

INTERMEDIATE MEANS OF TRANSPORT: A REVIEW PAPER WITH SPECIAL REFERENCE TO GHANA

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APPENDIX: Information on transport in the 5 study villages based on data collected 1998-9 in Project R7149.

EXECUTIVE SUMMARY

1. The paper reviews the history and current usage of Intermediate Means of Transport (IMTs) with particular reference to Ghana. It was prepared as background for a small action research project in 5 off-road villages in southern Ghana (planned to commence in February 2001), but the findings have wider application in Ghana and sub-Saharan Africa.
2. Sections 1-3 provide important background material. Section 1 summarises why IMTs have substantial potential in Ghana, but also why many IMT interventions in Ghana and elsewhere have failed. It considers the specific potential for IMTs to benefit currently disadvantaged groups, notably women. Section 2 gives a brief history of recent IMT introductions in Ghana, emphasising regional variations, notably the very low adoption rate in southern Ghana. Section 3 focuses down specifically on work conducted into current transport conditions in Central Region.
3. Section 4 presents detailed information of a range of IMT types with particular reference to their current usage in Ghana and elsewhere in sub-Saharan Africa: this includes discussion of issues such as availability, maintenance, and cultural biases. It reviews the specific disadvantages and advantages of each IMT type, and considers potential applicability in the study villages in Central Region.
4. Section 5 focuses on the economic, cultural, political, technical and environmental factors which commonly influence IMT adoption in low income countries, with particular reference to sub-Saharan Africa. It reviews cultural issues around gender and status; economic considerations around cost, credit availability and income generation; means of reducing costs such as group purchase, hiring centres and subsidies; the potential impact of IMTs on poverty alleviation; a wide range of institutional and policy issues (government and union attitudes, taxation, the role of NGOs etc.); IMT supply and factors affecting local production; maintenance problems and safety issues; associated (road/path) infrastructure and the impact of topography and climate. The section concludes by drawing attention to the 'critical mass' argument and its ramifications. Within each topic, specific consideration is given to conditions in Ghana.
5. Section 6 identifies priorities and strategies for action both nationally, within Ghana, and then more locally within the context of the project. It argues for an emphasis on the familiar, as opposed to the exotic; for support of so-called 'spontaneous' adoption where this occurs; for the need to take into account the diversity of potential IMT users and fit IMT types to the requirements of those users; and on learning about the specific requirements of disadvantaged groups. A number of recommendations are made concerning promotion of women's use of IMTs, including access to credit and operation and maintenance training. Stress is also placed on the need for a more co-ordinated approach to transport and IMT promotion among government ministries, local government and NGOs in Ghana - and the potential for the newly formed Ghana National Forum Group for Rural Transport and Development to support this.

1 INTRODUCTION

1.1 Aims of the paper

The paper aims to draw conclusions about the likely potential of various IMTs in coastal Ghana. Although the paper was prepared with specific reference to a set of study villages in two rural districts of Central Region, in southern Ghana, as background for a small action research project, planned to commence in February 2001, it will have wider application in Ghana and sub-Saharan Africa. The initial research for this paper was conducted prior to the inception of our action research programme, but further material has come to light over time, and consequently the first draft of the paper, completed in January 2001, has been revised while the project has been ongoing. It thus incorporates relevant material from additional studies, such as the reports by Maramba and Bamberger (April 2001) and Paul Starkey (May 2001).

IMTs can be described as "local transport solutions that increase transport capacity and reduce drudgery at a relatively low capital cost" (Starkey 2001:vii). They are intermediate in the sense of filling the gap between human walking, headloading and large-scale transport, not merely equipment at an intermediate stage in technological evolution (ibid). IMTs have been far more widely adopted in some Asian countries than they are in most of rural sub-Saharan Africa, where up-take, to date, has generally been low. This is the so-called 'Missing Middle' of the rural transport system (SSATP 1997) and may be related to such factors as lower population densities, longer distances to markets, low agricultural incomes and limited access to non-agricultural income sources, as well to institutional and cultural factors (Ellis 1997)

The conclusions reached in this paper are based on preliminary field material on IMTs gathered in the early months of the current project (R7575) and a previous project on rural access (R7149) in Ghana's Central Region, on a review of published and grey literature on transport and IMTs in Ghana, and, where relevant, reference to the broader literature on IMTs in West Africa and other low income regions. The discussion encompasses a review of individual types of IMT, and considers the broader technical, economic, cultural and policy considerations affecting their introduction and use, with particular reference to rural areas of southern Ghana. *Results from our current action research programme have not been incorporated because monitoring is still in progress.*

1.2 Reasons for promoting IMTs

The reasons for IMT promotion have been discussed widely and are not reiterated here in any detail. The potential for IMTs to help address the imperative of increased agricultural productivity and improved food security in sub-Saharan Africa has been recognised by a growing number of donor agencies and NGOs since the late 1980s (though this has not resulted in concerted programmes of research and development until very recently). In the Ghana context potential benefits include an estimated increase in food production of 20% through introduction of efficient IMTs (Howe and Barwell 1987:5; also see Rourke and Dapaah cited in Howe and Barwell: 119). IMTs can make an enormous contribution to meeting agricultural transport needs in the contexts where demands are often heaviest - i.e. production and harvesting. In an early study McCall (1985) calculated that loss in time for cultivation over the working day, due to time spent walking to distant fields, could amount to 20% where fields are located 4 km from the homestead, and 50% for fields at a distance of 10kms.

Given the limited availability of conventional motorised transport (and other factors which help to constrain motorised mobility), enormous amounts of time and effort are also expended in sub-Saharan Africa walking and transporting goods by headloading. This impacts particularly on women and their children, though it is important to recognise that men may also contribute labour as porters, both paid and unpaid (as they do in coastal Ghana). Nonetheless, the role of African women in portage is remarkable: they may spend over 4 hours per day solely on transport and move approximately 50 kg per day (Philpott 1994). Leyland (1996) suggests from review of a series of African surveys that women typically account for about 65% of all household time spent in transport activities and 66-84% of all effort; they undertake 71-96% of all domestic travel. Many women will also be carrying a baby on their back in addition to these loads.

Children themselves also play a vital but largely unrecognised role in head portage. One of the few studies to recognise their significance both directly as transporters and indirectly through contributing household labour (so that women in the household can spend time transporting goods) is the study of urban Accra by Turner and Kwakye (1996) which notes that girl children's education, in particular, suffers substantially as a consequence in this urban context. In rural areas children may also play similarly significant transport roles, as we have discovered in our current research project (R7575).

Time savings achieved by improved transport would not necessarily lead to reallocation of all saved time to productive activities but could, nonetheless, make a substantial contribution to welfare-enhancing activities. Urasa (1990: 64, citing Doran 1989) notes that in a Ghanaian study, of an anticipated twelve hours per week saved, 12% of that time (6.8 hours) would be spent on directly productive work, 35% (4.2 hours) on housework and 8% (0.9 hours) on leisure. Urasa (1990: 65), citing studies in Lesotho and Tanzania, notes that the reallocation of time saved by women to household activities may occur because they have traditionally sacrificed time on such activities in order to give priority to agricultural production. One of our project aims in R7575 is to examine actual impact of IMTs in this respect in the five study villages.

Health improvements achieved through reallocation of head loads to IMTs have not been recorded, but a number of studies refer to the damaging impact of headloading particularly on women's health (e.g. Carr 1983, cited in McCall 1985). A recent study in Rushinga District, Zimbabwe, for instance, notes a relatively higher incidence of backaches, head and chest pains among women than men, attributed in large part to headloading (Mudzamba and ILO 1998:12). Miscarriage may be another potential impact. An ILO study in Ethiopia found women fuelwood porters with an average 16% incidence of miscarriage (Doran 1996:61). In the R7575 study villages women use various medicines to ease backaches and pains, ranging from paracetamol to enemas which include a variety of local herbs (Porter 1999). In Accra porters are reported to use valium to relieve the strain of carrying (Turner and Fouracre 1995). The impact of headloading by women on their children's health can also be significant, affecting both growth of the foetus and reducing quality and quantity of breast milk of nursing mothers (Leyland 1996, Ellis 1997:9-10, both citing Curtis 1986). Long-term impacts can include deformation of the spine and osteo-arthritis of the soft tissue of the knee (Ellis 1997:10). Indirect health improvements may also result from introduction of IMTs if these improve access to and increase consumption of safe water supplies.

Beyond agriculture, IMTs can contribute significantly to rural livelihood diversification, not least by improving the potential for labour mobility from agricultural settlements with poor access. There is a growing literature which emphasises the crucial significance of off-farm employment and income diversification for household security in Africa (Bryceson and Jamal 1997; Barrett et al. 2001; Gladwin et al. 2001).

