Crop Post Harvest Programme (CPHP)

Rural Transport Services Project for Kenya

Development in smallholder agricultural sector: Possibilities for development and policy interventions:

A preliminary consultancy report

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For

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Preamble

From the earliest times man has been interested in transportation. At first he depended on animals for locomotion. But there was a need for more efficient ways of getting around. Innovations of the 19th Century revolutionized transport in ways that were previously unimaginable. The technological progress that led to the development of the motorcar has by the end of the last century seen phenomenal changes in road transport. However, in vast segments of the developing world today, the transport situation is little different form what it has been for centuries. Animal powered locomotion is till a central feature of transport technology in many rural and peri-urban regions of sub-saharan Africa (SSA) as is true of other developing parts of the world. This reality presents a unique challenge to all concerned with social and economic progress in these regions. The challenge lies in deliberately crafting well-rounded policy regimes that are meant to stimulate the development of vibrant intermediate transport sectors to serve the whole gamut of economic and social undertakings in these communities.

Background to the current study

The rural transport services (RTS) project under the auspices of the KENDAT consortium (KC) was conceptualized to generate policy relevant information that can be used in consolidating development efforts in the promotion and development of well functioning intermediate transport systems in rural and peri-urban areas of Kenya. While, as has been posited in the preamble, the bulk of rural transport in Kenya is build on, not advanced motorized technology but on rudimentary but immensely functional and utilitarian technologies that largely make use of animal power and human poterage and, of course, the wheel. The aim of RTS project is therefore to seek ways of influencing public policy so that intermediate means of transport (IMTs) claim their rightful place at the national transport and rural development policy fora.

The aim of the Agricultural Transport Economics component (which is the subject of this report), was to help in the appraisal of the nature of agricultural transport situation in specific areas and to provide illumination on how the (Smallholder agricultural sector) can benefit more fully from a well functioning IMT system. In particular the agricultural transport economics was meant to assess the following:-

1) Assess the economic incentives that exist within the study areas that may support the growth of a vibrant IMT sector within the agricultural systems.
2) Provide indications on the *high leverage points* for policy and development interventions.

I. The Role of IMTs in a Semi Arid Agricultural Systems : **The case of Ngurumani in Magadi**

The agricultural production that goes on in this area is confined to a relatively small pocket of fertile alluvial soils on the edges of indigenous forests. Outside this small pocket of agricultural activity is the vast pastoralist system characterized by very rudimentary and almost non-existent transport infrastructure to talk about.

The Ngurumani area offers a classic example of an isolated community whose immediate and basic need is for better access to the outside world (specifically Magadi and finally Nairobi). However, there is a glaring need for putting in place a local IMT system.
Given the limited role of agriculture in this community, it is inappropriate to assess the transport and infrastructure problem from an agricultural sector perspective alone. What is plainly apparent in this area is that there is an urgent need for development interventions that can help catalyze the evolution of a local IMT system.

The possibilities of such a system may be in the following areas:-

1) The promotion of acceptable donkey cart models. This will be an improvement over the pack donkey and human poterage. The constraint in this suggestion would be the huge investment required for donkey carts. At Kshs.7, 000 – 15,000; donkey carts may be way beyond the means of many families. However, since donkeys are part of the livestock portfolio in this area and therefore relatively easy to acquire, it may be feasible to operate communal donkey carts. Such arrangements may involve several families in a neighbourhood. This has the potential to ease the transport burden faced especially by women in water and firewood translocation. While speed and time savings may be realized from the increased use of donkey carts, the advantage of larger payloads and hence lower tonne – kilometer costs are definitely clear advantages to justify the engagement of the community here to pilot a communal donkey cart operation system.

   The other alternative and which would be pursued in tandem with the communal system is the encouragement of a local class of entrepreneurial operators of donkey carts (as is the case in Lari and Mwea). These could provide their services at reasonable fees to those who wish to hire carting services.

