kg)*	*Pax (no)*	*Frt (kg)*	*Pax (no) 000*	*Frt (t)*	*- - 0 ++*
Midi-bus	11	15	11	0	8	35	200	209	2200	220	803	0
Minibus	15	20	15	0	10	25	185	275	2775	318	1013	+
Small truck	8	8	4	0	8	3	wip	23	wip	0	wip	+
Motorcycle	93	115	35	15	15	2	25	157	2325	108	849	+
Total	**127**	**158**	**65**	**15**	**41**	**65**	**410**	**664**	**7300**	**646**	**2665**	

1. Annual transport is based on total passengers and freight carried on trips, not the overall passenger-km or tonne-km
wip: work in progress (data is being checked or is not yet available)

Table 3. Rural transport services key operational statistics for major transport modes			
	Motorcycle	**Minibus**	**Midi-bus**
Contribution to annual passenger transport (% of market)	11	89	0
Contribution to annual small freight transport (% of market)	60	25	15
Fare per km in USDc	21	3	3
Journey time (average speed on normal days) in km/hr	22	13	19
Transport frequency (normal days)	8	8	5
Number of days a year with 'normal service'	283	283	283
Number of busy days a year	52	52	52
Number of days a year with disrupted service	30	30	30
Number of days a year with no transport services	0	0	0
Reliability factor(s) (%)	65	88	84
Men as % of passengers/day	78	63	57
Women as % of passengers/day	16	34	36
Children as % of passengers/day	6	4	6
Cost of 50 kg accompanied freight in USD per tonne-km	4	0	0
Cost of 200 kg consigned freight in USD per tonne-km	2	0	0
Safety: Recalled no. of accidents per 100,000 vehicle trip	320	75	55
Security: Recalled no. of incidents per 100,000 vehicle trip	13	7	0
Operating distance per year in km	42296	48720	37800
Vehicle operating costs (VOC)/year (USD)	3703	32883	33267
VOC per passenger-km (USDc)	7	3	3
Operating income per passenger-km (USDc)	19	3	3
Percentage operating income due to freight	wip	wip	wip
Regulation compliance (overall assessment)	★☆☆☆☆	★★☆☆☆	★★★☆☆
Development impact (overall assessment)	★★★☆☆	★★★★☆	★★★☆☆

Table 4. User satisfaction with main RTS modes (disaggregated for gender)								
	Motorcycle		**Minibus**		**Midi-bus**		**Truck**	
	Men	***Women***	***Men***	***Women***	***Men***	***Women***	***Men***	***Women***
Sample size (N)	*14*	*10*	*14*	*14*	*9*	*5*	*2*	*0*
Fares	★☆☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★☆☆☆☆	wip
Journey time	★★★★☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	wip	wip
Operational features	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	wip
Freight	★★☆☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	wip
Safety and security	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	wip
Comfort	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	wip
Universal access	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★☆☆☆☆	wip
Overall satisfaction	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	wip
The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆= Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied								

Part 2: Rural Transport Service Indicators Report

Overview of road situation and issues

The Bagamoyo–Mlandizi road (40 km) is a gravel road located in the Coast Region of Tanzania. The road comprises a trunk road section and a regional road section. The road is under the management of Tanzania National Roads Agency (TANROADS). The trunk road section starts at Bagamoyo town and traverses through flat and rolling terrain to Makofia (5.5 km) along the Bagamoyo–Makofia–Msata road (65 km) which is being upgraded to bitumen standard. From Makofia junction the Mlandizi road is a regional road that traverses lightly rolling terrain to Mlandizi (34.5 km), a transport hub on the main TanZam highway that links Dar-es-Salaam with Morogoro.

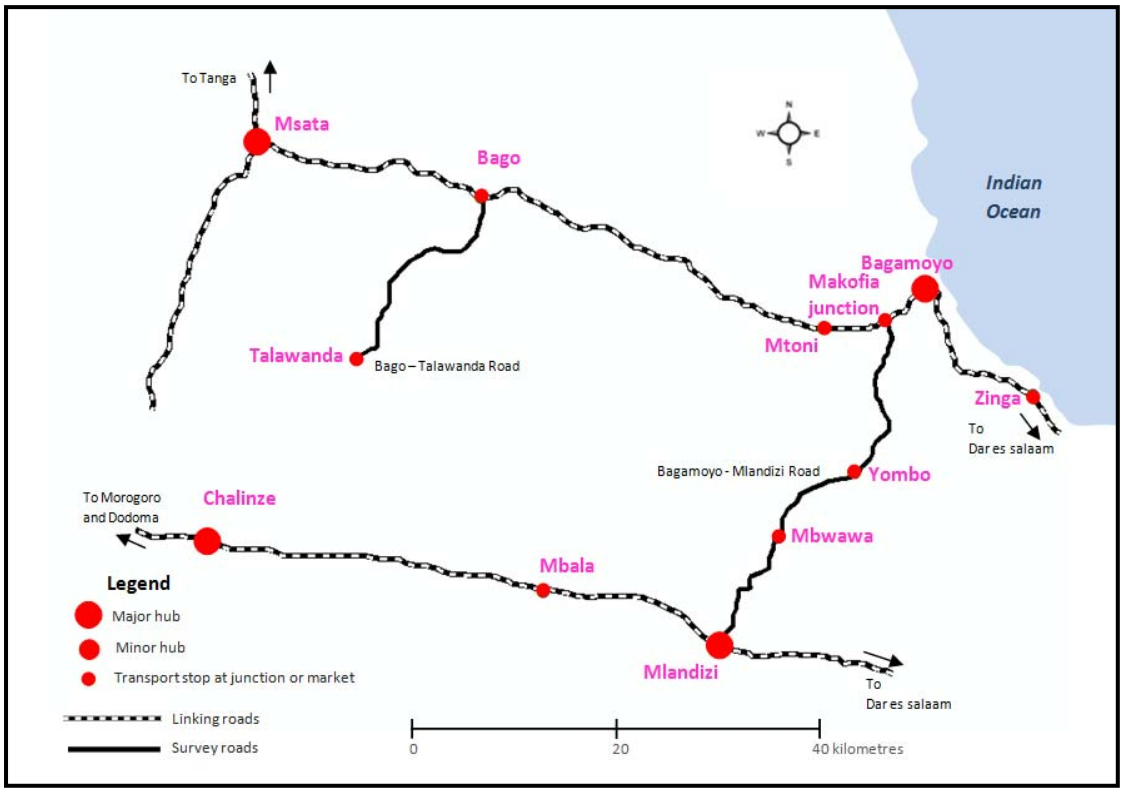


Fig. 1: Bagamoyo–Mlandizi road context map

The trunk road section from Bagamoyo to Makofia junction is currently fairly poor gravel standard (but is due to be upgraded soon). From Makofia junction to Mlandizi junction (34.5 km) the road is in a good gravel standard. The average speed of vehicles is 43 km/hr. The major economic activity along the survey road is agriculture. Crops grown include rice, coconut, sorghum, maize, cassava and pineapples. Charcoal is also produced and sold.

Overview transport services situation and issues

The main means of transport on the Bagamoyo–Mlandizi road are motorcycles, minibuses and midi-buses. Bicycles and trucks are also widely used. Based on a one day traffic count at Yombo (17.5 km from Bagamoyo town along the road) revealed the traffic volume as follows: 50 bicycles a day, 100 motorcycles a day, 15 minibuses a day and 10 midi-buses a day. There are also 10 trucks a day which are mainly freight transport in transit.

Seasonal patterns are of minor importance and disruption to services is very low for a rural road (30 days in a year). Based on the surveys, the overall annual passenger volumes are 108,000, 318,000 and 220,000 for motorcycles, minibuses and midi-buses respectively (Table 2 above). The capacity of midi-buses is 35 passengers while for minibuses can take up to 25 passengers. However, there are more minibuses, which is why they have a larger market share. The market share in terms

of total passengers carried on these modes is 17%, 49% and 34% for motorcycles, minibuses and midi-buses respectively. The market share for minibuses and midi-buses would be greater in terms of passenger-kilometres as they take people on longer journeys. Motorcycles make many short distance trips per day compared to other modes.

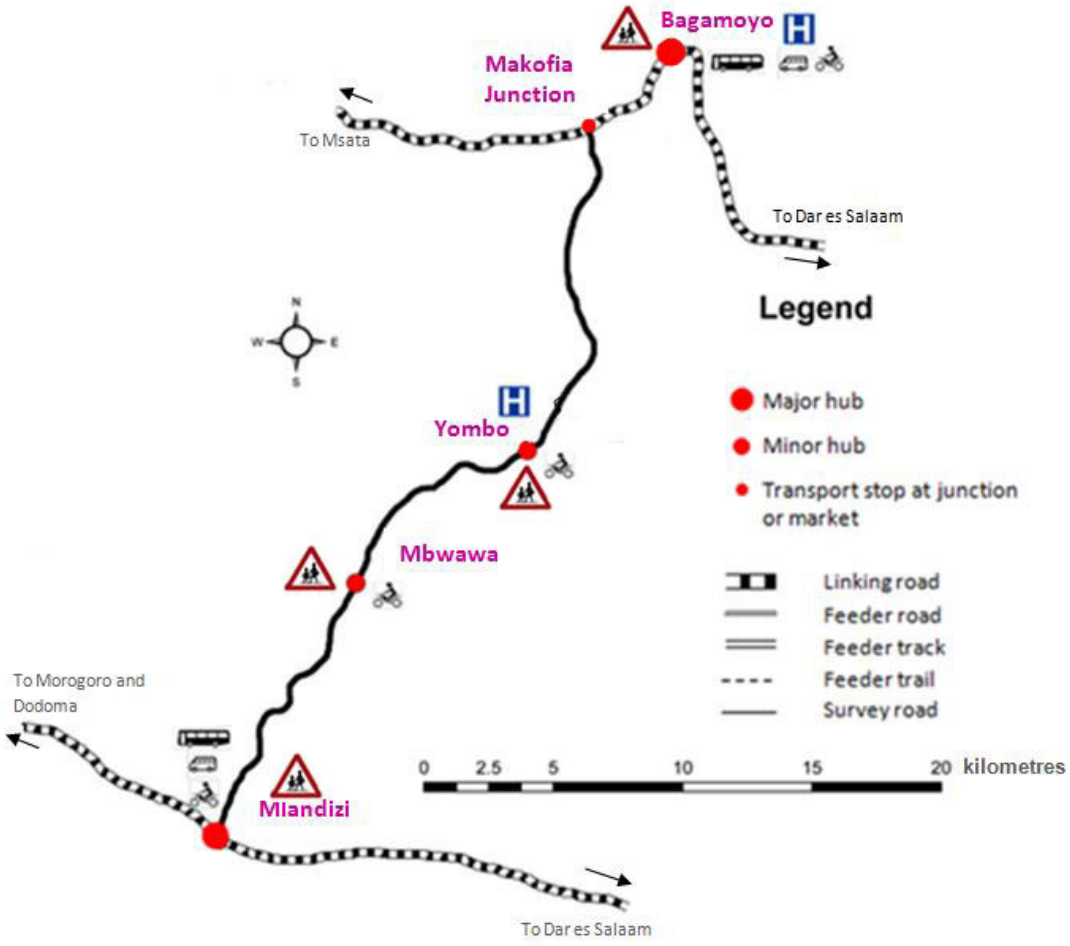


Fig. 2: Bagamoyo–Mlandizi Road showing hubs, linking and feeding roads

A total of 68 users of motorcycles, minibuses midi-buses and truck were interviewed for the Bagamoyo–Mlandizi road of which 39 were male and 29 female. The youngest respondents were students of 18 years while the oldest was a 62-year-old farmer. The user category interviewed included the farmers, traders, people with disability, elderly, students, health users, maternal health care, and those using transport for employment, financial services and/or for socio-cultural or religious reasons.

Summary of user satisfaction for motorcycle

Women and men were asked about their satisfaction with the different means of transport. For the motorcycle transport service, 14 men (58%) and 10 women (42%) women were interviewed. In the case of minibuses, 28 users were questioned of which 14 (50%) were men and 14 (50%) women. Figure 3 shows gender disaggregated levels of satisfaction with passenger fares, journey times, service frequency and service predictability. Higher scores represent greater satisfaction.

The survey result show that users were not satisfied with passenger fares of motorcycles but medium satisfied with minibus fares. Along the surveyed road, men were satisfied with the journey time for motorcycles but less satisfied with minibuses. Women were medium satisfied with journey time for motorcycles and medium satisfied with minibuses. This could be explained by the fact that motorcycles are usually fast and they do not normally stop along the route. Men appeared more

concerned about journey time than women. Men and women were both medium satisfied with the predictability of minibuses along the road. Women were particularly satisfied by the service predictability of motorcycles, as they were generally available at the junction hubs or could be called by a mobile phone (Fig. 3).