Other advantages of IMT availability may relate to their facilitating personal travel. Many men buy cycles precisely for this reason, but women and children can also benefit, for instance through improved access to school, clinics, banks and other facilities which promote their exposure to outside ideas and information and through this may lead to improved confidence and empowerment within their own communities (Leyland 1996, Rao in press).

Advantages of specific IMTs vary but may include their relatively low purchase cost, compared to conventional motor vehicles, potential for small-scale/decentralised manufacture, generally lower maintenance requirements (compared to motor vehicles), suitability for small to medium size loads and ability to operate on poor/narrow tracks.

1.3 The role of non-transport interventions

It is important to note that *non-transport solutions* can sometimes offer an alternative and more effective solution to access problems in cases such as water supply (e.g. Urasa 1990, 51-52). Malmberg-Calvo (1994) suggests that well-designed rural water projects with a reliable, year-round supply of potable water close to homes can reduce time and effort spent per household per day on water collection by up to 2 hours. She also emphasises the potential of woodlot schemes, improved wood-burning stoves and grinding mills for reducing the transport burden, but only if these projects are appropriately designed for local circumstances and in consultation with women. Sieber (1998), in a study of households which had benefitted from transport improvements in Makete district, Tanzania, found that the biggest effects on time budgets of households were achieved by installing water supply systems (followed by use of bicycles and donkeys). Recently attention has also been drawn to the potential for new information technologies (ICTs) such as mobile phones to reduce travel needs (Turner et al. 1998). A range of non-transport interventions which could improve access were thus considered in R7149 (see Porter, 1999, R7149 Final Technical Report).

1.4 Failed IMT projects

It is also important to recognise that a large proportion of IMT interventions in Africa have failed, for a wide range of reasons, including the following: irrational enthusiasm by promoters (hobbyism), high capital cost, low load capacity, poor market research, weak construction, emphasis on local manufacture when cheaper and better imports are available, poor state of paths, poor local maintenance facilities, lack of suitable finance/credit schemes, insufficient earning potential to cover fuel/repairs, unsuitable environment/culture re animal introductions, culturally inappropriate/low status solutions, lack of consumer appeal (Hine pers. comm.). As Edmonds (1998) notes, 'even where there has been an interest in purchasing IMTs, ownership has not necessarily resulted in their extensive use.' Leinbach (1982) in an early paper on this subject warns that appropriate technology 'may be a valuable, gap filling measure to ease the current transport problem in the short-term, but it will not necessarily engender development in the more active sense..... such a response must derive from individual reactions to the prospects for change'.

1.5 Researching IMT potential in Ghana

Despite these potential difficulties, there is substantial interest in IMT potential in Ghana, hence the Government of Ghana's current (World Bank funded) Village Infrastructure Project which, among its objectives, aims to support IMT uptake across the country (see Section II below). In reviewing IMT potential in coastal Ghana, it is important to consider not merely potential opportunities but also potential pitfalls. The overall conclusion of many recent transport/mobility studies is that much more careful research into local preferences and conditions are required prior to large-scale IMT introductions and that information on attitude needs to be regularly cross-checked with objective information from actual sales and use patterns, and any discrepancies investigated at an early stage (Starkey 2001).

1.6 IMT potential for women

Particular consideration in this paper is given to the potential for IMT uptake among women in the study region. The enormous transport burden faced by women in sub-Saharan Africa is now well established (Doran 1990 made a significant contribution in this respect). Howe and Barwell (1987:2) suggest that in Ghana the average adult female devotes almost three times as much of the working day to transport as the average male: at least 19 hours per week. Riverson and Carapetis (1991) refer to village studies in Ashanti, Northern and Volta regions where average rural households spend 4830 hours per year on travel and transport of 216 tons per km. Often about two-thirds of this load consists of water and fuelwood and the rest of agricultural inputs and produce. The majority takes place in rural areas, over short distances. Women in Africa are typically responsible for over 70% of the time spent on transport and over 80% of the effort (Urasa 1990:2): they are commonly regarded by their menfolk as 'natural transporters' (Fernando 1997). IMTs are now widely seen as at least a potential part-solution to their portage problems. However, despite growing attention to gender issues in development programmes and projects, IMT schemes appear to have rarely benefitted women (Urasa 1990:57, Bryceson and Howe 1993).

Of growing importance, however, beyond women's portage burden, may be their potential to access multiple livelihood strategies through IMTs. A number of important recent papers point to the growing emphasis in African households on improving food security through such strategies. Barrett et al. (2001:316) suggest as much as 40-45% of average household income may already come from non-farm sources, 'despite the persistent image of Africa as a continent of "subsistence farmers"'. Improvements in women's mobility could probably substantially improve their potential to benefit from such income diversification strategies (including trading).

1.7 IMTs and children

As discussed in section 1.2, children often play a vital though largely unrecognised role in head portage in sub-Saharan Africa, both in urban and rural contexts. Along with other required labour contributions, this may negatively impact on children's subsequent livelihood opportunities, due to associated poor school attendance and health problems which may only emerge later in life.

There is little reference to children in mobility, transport and IMT studies (Porter and Blaufuss 2002): the impact of transport interventions including IMT introductions on children is a research gap which needs urgent attention. However, one can hypothesise that a number of potential benefits - notably improved school attendance - could well arise for children from access to IMTs (particularly IMTs which promote personal mobility), since children currently usually lack funds for transport and often trek long distances to school,

especially in rural areas. Results of an ongoing intervention by the NGO Afribike in South Africa are thus likely to be of particular interest when they become available. This project seems to be a rare example of an IMT intervention - low-cost renovated second-hand bicycles, spares and repairs - mostly targeted at children (Song and Seedat 2001).

One rare reference to the impact of IMTs on children in a Ghanaian context comes from the study by Kwakye and Sharan (1994) who observe that women in a pilot cycle trailer project in northern Ghana in the late 80s often passed the trailers (often detached and used as handcarts) to their children to perform errands such as firewood collection and to transport goods in market centres from the market to lorry parks. Throughout Ghana they observe children running errands more willingly when IMTs are available, 'since no headloading was involved.' This is a feature of IMT substitution which forms part of our investigation in R7575.

1.8 IMTs and the elderly

IMTs may have an important role to play in improving access to services for the elderly, but there is even less information on the needs and current access of the elderly to transport services than is the case with children. Starkey et al (2001: 46) make the point that with increasing life expectancy transport solutions to serve this sector will be of increasing importance.

1.9 IMTs and the disabled

The needs of the disabled are only beginning to be addressed in academic research in a development context. However, there have been a number of practical programmes by NGOs specifically aimed at improving the mobility of disabled people in sub-Saharan Africa. Hand-operated tricycles for the urban disabled are in evidence in many African cities like Accra and Lagos.

1.10 The role of conventional transport solutions

Finally, it is important to emphasise that, in some circumstances, depending on loads, distance, nature of the route, density of demand etc., conventional motorised transport services are more appropriate than IMTs. Much work remains to be done on improving conventional transport services in rural areas of low income countries (Porter 2002).

2. A BRIEF OVERVIEW OF IMT INTRODUCTIONS AND USE IN GHANA

2.1 Current IMT use in Ghana

IMTs in rural Ghana consist principally of bicycles and draught animals/animal-drawn carts: both are mostly found in northern Ghana. Turner et al. (1996), for example, note that "in coastal Ghana, cycling is rare as an adult activity". In urban areas across the country, however, there has been a rapid and spontaneous expansion of pushcarts since the 1960s (Howe and Barwell 1987, and see section 4.1 below). Wheelbarrows are used particularly in urban areas for construction purposes.

A rough idea of *current broad regional patterns of IMT ownership and use* in Ghana is provided in the report of a survey of 1000 villagers across the country by Tengey et al (1999). 51.4% of 400 respondents in the savanna zone owned an IMT (mostly bicycles but also a small number of donkey and carts, motorbikes and bicycle cum trailers) compared to 9.8% (all bicycles) in the forest and coastal savanna combined (600 respondents). These figures show a fairly similar pattern to that reported by Anchirinah et al. (2000) for bicycle use in Ghana: essentially much higher levels of ownership in the north compared to the forest and coastal savanna zones. In a survey of 510 Ghanaian farmers in 1997, Anchirinah et al. find 66% of the 75 Guinea savanna farmers interviewed are bicycle owners, compared to 44% of the 150 transition zone farmers, 29% of the 60 coastal savanna farmers and 17% of the 225 forest zone farmers. A study in 1987 estimated the total stock of bicycles in Ghana at about 190,000, of which 76% were in the three northern regions of the country and suggested a shortfall at that time of around 520,000 cycles, of which 61% of demand was in the three northern regions (Ministry of Transport Bicycle Assembly study, cited by Adarkwa et al. 2000).

Tengey et al. also give figures for use of non-motorised vehicles to transport produce to market, access urban services and health services. Figures re use of respondents of NMTs for transport of produce to market were: 0% in the coastal savanna, 0% in the forest belt and 25.2% in the northern savanna. Figures for respondents NMT travel to town services were 2.3% in the coastal savanna, 0.7% in the forest belt and 25.1% in the northern savanna. For travel to health post the respective figures were 1.7% in coastal savanna, 0.7% in the forest zone and 37.9% in the northern savanna.