2) The above recommendation focuses on *goods* transport. However one wonders what type of IMT innovation, which can be introduced here to facilitate passenger (human transport). KC should aggressively explore this avenue by emulating examples from other parts of the world where human transportation on animal drawn carts is part of the transport system. Piloting this in this area would be a novelty that can be nurtured to become part of the community.

The role of bicycles is still limited by very poor road network. Local residents complain of inability to use bicycles owing to lack of roads. While this may be one area beyond the scope of KC, the consortium can play a significant role in lobbying at higher policy levels for urgent attention from government and the wider development community to be paid on developing a functional rural road network in this environment.

The recommendations I have given above are based on the *general principle of giving prominence to local level Intra-Rural Transport.* As I have noted in the previous paragraphs the rural transport and infrastructure situation in Ngurumani is a more fundamental issue than a problem of agricultural transportation. It spans the entire sphere of the economic and social existence of the community. A Key area that seems to have received scant attention in rural transport policy is the critical area of *local level, intra-rural and village level* transport. A lot of effort seem to be concentrated on developing

major road arteries envisaged to open up the rural communities to neighboring urban areas. Further these road facilities have been designed for motorized vehicles But evidence I have gathered from our field activities and extant research findings shows that up to 75% of the time and effort spent on transport are devoted to movements around the household and fields. Trips outside the village typically represent less than 25% of the annual transport effort. Table 1 below shows the proportion of transport time taken up by various activities carried out by the household. The figures are based on annual time expenditure on local household transport of 2500 hours per annum. For rural inhabitants the local level is the means to simplify the attainment of basic needs such as food, clothing, shelter, education and health.

Table 1 Proportion of transport effort devoted to various activities

Activity	Per cent of time
Water collection	26
Firewood collection	15
Crop harvesting	28
Grinding mill	6
Trips to market	9
Crop production	6
Others	10

Overall, it is apparent that the obvious lack of an IMT system in this area (Ngurumani) is largely attributable to weak economic incentives occasioned by isolation. It must be clearly noted that even the development of an IMT system that caters solely for human translocation can only take off if people can afford to invest in IMT hardware or otherwise have the wherewithal to hire such services.

The above table shows that if the proportion of transport time that is devoted to such activities, as firewood and water collection were reduced, more time would be available for directly productive activities. The above may illustrate that the amount of time spent in traveling in order to accomplish the various activities (not carrying out the actual activities) constitutes a high opportunity cost in terms of person days diverted from actual productive activities just to travel. For instance in the above example suppose the time spent traveling to collect firewood and water were reduced to say 15% this would save up to 650 hours (27 working days). If intra rural travel time is reduced, the saved time can be used for other productive purposes such as concentrating on education, intensification of agricultural production or production of other home goods and services to improve household welfare. The existence of roads of reasonable quality will stimulate the development of motorized transport services. Even the effectiveness of non-motorized transport such as bicycles and animal drawn carriages depends on the existence of adequate all weather road networks in the rural areas.

Modernizing the agricultural and pastoralist subsistence sector in the rural areas towards high value production will require among other critical elements, adequate infrastructure.. The flow of consumer and capital goods into the rural economy coupled with improved local productive capacity will have a definite positive impact on poverty and economic

growth. Improvements in intra rural labour mobility can be seen as an important benefit of improved transportation. This will enable people to move from less productive areas to exploit farm and off farm employment opportunities in neighboring regions.

It is difficult to see how the economic fortunes of Ngurumani and similar areas in Magadi or elsewhere in Kenya can be changed for the better without linking these communities to the outside world by opening them up through road infrastructure development. This is the central concern in this area. There is anecdotal evidence already, which suggest that horticulture production in Ngurumani can be expanded to hitherto unexploited areas if there were access roads to those places. This would ensure the off take of such extra production, which extra production is currently infeasible.