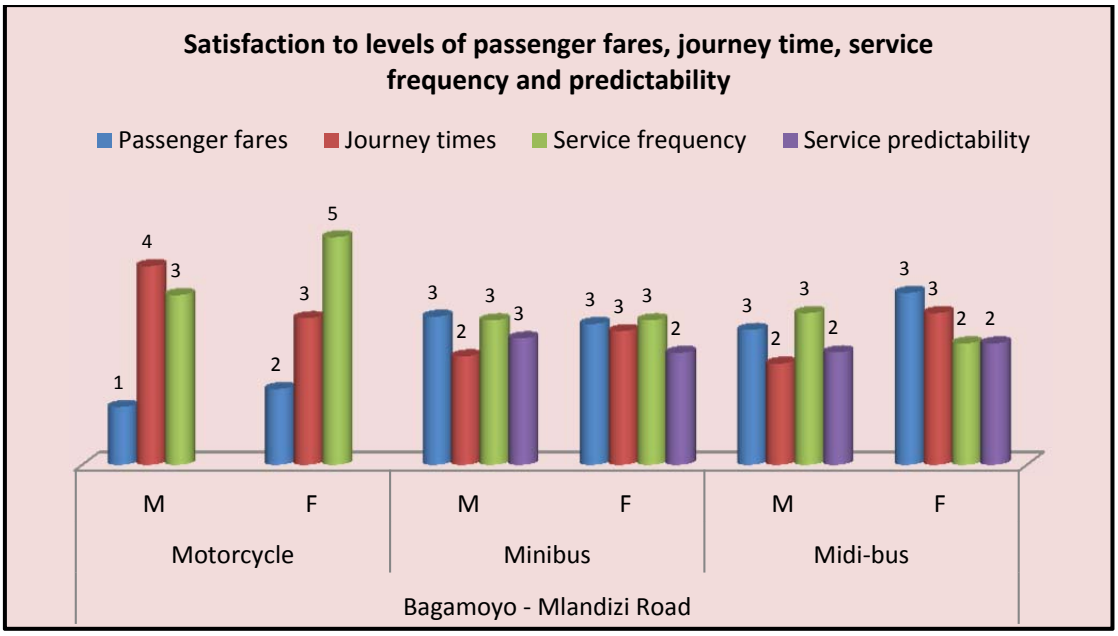


Fig. 3: Satisfaction levels for passenger fares, journey time, service frequency and predictability

In terms of freight characteristics, both men and women were medium satisfied with availability of motorcycles to carry small freight (20–50 kg). However, they were unsatisfied with the charges. Men were satisfied with availability of minibuses to carry small freight but medium satisfied with the charges. Women were medium satisfied with freight service availability but dissatisfied with the charges. Nonetheless, both men and women were medium satisfied with the handling of medium freight carried by minibuses. Correspondingly, both men and women were not satisfied with the availability of both motorcycles and minibuses to carry medium freight (100–200 kg). Users argued further that it is very expensive to transport medium freight using motorcycles compared to minibuses. However, both men and women were medium satisfied with the handling of medium freight across the transport modes (Figure 4).

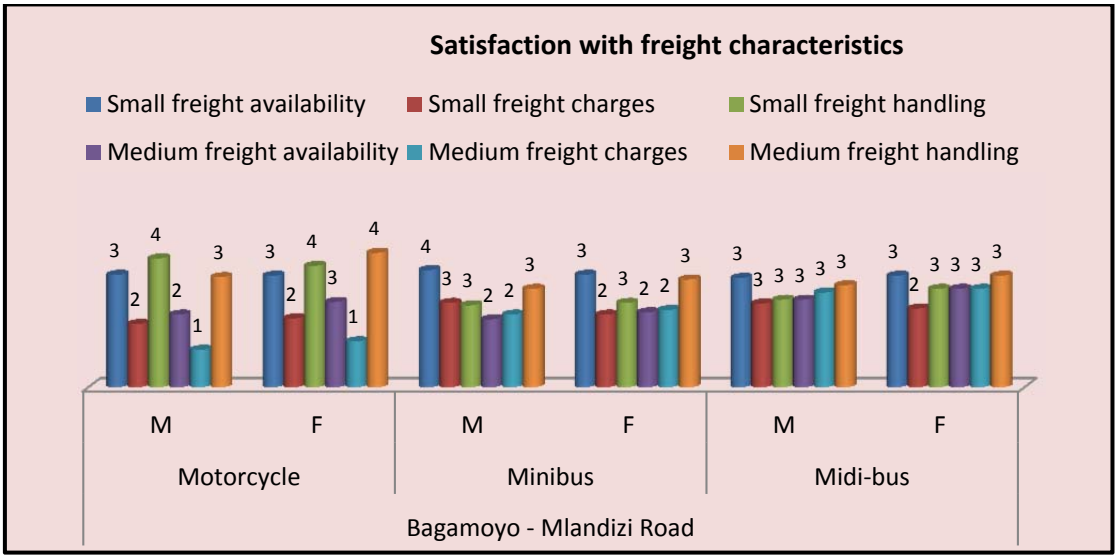


Fig. 4: Satisfaction with freight characteristics

The survey results indicate that women were satisfied with the comfort in terms of seat condition of motorcycles while men were medium satisfied. However, for the case of minibuses, both men and women were not satisfied with the comfort of the seat. Both men and women were satisfied with the security risk of minibuses (theft, assault, harassment) but dissatisfied with the security of motorcycles. Motorcycles were also perceived to be more prone to accidents than minibuses. Similarly, both men and women complained of the poor access for vulnerable people (elderly or physically challenged people) for both modes. Comfort in terms of the environment (noise levels/dust/heat) was also seen to be more of a problem on motorcycles than in minibuses. Motorcycle passengers are more exposed to dust and noise than minibus passengers (Figure 5).

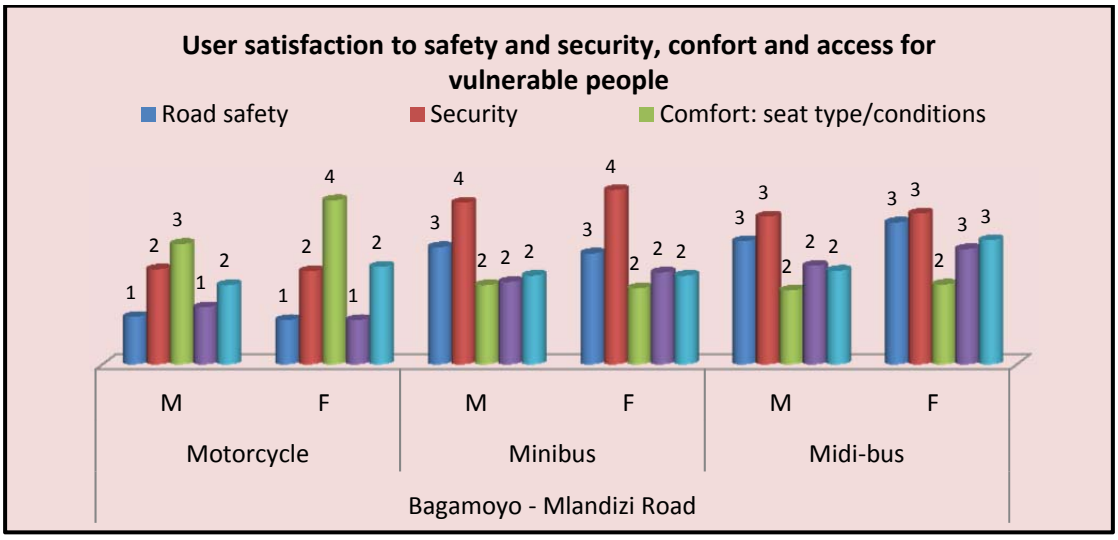


Fig. 5: User satisfaction to safety & security, comfort and access for vulnerable

Across the transport modes, all RTS users interviewed indicated that they were not satisfied with the roadside waiting facilities. This is easily explained as bus shelters or other waiting facilities do not exist along this road. In terms of intermodal connectivity, RTS users across the surveyed roads were generally satisfied with the feeding and linking intermodal connectivity. This suggests that motorcycles have an important role in facilitating the movement of people and goods to and from the road. They complement minibuses and midi-buses in facilitating timely links to the transport available at the major hubs. Table 5 provides as summary of user satisfaction for all transport modes, disaggregated for gender.

Table 5. Summary of user satisfaction responses disaggregated for gender[1]								
Means of transport	**Minibus**		**Midi-bus**		**Motorcycle**		**Truck**	
Gender of respondent	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Sample size (N)	*14*	*14*	*9*	*5*	*14*	*10*	*2*	*0*
Passenger fares	3	3	3	3	1	2	1	Wip
Journey times	2	3	2	3	4	3	wip	Wip
Service frequency	3	3	3	2	3	5	2	Wip
Service predictability	3	2	2	2	n/a	n/a	2	Wip
Passenger capacity	2	2	2	2	4	3	1	Wip
Small freight availability	4	3	3	3	3	3	2	Wip
Small freight charges	3	2	3	2	2	2	3	Wip
Small freight handling	3	3	3	3	4	4	3	Wip
Medium freight availability	2	2	3	3	2	3	2	Wip
Medium freight charges	2	2	3	3	1	1	2	Wip
Medium freight handling	3	3	3	3	3	4	4	Wip
Courier services	1	1	1	1	1	1	1	Wip
Road safety	3	3	3	3	1	1	3	Wip
Security	4	4	3	3	2	2	3	Wip
Comfort: space	2	2	2	1	4	5	1	Wip
Comfort: seat type/conditions	2	2	2	2	3	4	1	Wip
Comfort: surrounding baggage	2	2	2	3	3	3	3	Wip
Comfort: environment	2	2	2	3	1	1	3	Wip
Access for vulnerable people	2	2	2	3	2	2	1	Wip
Overall un-weighted	**2**	**2**	**2**	**3**	**3**	**3**	**2**	Wip
Overall weighted	**2**							

Satisfaction for all transport types		
Gender of respondent	M	F
Facilities at roadside stops	1	1
Feeding intermodal connectivity	4	4
Linking intermodal connectivity	4	3
Overall un-weighted	**3**	**3**
Overall weighted	**3**	

The higher the score the better.
1 = Very dissatisfied. 2 = Dissatisfied. 3 = Medium. 4 = Satisfied. 5 = Very satisfied

Operator perspectives

The Bagamoyo–Mlandizi road has three modes of RTS: motorcycles, minibuses and midi-buses. Two operators were interviewed for each mode. In all cases the operated leased the vehicles from the owners. The motorcycle operators paid a daily rental charge of about TZS 5000 (USD 3). Minibus and midi-bus drivers paid TZS 55,000 (USD 34) and TZS 70,000 (USD 44) a day respectively. Minibuses and midi-buses along the surveyed road make three or four return trips a day. The road has minimal seasonality patterns that affect the RTS operations. The road disrupted for perhaps thirty days a year, which is low for a rural road. Fares per kilometre were much higher for motorcycles than minibuses or midi-buses. Motorcycle fares were about USDc 21 per kilometre, while minibuses and midi-buses charged USDc 3 per kilometre (Fig. 6). Operators revealed that, there were two active associations of minibus and midi-bus operators which are concerned with the welfare of the members and the control of fares, queuing and terminal operations. One association is based in Bagamoyo terminal and the other at the Mlandizi terminal. The motorcycle operators do not yet have any association. In terms of competition amongst RTS, minibus and midi-bus operators indicated that motorcycle operators were mainly complementing their services. Motorcycles bring

passengers to and from minibus and midi-bus terminals and transport stops. Motorcycles provide 'feeding intermodal' services. Competition between minibuses and midi-buses is controlled by the associations through a queuing system. Vehicles generally do no leave the terminals until they are full.

