OVERCOMING THE FIRST MILE - LESSONS FROM FARMERS IN KENYA & TANZANIA

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ABSTRACT

Two small-scale pilot studies were undertaken investigating the initial 'First Mile' farm to market transport constraints faced by onion farmers in Nyeri County Kenya and tomato farmers in the Kilolo District Tanzania. Data on transport loads, costs and mode of transport were collected together with other information on transport challenges faced including transport delays and crop losses. In both locations, hired head and back loading was the prime method of movement on the initial journey (typically from one to four km) to the first point of consolidation. This method of transport could be over 20 times as expensive (on a per ton/km basis) than movement by truck. It was also found that the initial movements could account for between 10% and 40% of the total farmer's crop earnings. Crop losses from bruising, getting wet and unpredictable delays were also common.

In Kenya farmers groups had attempted to overcome the challenges through both load consolidation, to gain advantages of the economies of scale of truck transport, and by developing a better route to take their produce. However it was found that the new route had major limitations, on vehicle movements, that could be easily solved by simple technical advice.

1. INTRODUCTION

The paper describes two small-scale pilot studies carried out in Kenya and Tanzania into the issues associated with transporting harvest produce on the initial stages of movement from the farm. This maybe to the roadside or to a collection or consolidation point. In the following it is referred to as the 'First Mile'. In Africa First Mile transport is often carried out by human transport (by head or backload or by bicycle) and sometimes by animals, motorcycle or pickup or more rarely truck. The routes used are usually a combination of footpaths, tracks, trails and earth roads, usually with little or no structures.

In Kenya the pilot study was undertaken in the Kieni area of Nyeri County and investigated the movement of onions. The study was undertaken in 2014. In Tanzania the pilot study was carried out in Kilolo District, in Iringa region and investigated the movement of tomatoes. This latter study was carried out in 2015.

The studies were undertaken by the International Forum for Rural Transport and Development (IFRTD) and funded by the Africa Community Access Partnership (AFCAP) [1], [2].

2. RATIONALE

There is a growing awareness that rural infrastructure, including the location and standards of roads and markets, needs to be planned together with transport services, in order to minimise transport costs, reduce crop wastage and gain the maximum advantage for rural farmers, transporters and urban consumers.

Up until now both infrastructure and transport services have tended to develop in a rather piecemeal and organic fashion, in large part reflecting the farming, transport and marketing demands of previous times. The authorities often tend to respond with improving roads and tracks once traffic volumes have reached certain thresholds. There is usually little cost benefit analysis, or understanding how seasonally impassable roads adversely affect agricultural marketing or the social demands of the rural population, especially the small holder farmers.

The initial stages of crop movement, from collection at the farm to secondary roads, are the most expensive when expressed in tonne/ km terms and provide the biggest transport constraints to the development of agriculture. A study of selected small-holder value chains in Kenya shows that the down-stream distance can make up to 20% of the total transport costs of a transport chain [3]. These initial movements will usually take place on local paths and tracks and may involve carrying (by head load or on back load), or by Intermediate Means of Transport (IMTs) such as animal transport, bicycles or motorbikes, and then final transfer to light goods or multi-purpose vehicles.

The process is time consuming and expensive, when either the opportunity cost of labour, or the cost of hired labour or hired transport, is taken into account. Head loading, for example, is in the order of 10 to 30 times more expensive per tonne/ km than moving goods by truck.

Transport efficiency is not only important for improving financial and time costs in the delivery of inputs and produce, but also, in reducing post-harvest losses. Many crops such as tomatoes, mangos, soft fruit, green vegetables, bananas and even crops like onions can be bruised and loose value as they are man-handled and transported over rough roads. Other crops will also lose value through time delays in getting to the market, or factory milk is particularly sensitive. The pattern of transport may vary greatly between the periods, when the roads are dry or wet. During the wet season many tracks and roads will become impassable to conventional motor vehicles creating additional problems which results in extending the first mile transport and increasing costs.

For most farmers, with limited loads to harvest, load consolidation at markets, buying posts or bus and truck stops is crucial in order to gain the advantages of the economies of scale and lower transport costs of larger vehicles.

Despite its importance very little quantitative information is available on the harvesting and load movement of small holder agriculture. The First Mile project is designed, as an exploratory pilot project, to collect a range of data on the transport of harvest produce including consignment size, frequency of collection, mode of transport used at different stages, transport costs, transport losses, load consolidation, etc.