II. The Role of IMTs in a Vegetable Based Agricultural Production System – The Case of Lari

The IMT situation in Lari is one which has naturally evolved pulling itself by its own bootstraps in response to the nature of the agricultural production system in this area. Lari is largely dominated by the production of cabbages and kales that are sold in local and far flung markets such as Mombasa, Nakuru, Eldoret, Kitale and Kisumu. Vegetable growing takes place throughout the year. The marketing system seem to be well functioning especially for cabbages which is characterized by contract marketing and huggling. Nevertheless, the apparent intensification of cabbage and kale production does not seem to have translated into any spectacular economic well being for the majority of households with a mean income from all sources of Kshs 4000 per month per household. With an average household size of four persons this translates to a pa capita income of Kshs 1000 per month. This is below the national rural poverty line of Kshs 1269. It is clear that there is more that can be done to improve returns from the major economic activities in this area.

This raises the relevant question, what is the role of the IMT system in all this. *It is not possible to claim that the key to unlocking greater productivity in the vegetable production system in this area solely lies in changing the IMT system.* The IMT system that has evolved thus far, being a product of the underlying economic structure seem to be serving the production system here fairly well. In view of the relative advantage of donkey cart in comparison to other modes (Table 2 below), it is clear that *this evolution has been congruent with economic rationality.*

It is true that motor vehicle transport is superior to animal-based transport in terms of speed and carrying capacity. Nevertheless animal-based transport has other advantages. One it is affordable, secondly it can be operated on lower quality tracks and paths that may be impassable to motor vehicles. It thus offers a readily acceptable intermediate between the slow and drudgerous human potterage (with potential health hazards such as spinal injury) and the expensive and infeasible motorized transport. Table 2 below illustrates the relative advantages of animal based transport by comparing the typical loads and speeds of some transport systems

Table 2 Comparisons of Loads and Speed of Some Transport Systems

Means of transport	Load capacity (kg)	Typical Speed (Km/hr)	Load carrying capacity (tonne-km/hr)
Human (headloading)	25	4	0.1
Donkey (packload)	50	5	0.25
Ox-cart	1000	4	4
Two wheel tractor	1000	10	10
Tractor/trailor	3000	20	60
Truck	10000	50	500
Bicycle	100	10	1

As I have said in the case of Ngurumani in Magadi, it is not possible to expect that every household will be able to afford animals or certain animal traction equipment such as carts, it is important for KC to initiate programmes to encourage the of business opportunities in the provision of *animal transport hire services*. Can this be a viable business enterprise in its own right? There is evidence this is the case research done by our department shows that rental services offered by those who own and operate ox-carts provided valuable opportunities to improve profitability of smallholder farming in Western Kenya accounting for 30% of the total cash income. If this is so, then institutional and policy support to encourage this development will certainly be worthwhile and KC may wish to take this up.

Table 3 Summary of Rural Goods Transport Costs and Charges

Mode	Cost (Kshs/tonne km)	Charge (Kshs/tonne km)
Lorry	20	194
Bus	47	5235
Matatu	41	2941
Tractor and Trailer	394	470
Ox cart (2oxen)	52	529
Donkey cart (2 donkeys)	52	2941
Donkey (packing)	364	1964
Bicycle	100	1000
Headloading	1117	2941

The real challenge may lie in ensuring the following:-

1) Transport of vegetables from farm to collection centers is smoothened out even during difficult wet season.

2) Enabling local farmers to access far flung markets in Western Kenya and beyond. The greatest transport impediment here lies in the lack of locally owned long-haul trucks to help in mopping up production gluts to markets further afield.

My considered view is that K C should concentrate its efforts in the following areas as far as RTS is concerned in Lari.

1) Improving the existing donkey cart system. Based on the engineering component report, it is possible to isolate material improvements that need to be made in cart construction, and design and in the harnessing components. Where engineering deficiencies exist, then KENDAT consortium should undertake public education programmes similar to the donkey welfare initiative they are successfully running together with BHA. These education programmes will be undertaken to help foster adoption of improved cart and harnessing models.