2.2 Reasons for regional variations in levels of IMT use

IMT use is much lower in southern than northern Ghana: Howe and Barwell (1987:3) assess IMTs are least used in the forest zone, where physical conditions including terrain, rainfall, vegetation and tsetse fly cause some problems for IMTs, though Howe and Barwell suggest these problems are not insurmountable. Another issue related to higher use of cycles, in particular, in northern Ghana, may be population density and distance to farms and services. Densities are generally lower in the north and farms may be as much as 10 km or so from the village, so that cycle ownership is essential to reach farms in time to undertake a full day's work.

2.3 IMT schemes in northern Ghana

There have been a number of initiatives by donors, the Ghana government and by NGOs to expand the use of IMTs in Ghana since the late 1980s but these also have been mostly focussed on the northern rural regions of the country.

In the late 1980s the Intermediate Means of Transport in Ghana Project, funded by the World Bank, aimed to produce IMT prototypes, test them in rural areas and monitor and evaluate their impact. Local NGOs were involved in the implementation of the scheme. Details of the cycle trailer project are provided in Salifu (1994) and Buabeng et al. (1995); also see Section 4.3 below. Overall, the cycle trailer project was unsuccessful. Other initiatives included a donation of several thousand bicycles by an NGO, the Christian Council of Ghana, to the northern region (Lowe 1989).

2.4 IMT schemes operating in southern Ghana

A few examples of IMT provision in southern Ghana have been found: for example, ADRA motivators (female and male) in a number of southern districts were issued with (men's) Phoenix bicycles to aid their health promotion work in 1997 (Interim Report no.3, interview with Mrs V. Daako, ADRA). About 75 were issued to staff in Central Region, both women and men who paid 5,000 cedis per month: there were reportedly no refusals. It is unclear how many of these are still in operation; no training on riding or maintenance was provided.

During the recent (March 2000) census exercise, enumerators across the country - including those in southern Ghana - were issued with new bicycles, but again seem to have received no training in riding or maintenance (according to staff interviewed in Central Region villages).

One of the most important sources of organised IMT provision in northern and southern Ghana, however, has been through the Ghana Ministry of Health. Motorcycles have been used by field staff for many years but a formal system of transport support (with assistance from the NGOs TRANSAID and Riders for Health) was introduced in 1993 with the adoption of a transport management system. One of the components of this work was implementation of a 'zero breakdown motorcycle fleet'. TRANSAID (Projects update, 2001) report motorcycles running at 100% availability after 65,000 kms in Ghana (compared to the average life of a motorcycle in an untrained, unmanaged system of about 8,000 km).

The Ministry of Health supplies motorcycles to its staff involved in outreach in all regions of Ghana; generally 2 motorcycles (mostly now 100 cc Yamahas) per health centre, with fuel, maintenance and training provided by the Ministry of Health. Motorbikes are ridden both by men and women, though there was reportedly some initial resistance, particularly in southern Ghana, from women (see section 5.2). The Ministry of Health also provides bicycles: initially these were for messengers but in 2001 a programme for provision of cycles (and associated training) to community volunteers (for community-based disease surveillance) was instituted. This is currently supported by USAID which provides funding for a minimum of 5 (Indian-made) cycles per district. (However, the locally preferred cycles, Phoenix, are Chinese.) (Interview Saaka Dumba, February 2002).

2.5 The Ghana Village Infrastructure Project and its IMT component

The latest major initiative to improve rural access is the World Bank's Village Infrastructure Project, the 18 month pilot phase of which commenced in March 1997. This was targeted at poor rural farmers and households and focuses on rural water infrastructure, rural transport infrastructure, rural post-harvest infrastructure and institutional strengthening. The rural transport component included selective improvement of feeder roads, but also involves consideration of footpath and track access improvements and IMTs (World Bank 1997).

The VIP IMT component in the pilot focused on 3 IMTs: power tillers, bicycles with trailers and donkey carts. It was introduced in 4 regions: Ashanti, Brong Ahafo, Northern and Greater Accra and incorporated work in 20 districts. In this pilot phase 22 power tillers were supplied to farmer groups in Ashanti and Brong Ahafo and a further 42 power tillers, 50 bicycles and trailers and 20 donkeys and carts were supplied to other farmer groups (MOFA RICU, February 1999). Farmers were expected to establish group farms of 2-5 acres to cover the down-payment on the equipment which was charged at cost without interest.

The implementation of the IMT component in the pilot was undertaken by an NGO, Self Help Foundation, which set up satellite repair centres in various areas and gave training to

local mechanics. (SelfHelp Foundation is represented on the Consultative Group of R7575). The pilot ended in February 1999. A review of the pilot conducted by SelfHelp Ghana (August 1999) reported successful completion of the project while noting a number of constraints and difficulties which would need addressing in the main component of the project. These included weak linkages between the project and associated financial institutions, between the project and the Department of Feeder Roads, some problems with the operation of beneficiary groups and limited involvement of women (SelfHelp Ghana 1999: 10,12). These issues are discussed further in the relevant sections below.

A status report by MOFA VIP in May 2001 indicated that IMT procurement for the main phase of the project was still in the planning stage, the majority of IMT procurement awaiting quotations from suppliers. In the three regions of northern Ghana the IMTs requested and approved up to that date comprised 17 animal drawn carts, just two bicycle/trailer groups and 4 power tillers. A total of 14 power tillers (but no other equipment) had been requested and approved for other regions, not one for Central Region. (However, footpath improvements had been approved for one Gomoa village (Abora) in association with our IMT project.) However, a subsequent review following a Private Goods Strategy Mission in January/February 2002 pointed to various delays which have restricted progress on the project and to the need for changes to the arrangements for administering loans in the scheme. This aspect of the project is discussed in section 5.3.11.

2.6 The RTTP in Ghana

The only other potentially substantial rural IMT initiative on the horizon appears to be a proposed IMT component in the World Bank RTTP (Rural Travel and Transport Programme, one component of the Sub-Saharan Africa Transport Policy Programme) based in the Department of Feeder Roads. (For a detailed review of the broader Programme context see Plumbe et al. 1995).

The RTTP programme in Northern Region, which to date has principally focussed on feeder road improvement, may incorporate an IMT component in the future. The programme functions entirely separately from the VIP, although there are potential synergies. (The Feeder Roads RTTP is represented, like VIP, on R7575's Consultative Group).

2.7 IMT schemes in urban Ghana

A World Bank funded Ghana Urban Transport Project aims to improve conditions for IMT users (notably push truck operators and cyclists) in Accra through measures such as cycle lanes along main routes and traffic calming measures (Amponsah et al. 1996). In Tamale the creation of cycle paths already appears to have had substantial impact, but in Accra, where IMTs as a proportion of motorised transport are relatively small, the impact may be less.

2.8 Government and NGOs in IMT promotion

Despite the various schemes referred to above, there remains a tendency among officials to view IMTs as 'backward' modes suitable for 'backward' areas (by inference, the less developed northern regions of Ghana). As Ellis and Hine (1995) discuss, this is a common attitude among government staff in low income countries. We were told by staff at the Feeder Roads Department in Accra and Cape Coast that there is some resistance to non-motorised transport in coastal Ghana (R7575 Access to marketing opportunities in Ghana's off-road communities: a review of constraints and potential interventions in Gomoa and Assin districts, Central Region, section 5.2).

The main NGO involved in IMT promotion in southern and northern Ghana in recent years has been SelfHelp Foundation, through its work with the VIP pilot. The main international NGO to have been involved in IMT support has probably been Riders for Health, through its work with the Ministry of Health. Overall, however, the pattern of IMT promotion by government and NGOs in Ghana has been ad hoc and piecemeal.

3. BACKGROUND: R7149, R7575 AND THE ENVIRONMENTAL AND SOCIAL CONTEXTS OF THE PROJECT STUDY DISTRICTS

3.1 A brief outline of projects R7149 and R7575

R7149 was a one-year project, Access to Market Opportunities in Ghana's off-road communities. Its overall aim was to assess the scale and nature of access problems for women and men in off-road areas in Ghana's Central Region and to examine the potential for improving access through various low-cost strategies, including IMTs. The study focussed on 5 settlements, 4 in the coastal savanna of Gomoa district and an additional settlement in a rain-forest area in Assin district. The latter settlement was included in the study on the advice of ministry staff in Cape Coast.

The study was based principally on qualitative participatory research and involved a range of investigations into conventional transport costs and service provision, views on IMTs, uptake potential for basic agricultural processing in off-road settlements and other non-transport interventions, cooperation and group formation in the study districts etc (Porter 1999). A consultative group consisting of staff from MOFA PPMED, MOFA VIP, MOFA Agricultural engineering services department etc. provided ongoing advice through the project. Full details of Project R7149 are available in a series of reports prepared for DFID: copies can be obtained directly from Gina Porter (Department of Anthropology, University of Durham: r.e.porter@durham.ac.uk).