With better analysis and understanding of how harvest produce is taken to market and the major constraints involved, a comprehensive view on how to improve the initial stages of movement should emerge that takes into account both rural transport infrastructure and services.

However the work has provided an opportunity to refine the research methodology and survey instruments so that a larger scale survey, covering a much wider range of locations and crops, may be carried out with greater confidence later on. The benefits of this research should eventually lead to:

- Better advice to road planners on the best location for improvements and a quantification benefits of better initial access.
- A framework to provide advice to farmers and the authorities on best pattern of transport and marketing solutions in different circumstances, covering means of transport, consignment size, and the pattern and location of load consolidation and markets.
- Better understanding of the role of different forms of transport in agricultural marketing and the best ways and needs to regulate them

3. THE CHANGING RURAL ENVIRONMENT

Just as agriculture is changing with the increasing use of modern inputs (seeds, fertiliser, insecticides), there are also changes in the availability and costs of transport vehicles including bicycles, motorcycles, trucks and buses and in marketing practices. Undoubtedly the biggest change in rural transport now taking place in Africa, is the growth of motorcycles. For example in 2008 there were 130,307 motorcycles and registered in Kenya but by 2012 this had grown to 610,056 registrations [4]. Similarly in Tanzania in 2005 there were 31,006 motorcycles registered but by 2010 this had grown to 323,192 registrations [5]. This is equivalent to an annual growth rate of 60% per year, in

comparison other vehicles increased at an annual growth of 6.4% These increases have been aided both by the recent increases in incomes in Africa, coupled with the availability of lower priced motorcycles from China.

Another important factor change is the widespread use of mobile phones in rural areas. Now a customer can call the motorcycle driver directly to the house for a pickup, whereas previously this was impossible to do.

Increasingly, domestic supermarkets that are attracting a growing proportion of the total market share are looking to establish new long term relationships with farmers and to adopt practices whereby produce is harvested and quickly taken for final distribution and avoiding intermediate markets. Likewise the development of higher value export crops (particularly green beans, flowers, mangoes, pineapples) is also changing the nature of the patterns of harvesting and marketing.

One solution to help agricultural development is through contract farming whereby farmers agree to supply produce to marketing and processing firms through forward agreements often at pre-determined prices. This can reduce the insecurity of both buyers and sellers. Because the farmer knows that they can sell their produce at a given price they are better able to secure credit and invest in the farm. The processor can also plan production knowing that they have a contract with farmers to supply a certain quantity of produce [6].

In some contract farming schemes, the buyer may provide inputs, credit, and technical advice. The buyer also guarantees transport at designated collection points with the farmer still responsible for the First Mile transport.

A wide range of contract farming schemes now operate in Tanzania covering produce such as sugar cane, cotton, tea, pyrethrum, tobacco, cashew, sisal, Nile perch, dairy products, and maize. However although they are perceived to be broadly successful, it is recognised that the schemes are ‘buyer dominated’ and that there is enormous scope for improvement. The comparative advantage of Tanzanian crops involved in contract farming schemes is low and quality is often poor [7].

Farmers are also responding to new markets in supplying high value products to foreign markets such as fruit, vegetables, fish and flowers. These require modern supply chain management, involving quality control, cold storage, careful packing, and timely transport to meet specific flight schedules. Supermarkets like to work with medium and large scale farmers, however, in Kenya 75% of fruit and vegetables come from small farmers [8].

The organisation of the first mile transport is critically important to the whole agricultural supply chain, from farmer to final consumer. This affects not only the immediate transport costs from farm to secondary roads, but also the scale and efficiency of transport and marketing for remaining parts of the journey. The efficiency of agricultural transport and marketing is a major concern. In an early analysis of staple grain crops in nine Asian and African countries, Tanzania was found to have the lowest percentage of producer price (farm-gate price) to final market price of all countries. This was 41.4% compared with an average of 64.4% for the nine countries. In contrast, for the four Asian countries (Bangladesh, India, Indonesia and Philippines), the average was 81.6% [9]

Contrary to expectations, the difference in farm-gate price to final retail price was found to be growing during the 1990s and early 2000s in important market sectors that had been liberalised. The issue was reported to be an important concern for the Government [10].