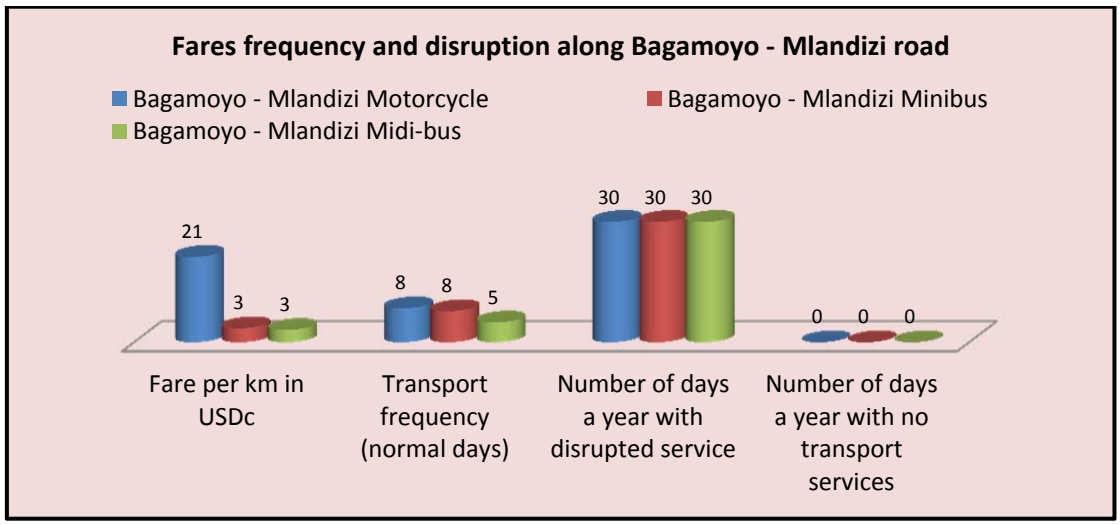


Fig. 6: Fares, service frequency and disruption along the Bagamoyo–Mlandizi road

Based on the survey access to capital is seen as a problem for operators. Regulatory issues such as check points, barriers, enforced safety regulations relating to loading levels, crash helmets, seat belts and restrictions on operating hours and routes of operation were not considered major constraints or 'disincentives'. Operators felt that they had some incentives for RTS operations, perhaps in the form of flat-rate taxes.

Table 6. Summary of operator perspectives

Means of transport	**Motorcycle**	**Minibus**	**Midi-bus**
Sample size (N)	***2***	***2***	***2***
Road condition for operations	★★★☆☆	★★★★☆	★★★★☆
Adequacy of working capital	★★★★☆	★★☆☆☆	★☆☆☆☆
Facilities for formal credit	★★☆☆☆	★★☆☆☆	★★☆☆☆
Facilities for informal credit	★★☆☆☆	★★☆☆☆	★★☆☆☆
Adequacy of technical facilities	★★★☆☆	★★★★☆	★★★☆☆
Regulatory disincentives	★★★★☆	★★★★★	★★★★★
Regulatory incentives	★★★☆☆	★★★☆☆	★★★☆☆
Active associations	★☆☆☆☆	★★★★☆	★★★★☆
Security risks	★★★★☆	★★★★★	★★★★★
Un-weighted average 2	★★★☆☆	★★★☆☆	★★★☆☆

The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆= Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied

Regulator perspectives

A Ward Executive Officer (WEO) and a traffic police officer were interviewed to provide their opinions on the regulator's perspective. The traffic police are responsible for enforcing traffic regulations and have a good understanding about the operators' compliance with traffic regulations. Ward Executive Officers are also suitable people to interview as they have to travel regularly by public transport and are generally aware of various regulatory issues.

The people interviewed suggested that motorcycle operators did little to comply with technical regulations or tax and financial regulations. Officials in the Surface and Marine Transport Regulatory

Authority (SUMATRA) revealed that motorcycles regulation only started in January 2012. There is little enforcement of regulations in rural areas as SUMATRA does not have available staff. There are on-going discussions as to whether village leaders could be involved in the enforcement of regulations.

Minibuses and midi-buses tended to comply more with insurance, tax and financial regulations. In general, rural transport services on the road do little to comply with safety regulations (speed, overloading, drivers' behaviour, use of safety belts and crash helmets), operational regulations (timetables, routes and loading levels) or environmental legislations such as emission and noise control. The traffic police do little enforcement on that road and tend to be inconsistent. Operators' compliance with insurance is high for the larger vehicles. This is partly due to the fact that these vehicles generally travel to and from Bagamoyo and sometimes on the Mlandizi-Dar es Salaam road where regulation enforcement is higher. The regulator perspectives are summarised in Fig. 7 and Table 7.

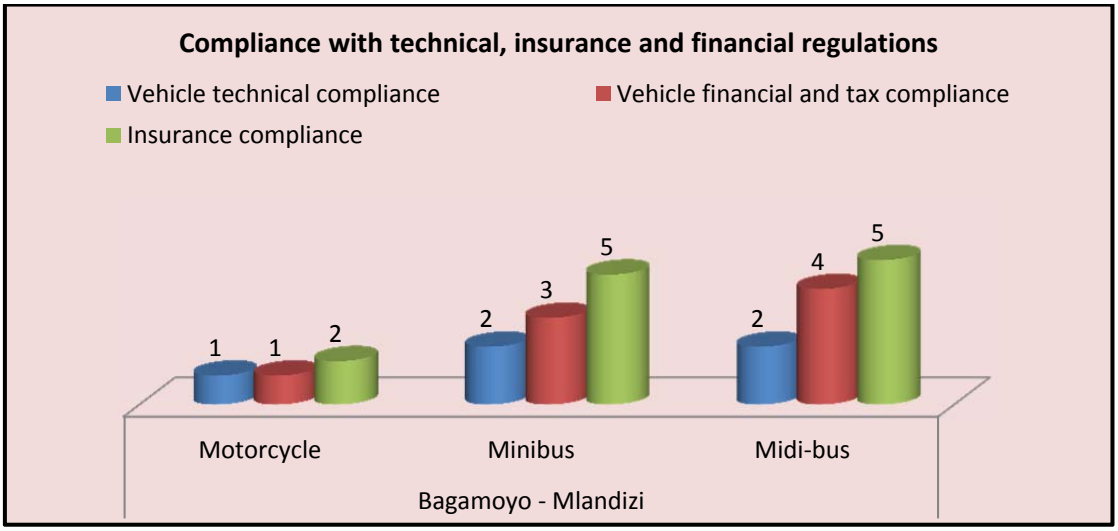


Fig. 7: Technical, insurance and financial compliance

Table 7. Summary of regulator perspectives

Means of transport	Motorcycle	Minibus	Midi-bus	Truck
Vehicle technical compliance	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★★★★☆
Vehicle fiscal compliance	★☆☆☆☆	★★★☆☆	★★★★☆	★★★★★
Insurance compliance	★★☆☆☆	★★★★★	★★★★★	★★★★★
Operational compliance	★☆☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
Safety compliance	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆
Environmental compliance	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★★☆☆☆
Regulatory planning framework	★☆☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Safety of the road	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Un-weighted average	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆

The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆= Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied

Development perspectives

A total of four people were interviewed to provide opinions on the development perspective. These were a Ward Executive Officer (WEO), a medical doctor and two head teachers. The doctor was able to give opinions on how the various type of transport meet the needs of patients and the activities of the various health services. The Ward Executive Officer was regularly involved in discussions

within communities that address development issues such as constraints to rural enterprises, agriculture, and medical sector. Head teachers tend to have good understanding of various rural challenges, including education and the empowerment of young people. Therefore, the people consulted together are thought to have provided relevant and authoritative assessments of development perspectives.

Good capacity and a mix different transport services were considered crucial for agriculture and rural enterprises which are the key economic activities. This road is in reasonable condition and has a mix of services. Opinions from the development perspective suggest that motorcycles, minibuses and midi-buses play an important role in facilitating agriculture and rural enterprises along the road. All forms of transport contributed to the transport for many health needs, but transport for maternal needs was less good, as the transport was not really comfortable or appropriate. Mobile phones are increasingly important to help rural transport operations across the surveyed road, particularly for motorcycles.

While motorcycles are considered risky in terms of accidents, they contribute greatly to the employment of young men. The VEO at Yombo suggested that thefts had declined in recent years as young men could now earn an income driving motorcycles. The high cost of motorcycle fares meant they had a less positive impact on education than minibuses and midi-buses. Table 8 summarises the development impact of the different modes of transport.

Table 8. Summary of development perspectives

Means of transport	Motorcycle	Minibus	Midi-bus	Truck
Agricultural facilitation	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆
Enterprise/trade facilitation	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆
Women's empowerment	★★☆☆☆	★★★★☆	★★★★☆	★☆☆☆☆
Minority group empowerment	★★★☆☆	★★★☆☆	★★★☆☆	★☆☆☆☆
Disabled people's empowerment	★★★☆☆	★★★★☆	★★★★☆	★★☆☆☆
Young people's empowerment	★★★★★	★★★☆☆	★★★☆☆	★☆☆☆☆
Maternal health needs	★★★☆☆	★★★★☆	★★★☆☆	★☆☆☆☆
Medical service transport	★★★★☆	★★★★☆	★★★★☆	★☆☆☆☆
Education-related transport	★★☆☆☆	★★★★☆	★★★★☆	★★☆☆☆
Mobile phone and ICT integration	★★★★☆	★★☆☆☆	★★☆☆☆	★☆☆☆☆
Un-weighted average	★★★☆☆	★★★★☆	★★★☆☆	★☆☆☆☆
Cultural impact	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Environment impact	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
HIV/Aids impact	★★★★☆	★★★★☆	★★★★☆	★★★☆☆
Un-weighted average	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Weighted average	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Overall weighted average	★★★☆☆			
Integration with feeder transport		★★★☆☆		
Integration with external transport		★★★☆☆		
Road maintenance adequacy		★★☆☆☆		
Final weighted average		★★★☆☆		
Number of interviews (people answer questions relevant to their experience)		4		

The more stars the better, from the development perspective. The contribution of each mode of transport to the achievement of development goals in that area of concern has been rated by the people interviewed as:
★☆☆☆☆= Very poor. ★★☆☆☆= Poor. ★★★☆☆= Medium. ★★★★☆= Good. ★★★★★= Very good.

Conclusions

The survey of the Bagamoyo–Mlandizi (40 km) road has helped to define many of the characteristics of the rural transport services along the road. Transport services along this road respond to the condition of the road that provides interconnectivity between two major hubs (Bagamoyo and Mlandizi). Public transport is provided by motorcycles, minibuses and midi-buses. Trucks mainly carry freight in transit. Bicycles are widely used but mainly for individual use (including traders carrying freight). Bicycles do not generally provide public transport services.

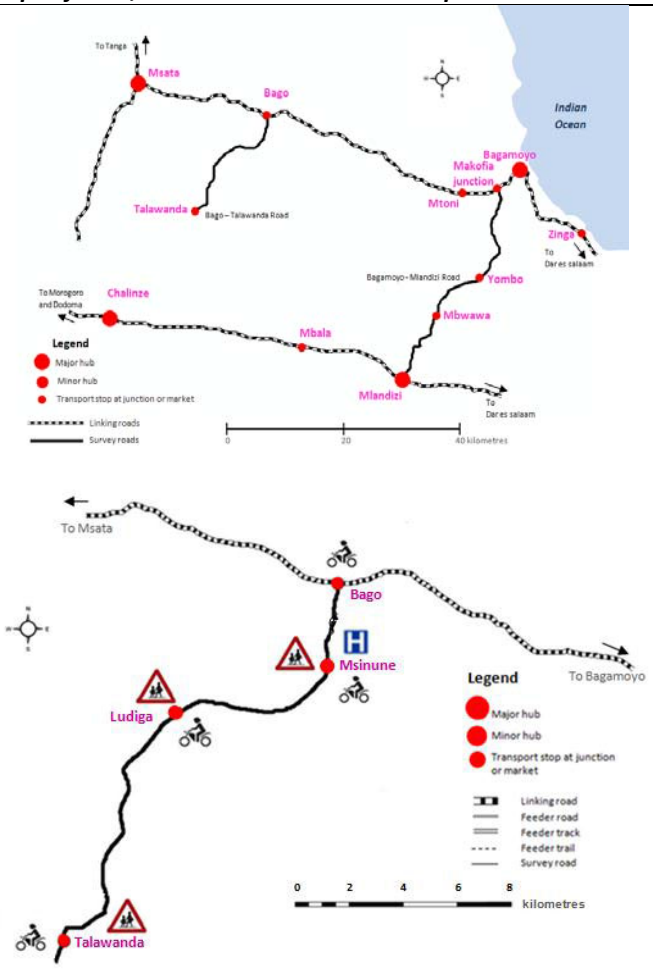
Several concerns have been raised by different stakeholders. The key concerns for the users include the high passenger fares especially for motorcycles, unavailability of medium freight (200 kg) services coupled with high charges, safety of the RTS particularly with motorcycles and the environment (noise level/dust/heat). Operators were more concerned with access to capital/credit facilities to own and/or operate RTS. Regulators noted the low levels of compliance with safety regulations, operational regulations and environmental legislations such as emission and noise control. People providing a development perspective stressed the importance of good road maintenance which impacts positively on the rural transport services that are crucial to facilitate agriculture and rural enterprises.