R7575 is a direct extension of R7149, this time focussing specifically on the potential for IMTs in coastal Ghana and based on research in the same 5 study settlements. It is an action research project, whereby villagers, particularly women, have been provided with IMTs of their choice on credit, on condition that they allow monitoring of their use of the equipment. Monitoring of IMT use is still in progress. Preliminary socio-economic impacts (e.g. on agricultural production, marketing, gender relations) and environmental impacts are being assessed through a range of qualitative and quantitative studies. It is supported by the Consultative Group originally established in R7149.

3.2 Gomoa district

Gomoa district, in Central Region, is one of Ghana's poorest coastal districts (Hewawasam et al. 1996). It was created out of Effutu-Ewutu-Senya district when the current decentralisation programme started in 1988 and is the second largest district in the region. Gomoa is located very largely in the coastal savanna belt; the climate is characterised principally by a bimodal rainfall distribution and a mean annual rainfall of between 70 and 90 cm along the coast, and 90 to 110 cm in the northernmost area where savanna gives way to semi-deciduous forest. The topography is gently rolling, mostly under c. 350 feet, but with occasional hills of up to c. 750 feet. Settlements are generally nucleated.

Gomoa is principally an agricultural district and the main crops grown are maize (often the major cash crop), cassava (grown both as a food crop and, generally to a lesser extent, as a cash crop), peppers and tomatoes (both the latter grown as cash crops and, in the case of green pepper, sometimes as an export crop). Maize occupies the largest acreage according to the District Development Plan (May 1996) but yields are below the national average (Young 1998). The Development Plan refers to the high potential for grain production and the development of large-scale export production of pineapples and pepper. However, current constraints are reported in the Plan as unreliable rainfall, lack of credit for farmers, fluctuation in agricultural prices, high input costs and poor roads.

Labour shortage is also a problem in many areas: youths have migrated out of Gomoa to the forest zone where they are engaged in cash crop cultivation. This can be linked to the currently limited agricultural production in Gomoa and suggests a vicious circle whereby labour migration is encouraged by the relatively underdeveloped state of agriculture and labour shortages help perpetuate low productivity. Communal labour parties (nnoboa) for agricultural work are still common in this area and a bush-fallowing cultivation system without the use of any fertiliser is widespread. An estimated 16% of the active labour force in the district migrate regularly to the forest zone to cultivate cash crops. (Further details on the agriculture of Gomoa and the selected survey settlements are provided in Young 1998). Time savings from increased transport efficiency could arguably have a substantial impact on agricultural productivity. On the basis that a headload typically weighs around 30 kg., and that yield is around 10,000 kg per ha for cassava and 1,900 kg per ha for maize, estimates suggest it takes 167 person-days to load one acre of cassava from farm to village, and 32 person-days per acre of maize (Riverson and Carapetis 1991:6).

While farming is undertaken by most men and women in rural Gomoa (even in coastal settlements), men tend to have primary access to land, and farm more extensively than women. Women are the principal agricultural produce traders, however, travelling extensively both within and outside the district to market their own and their husbands' produce and returning home with other items which have been purchased for resale in their village area. In addition to trading, most women are involved in farming (sometimes on their own account, sometimes in conjunction with their husband) and a host of household activities including water and fuelwood headloading for domestic use and the headloading of most of their own and their husband's produce from the fields to the village. Fieldwork in R7149 indicated that the majority of loads carried are relatively small, with most loads transported on most trips being below 25kg.

Four villages located off the paved road in 1999 were selected for detailed study: Adabra (8 km from the paved road), Lome (8 km from the paved road), Sampa (8 km from the paved road) and Abora (3 km from the paved road until 2000, when a tarred road was constructed to the village). A brief resume of the characteristics of each village is provided in Appendix 2. All are primarily Fanti villages, though stranger farmers from other parts of Ghana (notably Volta Region) are also resident in each of the villages.

3.3 Assin district

Assin district, Central Region's largest district, is located in the rain forest zone in an area of rolling topography (not dissimilar topographically to Gomoa), mostly under 400 feet. It has a higher rainfall than Gomoa though the pattern remains bi-modal, with the main rains in

April-July and the minor rains in September-November (the minor farming season). As in Gomoa, settlements are generally nucleated.

Assin has a much stronger emphasis on cash crops than Gomoa, particularly cocoa. The cocoa farms of men are generally much larger than those belonging to women, though some women have a substantial interest in cocoa. Other cash crops include palm oil and citrus fruits. According to the District Plan, food crops grown in the district include maize, rice, cowpea, groundnuts, cassava, yam, cocoyam and plantain. Forest products including timber and a wide variety of non-timber products are grown for sale (Assin District Assembly 1996). As in Gomoa, women are the principal foodstuffs traders in Assin. Cocoa is sold by men and women farmers directly to the buying stations. At yields of around 900 kg per ha for cocoa, it is estimated it will take 15 person-days to headload one acre from farm to village using men, women, children and hired labour (Riverson and Capapetis 1991:6, citing Dapaah 1989)

Only one off-road village in Assin was studied in detail, Aworabo (25 km from the paved road) in the north east of the district.

3.4 Differences among Gomoa and Assin settlements

The off-road villages selected for study vary considerably in terms of wealth and access. The villages in Gomoa are only around 3-8 km from the paved road, whereas the village in Assin is much further (25 km) away. Regarding assets, some villages appear to be substantially wealthier than others, in terms of physical infrastructure (as measured by house construction materials etc.). Estimating wealth is extremely complex, but a survey of vehicle, radio and battery-operated television ownership (consumer goods much valued in the villages) provides one small indication of the diversity and emphasises the relative wealth of Aworabo in Assin, compared to most off-road villages in Gomoa, despite its distance from the road. This can be attributed to factors such as the more reliable, higher rainfall and high fertility of the area which allows a stronger focus on cash crop production, particularly cocoa.

3.5 Transport availability in Gomoa and Assin off-road settlements

3.5.1 Conventional motorised transport services

Although motorised transport is regular and frequent along the major paved roads of the two districts, off-road transport services are extremely poor. This is an area where population density is relatively low (though not by comparison with many parts of northern Ghana). [Unfortunately, data from the March 2000 census to illustrate this point is not yet available. The previous census was conducted in 1984.] Densities tend to be higher near the paved roads. We have here the low density conditions so common across sub-Saharan Africa, which results in lack of a critical mass of transport demand and presents such a formidable challenge to conventional transport planning approaches (IFRTD rural transport services e-mail discussion group, Oct/Nov 2000).

3.5.2 IMT usage

IMT use is very low across the two districts, and seems to be mostly concentrated in wealthier settlements on the paved road, where IMTs include bicycles, motorbikes and push trucks.

In the five off-road villages studied in R7149, IMT ownership and use was found to be extremely low. IMTs had generally been obtained within the last few years, and were almost

wholly owned and operated by men. They mostly consisted of bicycles, purchased by men for cash out of farming or hunting profits (these are areas where small game is still common and hunting widespread). Few women were found to have ever ridden a bicycle and, if so, these were generally young women who had mostly done so within the village centre, 'for pleasure'. Men do not generally loan out their bicycles to their wives. Hand carts are principally found in the district capital, Apam, and hardly encountered in rural areas (though two of the study villages had one or two carts). The limited availability of transport means in the 5 villages is illustrated in the following table which shows ownership figures for both motorised transport and IMTs in 1998.

Village based transport in Ghana's Central Region: motorised and non-motorised ownership in five study villages, 1998

Village	Abora		Sampa		Adabra		Lome		Aworabo	
	M	F	M	F	M	F	M	F	M	F
Private car	0	0	0	0	0	0	0	0	0	0
Taxi	0	1	0	0	0	0	0	0	0	0
Tro-tro	0	0	0	0	0	0	0	0	0	0
Bicycle	2	1	2	0	6	0	5	0	6	0
Motorbike	0	0	0	0	0	0	0	0	0	0
Push truck	0	0	0	0	1	0	2	0	0	0

3.6 Potential IMT users in the study districts (current requirements, preferences, prejudices)

A preliminary view of perceptions of various IMTs was obtained in R7149 through the use of photographs and focus group discussions with men and women of different ages (see Appendix 1). However, the intervention in R7575 - including IMT selections made at the village workshops by villagers and subsequent usage of the equipment purchased - is perceived as itself providing the main testing ground for previously expressed views and preferences.

4. CURRENT USE OF INDIVIDUAL IMT TYPES IN GHANA

This section reviews usage of a range of IMT types in Ghana and considers their potential for use in southern Ghana's off-road villages. Where relevant, material related to their use in other regions of sub-Saharan Africa is considered. The range of equipment considered is limited, because only a limited range of IMTs are available - and realistically likely to be available in the near future - in southern Ghana. There is a very low diversity of IMTs in Africa compared to Asia, due to low demand to date and related factors (Platteau 1996).