4. THE STUDY AREAS

4.1 Kieni, Nyeri County, Kenya

The study area is also known as Kiamunyuru sub-location consisting of 6 small villages. It is located to the North West of Nyeri County, 30 km from Nyeri town and 9 km from Kiawara which is the nearest trading centre.. The area is 2500-3000 meters above sea level and is located on the slopes of the Aberdare Ranges. The area receives two rainfall seasons. The long rains occur between March and May and short rain from October to December. The annual rainfall ranges from 550-950 mm. The driest month is July when monthly rainfall is at times close to zero while the mean annual temperature of the study area is 21^0C.

The terrain is ragged and is characterized by ridges and valleys. In some areas the slope gradient is more than 45%. The nature of the terrain is a challenge to the transportation system during both the rainy and sunny seasons. It lies approximately.

The black cotton clay soil type is most common in the area and provided a favourable condition for onion growing. Next to onions, in order of commercial importance, are potatoes, beans and wheat.

The total population of the sub-location is 2258 persons which is unevenly distributed among the 6 villages. The average household size of the sub-location is 5.5 persons/household and a total of 407 households.

The rate of migration is unknown though land buying rate have increased in the recent years due to availability of land and the high productivity of the area.

Kimunyuru sub-location area is linked to a national trunk road by a series of a class D rural access roads and a murram surface motorable road. The national trunk road is 9 kms away from the study area.

4.2 Kilolo District, Iringa Region, Tanzania

The study villages fall within Kilolo District Council which is one of four districts in Iringa Region. Administratively, Kilolo District is divided into 3 divisions, 23 wards, 93 villages, 484 hamlets and 51,455 households. The divisions are Kilolo Division with 12 wards, Mazombe with 8 wards and Mahenge division with 3 wards. The district has a population of about 218,130 people (United Republic of Tanzania 2013) of who 112,274 are female and 105,856 are male [11].

The major economic activities in the hilly hinterland are agriculture and livestock keeping. Crops grown include maize, sunflowers, beans, peas, vegetables, tomatoes and various types of fruit. Farmers and traders use the village access tracks to bring produce from the

farms and onto the more accessible rural roads such as the Ihimbo-Itimbo road where traders buy and transport to nearby markets in the district or onto Iringa town and beyond.

The small scale tomato farms are found in the villages along the Ihimbo-Itimbo road. The villages fall within the Ihimbo ward, which has a population of 10,212 people of whom 4,978 are men and 5,234 women. It has a total number of 2,328 households. The zone is about 14 km from Iringa-Kilolo road junction, and about 23 km from Iringa town. According to the Kilolo District Agricultural Officer, the total number of tomato farmers in the last season was estimated to be 127, though this fluctuates from season to season.

5. THE SURVEYS

5.1 Kieni, Nyeri County, Kenya

Five different pilot survey instruments were administered in an area covering six villages in the study area. The villages chosen were known for their growing of onions and onion farmers were specifically chosen in the farmer survey.

The study combined both qualitative and quantitative methods. The quantitative method consisted of questionnaire based surveys distributed as follows:

- A farmers survey (35 interviews)
- A transporters survey (13 interviews)
- A traffic survey (934 movements recorded in 2 locations, on one day; 6 am to 6 pm)

Traffic counts were conducted on two points one - on the rural access road just after the main trading center of Kiawara and the other on a minor but motorable road off the main rural access road.

The fourth instrument consisted of Focus Group Discussions of the farmers' groups. The groups were broken down into separate groups of men, women and the youth. Finally, semi-structured key informant interviews were conducted with the divisional agricultural officer and the village chief and assistant chief.

Since the study area is relatively small and the onion farmers are relatively homogeneous, the questionnaires to farmers were administered randomly across the sub-location. It was felt that a range of information on the general transport issues faced by farmers would be learnt from the individual farmers and the farmer's associations.

From the outset it was recognised that onions are not the most sensitive crop to loss during the transport process. Onions can be stored however it was found during the survey, they can also lose some value through bruising from excessive shaking or manhandling while being transported.

5.2 Kilolo District, Iringa Region, Tanzania

The study area has six tomato growing villages which are Itimbo, Isoliwaya, Iwonde, Itimbo, Luwiva and Ibohola. Data was collected through structured surveys with farmers and transporters, semi-structured interviews with key informants, a traffic count and

observation of such things as prices in various tomato markets. Details of the tools used are as follows:

- Transporter Survey: 58 transporters of different means of transport were interviewed: 22 were female and 36 male. The interviews took place at the roadside collection points, on small markets along Kilolo-Iringa Road and in Iringa tomato market;
- Key Informant interviews : Key informant interviews were conducted with the following people: District Agriculture, Irrigation and Cooperative Officer, chief engineer Kilolo District, Social Development Officer Kilolo District, District Executive Officer Kilolo District, Regional Administration Secretary for Iringa region, acting District Executive Director for Kilolo and 4 village leaders in Ihimbo, Itimbo Luwiva and Ibohola
- Farmers Survey: A total of 52 tomato farmers were interviewed drawn from the 6 tomato growing villages. Of these 13 farmers were female and 39 male. The survey was conducted. The interviews aimed at establishing the volumes produced per acre, amounts marketed, average prices per kg, first mile distances, and means of transport used and costs per tonne/km.
- Traffic Count: A one day traffic count was conducted at two points, both outside the two markets hubs of Ihimbo and Itimbo.
- Observations: Observations were made at the first mile collection points and key markets. The purpose was to cross check transport costs associated with different means of transport, the inter-modal interface between the first mile and the subsequent transport segment, average volumes transported and prices of tomatoes at different stages of the transport chain.

6. SURVEY RESULTS

6.1 Onion Farming and Transport in Kieni, Kenya

6.1.1 *Farmers, Land Holding and Incomes*

The farmers were predominantly middle aged men with primary education. In total 31% were female and 69% male. The education levels were 60% primary, 31% secondary and 9% tertiary. In terms of age, 35% were below 40 yrs., 51% between 40 and 50 yrs., and 14% above 50 yrs.

Of the farmland, 71% was owned by the farmers, with 29% rented. Over 80% of the onion farmland was under two acres. Most farmers grow other crops, besides onions the most common of which are potatoes, beans and maize. However for 85% of farmers, onions account for the majority of their farming income and for 65% of farmers this amounts to over 75% of their agricultural income. The farmers reported an average income of 112,000 Kenyan Shillings (US$1281)[1] per acre, against direct production costs (i.e. covering seeds, fertiliser hired labour) of 37,000 Kenyan Shillings (US$423) per acre this translates to an average profit of 75,000 Kenyan Shillings (US$858).

The farmers prefer growing onions as they are more disease resistant, grow over a short period and tend to be more profitable than other crops.

[1] 1US$=KSHS87 (June 2014)

6.1.2 *Onion Production and Harvesting*

Onions are grown over several seasons annually in the area, with 9% having one season in the year, 50% two seasons and 41% three seasons. Farmers reported that they harvested, on average 5,514 kg of onions and 4,085 kg of other crops during the year. 17% of the farmers harvested more than 10,000 kg.

However not all production was transported out of the farms. For example only 65 % of farmers reported that 75% or more of their onion crop was transported to market. The amount that was not transported was consumed at home, or was lost in storage due to transport problems, or loss of quality during harvesting, storage and packaging.

6.1.3 *Onion Transport*

The First Mile distance (distance to the first collection point) is usually within 4 km (Figure 1). It was however noted that the farmers do not have common collection points where they deliver their produce but each take theirs to the nearest point on the accessible road.

The mode of transport used is given in Figure 2. Here it can be seen that for the first stage of movement back loading is the predominant form of transport, followed by animal carts. However some farmers (15 out of 35) are able to organize commercial transport straight from their farm to market, avoiding the first collection point.

Over 80% of First Mile transport is hired in, including head and back loading, with only three farmers owning some kind of transport (an animal cart, wheelbarrow and motorcycle).

In normal circumstances 27 out 28 farmers reported their First Mile journey to be under 50 minutes, with one farmer reporting two hours. However in wet periods 6 farmers said their journey time increased to between 50 minutes and two hours.