8 RTSi Report of Bago–Talawanda Road, Coast Region, Tanzania

Prepared by: Shedrack Willilo. Date: 28 September 2012

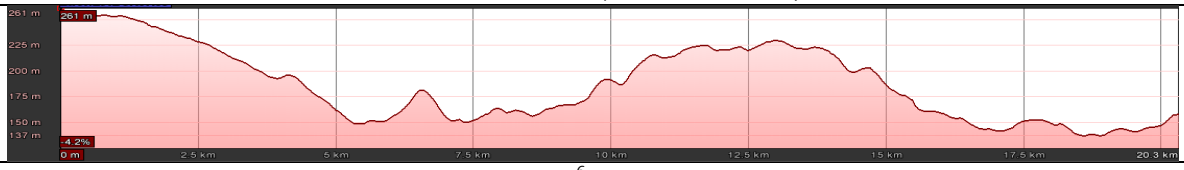
Part 1: Summary tables

Table 1. Road information			
Road name: Bago–Talawanda			
District, Region and Country: Bagamoyo, Coastal, Tanzania			
Road type: District Road	*Responsible authority: PMO-RALG*		
Road start location: Bago	*GIS:*		
Road finish location: Talawanda	*GIS:*		
Road length:20Km	*Catchment population* [1]		
Road quality and condition from different perspectives			
Road authority [2]	*Operators* [3]	*Development* [4]	*Safety* [5]
	★★★☆☆	★★☆☆☆	★☆☆☆☆
Summary of road geography and socio-economic situation			
The Bago–Talawanda road (20 km) is located in the Coast Region. This is a district road under the management of the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). The road starts at Bago village hub 43.5 km from Bagamoyo town along the Bagamoyo–Makofia–Msata trunk road (65 km). From Bago, the road traverses rolling, hilly terrain to Talawanda village hub (20 km). The major economic activity along the survey road is small-scale agriculture and livestock keeping. Crops grown include maize, sorghum, sesame, cassava, pineapples and various legumes. The production and sale of charcoal is economically important.			
Maps of road, with context and hub and spoke connections			



Schematic map of 'straightened' road with features

GPS elevation track *(same horizontal scale)*



GPS speed track [6] *(same horizontal scale)*

Description of hub and spoke patterns

Bago is a small transport hub along the Bagamoyo–Makofia–Msata road (65km) which links Bagamoyo to Msata along the Tanga-Arusha trunk road. Bagamoyo is a district market town and transport hub. Talawanda is a small village and transport hub. Village market is also held at this village monthly. Several spokes feed into this village via Intermediate Means of Transport (IMT) mainly motorcycles and bicycles. Motorcycle taxis are the sole transport services, with hubs at Talawanda, Ludiga, Msinune and Bago where minibuses stop.

Intermodal connectivity *(one to five stars, the more stars the better)*

'Feeding' [7]	*User satisfaction* [8]	★★★☆☆	*Development impact* [9]	★★★☆☆
'Lnking' [10]	*User satisfaction* [11]	★★★★☆	*Development impact* [12]	★★★☆☆

Table 2. Traffic and transport along road *(work in progress)*

Daily traffic flows					**Fleet**	**Passengers and small freight**						
	Normal	*Busy*	*Disrupted*	*Impassable*	*No of vehicles operating on road*	***Trip transport*** *normal day per vehicle*		***Daily transport*** *normal day all vehicles*		***Annual transport*** *adjusted for traffic fluctuations*		***Change*** *in past year*
						Pax (no)	*Frt (kg)*	*Pax (no)*	*Frt (kg)*	*Pax (no) 000*	*Frt (t)*	*- - 0 ++*
Motorcycle	75	85	23	5	40	2	100	150	7500	217	2,738	++
Total	**75**	**85**	**23**	**5**	**40**	**2**	**100**	**150**	**7500**	**217**	**2,738**	

Table 3. Rural transport services key operational statistics for major transport modes	
	Motorcycle
Contribution to annual passenger transport (% of market)	100
Contribution to annual small freight transport (% of market)	100
Fare per km in USDc	22
Journey time (average speed on normal days) in km/hr	27
Transport frequency (normal days)	10
Number of days a year with 'normal service'	193
Number of busy days a year	52
Number of days a year with disrupted service	90
Number of days a year with no transport services	30
Reliability factor(s) (%)	66
Men as % of passengers/day	88
Women as % of passengers/day	12
Children as % of passengers/day	0
Cost of 50 kg accompanied freight in USD per tonne-km	1
Cost of 200 kg consigned freight in USD per tonne-km	1
Safety: Recalled no. of accidents per 100,000 vehicle trip	2060
Security: Recalled no. of incidents per 100,000 vehicle trip	127
Operating distance per year in km	54560
Vehicle operating costs (VOC)/year (USD)	2965
VOC per passenger-km (USDc)	3
Operating income per passenger-km (USDc)	22
Percentage operating income due to freight	0
Regulation compliance (overall assessment)	1
Development impact (overall assessment)	4

Table 4. User satisfaction with main RTS modes (disaggregated for gender)		
	Motorcycle	
	Men	**Women**
Sample size (N)	**23**	**11**
Fares	★★☆☆☆	★☆☆☆☆
Journey time	★★★☆☆	★★☆☆☆
Operational features	★★☆☆☆	★★★☆☆
Freight	★★☆☆☆	★★☆☆☆
Safety and security	★★☆☆☆	★★☆☆☆
Comfort	★★☆☆☆	★☆☆☆☆
Universal access	★★☆☆☆	★★☆☆☆
Overall satisfaction	★★☆☆☆	★★☆☆☆
The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆= Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied		

Part 2. Rural Transport Service Indicators Report

Overview of road situation and issues

The Bago–Talawanda road (20 km) is located in the Coast Region. This is a district road under the management of the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). The road starts at Bago village hub 43.5 km from Bagamoyo town along the Bagamoyo–Makofia–Msata trunk road (65 km). From Bago, the surveyed road traverses rolling, hilly terrain to Talawanda village hub (20 km).

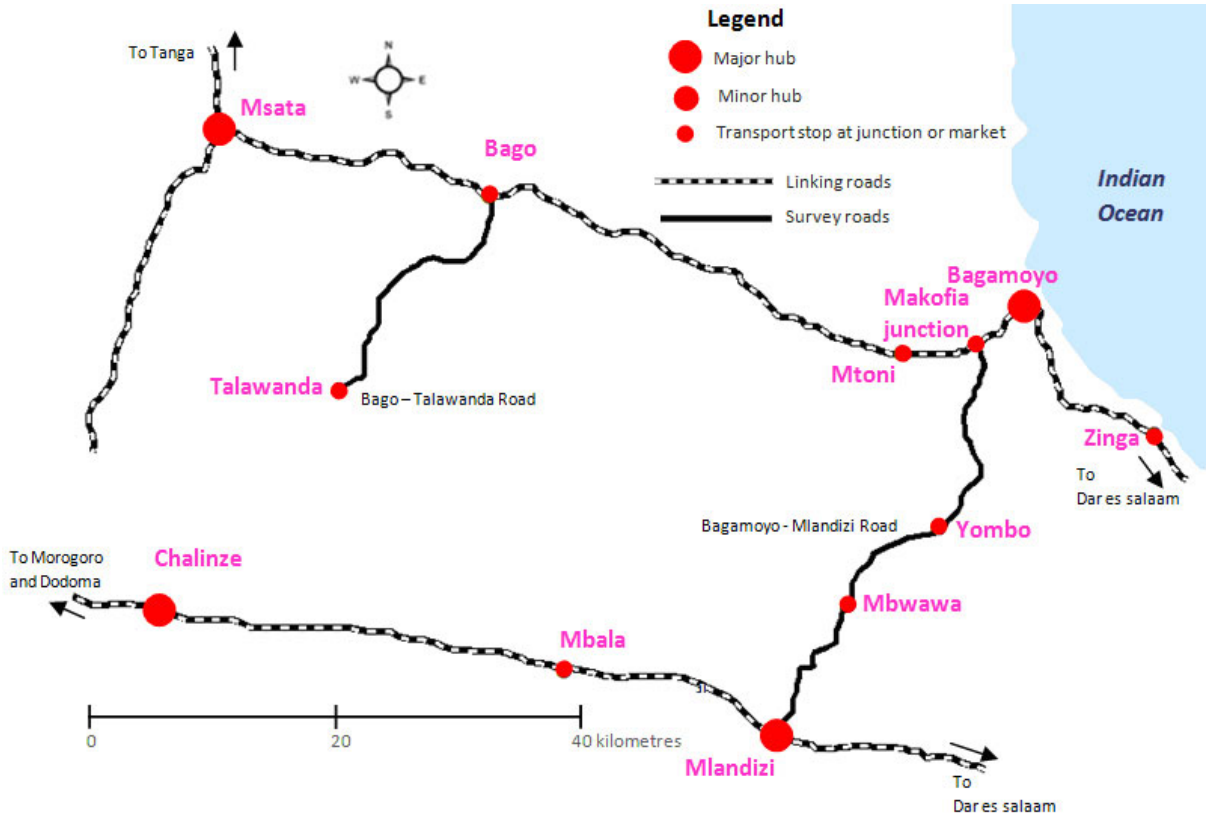


Fig. 1: Bago–Talawanda road context map

The African Community Access Programme (AFCAP) has been funding a project on this road to demonstrate alternative surface options for low volume roads. These include sections of tarmac, gravel, concrete strips, packed stone and earth. Before upgrading, the road was hardly motorable even during the dry season. Currently, the road still experiences disruptions during the rainy season due to flooding at one water crossing. One section of packed stones has become so uneven it is difficult to pass, and so motorcycles use the shoulder and trucks use a bypass through the bush. The major economic activity along the survey road is small-scale agriculture and livestock keeping. Crops grown include maize, sorghum, sesame, cassava, pineapples and various legumes. The production and sale of charcoal is economically important.

Overview transport services situation and issues

Transport along the road mainly involves walking, bicycles, motorcycles and occasional light charcoal trucks. After upgrading the road, a midi-bus started to operate daily services from Talawanda to Bagamoyo. Since February 2012, this has stopped. The owner said this was due to the financial difficulties of maintaining the bus on that road, and the poor condition of sections of the road, particularly during the rainy season. During a one-day survey of traffic carried out in May 2012, the only traffic was 50 motorcycles a day and 25 bicycles a day. On some days a light truck uses the road to collect charcoal.

Disruption to services is significant (90 days in a year of disruption and 30 days with no services). Based on the surveys, the overall annual passenger volume for motorcycles was 217,000. This is two times the annual number of passengers carried on similar mode along the Bagamoyo–Mlandizi road in the same region.

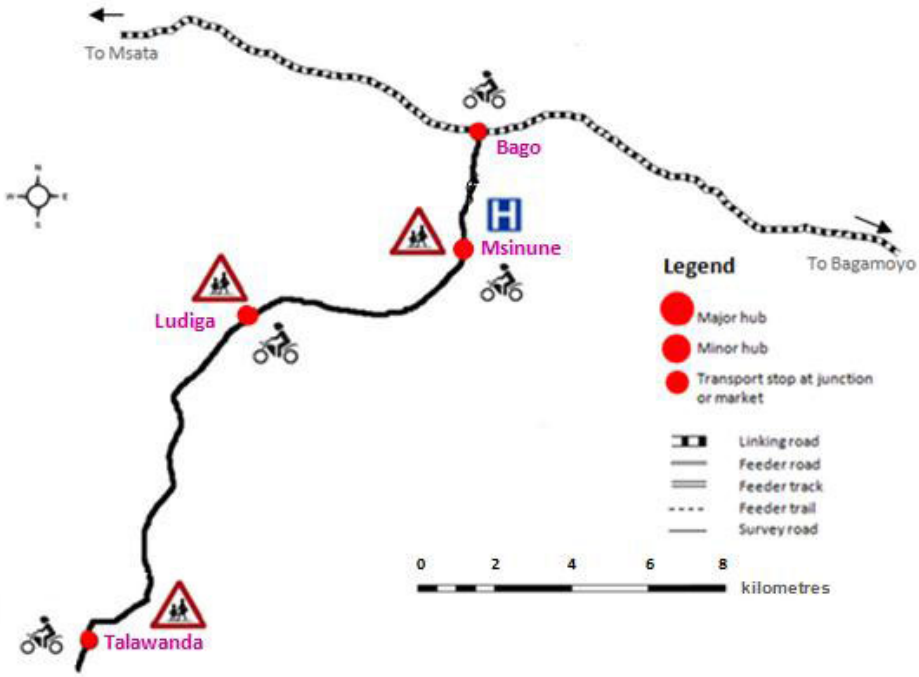


Fig. 2: Bago–Talawanda Road showing hubs, linking and feeding roads

User perspective

Motorcycles were the only transport service operating along the Bago–Talawanda road. A total of 34 users of motorcycles were interviewed for their opinions. Of these, 23 (68%) were male and 11 (32%) were female. The youngest respondent was a student of 18 years while the oldest was a 70-year-old farmer. The users included farmers, traders, people with disability, elderly, students, health users, maternal health care users and those using transport for employment, financial services and/or for socio-cultural or religious reasons.