2) KC should seek to bring *the co-operative movement on Board.* Rekindling the co-operative spirit in the development of rural infrastructure may be another strategy to pursue. For example, in bulk transport, the community can pool resources to acquire haulage trucks that require heavy investment and which may be uneconomical in the absence of economies of scale. By pooling their products, local small-scale producers can attain sufficient economies of scale as to justify such investment. This sort of arrangement can be supplementary to other intermediate modes of transport such as animal drawn carts, bicycles and motor cycles to move agricultural produce from farms to collection centers where long distance haulage to far flung markets can then take place. Lobbying for the formation of strong co-operative movement in this area to enable local farmers to operate long haul trucks to exploit markets in other parts of Kenya and to avoid local market gluts can be an important advocacy undertaking for KC.

3) Post harvest Handling

i) The third area concerns post harvest handling operations. The low returns realized from the sale of cabbages and kales is partly due to the absence of value addition at the farm level. Once cabbages and kales are harvested, there is no clear grading system and no concomitant packing to facilitate such grading. This leads to a situation of adverse selection which depresses the overall price structure for cabbages and kales. This means that local production is mainly of undefined quality and generally paid low prices. Farmers therefore have no incentives to produce at certain quality/grade levels since there is no premium for such. KENDAT consortium should therefore leverage support from the DFID's CPHP to undertake feasibility studies in the area on the desirability of a grading system as a means of adding some value at the farm level.

ii) The foregoing may be one of the most radical undertakings KENDAT consortium (KC) may attempt. However, putting in place a meaningful grading system must be supported by matching changes in packing and transportation. What I envisage is a situation where; fore sukumawiki; the packing system is changed from gunny bags to wooden/plastic boxes. Cabbages can still be packed in bags even if

graded differently. This will certainly call for changes in the design of carts to accommodate such changes. Especially will such a grading system be feasible for the nearby Nairobi market. This may afford farmers opportunity to make inroads directly into middle to high income markets in major urban areas such as supermarket chains and green grocery outlets in middle – high income segments of the market. This will definitely reduce wastage, which occurs when buyers themselves do grading a fact, which is responsible for the poor farm-gate prices farmers receive. This is an aspect of adding value at the farm level.

III. Role of IMTs in Rice based Agricultural Production System: **The case of Mwea**

Mwea is dominated by commercial irrigated rice farming. Again the role of IMT and the constraints wrought by these is only a small component of the sector. Whatever difficulties exist in rice or tomato growing are more to do with wider problems of marketing and not necessarily IMT specific. It is also evident that the existence of an active IMT system dominated by donkey carts and bicycle taxis has been precipitated partly by the failure of the farm and other non-farm sectors to provide adequate remunerative employment for many unemployed youth.

The main economic activity here, rice is currently estimated to generate gross output of about Kshs 600 million with 400 million being the cost of production and 200 million being value addition. With 3250 farmers, this value addition would generate a pa capita income for the farming household of Kshs 61500 per growing season. This is an *unrealistic* estimation in the sense that this value addition is contributed to by farmers, millers and transporters among others. The proportion of this value addition earned by farmers will depend on their contribution to the value adding process. The real challenge is the *equitable distribution* of this amount among all players namely farmers, transport operators, millers and rice merchants and small traders . Coupled with the foregoing, the typical Gross margins for French beans of between Kshs 49000 to 130000 per hactare illustrates that the economic base in this community is solid enough to sustain the development of profitable IMT systems.