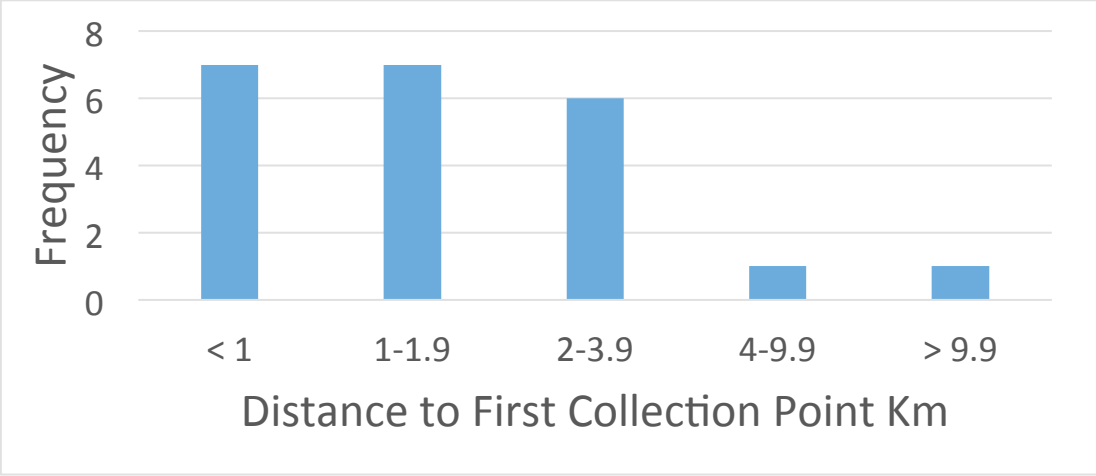

Figure 1.- Distribution of distances to first collection point

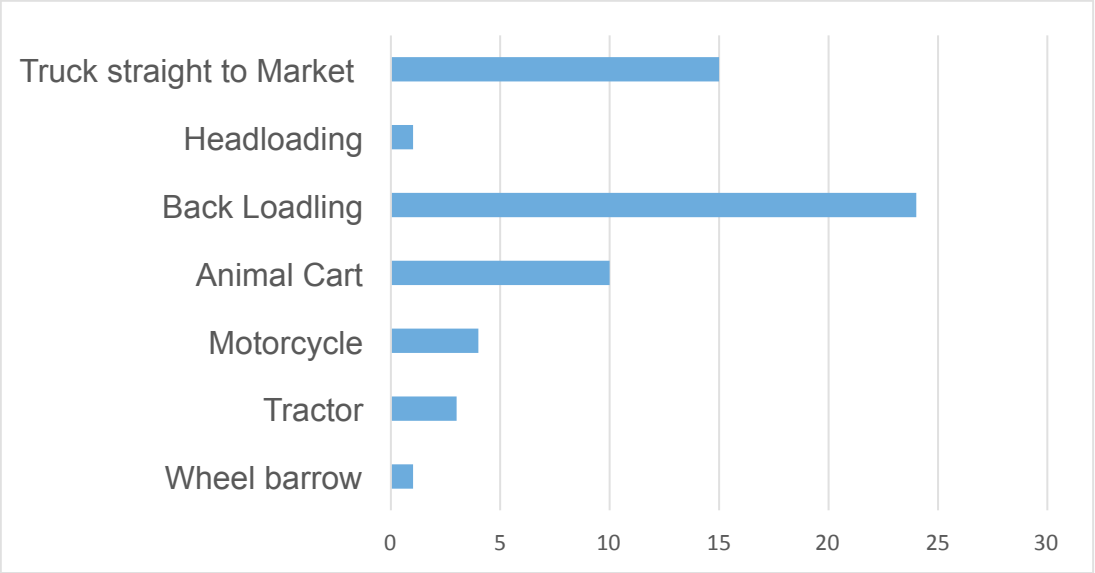

Figure 2.- Distribution of modes used to take onions to first collection point.

A transporter's survey was used to find out in more detail the loads carried, typical distances and the charges. This data is given in Figure 3. Here it can be seen that per tonne/km truck transport is much cheaper than the other modes. In fact head and back loading, the most frequent means of transport used on the first mile, is 16 times as expensive.

Mode	Mean Trip Distance km	Mean Load kg.	Mean charge Ksh /kg	Mean charge Ksh/ton-km
Motorcycle	10	150	5	500
Pick up	10	1800	0.9	90
Truck	30	8000	0.9	30
Animal cart	2	350	1.75	875
Head/back loading	2	40	1.0	500
Tractor (wet season)	2	4000	2.0	1000

Table 1. -Transport Loads and Costs by Mode in Kenya (Transporter's Survey)

6.2 Tomato Farming and Transport in Kilolo, Tanzania

6.2.1 *Tomato Farming*

Fifty two farmers were interviewed, representing 41% of the total population of tomato farmers along the Ihimbo-Itimbo road, 13 of whom were women and 39 men. The land ownership tenure practiced is predominantly customary (82%)[2], while 18% of the farmers are renting and are not originally from the study area. Farmers combine tomato farming with other crops such as maize, beans peas and vegetables. The average land holding size under cultivation is 2.5 acres, while tomatoes are cultivated on an average of 0.9 acres. The tomato growing cycle is once a year with the peak harvest months being August to December. Most farmers harvest once a week while some reported being able to occasionally harvest twice a week mainly targeting the local markets. Average production for the farmers interviewed is approximately 7 tonnes per season.