Summary of User Satisfaction

Generally, user satisfaction with transport services along the Bago–Talawanda road is very low as only motorcycles operate on the road. These are can be unpredictable and are not always convenient to people, notably the old and those seeking medical attention. Motorcycles services were expensive compared to the midi-bus that used to operate along the road. The survey results show that users were dissatisfied with passenger fares, with women being very dissatisfied. Users were not happy with the availability of the medium freight transport (using motorcycles) and with their high charges. The safety and security risks of motorcycles were also reported to be high along the road. Although access on motorcycles is difficult for vulnerable people and those with disabilities, access was only considered a problem, not a serious problem. These findings are illustrated in Fig. 3.

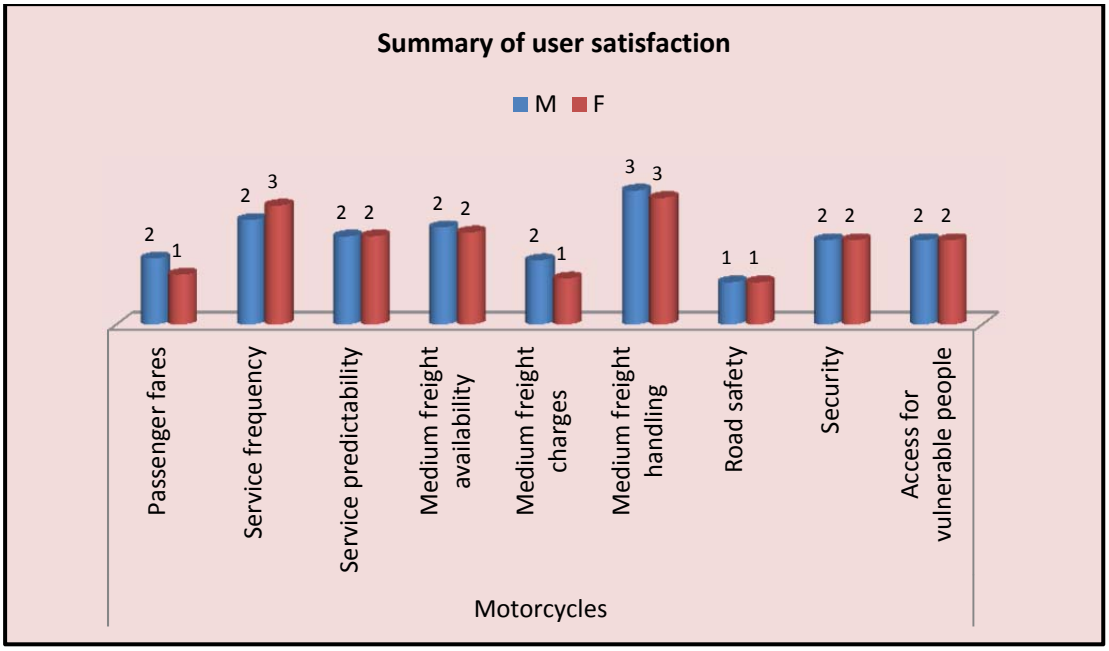


Fig. 3: Summary of user satisfaction for motorcycles services

There is severe seasonal disruption to the transport services along the road. During the rainy season students have to walk about 15 km to school with luggage on their head. Some female students reported that during the rainy season they do not go to school as they cannot walk 15 km with luggage as the male students do. Pregnant women depend on local midwives to assist them to deliver at home when there is no transport to take them to the health facility as Msinune.

Table 5. Summary of user satisfaction responses disaggregated for gender		
Means of transport	**Motorcycle**	
Gender of respondent	**M**	**F**
Sample size (N)	**23**	**11**
Passenger fares	2	1
Journey times	3	2
Service frequency	2	3
Service predictability	2	2
Passenger capacity	3	3
Small freight availability	3	4
Small freight charges	2	2
Small freight handling	4	3
Medium freight availability	2	2
Medium freight charges	2	1
Medium freight handling	3	3
Courier services	1	2
Road safety	1	1
Security	2	2
Comfort: space	n/a	n/a
Comfort: seat type/conditions	3	3
Comfort: surrounding baggage	n/a	n/a
Comfort: environment	2	1
Access for vulnerable people	2	2
Overall un-weighted	**2**	**2**
Overall weighted	**2**	
Satisfaction for all transport types		
Gender of respondent	**M**	**F**
Facilities at roadside stops	1	1
Feeding intermodal connectivity	3	3
Linking intermodal connectivity	4	4
Overall un-weighted	**3**	**3**
Overall weighted	**3**	
The higher the score the better. *1 = Very dissatisfied. 2 = Dissatisfied. 3 = Medium. 4 = Satisfied. 5 = Very satisfied*		

Operator perspectives

Three motorcycle operators were interviewed to gain information from the operators' perspective. Two operators leased their motorcycles for TZS 6000 (USD 3.75) a day. The third was an owner-operator. Operators stressed that seasonal weather patterns affect their operations. The road is disrupted for about three months with about thirty days a year with no services. Fares per kilometre were about USDc 22 which is much higher than the rates that used to be charged on the midi-bus. There is no association of motorcycle operators along the road.

The survey showed that the operators regard the formal and informal financial services and the access to working capital and/or credit as very inadequate. This is a key challenge faced by the operators. Regulatory issues such as check points, barriers, enforced safety regulations relating to

loading levels, crash helmets, seat belts and restrictions on operating hours and routes of operation were not regarded as constraints or disincentives. This because there are no traffic police enforcing regulations along this road and there is little compliance. The operators did not feel there were significant regulatory incentives for RTS operations.

Table 6. Summary of operator perspectives	
Means of transport	**Motorcycle**
Sample size (N)	*3*
Road condition for operations	★★★☆☆
Adequacy of working capital	★☆☆☆☆
Facilities for formal credit	★☆☆☆☆
Facilities for informal credit	★☆☆☆☆
Adequacy of technical facilities	★★☆☆☆
Regulatory disincentives	★★★★☆
Regulatory incentives	★★☆☆☆
Active associations	★☆☆☆☆
Security risks	★★★★☆
Un-weighted average 2	★★☆☆☆
Weighted average 3	
The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆=Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied	

Regulator perspectives

Around the road, a Ward Executive Officer (WEO), a teacher and a traffic police officer were interviewed to provide their opinions on the regulator's perspective. Ward Executive Officers are suitable people to interview as they have to travel regularly by public transport and are generally aware of various regulatory issues. The teacher was knowledgeable and travelled regularly. The traffic police officer was responsible for enforcing traffic regulations and had a good understanding about the operators' compliance with traffic regulations. Therefore, the opinions from the interviewed people on the regulator perspective were considered authoritative and relevant.

The people interviewed all agreed that motorcycles operating on that road do not comply with any regulations. Regulations relating to motorcycles do not appear to have reached the Talawanda road, due to its remoteness.

Table 7. Summary of regulator perspectives	
Means of transport	**Motorcycle**
Vehicle technical compliance	★☆☆☆☆
Vehicle fiscal compliance	★☆☆☆☆
Insurance compliance	★☆☆☆☆
Operational compliance	★☆☆☆☆
Safety compliance	★☆☆☆☆
Environmental compliance	★☆☆☆☆
Regulatory planning framework	★☆☆☆☆
Safety of the road	★☆☆☆☆
Un-weighted average	★☆☆☆☆
The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆=Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied	

Development perspectives

Three people were interviewed to provide opinions on the development perspective: a medical doctor, a Ward Executive Officer (WEO) and a head teacher. The doctor was able to give opinions on how the various type of transport meet the needs of patients and the activities of the various health services. The Ward Executive Officer was regularly involved in discussions within communities that address development issues such as constraints to rural enterprises, agriculture and the medical sector. Head teachers tend to have a good understanding of various rural challenges, including education and the empowerment of young people. Therefore, the people consulted together are thought to have provided relevant and authoritative assessments of development perspectives.

Opinions from the development perspective showed that although the community depend entirely on motorcycles, these do make an important contribution to facilitating agriculture and rural enterprises along the road. Similarly, despite motorcycles being uncomfortable and difficult for some people, they are useful for those seeking medical attention (there is no alternative). They are a positive contribution to education. The surveys also indicated that the use of mobile phones was very important, allowing people to organise trips and order transport from various points. Although motorcycles have a high accident risk, they are important for the advancement of the young, particularly young men. The trucks that occasionally use the road are primarily buying charcoal and make little contribution to development issues.

Table 8. Summary of development perspectives

Means of transport	Motorcycle	Truck
Agricultural facilitation	★★★★☆	★☆☆☆☆
Enterprise/trade facilitation	★★★★☆	★☆☆☆☆
Women's empowerment	★★★☆☆	★☆☆☆☆
Minority group empowerment	★★★☆☆	★☆☆☆☆
Disabled people's empowerment	★★☆☆☆	★★☆☆☆
Young people's empowerment	★★★★☆	★☆☆☆☆
Maternal health needs	★★★☆☆	★☆☆☆☆
Medical service transport	★★★★☆	★☆☆☆☆
Education-related transport	★★★★☆	★☆☆☆☆
Mobile phone and ICT integration	★★★★★	★☆☆☆☆
Un-weighted average	★★★★☆	★☆☆☆☆
Cultural impact	★★★☆☆	★★★☆☆
Environment impact	★★★☆☆	★★☆☆☆
HIV/Aids impact	★★★★☆	★★☆☆☆
Un-weighted average	★★★☆☆	★★☆☆☆
Weighted average		
Overall weighted average		
Integration with feeder transport		★★★☆☆
Integration with external transport		★★★☆☆
Road maintenance adequacy		★★☆☆☆
Final weighted average		

The more stars the better, from the development perspective. For example, the contribution of each mode of transport to the achievement of development goals in that area of concern has been rated by the people interviewed as:

★☆☆☆☆= Very poor. ★★☆☆☆= Poor. ★★★☆☆= Medium. ★★★★☆= Good. ★★★★★= Very good.

Conclusions

The survey of the Bago–Talawanda road (20 km) has provided understanding of some of the transport challenges in various rural communities along the road. Motorcycles were introduced about three years ago and are now the only transport services along the road. Prior to the motorcycles, the only means of transport were bicycles and walking. The survey highlighted the impact of various road maintenance interventions for rural roads. Despite the road rehabilitation, the road is not considered good enough for minibus services. The road is badly disrupted during rainy season, particularly due to flooding at one drift.

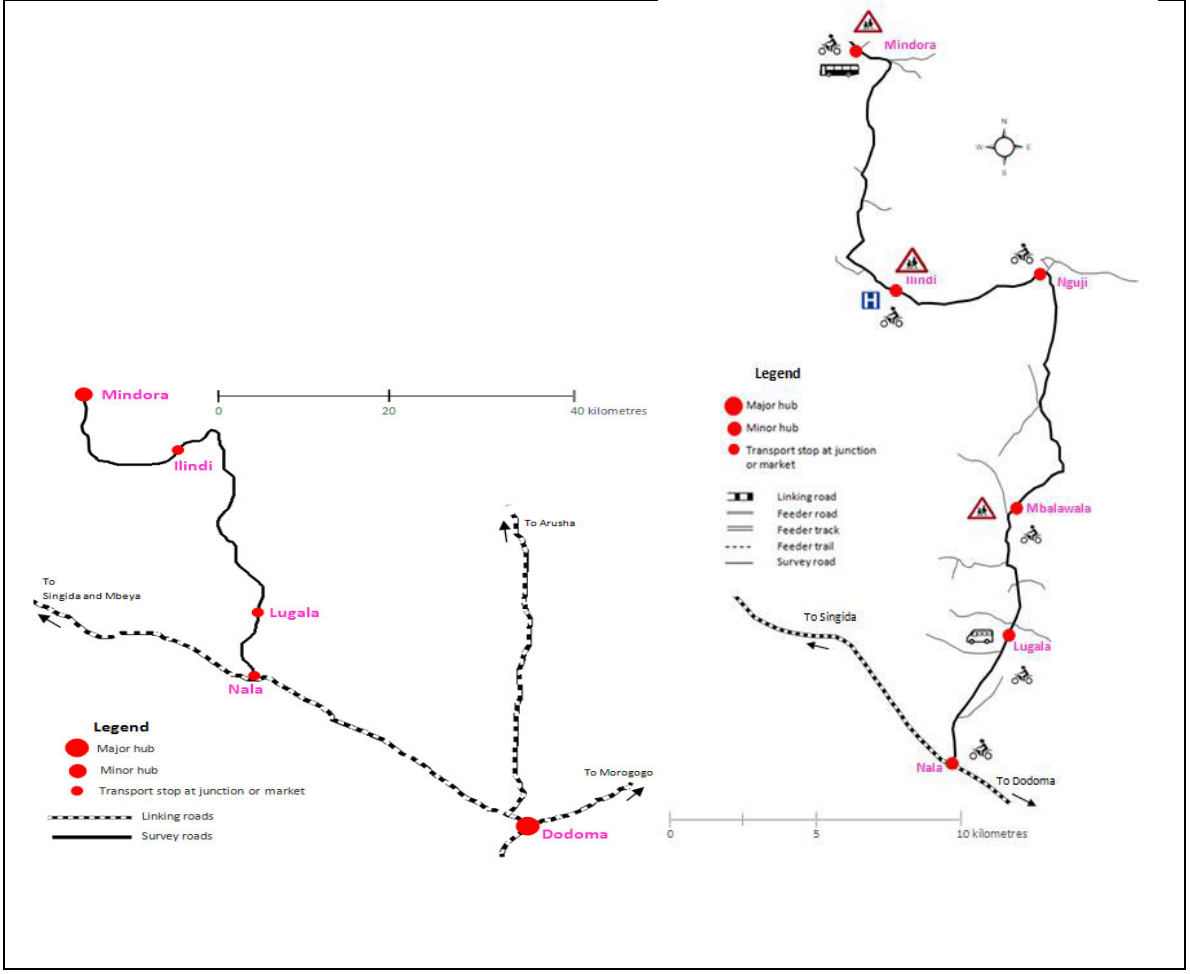
Several concerns have been raised by different stakeholders. The key concerns for the users include the high passenger fares and expensive medium freight (200 kg) services. There were also problems of poor safety, security and the problems of noise and dust on the motorcycles. Operators were concerned about access to capital/credit facilities to own and/or operate motorcycle services. Regulators felt there was minimal compliance with regulations relating to safety, operations and environmental legislation. From the development perspective, the biggest problem was the lack of rural taxis or minibuses. However, people commended the contribution of motorcycles in facilitating agriculture and rural enterprises in the area and for assisting transport to health and education and providing opportunities for young men.