4.1 Four-wheeled platform pushcarts (known in Ghana as 'trucks')

Indicative characteristics across low-income countries: cost price \$60, load 150 kg., speed 4 km/hr, range 5 km (all highly approximate, source: Starkey 2000:12).

Ghana cost October 2000: 350,000 cedis (Generally available only through cash purchase.)

Days required to achieve equivalent earnings at the official minimum wage of 5,500 Cedis in 2000/01: 64 days (though note that rural earnings are probably at almost half this level.)

4.1.1 Manufacture and use of the push truck in Ghana

Starkey (2001:15) describes these strong, four-wheel load-carrying platform trolleys which are widely used in urban areas and around markets in rural service centres in Ghana. They are constructed by local metalworkers in the informal sector, mostly using second hand parts including two scrap pickup axles (cut and joined to reduce the width). The front axle is mounted on a turntable which assists steering and some have brakes; the platform is constructed from wood. Because they have four wheels they are very stable for loading and are strong enough to carry loads of up to one tonne, if road conditions are adequate. They are relatively expensive because of the four wheels, two axles and turntable mechanism. The trucks are pulled or pushed by one or more operators and are used for delivering and collecting goods, typically over distances of 2 to 3 kms. Kumasi is currently the major centre of pushcart manufacture, though others are made in Accra and in smaller towns (in the latter case using scrap imported from the big urban centres.) Hence, they are referred to below as Kumasi push trucks.

Though their origin is unknown they have been spreading since the 1960s and are now found in most towns and at rural market centres in Ghana. Howe and Barwell (1987:71-) estimated that there were perhaps 7-14,000 in use and that their numbers were increasing, though they were mainly restricted to urban areas and to some villages in the north, 'although the configuration is ill-suited to use on unsurfaced roads, tracks and paths' (ibid:72). Some entrepreneurs were found to own more than one, and hired them out to full-time operators. In many towns they are now regulated and operating licenses are required. Starkey (2001: 15) uses these hand trucks in Ghana as an illustration of a local innovation that spread 'spontaneously'. He emphasises that they spread without public-sector promotion or credit provision.

4.1.2 Push trucks in Accra

The other major source of published information on push trucks in Ghana, is a study in Accra reported in Grieco et al. (1996:chapter 5) and Amponsah et al. (1996). Amponsah et al. illustrate the importance of these IMTs for petty traders in the city, notably because of their lower costs (possibly one-third the cost of motorised transport) for moving large loads over short distances and manoeuvrability in congested areas and narrow market alleys where motorised vehicles could not reach. They are always male-operated in Accra. The reasons for this, as given by women and men in Accra, revolves around women's lack of strength and traffic dangers, though the problem of moving a trolley while carrying a baby on the back was also mentioned. Grieco et al.(1996) suggest that it is difficult to untangle the practical difficulties women face in using the present technology from the gender stereotype linked to customary roles and division of labour. However, they find evidence of women owning trucks. They suggest the need to develop improved trucks, notably through fitting a brake pedal, possibly also with motors.

4.1.3 Push trucks elsewhere in southern Ghana

The author of this report has observed pushtrucks in use in Volta, Greater Accra, Eastern and Central Regions, mostly (but not wholly) in or close to major urban centres, where they are most widely in evidence on market days in the areas close to major markets. They are also used for fish in some harbour locations, such as near Gomoa-Fetteh. They are almost always operated by men or children (mostly boys). The only situation where I have observed a woman in charge of (but still not operating) a push truck was at a roadside village in Greater Accra region: the cart was being used to transport a container of water and was being pushed

along by her three young girl children. In this particular village there are 7 push trucks which are mostly hired out for transporting goods including farm produce. The hirer generally assists the push truck operator to transporting such goods.

4.1.4 Push trucks in the survey villages

In the five survey villages studied in R7149 push trucks were rarely encountered. Only two villages had trucks, though push trucks were also occasionally used by inhabitants at Abora village, in this case through hiring them at the nearest roadside village, Ankamu.

At Adabra one man owned a small four-wheeled truck which he purchased for cash from a local manufacturer in Accra and rented out (in 1998) at between 1,500 and 3000 cedis per day (according to load and distance) to men and women (who used it mainly to transport crops to neighbouring villages and from their farms to the village). The truck had cost 150,000 cedis and third-hand tyres from the vulcaniser cost 8-10,000 cedis per tyre. They had been changed several times since purchase of the truck eighteen months prior to our interview in 1998 with the owner. Nonetheless, the owner was pleased with his investment.

Lome village also had two small push trucks at the time of the access study in 1998/9. These were made by the owner himself (a mason/farmer) in the village in about 1996. The wheels were solid and made of wood (unlike the standard manufactured truck), and rubber tread had been pasted on. The two carts together cost the owner 55,000 cedis in total in construction costs (i.e. a fraction of the cost of a manufactured cart). Like the truck at Adabra, these trucks were reportedly hired out to men and women who used them to take their maize in some cases over the 7 km to the junction (for which a charge of 6,000 cedis was made for a full load), or for moving cassava and firewood from their farm to the village (charged at between 2,500 and 5,000 cedis, depending on the distance). However, the trucks were principally used for transport of construction materials during house building, since only those who did not have relatives available to help carry their produce generally paid to hire the truck. (Relatives are simply given a small portion of maize for their assistance.) The owner or his brother always accompanied the truck when it was hired out. More recently (in October 2000) the trucks have been out of action because the owner had travelled to Northern Region and dismantled them before he departed to stop children playing with it and possibly breaking it.

It seems likely that the current limited diffusion to rural areas is partly a function of cost of the truck in Ghana (which explains the effort made by the Lome owner to build his own -far cheaper- version) and problems of operating the truck along narrow footpaths, but it may also be a function of the restricted market for truck transport in villages where head portage is widely available, if the Lome case is representative. However, since many Gomoa villagers complain of labour shortages, the advantages of push truck transport along major routes may be sufficiently recognised to encourage uptake, if assistance is available for initial purchase (as in R7575).

4.1.5 Sustainability issues

One issue in the future expansion of the push truck in Ghana is the sustainability of the supply of scrap from which the trucks are mostly constructed. In a review of carts in Tanzania (1989:8), Howe observed that handcarts, as in Ghana, tend to be restricted to urban areas, and notes that the fact that they compete with animal carts for used motor vehicle tyres

is an increasing problem. He cites Barwell regarding the high profits which hand carts earn in urban Tanzania (sufficient to repay the initial investment in as little as 20 to 40 days.)

4.1.6 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: heavy for women to manoeuvre, not suitable over long distances, difficult to manoeuvre along narrow paths or very uneven surfaces.

Summary of advantages: indigenous, private sector innovation; manufactured locally in the private SME sector and readily available in major centres; have a long life and are easily repaired; relatively low cost; useful over short distances; stable in loading.

Likely potential in the study villages: some potential if credit available, particularly for use along feeder roads to nearest major road junction. [Compared to northern Ghana, farms are generally closer to villages in this region, so the push truck may have more potential here than the cycle.] Women and men may see them only as a men's IMT.

4.2 Bicycles

Indicative characteristics across low-income countries: cost price \$100, maximum load 75 kg., speed 3-15 km/hr (depending on road quality), range 20 km (all highly approximate, source: Urasa 1990: 47, Riverson and Carapetis 1991:9, Starkey 2000:12) .

Ghana cost November 2000 for a basic Phoenix cycle: c. \$62 (n.b. in Vietnam a bicycle costs c. \$25, according to Schelling, IFRTD email discussion group, 26/10/2000)

April 200: 290,000 cedis, but by October 2000 had risen to 400,000 cedis due to inflation.

Days required to achieve equivalent earnings at the official minimum wage of 5,500 Cedis in 2000/01: 73 days (though note that rural earnings are probably at almost half this level.)

(N.B. in Malawi the retail price of the least expensive bicycle in 1988 was 650 days of earning at the rural minimum wage, in 1996 it was 160 days; IT Transport 1996:9). In Burkina Faso a new Peugeot cycle was \$140 and a Chinese cycle \$106 (1999? Dennis, nd.)

4.2.1 Bicycle use in Ghana

Bicycles are the most common IMTs in use in Ghana. In a sample survey of 123 household heads in Northern Region in 1988, 69.1% possessed bicycles (Buabeng et al. 1995). A figure of 28% ownership is reported among households in 8 study villages (across 3 environmental zones) in another Ghana survey (Dawson and Barwell 1993:14). Anchirinah and Addison (1998) in a survey of 572 farmers across four regions of Ghana, found the following levels of bicycle ownership among respondents: northern region, 66.4% own at least one bicycles; forest zone 17.4%; coastal savanna (Greater Accra) 29.2%; transition zone 44.2%. Ownership was far lower, however, among the off-road villages surveyed in Gomoa and Assin districts in Project R7149 (around 1% of the total population). It may be that in the previous surveys many of the respondents were from (richer) villages on paved roads. As White et al. (2000) observe, "the full potential of cycle use in Ghana still remains unrealised, especially among women and in regions outside ... the country's northern region."