Average profit to the farmers from tomato production last year was approximately TZS 331,867 (approximately US$ 200 at the exchange rate of TZS 1662 to US$). Farmers sold tomatoes to traders from Iringa, Dar es Salaam and Dodoma. Traders come ahead of the transport and organise consolidation from different farmers before calling in transport that comes and collects along the main road. The farm gate prices of tomatoes are highly variable, with seasonality and availability of transport being the key factor. During peak harvest periods (July-November), prices can be as low as TZS 4,000 per 60 kg bag while in periods of scarcity (March-June), the prices can range between TZS 10,000-25,000 for 60 kg bag.

6.2.2 *Tomato Transport*

Of the 52 farmers that were interviewed, only 12 owned some kind of means of transport. These were exclusively men, 10 of whom owned a bicycle, while one owned a motorcycle and the other a pick-up. The latter was a farmer as well as a trader within the area. The majority of farmers surveyed (77%) had no means of transport of any kind.

The concentration of the tomato farmers increases with proximity to the Ihimbo-Itimbo road. The villages of Iwonde, Itimbo, Ihimbo and Isoliwaya had the highest numbers of tomato farmers in the last season, with each village having between 23 and 29 tomato farmers. These villages lie in close proximity of the Ihimbo-Itimbo road, with an average distance of 1.5 km to the nearest consolidation point.

The villages of Luwiva and Ibohola had lower numbers of farmers at 13 and 9 respectively. These villages, while generally accessible by motorised transport in the dry season, get cut off in the wet season, part of which is tomato harvesting time. During this rainy period, they have to find a way of transporting tomatoes to the more accessible Itimbo consolidation point which is an average of 5 km distance for the farmers that were interviewed. Discussions with the farmers showed that that proximity and ability to access collection points where trucks can reach is a key consideration in the decision to become a

[2] Where land is administered by community leaders and allocated to those who need to use it.

tomato farmer. Tomatoes are concentrated nearer the motorable road as this enables them avoid the risk of post-harvest losses and also reduces the cost of first mile transport.

The means of transport used in the first mile includes headloading, bicycle and motorcycles. Headloading is the dominant transport mode, with 88% of respondents using human porterage as their primary method of first mile transport (all the female farmers interviewed used this mode). Bicycles account for 8% of the transport mode in the first mile while transport by motorcycles account for 4%. Low use of motorcycles is largely due to their higher transport charges.

During the rainy period, there are severe disruptions in the motorability of the Ihimbo-Itimbo road where the first mile consolidation points are located. The rainy period is November to May. There are two months of harvest period (November and December) that coincide with the rainy period. There is a particularly challenging time for tomato farmers as transporters often fail to show up on the expected days at the consolidation points.

The farm gate prices of tomatoes are highly variable with seasonality and availability of transport being key factors. During peak harvest periods (August-December), prices can be as low as TZS 4,000/60 kg bag while in periods of scarcity (March-June), the prices can range between TZS 10,000-25,000. There is also a huge difference in the prices of tomatoes as they move up the transport chain from the farm gate to intermediate and major markets. The study collected simultaneous information on the price of tomatoes in different markets, and the results showed that prices at the major markets (like Dar es Salaam) can be 250% higher than the farm gate price (see Figure 3).