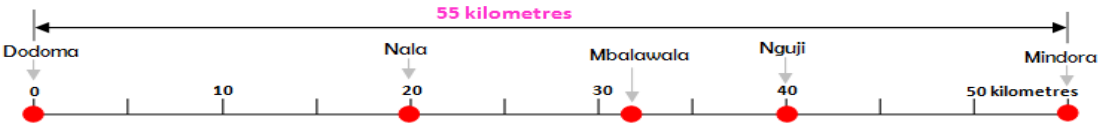
9 RTSi Report of Nala–Mindora Road, Dodoma Region, Tanzania

Prepared by: Shedrack Willilo. Date: 28 September 2012

Part 1: Summary Tables

Table 1. Road information			
Road name: Nala–Mbalawala–Mindora			
District, Region and Country: Urban & Rural Dodoma, Dodoma, Tanzania			
Road type: District road	*Responsible authority: PMO-RALG*		
Road start location: Nala	*GIS:*		
Road finish location: Mindora	*GIS:*		
Road length: 35km	*Catchment population* [1]		
Road quality and condition from different perspectives			
Road authority [2]	*Operators* [3]	*Development* [4]	*Safety* [5]
	★★☆☆☆	★☆☆☆☆	★☆☆☆☆
Summary of road geography and socio-economic situation			
This road is located in Dodoma Region in Dodoma Urban and Dodoma Rural Districts. The Nala–Mbalawala–Mindora road is a 35 km district road managed by the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). The road starts at Nala which is 20 km from the city of Dodoma on the Singida road. The road traverses flat and gently rolling terrain to Mindora village which is 35 km from Nala. The major economic activities along the survey road are agriculture and livestock keeping. Crops grown include sorghum, maize, millet, sesame, groundnuts and sunflowers.			
Maps of road, with context and hub and spoke connections			



Schematic map of 'straightened' road with features

GPS elevation track *(same horizontal scale)*
GPS speed track [6] *(same horizontal scale)*
Description of hub and spoke patterns
Nala is a small transport stop for the buses along the Dodoma–Singida road. Mindora is a large village and transport hub. A village market is also held at this village on a weekly basis during the dry season. Several small spokes feed into this village that are mainly used by motorcycles and bicycles. Motorcycles are important transport services but they are few. Most are operated by owners who also use them for other private activities. The motorcycle hubs along the road are at Mindora, Ilindi, Nguji, Mbalawala and Lugala. However, the main transport hubs along the road are Mindora, Ilindi and Lugala.
Intermodal connectivity *(one to five stars, the more stars the better)*

'Feeding' [7]	*User satisfaction* [8]	★★☆☆☆	*Development impact* [9]	★★☆☆☆
'Lnking' [10]	*User satisfaction* [11]	★★★★☆	*Development impact* [12]	★★★☆☆

Table 2. Traffic and transport along road *(work in progress)*

Daily traffic flows					**Fleet**	**Passengers and small freight**						
	Normal	*Busy*	*Disrupted*	*Impassable*	*No of vehicles operating on road*	***Trip transport*** *normal day per vehicle*		***Daily transport*** *normal day all vehicles*		***Annual transport*** *adjusted for traffic fluctuations*		***Change*** *in past year*
						Pax (no)	*Frt (kg)*	*Pax (no)*	*Frt (kg)*	*Pax (no) 000*	*Frt (t)*	*- - 0 ++*
Bus	1	1	0	0	1	61	800	61	800	10	292	+
Minibus	1	1	0	0	1	10	200	10	200	4	73	+
Motorcycle	22	30	10	5	10	2	50	44	1100	5	402	+
Total	**24**	**32**	**10**	**5**	**12**	**73**	**1050**	**115**	**2100**	**18**	**767**	

Table 3. Rural transport services key operational statistics for major transport modes			
			
	Motorcycle	**Minibus**	**Bus**
Contribution to annual passenger transport (% of market)	33	43	0
Contribution to annual small freight transport (% of market)	40	43	17
Fare per km in USDc	24	3	3
Journey time (average speed on normal days) in km/hr	23	20	16
Transport frequency (normal days)	8	1	1
Number of days a year with 'normal service'	0	180	0
Number of busy days a year	20	20	20
Number of days a year with disrupted service	210	90	162
Number of days a year with no transport services	135	75	183
Reliability factor(s) (%)	52	68	57
Men as % of passengers/day	82	60	52
Women as % of passengers/day	15	40	33
Children as % of passengers/day	3	0	15
Cost of 50 kg accompanied freight in USD per tonne-km	1	0	0
Cost of 200 kg consigned freight in USD per tonne-km	2	0	0
Safety: Recalled no. of accidents per 100,000 vehicle trip	2701	38	1167
Security: Recalled no. of incidents per 100,000 vehicle trip	14	0	0
Operating distance per year in km	15600	25200	34320
Vehicle operating costs (VOC)/year (USD)	1939	15638	50721
VOC per passenger-km (USDc)	8	3	2
Operating income per passenger-km (USDc)	27	4	1
Percentage operating income due to freight	13%	19%	19%
Regulation compliance (overall assessment)	1	2	2
Development impact (overall assessment)	2	2	2

Table 4. User satisfaction with main RTS modes (disaggregated for gender)						
	Motorcycle		**Minibus**		**Bus**	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Sample size (N)	**21**	**12**	**6**	**7**	**16**	**14**
Fares	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Journey time	★★★★☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★☆☆☆☆	★★☆☆☆
Operational features	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Freight	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Safety and security	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Comfort	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Universal access	★★☆☆☆	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Overall satisfaction	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆

The more stars the better. ★☆☆☆☆= Very dissatisfied. ★★☆☆☆= Dissatisfied. ★★★☆☆= Medium. ★★★★☆= Satisfied. ★★★★★= Very satisfied

Part 2: Report

Overview of road situation and issues

The Nala–Mbalawala–Mindora road is located in Dodoma Region in Dodoma Urban and Dodoma Rural Districts. This is a 35 km district road, managed by the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). The road starts at Nala which is 20 km from the city of Dodoma on the Singida road. The road traverses flat and gently rolling terrain to Mindora village which is 35 km from Nala.

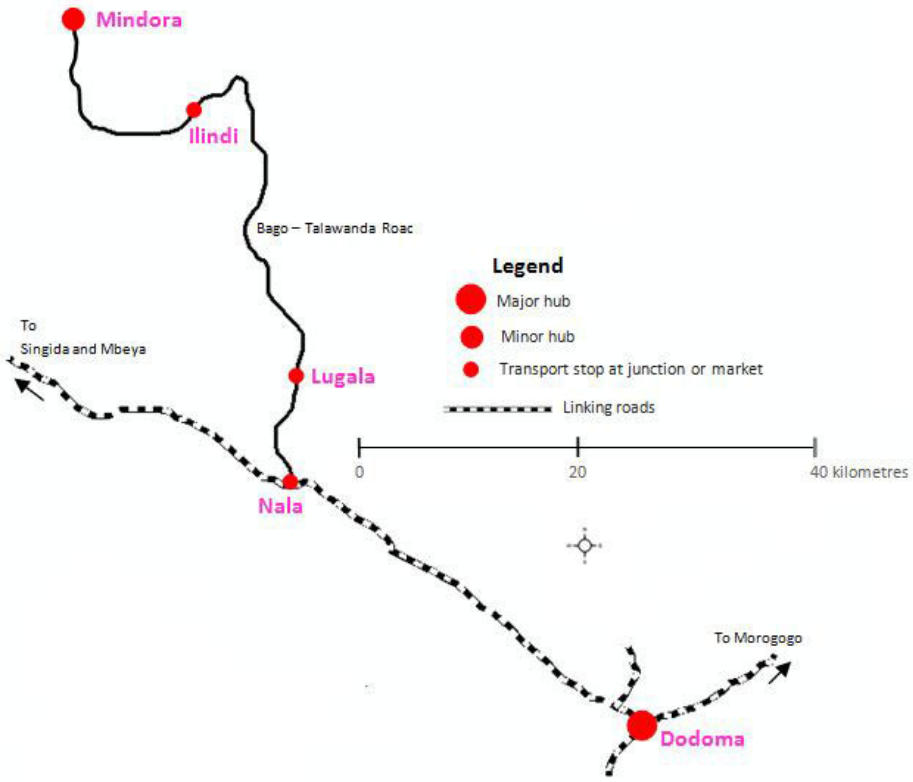


Fig. 1: Nala–Mbalawala–Mindora road context map

The first 12 km section of the road from Nala to Mbalawala is of good gravel standard. Much of the subsequent 23 km section from Mbalawala to Mindora is a non-engineered earth road that is in 'poor' condition. There are some drainage culverts and those near Mindora are being replaced. Due to the poor state of this second section of road, motorised transport services are considered unreliable and are disrupted for a period of five months during the rainy season. The major economic activities along the survey road are agriculture and livestock keeping. Crops grown include sorghum, maize, millet, sesame, groundnuts and sunflowers.

Overview transport services situation and issues

Typical transport services along the Nala–Mbalawala–Mindora road include several motorcycles, two minibuses and one large bus. Bicycles are important for personal transport, including carrying goods, but they are not considered public transport services. Truck operations are important in the dry season, when they are used to buy agricultural produce for sale at the Dodoma market hub. Based on a one day traffic count at Mbalawala, the daily transport along the road comprises 60 bicycles, 20 motorcycles and one large bus. Pack donkeys are quite widely used for freight transport along the road. The daily bus service has an informal timetable, but users say it is nonetheless unpredictable.

Disruption to services is a serious issue and increases in the direction of the Mindora hub. Generally, the road is disrupted for about five months a year, during which time the community survives without a bus service. Based on the surveys, the overall annual passenger volumes were 5000, 4000

and 10,000 for the motorcycles, the two minibuses and a bus respectively (see Table 2 above). The maximum carrying capacity is 2 passengers for motorcycles, 25 passengers for minibuses and 70 passengers in the bus. Both minibuses and the bus make one return trip a day. However, the bus is more disrupted than the minibuses as it starts further up the road where the road is poor. The share of the passenger market for these modes therefore is 26%, 20% and 54% for motorcycles, minibuses and bus respectively.