4.2.2 Purchase cost and affordability in sub-Saharan Africa

Among poorer populations the *capital cost of purchase* tends to limit bicycle ownership: 'despite a somewhat proletarian image, the bicycle has always in reality been the prerogative of the relatively affluent in Africa due to its price' (Howe and Dennis 1993:9). However, Howe and Dennis found no consistent relationship between rural household income and bicycle ownership in sub-Saharan Africa (ibid: 7). Indeed, they note that the high ownership of bicycles in Burkina Faso is related to availability of credit to rural households (ibid:12).

4.2.3 Purchase cost and affordability in Ghana

In mid-1998 a basic bicycle of Chinese/Asian manufacture (such as the Phoenix brand, which is currently probably the most commonly imported brand in Ghana) cost from about 120,000 to 150,000 cedis (between approximately £32 to £40 at 3,700 cedis to £1) in southern Ghana. By March 2000 they were on sale in the Accra market at around 240,000 cedis, but by early November 2000 inflation meant that the cost had increased to 400,000 cedis (still only about £42 but with the cedi now pegged at around 9,500 to £1). Indian cycles cost rather less but are considered not so strong. The Phoenix brand is overwhelmingly dominant in southern Ghana's rural areas, though increasing numbers of imported second hand cycles, including the mountain bikes favoured in urban areas, are now observed, even in off-road villages (observation and D. Peckham, pers. comm 6/4/2000). White et al, (2000) point out that 'while the Phoenix brand bicycles employ design and components that are antiquated, they are established, relatively inexpensive, rugged and suitable for many applications.' A similar preference for cycles without gears was expressed by the Village Bicycle Project, by one of the main Accra cycle importers and the staff member in charge of cycles at Peacecorps, Accra office (volunteers across Ghana are issued with cycles: interview March 2000): all considered that cycles with gears in Ghana usually don't last. One of the main cycle dealers in Ghana, Fatawu Bicycle Company in Tamale (which reports sales of around 10,000 new cycles and 2000 second hand ['home use'] per annum), reports that the Phoenix is always their best selling cycle despite its slightly higher cost (about 5\$ more than the Indian equivalent). An interview with the bicycle repairer at Swedro, a town just north of Gomoa district, indicated that Phoenix brand also has the cheapest spares. Phoenix bicycles were supplied to farmers in the VIP pilot phase because it was the only make widely available.

4.2.4 Cycle imports and local manufacture in Ghana

New bicycles have been imported from China and India for many years in CKD (Completely Knocked Down kit form) for assembly by firms across Ghana. According to one major importer, five workers can assemble about 100 cycles in a day. There is also now a large market in imported second hand bicycles, both women's and men's. These generally come from Europe and are brought in by small-scale importers. Attempts to increase the local content of bicycles do not seem to have had much success, due to shortages of raw materials and components, though White et al. report some small-scale manufacturing of bicycle parts and accessories in northern Ghana (Howe and Barwell 1987:83-5, White et al. 2000). See Section XX for further discussion.

4.2.5 Maintenance costs in sub-Saharan Africa

Maintenance costs widely reduce time in use: Howe and Dennis (1993: 12, 21) report high levels of bicycles out of service and needing repair in Zambia and Zimbabwe: in Zambia 30 to 40% of bicycles were out of service awaiting repairs; Urasa (1990:50) cites figures of only 25-30% of bicycles owned being in working order in Tanzania. In Ghana in 1998 a new bicycle tyre cost around 12,000 cedis. The new tyre may well last less than six months on poor roads and tracks. Second-hand tyres can be obtained much more cheaply from vulcanisers, but are reckoned by those with sufficient funds to purchase new tyres to be a bad investment since they are very rapidly spoilt. Although tariffs and taxes on imported bicycles were dropped in 1988 (resulting initially in a substantial increase in sales, until devaluation of the cedi reduced imports once more), cycle spare parts continue to attract import taxes, amounting to around 23% (see White et al. 2000).

A Kenyan study suggested annual repair costs of between 10 and 30% of the initial cost of a bicycle, depending on usage and age. Average yearly replacement /maintenance costs included replacement of two tyres and tubes, at least 6 spokes, tow pedals, one chain, one axle and at least one weld repair to the frame, plus puncture repairs (Howe and Dennis 1993:21 citing Kaira 1983). In Ghana, Howe and Barwell (1987) suggested annual spare parts demand of 10-15% of the cost of a new bicycle. White et al.(2000) report on the limited or non-availability of bicycle tools and load carrying accessories.

4.2.6 Hiring out

Hiring may be a potential solution to the problem of high purchase and running costs of bicycles for poor households and a potential source of income for bicycle owners. Bicycles are hired out in rural Gomoa and Assin: in 1998 the rate was generally 100 cedis per five minute interval! Often bicycles seem to be hired out by villagers for leisure in the study districts: in the village of Abora, bicycles were sometimes brought down from the roadside centre, Ankamu, for hiring on Sunday afternoons. However, the point made by Grieco et al. (1996) that in Accra bicycles are often hired out and that, since women need bicycles for limited periods when trading, they could hire rather than own, is more relevant in an urban context. Women in off-road villages would need the bicycle for longish periods in order to visit local markets.

4.2.7 Bicycle taxis

One solution to this would be for bicycle owners or their employees to carry passengers on *bicycle taxis* between village and market, as is now common in Uganda and western Kenya (the 'boda-boda'). The boda-boda service reportedly originally developed spontaneously in the Kenya-Uganda border area (hence the name) in the 1990s but are now widespread across Uganda and western Kenya (Maganya 1997). In the Ndhiwa area of western Kenya within three years of introduction of bicycle taxis there were about 60 operators in business (many of the cycles used are hired), controlled by a local association. They tend to operate from the main road to off-road settlements, supplementing matatu services. In areas where there is insufficient demand to support conventional motor services they provide an extremely valuable service. Many households now use the service on a daily basis (Dennis n.d. 1999?). The bicycles used are usually simple models without gears. They are converted by reinforcing the forks and fitting stronger brakes, a passenger seat and footrests (Iga, 1999).

In urban Kisumu, Kenya, about 60% of clients are reported to be women, but in rural Uganda most passengers are men, because few women can afford the fares. Iga found that women have benefited little from the services in rural Uganda because they are constrained by fear of harassment from operators, awkward sitting position, and cultural taboos such as body contact with the male operator during the journey.

Only one case has been encountered of a bicycle passenger service during field work in R7575 in coastal Ghana: this was in a roadside village in Greater Accra region where people resident in nearby off-road villages were transported for a fee. Enquiries to date suggest no other examples of bicycle taxis operating anywhere else in Ghana.

4.2.8 Cycles, cultural biases and ethnicity

Howe and Barwell (1987: 69, 100) refer to an apparent *cultural bias* among the Akan in Ashanti and parts of Brong Ahafo against bicycles, where it is 'regarded as the converse of a status symbol'. Turner et al. (1996) and Grieco et al (n.d.) point to ethnic contrasts in cycle

use in Accra, where in a community of largely northern extraction, parents encourage their children to cycle, whereas in another area where indigenous coastal people predominate, parents "frequently beat their children for cycling". One urban Ashanti informant observed to the author of this report, 'a bicycle makes you lower class'. This might also be a factor deterring its widespread acceptance in Central Region. However, in the off-road study villages, it is often richer members of the community who own bicycles, such as hunters, and this view does not seem to prevail (field survey R7149).

4.2.9 Gender patterns of use

In Burkina Faso and northern Ghana (where the flat topography and dispersed settlement pattern favours bicycles) the bicycle is a symbol of social status and prestige (Buabeng et al. 1995, Dennis n.d. 1999?) and is consequently mostly owned and used by men, though White et al. (2000) report anecdotal information that the number of women cycling in northern Ghana has expanded substantially in the last five to seven years. (A study of bicycle use in Tamale and Ouagadougou by Kipke in 1987 contrasts Tamale where no women were seen riding cycles with Ouagadougou where women commonly rode them: see Kipke 1991. Apparently, women questioned in Tamale about why they did not ride said this was because they could not afford one.) In both regions bicycle ownership is considered important for attracting a wife, though in urban Burkina Faso the moped is replacing the bicycle as a significant status symbol (Dennis n.d. 1999?).