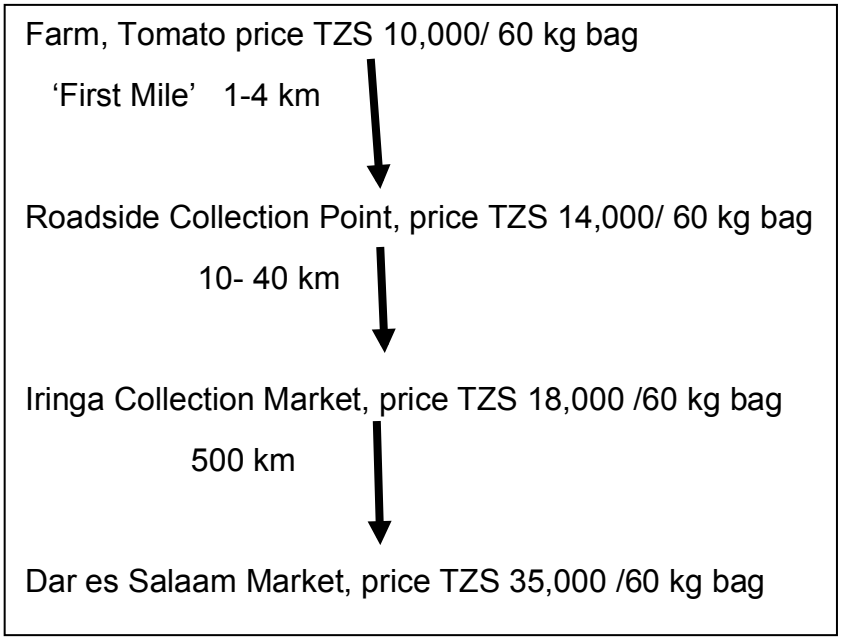

Figure 3.- The Tomato Transport Chain

6.2.3. *Transport Costs by Mode and by Different Links in the Transport Chain*

Data was collected in a separate transporters survey to find out journey lengths, loads and costs. The predominant mode of transport for the 'First Mile' was by head or back loading and the typical distance was 2 km ranging from 1 to 4 km. Average journey distances for motorcycles was 13 km as they travelled on the second leg of the journey, supplying nearby roadside markets and small market hubs. The average distance covered by the higher capacity pickups and trucks, at the time of the survey, was recorded at 30 km. Again this was predominantly on the second journey leg supplying Kilolo district and Iringa town. Transporters covering the long distance movement for example to Dar es Salaam was not recorded. There are roadside markets on the main road outside of Iringa that cater for the long distance transporters taking produce to Dar es Salaam and other cities.

For the First Mile journey motorcycles are relatively more expensive than head loading. The average transport costs per tonne-km to the consolidation points on normal days were TZS 10,000 and TZS 16,700 for head/back loading and motorcycles respectively. On disrupted and/or rain days the average transport cost per tonne-km is higher by 50% for head/back loading (TZS 15,300) and 20% for motorcycles (TZS 19,800).

For the second journey leg the average costs of transporting tomatoes to the market centres on normal days were TZS 5,100 and TZS 428 (tonne-km) for motorcycles and trucks respectively. This indicates that for a typical distance the cost using motorcycles is 12 times higher compared with trucks. During rainy days, trucks often do not make any trips to the study area. The average transport cost for tomatoes being transported by motorcycles during this period is TZS 5,500 per tonne-km (Figure 4).