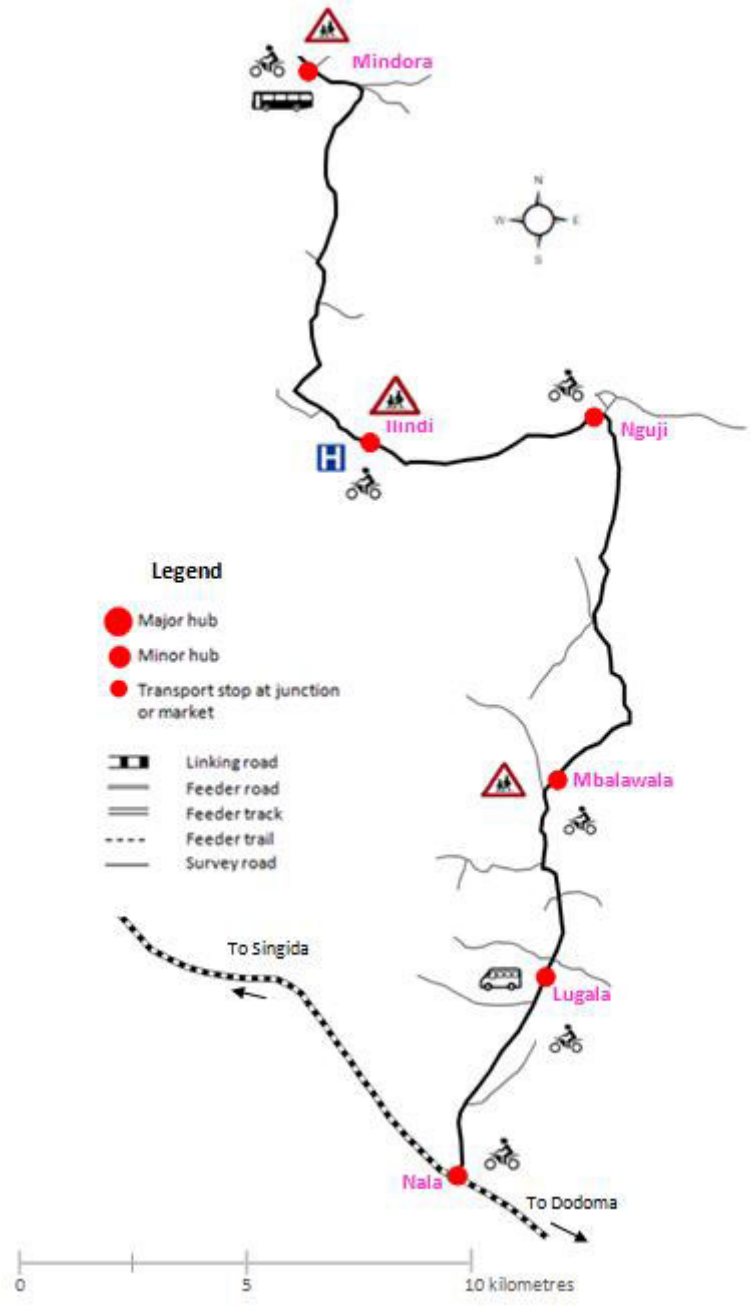


Fig. 2: Nala–Mbalawala–Mindora road showing hubs, linking and feeding roads

User perspectives

A total of 76 users of motorcycles, minibuses and the bus were interviewed for the Nala–Mindora road. Out of these, 43 (57%) were male and 33 (43%) were female. The youngest respondent was a student of 16 years while the oldest was a 70-year-old farmer. The user categories interviewed included farmers, traders, disabled, elderly, students, health users, maternal health care, and those using transport for employment, financial services and/or for socio-cultural or religious reasons.

Summary of User Satisfaction

Women and men were asked about their satisfaction with the different means of transport. For motorcycle transport services, 21 (64%) men and 12 (36%) women were interviewed. In the case of minibuses, 13 users were interviewed of which 6 (46%) were men and 7 (54%) were women. Thirty bus users were questioned of which 16 (53%) were men and 14 (47%) were women. Fig 3 presents gender disaggregated levels of satisfaction with passenger fares, journey times, service frequency, and service predictability. Users were very dissatisfied with the passenger fares of motorcycles. They were medium satisfied with the fares for minibuses and the bus. Along the surveyed road, men were satisfied with the journey time for motorcycles while women were medium satisfied. Both men and women were dissatisfied with the journey time and service frequency for minibuses and very unsatisfied with the frequency of the bus. This is partly because the bus operates on a longer and more deteriorated road than do the minibuses. The users also complained about the unpredictability of the transport services on this road. These statistics are illustrated in Fig. 3.

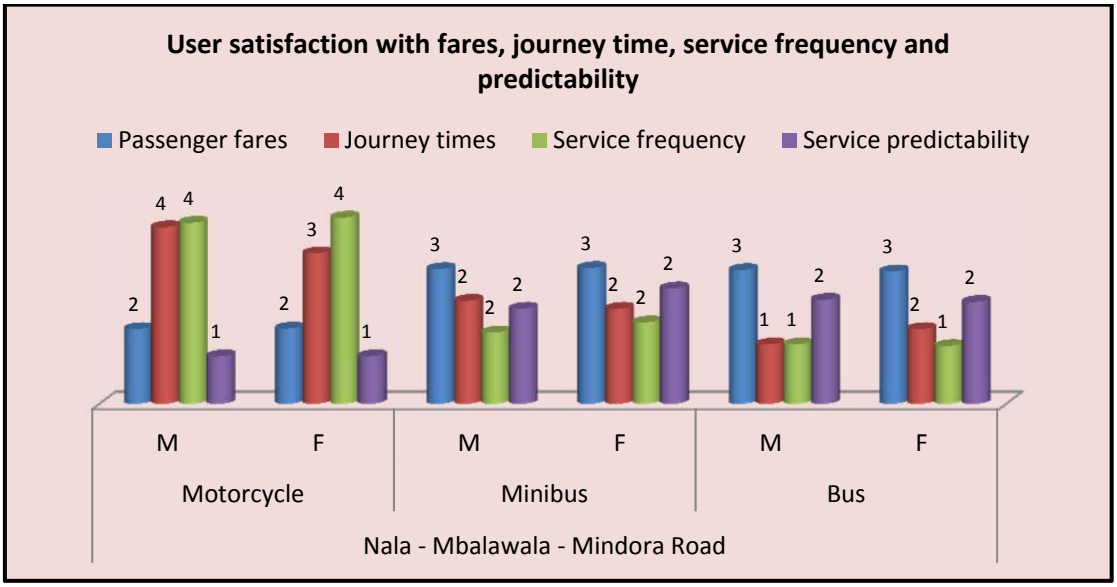


Fig. 3: User satisfaction with fares, journey time, service frequency and predictability

In terms of freight characteristics, men and women were medium satisfied with availability of the various modes of RTS to carry small freight (20–50 kg) but they were unsatisfied with the charges. Users were dissatisfied with the availability of motorcycles to carry medium freight and the very high charges. Users were dissatisfied with medium freight on minibuses. Users were medium satisfied with the availability of a bus to carry their medium freight but complained about the transportation cost. Freight handling was not considered a problem. These statistics are illustrated in Fig. 4.

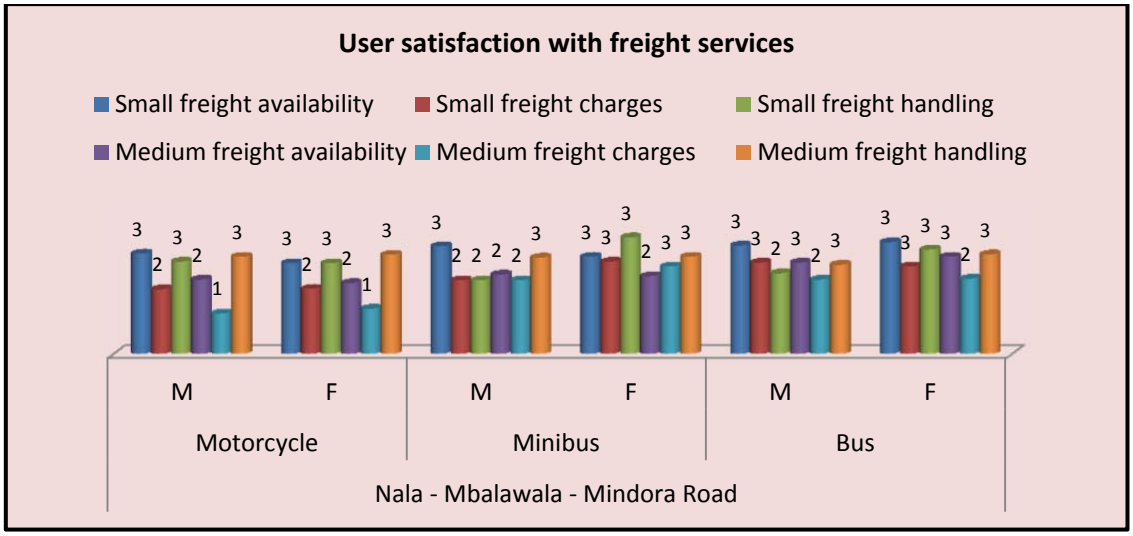


Fig. 4: User satisfaction to freight characteristics

The survey results indicate that both men and women were dissatisfied with the safety of all transport modes. Women were more satisfied than men with the security risks (theft, assault, harassment) of the minibuses and bus. Users were dissatisfied with the comfort in terms of seat condition of minibuses and bus but were satisfied with those of motorcycles. Both men and women considered there was poor access for vulnerable people (elderly or physically challenged people) on all modes, and women considered motorcycles particularly difficult for vulnerable people (Figure 5).

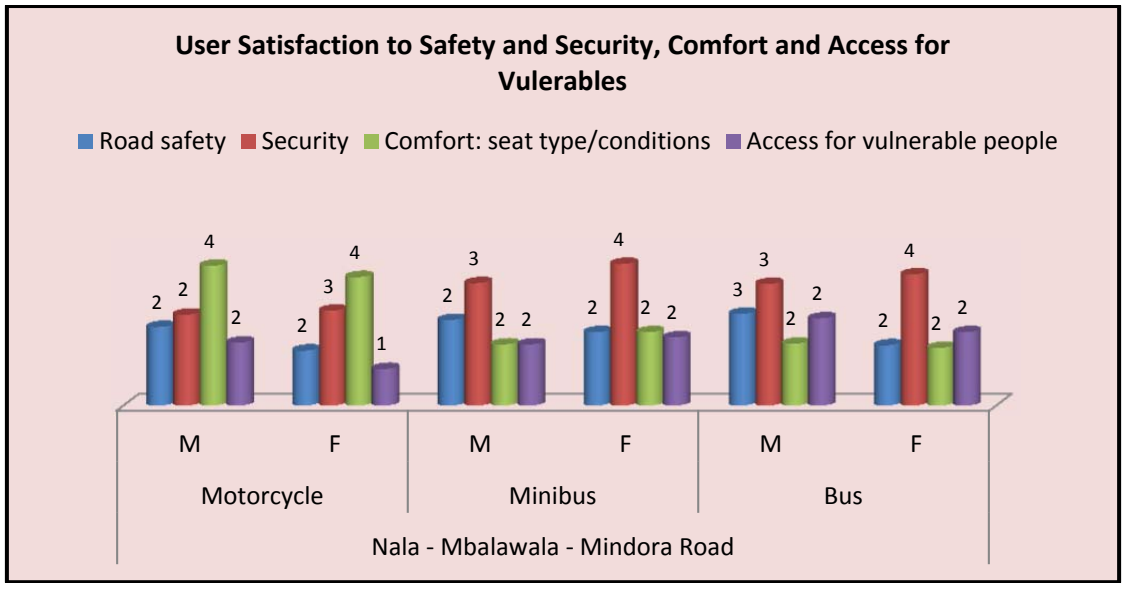


Fig. 5: User satisfaction to safety and security, comfort and access for vulnerable

Men and women regard motorcycles as providing very poor comfort in terms of the environment (noise levels/dust/heat) as shown in Table 5. All transport users interviewed indicated that they were dissatisfied with roadside waiting facilities. This is due to the fact that these facilities do not exist. Users were satisfied with the linking intermodal connectivity but dissatisfied with the feeding intermodal connectivity. This can be explained by the fact that the available motorcycles provide feeder transport services that are operated by owners who also use them on other private activities. At the time of the survey, there were no dedicated motorcycle taxi operators available at hubs. However, they could be called from their home bases by mobile phones.