Areas of intervention by KENDAT consortium may be:

1) Seeking to upgrade the bicycle technology to motorcycle. The operation of Boda boda bicycles (BB) is increasingly becoming a public health concern. The introduction of motorcycles will be a definite improvement of the system in terms of speed and higher returns. The direct linkage of this interaction with the agricultural system is still unclear but the payoff in terms of speedier intra village travel will be highly significant. Seek ways of stimulating forward and backward linkages and spillovers with boda boda. Since operation of BB seems to be a distress economic option it is important to integrate the system in the wider economic sphere so as to widen the opportunities of those who choose to engage in it. It is also becoming apparent from the various attestations we have received from stakeholders in the BB operation that the business may be undergoing saturation and low profitability. This must relate to its low payloads compared to donkey carts. This reduced payload means that those who operate bicycles for haulage encounter diseconomies of scale a fact that makes use of bicycles unprofitable due to high unit costs compared to donkey carts (Table 3). The up

take of any transport technologies will depend on their rate of return within the economic circumstances of the households expected to use them. Any IMTs must be carefully evaluated with the intended users to carefully determine their benefit cost ratios. This is the context within which the proposed introduction of mopeds must be evaluated by KC to justify their integration into the Mwea transport system. Only then can widespread adoption be expected or justifiably supported by development programmes. Ex ante piloting will be needed to confirm these profitability concerns. Still once the profitability questions are answered, acquisition of mopeds and related equipment may still be out of reach for the majority of farmers due to cash limitations occasioned by low incomes. However, once the problem of intrinsic poor profitability is solved, credit and other financial services can foster the adoption of these new IMTs

2) Crop Post Harvest Handling

This appears again to be another area for radical intervention. The recommendations here can be the following:-

i) The rice-packaging sector seems vibrant with the exit of NIB from rice marketing. There is therefore a proliferation of packaged brands. The effect is the existence of many small brands having only tiny market niches. It may be desirable to have a centralized system through one or two marketing co-operatives that can undertake the branding of only one or two major brands. These would then be marketed countrywide and would carve for themselves distinctive market recognition domestically, regionally and even internationally. The resultant effect would be expanded market share for mwea rice, improved prices for farmers and therefore better incentives. This is akin to the branding concept successfully implemented by Mumias Sugar and now being emulated by other sugar companies.

ii) Seek ways of developing investment in storage facilities for horticultural produce so that farmers are able to handle excess produce without losses and have affordable storage facilities they can use as they engage in price discovery. This will enable producers avoid distress sales at below cost prices and hence losses. This is one area that has reportedly attracted interest in the past but it appears that high operational costs prevent most producers from using these facilities.

Summary and Conclusions

The overall scenario that emerges this far is that the agricultural transport phenomena in the study areas must be looked at within the context of other nonagricultural productive and social activities. The challenges facing the smallholder agricultural systems can be tackled partly from the vantage point of IMT systems, but in tandem with the wider infrastructural and overall transport development scenario. The major strands of the recommendations of this report are as follows:

- The report has emphasized the need to concentrate on village road infrastructure in Ngurumani together with piloting communal donkey carts for haulage and passenger transport.
- Building on the naturally evolving donkey cart system in Lari was highlighted to improve this IMT technology where engineering deficiencies are discerned. On post harvest handling, innovative grading systems with concomitant changes in cart design and packaging systems have been proposed for Lari.
- In Mwea, the BB system seems ripe for the introduction of mopeds (motorcycles). Encouraging more centralized branding and post harvest handling of rice is likely to lead to greater market share, economies of scale and grater share of value added by farmers where such branding is done by democratically owned cooperative enterprises.

This report has highlighted the role played by adequate infrastructure in opening up opportunities for economic growths are hardly debatable. The widespread benefits will be felt beyond the rural sector. Taking an integrated perspective in the development of rural infrastructure is important in order to ensure that projects that are initiated are congruent with local economic incentives or where such incentives seem to lack, then rural transport projects must be implemented in tandem with efforts at creating new productive activities (as in the case of Ngurumani) that will justify such projects. The promotion of intermediate modes of transport, prominent being animal-based transport, and developing linkages between these and motorized transport offers a realistic strategy in rural transport development. Stimulating the development of rural finance must be critically integrated in rural transport development programmes.