On a visit to northern Ghana in October 2001, I observed most women in rural areas being driven by men: they were mostly riding pillion side-saddle. A woman who works for an NGO in Tamale, an indigene of Northern Region, was one of the most forthcoming informants on this issue. She says that women in northern Ghana will buy cycles for their children but would not wish to be seen to own a cycle themselves:

'they see it as something she shouldn't own... when you marry as a woman, everything belongs to him... the men think a woman should not do what a man is doing, she is comparing herself to a man.... In some communities when a woman rides a bicycle she is seen to be superior, it gives her status. They say women can have cuts in the vagina from riding and the cross-bar can hurt you. Women do worry about that, especially when the bicycle is old. They'd prefer it without the bar. I myself was given one with bar, I sold it and bought one without the bar. Old ladies in rural areas will advise girls not to ride bicycles with the bar because they will hurt themselves and have cuts in the vagina. But now women will ride, the attitude is changing. Now in town women even ride motorbikes.

[prompt: why do women ride sidesaddle in town?]

A woman is not supposed to open the legs wide like that, they can get cuts, so that's why we have to sit sideways..... Our problem is the opinion leaders and the religious leaders. When we do gender projects, every community we enter we go to see those who two people and try to convince him [sic] before we go to the women. If we can convince them well...

[prompt: any education in schools re girls riding cycles?]

There are plenty of bicycles at schools... schools encourage children to use them to get there early. They don't tell girls about riding, but just advise them to ride carefully, especially when mounting a hill on a crossbar as you can fall forward and hurt yourself if you miss the pedal.

Everywhere in Ghana bicycles appear to be overwhelmingly male owned and used (Dawson and Barwell 1993:14). However, Grieco et al. (1996:115) suggest they would have great economic value for women petty traders. Unfortunately, 'cultural stereotypes and infrastructural dangers' work against the use of the bicycle by women (ibid). They also note

that capital requirements for bicycle purchase are too high for many female traders, and suggest that redesign of bicycles and cycling facilities could assist women. Very similar views emerge in Malmberg-Calvo's (1994) study of rural women's bicycle use and attitudes in Uganda.

4.2.10 Cycle design and dress issues: are women's bicycles necessary?

Malmberg-Calvo (1994) finds women eager to adopt bicycles and suggests their access is limited by cultural, educational and economic constraints. The introduction of a sturdy *ladies bicycle* could, she suggests, help overcome cultural resistance to women riding bicycles, and reduce the likelihood of their appropriation by men. She also emphasises the need for credit. The issue of cycle design (raised above in 4.2.9 by the Tamale informant) seems to be an important one. Most new cycles available in Africa have crossbars, though there is increasing availability of women's cycles in the second-hand market in countries like Ghana. Starkey (2001:37) notes that even programmes promoting use of bicycles for women have used bicycles with crossbars, on the basis that they are readily available and considered stronger for load carrying.

It may arguably be difficult for a woman to ride a cycle - particularly a cycle with a crossbar - while wearing traditional dress such as the wrapper (commonly worn by women in coastal Ghana). Men in some regions can be observed cycling in long traditional gowns - as in the case of men wearing the *riga* in northern Nigeria - but of course the matter of modesty is not applied in the same way in the male case and the *riga* can be pulled up clear of the bicycle chain. Perhaps, as Grieco et al. (n.d.) suggest, the use of trousers by women could be promoted in conjunction with cycle use. In Central Region many women (even quite elderly women) now wear trousers to farm under their wrapper to reduce scratches, though some keep them at the farm so that they are not seen wearing them. Further discussion on this issue is presented in 5.2.4.

Smaller bicycles may also be easier for women to ride. Doran (1996:25) suggests that bicycles with a 26" diameter wheel (rather than the standard 28" wheel) may be more appropriate for women, but requires availability of 26" tyres and inner tubes. In Malawi women reportedly would use bicycles more if women's models were available (IT Transport 1996:26).

In Ghana interviews with cycle importers suggest that demand for women's cycles is very low: one major dealer in Accra recounted the story of how he imported 700 women's cycles and didn't manage to sell them all for 2-3 years. In the end he reduced the price (originally set at the same price as the man's cycle) to clear them. The purchasers were from Bawku (Upper East) and apparently sent them over the border to Burkina Faso for sale. Women, he argued, do not use cycles in Ghana, with the exception of those who live close to the Cote d'Ivoire, Burkina Faso and Togo borders. In Accra cycle market dealers in new cycles generally sell men's models. The Fatawu Bicycle Company in Tamale also reports that it mainly sells men's large cycles with crossbar (field interviews 1998, 1999, 2001).

4.2.11 Ethnic and gender issues in cycle promotion

Grieco et al. (1996) point to the need for differing strategies for enhancing bicycle use by women among different ethnic groups in Ghana: northerners on the whole value bicycles southerners, on the whole, do not. This latter observation, however, is based on research in an urban context and reflects urban perspectives: rather different views were elicited during

field work in off-road areas in Gomoa and Assin in R7149, and these will be tested in R7575. Here many younger women said they would welcome the opportunity to own and use a bicycle, but are too poor to be able to afford to purchase one. Most had never ridden a bicycle and male owners rarely loan their bicycles to the womenfolk in their family. Only one case was found in R7149 where a woman had ridden her husband's bicycle: she was an Ewe woman from Volta Region, where women are more frequently observed cycling than in Central Region.

4.2.12 Carrying children on cycles

Some women observed that it would be difficult to ride a bicycle with a baby on the back: certainly in northern Ghana rarely are women observed cycling with a baby on their back. For older children, children's seats would be valuable: these are not generally available in Ghana.

4.2.13 Age patterns of use

There is little information on age patterns of use for bicycles in Ghana or elsewhere. Observation and discussion in the study villages suggest that most cyclists are young or at most middle-aged (though in northern Nigeria many elderly men can be observed riding bicycles.) One study in urban Indonesia found no women over the age of 38 riding cycles, though the reasons were unclear to the authors (GTZ 2000) In the 5 Ghanaian study villages, discussions with elderly women suggested they would be frightened of riding a bicycle in case they fell, and that most had never learned to ride.

4.2.14 Bicycles and load carrying

Whether ridden by men or women, bicycles in Central Region seem to be perceived as a means of personal transport, rather than as a potential *load carrying* IMT. A similar perception is recorded in a Zimbabwean study where bicycles were similarly owned mainly for their travel rather than their transport benefits (Mannock Management Consultants and ILO 1997). But in northern Ghana, Burkina Faso and many other regions of sub-Saharan Africa, substantial loads are often carried by bicycle, generally using a carrier over the rear wheel. There the bicycle is generally used for carrying loads to market or bringing inputs back to the village, rather than for carrying water or firewood (though men can be observed carrying firewood on the back of their cycles on the main paved roads in the north: possibly this is for sale). Howe and Dennis (1993:13) suggest this is probably because fuelwood and water collection for domestic use are designated as women's tasks. They estimate (ibid: 13) that the bicycle has about five times the load carrying capacity of human portage (i.e. perhaps 50 kg at 8-10 km/hour, compared to 25 kg at 3-4 km/hour). Beenhakker et al. (1987: 106) state that bicycles in India are used to carry up to 80kg of compact, non-bulky commodities.

Sieber's (1998) study in Makete district, Tanzania, shows that bicycles can enable farmers to cultivate bigger fields and use more fertiliser through their load-carrying potential. In south-east Burkina Faso a small study suggests that men sometimes prefer to take their produce on a bicycle to market, even if they own a donkey cart or a moped, because of the relatively long distances involved and the fuel cost (Dennis n.d.1999?). Bicycles with a luggage rack or easily dismantled metal panniers may prove more appropriate for load carrying than a cycle and trailer (see below), particularly over short distances in circumstances where load carrying requirements vary substantially, because it is often quicker to make repeat journeys by cycle than invest in the cost of a trailer which may only be used for occasional large loads.

In south-east Nigeria women use bicycles to carry sacks of cassava and plantain to market (Olukoya 2001). Even in southern Ghana, there is some evidence of rather greater use of bicycles for load carrying in the Volta Region. White et al. (2000) report use of bicycles in Denu district for carrying loads illegally across the Togo border, by traders moving between local markets, and even for ferrying firewood, water and produce. If heavy loads are carried, however, it is necessary to have strong chains, brakes and pedals. The heavy duty Phoenix 28 with double cross bar is suitable. Usually in Ghana the load is attached to the load carrier at the back of the seat: in Accra and other urban centres the standard rack is replaced by a larger rack by local blacksmiths. There are now also metal baskets being imported from Nepal which are sold widely in northern Ghana.

4.2.15 Potential for the extended bicycle

Experiments have taken place in southern Ghana at the MOFA agricultural engineering unit with an extended bicycle which would increase the load carrying capacity of a normal bicycle, but these seem to have come to a halt. Starkey (2001:47) writes that in Sri Lanka uptake of extended bicycles has been minimal, despite the fact that they cost only 25% more than a standard bicycle and can carry a safe load of up to 100 kg, because users did not perceive the improvement as worth the extra cost. White et al (2000) reports production of an extended bicycle using an IT Transport design by a workshop in Tamale, northern Ghana: in the first year of production, 1999, 15 such bicycles were sold to local people, but these are only being made to order because of shortages of raw materials and currency inflation. It costs around \$30 to extend an existing bicycle. It would seem likely that, in the short term, the extended bicycle has much greater chance of uptake in the north, where bicycles are already widely used.