Table 5. Summary of user satisfaction responses disaggregated for gender						
Means of transport	**Motorcycle**		**Minibus**		**Bus**	
Gender of respondent	**M**	**F**	**M**	**F**	**M**	**F**
Sample size (N)	*21*	*12*	*6*	*7*	*16*	*14*
Passenger fares	2	2	3	3	3	3
Journey times	4	3	2	2	1	2
Service frequency	4	4	2	2	1	1
Service predictability	1	1	2	2	2	2
Passenger capacity	4	4	3	3	2	2
Small freight availability	3	3	3	3	3	3
Small freight charges	2	2	2	3	3	3
Small freight handling	3	3	2	3	2	3
Medium freight availability	2	2	2	2	3	3
Medium freight charges	1	1	2	3	2	2
Medium freight handling	3	3	3	3	3	3
Courier services	2	2	2	2	2	1
Road safety	2	2	2	2	3	2
Security	2	3	3	4	3	4
Comfort: space	n/a	n/a	2	3	2	2
Comfort: seat type/conditions	4	4	2	2	2	2
Comfort: surrounding baggage	n/a	n/a	1	2	1	2
Comfort: environment	1	1	2	2	2	2
Access for vulnerable people	2	1	2	2	2	2
Overall un-weighted	**2**	**2**	**2**	**2**	**2**	**2**
Overall weighted						

Satisfaction for all transport types		
Gender of respondent	**M**	**F**
Facilities at roadside stops	1	1
Feeding intermodal connectivity	2	2
Linking intermodal connectivity	4	4
Overall un-weighted	**2**	**2**
Overall weighted		

The higher the score the better.
1 = Very dissatisfied. 2 = Dissatisfied. 3 = Medium. 4 = Satisfied. 5 = Very satisfied

Operator perspectives

Five operators were interviewed to provide opinions on the operator's perspective. Three were owner-operators of motorcycles. The minibus operator and the bus operator were both drivers who were retained by the owners. The drivers did not pay a daily leasing fee but paid over the daily income, less the cost of the daily fuel. The minibus driver paid TZS 15,000 (USD 9.38) a day to the owner and the bus driver paid TZS 105,000 (USD 66) to the owner on operating days. Their salaries were not constant, but varied with the level of the operating income. The minibuses and bus each made one return trip a day to Dodoma, leaving in the morning and returning in the afternoon. The road has major seasonal disruption that seriously affects the RTS operations. The road is disrupted for about five months a year. The bus is more disrupted than minibuses and motorcycles. Fares per kilometre were much higher for motorcycles as compared to the bus and minibuses. The average

motorcycles fare was USDc 24 per kilometre, while those for minibuses and the bus were USDc 3. There are no operator associations on this road. Some of the statistics are summarised in Fig. 6.

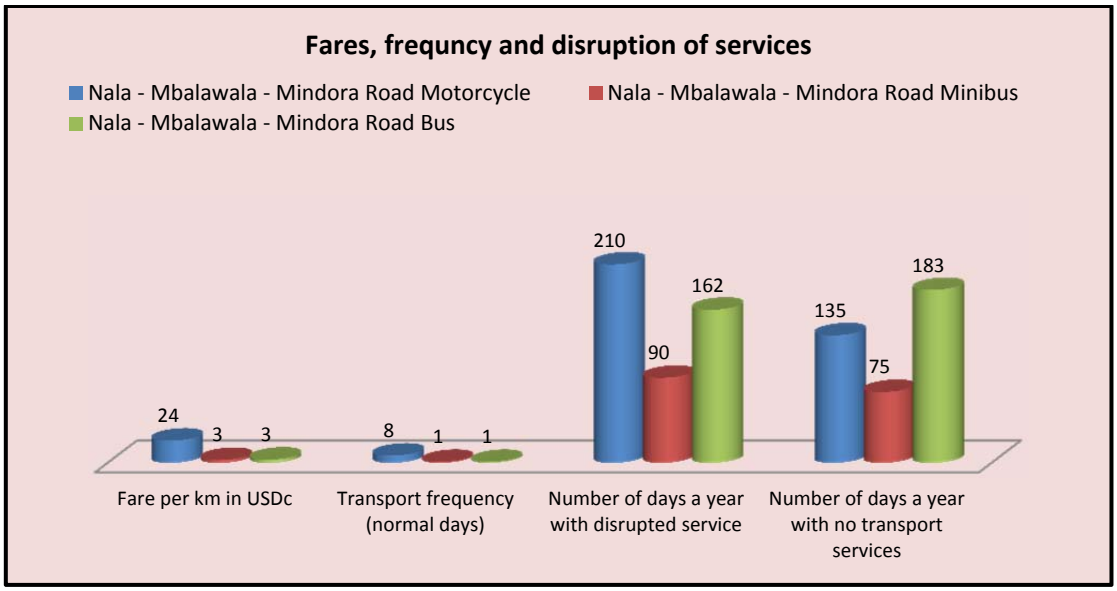


Fig. 6: Fares, service frequency and disruption along the Nala–Mbalawala–Mindora road

The survey results for operators indicate that poor road condition and access to capital/credit facilities were amongst the key challenges facing the operators. On the other hand, regulatory issues such as check points, barriers, enforced safety regulations relating to loading levels, crash helmets, seat belts and restrictions on operating hours and routes of operation were regarded as very strong disincentive to operate on the road especially for minibuses and bus. A bus operator confessed that, if they know that they were overloaded they normally bypass Nala junction so as to avoid the weighbridge along the Singida road. Conversely subsidies, tax relief, flat rate tax, and route allocation were perceived as weak incentive to RTS operations along the subject road.

Table 6. Summary of operator perspectives

Means of transport	Motorcycle	Minibus	Bus
Sample size (N)	*3*	*1*	*1*
Road condition for operations	★★☆☆☆	★★☆☆☆	★★☆☆☆
Adequacy of working capital	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Facilities for formal credit	★★☆☆☆	★★☆☆☆	★☆☆☆☆
Facilities for informal credit	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Adequacy of technical facilities	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Regulatory disincentives	★★★☆☆	★☆☆☆☆	★☆☆☆☆
Regulatory incentives	★★☆☆☆	★★☆☆☆	★★★☆☆
Active associations	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Security risks	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Un-weighted average 2	★★☆☆☆	★☆☆☆☆	★☆☆☆☆
Weighted average 3			

The more stars the better. ★☆☆☆☆ *= Very dissatisfied.* ★★☆☆☆ *= Dissatisfied.* ★★★☆☆ *= Medium.* ★★★★☆ *= Satisfied.* ★★★★★ *= Very satisfied*

Regulator perspectives

A Ward Executive Officer (WEO), a village secretary and a traffic police officer were interviewed to provide their opinions on the regulator's perspective. The traffic police are responsible for enforcing traffic regulations and have a good understanding about the operators' compliance with traffic

regulations. Ward Executive Officers and village secretaries are also suitable people to interview as they have to travel regularly by public transport and are generally aware of various regulatory issues. Therefore the interviewed people were considered to be authoritative and relevant from the regulator's perspective.

The operators of motorcycles tend to ignore regulatory issues on this road. This may be due to low enforcement capacity and the remoteness of the hubs where these motorcycles operate. Minibuses, the bus and trucks do comply with insurance, tax and financial regulations. They do not generally comply with safety regulations, operational regulations and environmental legislation. There is minimal enforcement of these regulations. Figure 7 and Table 7 summarises regulatory compliance issues.

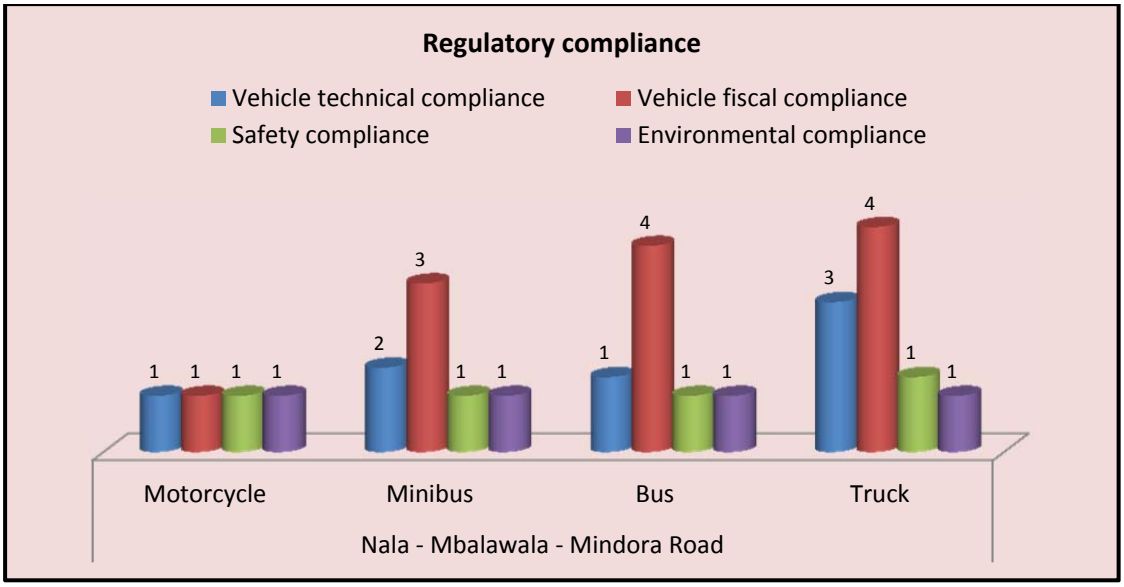


Fig. 7: Compliance levels with technical, fiscal, safety, and environment along Nala- Mindora Road

Table 7. Summary of regulator perspectives

Means of transport	Motorcycle	Minibus	Bus	Truck
Vehicle technical compliance	★☆☆☆☆	★★☆☆☆	★☆☆☆☆	★★★☆☆
Vehicle fiscal compliance	★☆☆☆☆	★★★☆☆	★★★★☆	★★★★☆
Insurance compliance	★☆☆☆☆	★★★★☆	★★★★☆	★★★★☆
Operational compliance	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Safety compliance	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Environmental compliance	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Regulatory planning framework	★☆☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Safety of the road	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Un-weighted average	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆

The more stars the better. ★☆☆☆☆ *= Very dissatisfied.* ★★☆☆☆ *= Dissatisfied.* ★★★☆☆ *= Medium.* ★★★★☆ *= Satisfied.* ★★★★★ *= Very satisfied*

Development perspectives

Four people were interviewed to provide opinions for the development perspective. These were a Village Executive Officer (VEO), a Ward Executive Officer (WEO), a nurse and a teacher. The nurse was able to give opinions on how the various type of transport meet the needs of patients and the activities of the various health services. The VEO and WEO were regularly involved in discussions within communities that address development issues such as constraints to rural enterprises,

agriculture and the medical sector. Teachers tend to have had good understanding of various rural challenges, including education and the empowerment of young people. Therefore, the people consulted together are thought to have provided relevant and authoritative assessments of development perspectives.

Opinions from the development perspective showed that the contribution of the existing rural transport services to facilitate agriculture and rural enterprise along the subject road was weak. Despite motorcycles being uncomfortable and difficult for many people, their availability meant that their contribution to development-related transport was large. This was even true for their contribution to maternal health. In fact the overall development impact of motorcycles was greater than that of the minibuses or bus (based on a non-weighted average of all issues).

Table 8. Summary of development perspectives[1]

Means of transport	Motorcycle	Minibus	Bus	Truck
Agricultural facilitation	★★☆☆☆	★☆☆☆☆	★☆☆☆☆	★★☆☆☆
Enterprise/trade facilitation	★★★☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆
Women's empowerment	★★☆☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Minority group empowerment	n/a	n/a	n/a	n/a
Disabled people's empowerment	★☆☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
Young people's empowerment	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Maternal health needs	★★★★☆	★★☆☆☆	★★☆☆☆	★☆☆☆☆
Medical service transport	★★☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
Education-related transport	★★☆☆☆	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
Mobile phone and ICT integration	★★★☆☆	★☆☆☆☆	★☆☆☆☆	★★☆☆☆
Un-weighted average[2]	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Cultural impact	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Environment impact	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
HIV/Aids impact	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Un-weighted average[3]	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Weighted average[4]				
Overall weighted average[5]				
Integration with feeder transport		★★☆☆☆		
Integration with external transport		★★★☆☆		
Road maintenance adequacy		★☆☆☆☆		
Final weighted average[6]				

The more stars the better, from the development perspective. For example, the contribution of each mode of transport to the achievement of development goals in that area of concern has been rated by the people interviewed as:
★☆☆☆☆ *= Very poor.* ★★☆☆☆ *= Poor.* ★★★☆☆ *= Medium.* ★★★★☆ *= Good.* ★★★★★ *= Very good.*

Conclusions

The survey of the Nala–Mbalawala–Mindora road (35 km) gives a fascinating picture on how transport demand in rural areas can attract various types of rural transport services. It is very unusual for a 65-seater bus to operate on a narrow, sandy and un-engineered road. However due to the poor road and the weather, this crucial service cannot operator for about five months of the year. In the rainy season, many people have to walk or cycle as the number of motorcycle taxis is still small. However, the relevant authorities appear to be responding to the issue and are rehabilitating the road with drainage culverts.

The overall satisfaction for all forms of transport was low. The key concerns for the users included the poor service frequency for buses, poor predictability for motorcycles and high cost of medium freight (100–200 kg) on motorcycles. Operators complained about the poor road condition, lack of access to capital/credit facilities and poor technical support facilities. Regulators noted very low compliance levels for motorcycles, but buses and minibuses complied quite well with insurance and fiscal regulations. The people providing a development perspective considered that overall transport contribution to development was poor. Although all means of transport were less than satisfactory, motorcycles were rated as the means of transport contributing most to development (based on the un-weighted mean).