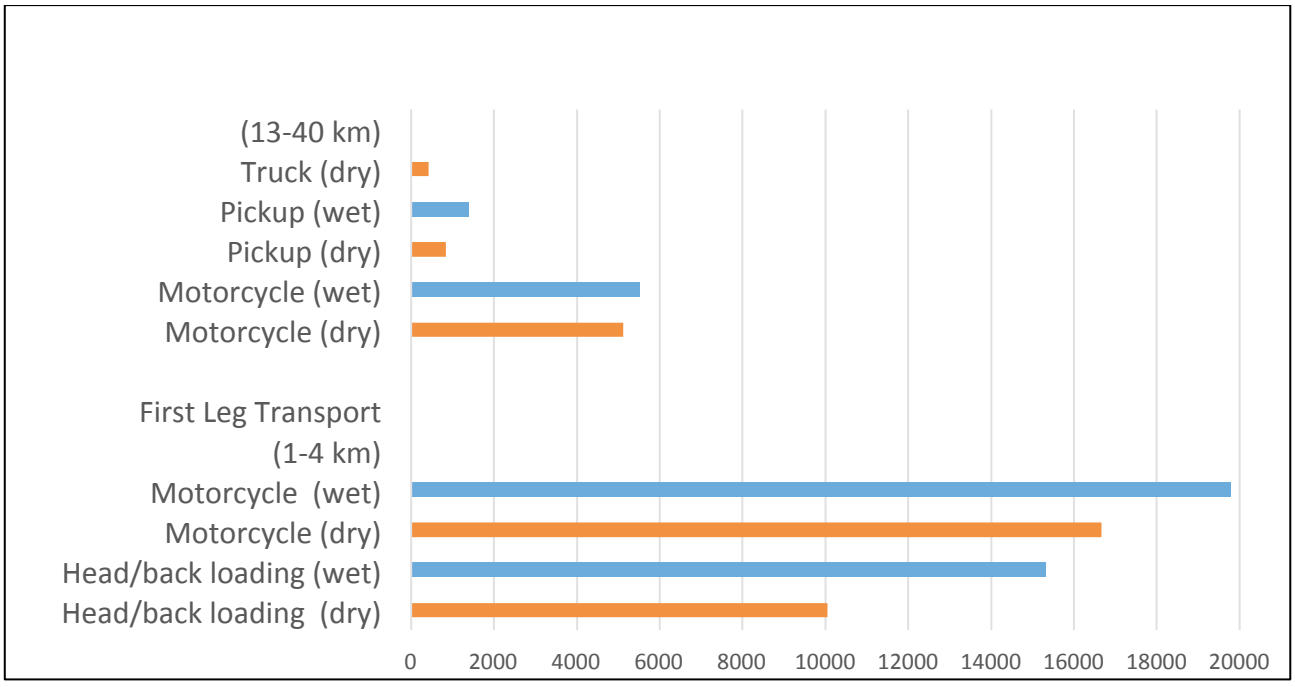

Figure 4. - Transport Costs TZS /ton/km, Wet and Dry Seasons (Transporter data)

7. CHALLENGES FACED BY FARMERS IN FIRST MILE TRANSPORT AND THEIR RESPONSE

A range of similar problems were faced by the two groups of farmers in First Mile transport. Firstly, it is very expensive. In Kenya it is estimated that onion farmers spend around 10 to 20% of their income also on initial movement costs if they use traditional forms of transport. In Tanzania it is estimated that as a proportion of the roadside price farmers spend 20-30% of first mile movement costs in dry season and 40-50% in the wet season if they use head loading or motorcycle transport. In Kenya it was estimated that in the dry season head and back loading was 16 times as expensive than by truck and in Tanzania 23 times as expensive. The absolute differences would be much greater in wet season, if truck transport was available. So huge economies would result if the produce could be loaded on a truck at the farm and transported direct to market. In fact some of the onion farmers in Kenya were able to arrange to have their produce taken directly from farm to market.

Secondly there were repeated reports of crop damage through both manhandling and through produce spoiling by getting wet and delays. The onion farmers in Kenya discovered that their produce deteriorated much more by being carried and loaded and unloaded than if it was placed directly onto a truck. They could only get 'grade two' prices. Both sets of farmers complained about a loss of value if the produce got wet either as it was transported or waiting for transport. The tomato farmers in Tanzania complained that diseases (for example by mould) would set in if they got wet.

There were repeated complaints by both sets of farmers over the unreliability of transporters. Transport may be booked or expected at a first collection point but very often did not arrive –particularly in the wet season. Again produce would deteriorate and incomes fall as a result. In Kenya there were examples of a complete loss of value of the crop.

To overcome their problems farmers in Kieni area of Kenya recognised that they needed to address two related problems transport:

a) Coordination of transport services and load consolidation
b) The state of the track/ road network

To overcome the first issue they formed themselves into groups (making use of the local farmer cooperative) and tried to book transport as consolidated loads so that they could gain advantage from economies of scale and lower transport costs. The cooperative approach also helped with buying and distributing fertiliser and was sometimes able to negotiate better market prices for produce.

On the second issue they survey team found that one group of farmers recognised that the current track leading to their farms had severe problems preventing the movement of trucks, particularly in the wet season. As a result the group had recently collectively purchased land to provide a short cut and better access between the road and their farms. A rough track was then prepared. Although this was an improvement it became apparent that the track was not very suitable for motor vehicles because of a short length with a very steep gradient. Even in the dry season vehicles needed additional help with people pushing and also by unloading vehicles to travel up the gradient. The group did not have technical advice in planning the route and, later engineers visiting the site agreed that by

slightly lengthening the route a more gentle gradient could be adopted that would solve this problem.

8. CONCLUSIONS

Because of a lack of direct road access farmers in Kenya and Tanzania face major issues in moving their produce on the First Mile leg of the journey to market. Head and back loading as well as motorcycle transport is used for this journey which can be over 20 times as expensive, per ton km than by truck. A very high proportion of farming income is lost, typically ranging from 10% to 40%, as a result. Beside the transport costs farmers also face high losses as crops are bruised, damaged and spoilt as the crops are manhandled and get wet in these initial journey stages. In the wet season transport becomes more difficult and often transporters do not turn up on schedule and further losses result.

To deal with this issue two-fold solutions are required to both improve tracks and roads so the trucks can pass and secondly to help farmers consolidate loads so that benefits of economies of scale in transport can be achieved and lower transport costs can be passed onto farmers. In Kenya it was found that small scale technical advice to help local groups improve track accessibility, through a 'spot improvement' approach would be extremely beneficial.

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