4.2.16 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: cost; people need training to ride and maintain them; loads may be restricted by size of carrier (difficult for fuelwood and water loads); older women perceive them as unstable and unsuitable for their own use; difficult to ride on steep gradients and/or in conditions of high humidity (though it should be noted that bicycles are widely used in regions like south-east Nigeria, despite humidity levels being high all year round, and are used in countries like China even in mountainous areas.)

Summary of advantages: relatively speedy transport, able to manoeuvre narrowish tracks, can have up to five times the load carrying capacity of human portage, can be pushed rather than ridden if heavy loads are being transported or the topography makes riding difficult, needs no fuel. Likely to have the lowest operating cost of any IMT at short distances and where loads are light (Ellis and Hine 1998:42).

Likely potential in the study villages: potential among men and younger women appears to depend at least partially on credit available for purchase.

4.3 Bicycle trailers

Bicycle and trailer : Indicative characteristics across low-income countries: maximum load 200 kg., speed 10-15 km/hr (depending on road quality), range 15-20 km (all highly approximate, source: Riverson and Carapetis 1991:9) .

Cost in VIP pilot (1997): 340,000 cedis (cycle + trailer)

4.3.1 Promotion of cycle trailers in Ghana

In a study of the potential of IMTs in Ghana for the Ministry of Transport and Communications, on behalf of the World Bank, Howe and Barwell (1987) considered the bicycle trailer to have the greatest potential among various load carrying adaptations of the bicycle. Its advantages included its flexibility and the fact that it could be used with existing bicycles. Field studies by IT Transport had suggested that a bicycle trailer could allow a rider to carry up to 440 pounds (Lowe 1989). Howe and Barwell proposed that a two-wheel trailer, fitted with strong wheels, be promoted.

A World Bank scheme to introduce bicycle trailers in Northern Region, Ghana, reportedly first implemented on a large scale in 1991, was reviewed by Kauffman 1993, Salifu 1994, Kwakye and Sharan 1994 and Buabeng et al. 1995. The trailers were adapted to local conditions/resources at the Technology Consultancy Centre ITTU workshop at Suame Magazine in Kumasi and were apparently first used in Kumasi (Kwakye and Sharan 1994). They were supplied in bulk in northern Ghana through three NGOs (one in Upper East, two in Northern Region) with 'generous subsidy and credit terms to encourage rapid adoption'. The Department of Feeder Roads was also involved in the project. The mood of participants was 'generally ecstatic' and two engineering workshops at Tamale were commissioned to start commercial production (Salifu 1994).

Preliminary results were very positive and this is reflected in reviews by Kwakye and Sharan (1994) and Buabeng et al. (1995). Buabeng et al. focus on the impact of the bicycle trailers on 6 volunteer individuals and households who adopted the project transport, but do not consider the impact on non-beneficiaries. They found the trailer being used by itself by women and children for both productive and household provisioning activities; the trailer is used with the bicycle mainly by men and in this case is used primarily for 'male' activities (transporting farm produce, farm inputs and building materials). They found an unanticipated emphasis on the time saved by IMT adoption. Pankaj and Couthart (1993) while noting some credit problems, are similarly fairly positive, suggesting that the cycle trailers received an 'enthusiastic' reception, and 'the gradual withdrawal of government and donor assistance appears to be leaving in place a sustainable, and replicable, enhancement of the mobility and load-carrying capacity of the rural poor'.

However, both Kauffman (1993) and Salifu (1994) tell a different story. They reported the scheme a failure for a variety of reasons: the cycle trailers were too expensive, they were not strong enough to carry large loads and were heavy to pull, women did not generally own bicycles to pull the trailers and strong women's bicycles were not available. Kauffman emphasises the difficulties of the scheme - which targeted women - for women. Provision of cycle trailers to women who did not own a bicycle was futile, as the women themselves emphasised: "what are we supposed to do with the cycle-trailers if we don't own bikes, tie them around our waists?" Men in the villages who owned cycles reportedly would not let their wives have access to them on the basis that to show favouritism to one wife in this way would discriminate against the rest! Moreover, newly built roads which were also in the project encouraged improved services by conventional market trucks, so the cycle trailers were unnecessary. Salifu suggests that the prime motive of participants was acquisition of a bicycle, rather than confidence in the cycle trailer technology. Since cyclists in northern Ghana generally use a flat carrier for transporting goods on the back of the bicycle, the trailer was perceived as a 'rather clumsy and redundant addition'.

The Department of Feeder Roads/United Consultancy in a 1997 report noted continued difficulties with bicycle trailers despite their acceptability to communities, notably because of lack of capital among villagers to buy both bicycles and trailers, even when allowed to make a down payment of 50% with the remainder spread over a time period. White et al. (2000 reporting an interview with Amasachina, the NGO chosen to implement the Northern Region pilot scheme in 1991), reports that another reason for failure of the trailers was that ‘in many of the beneficiary households, as many as four wives were vying for use of one bicycle and trailer. This created a political problem within the household, which often resulted in the men being the sole beneficiary to resolve the conflict.’ Apparently, because of mechanical problems, many of the trailers were subsequently converted into light-duty handcarts which are still to be observed in Tamale in use for mobile vending.

4.3.2 Current level of adoption and experience elsewhere

Starkey (2000) concludes that in 1999 while ‘some cycle trailers exist in Ghana, their manufacture and use is not widespread’. Starkey (2001:23) argues from the Northern Ghana project experience that the trailers were promoted without clear understanding of the social, economic and technical issues involved; that although initial responses to IMT demonstrations can be ‘euphoric’, careful participatory research is needed to establish likely costs, benefits, usage patterns and constraints; and that other poverty alleviation options to assist women should have been explored. These points are of general relevance to the broader IMT debate. He reports (2000:63) that the Ghana experience is by no means unique: in India, Kenya, Tanzania and Sri Lanka similar low patterns of adoption have occurred, despite the fact that the trailers ‘seemed technically capable’.

4.3.3 Cycle trailers in the VIP Pilot

Surprisingly, in view of the problems associated with bicycle trailers, these were one of the three IMT types promoted by the recent VIP pilot project in Ghana. In their baseline survey for the VIP, Anchirinah and Addison (1998: 34) state: ‘most farmers are more familiar with the bicycle and therefore felt the attachment of a trailer should not pose major problems.’ One trailer was taken by a women's group in Ashanti Region, but most went to the north.

Yet predictably, the cycle trailers continue to fail to meet expectations. I visited VIP pilot project participants in a Shire hills settlement in Greater Accra region who had received two cycle trailers manufactured by the Fatawu factory at Tamale. Both had broken. One trailer was lying in a shed; according to the owner it collapsed the first time it was used to take goods from the homestead to the road junction about 1 km away. The trailer was evidently flimsy, and built with ordinary bicycle tyres.

Discussions about the cycle trailer problems have taken place in R7575 with both MOFA VIP and Self Help Foundation. According to Self Help staff the cycle trailer problem is principally one of bad workmanship in construction of the trailers (which were required in a hurry) rather than poor technology: there are also reportedly specific difficulties with the hitch mechanism when the carts are heavily loaded which are still not resolved. The poor quality of local roads was proposed as the principal reason why the cart wheel rims twisted and broke. SelfHelp reported that in the VIP pilot carts were mostly abandoned by recipients because of these problems and some were taken back by SelfHelp. The farmers simply use the bicycles without the carts. The trailers were originally charged to farmers at 175,000 cedis (on credit), but because of the problems with the cart farmers have been told they need

only repay the bicycle costs (interviews, director and staff, Self Help Foundation, Kumasi and field interviews).

Apparently GRATIS have been awarded a contract to examine the cycle trailer problems. An evaluation report on the pilot VIP IMT work in Brong Ahafo and Ashanti prepared for Self-Help Foundation (Anchirinah and Yoder September 2000) noted that all but one of the bicycle carts supplied were not being used 'due to their poor design and construction, which has resulted in bent rims on the cart tyres after initial use'; the hitch on the one still in use had been modified by its owner, a mechanic. He apparently also intended to attach an axle with motorbike tyres to increase its strength. The cycle trailer apparently remains a component in the proposed main phase of the VIP project (though now there is reportedly a move to consider supplying tricycles instead of bicycles with the trailers because women in the pilot apparently found the bicycles insufficiently stable).

4.3.4 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: currently poor construction in Ghana (inadequate wheel strength, problems with the hitch), high cost since need bicycle to pull, need a track width of at least one metre. Cycle trailers do not seem to have really taken off anywhere, despite some success in relatively small projects (eg. in Sri Lanka).

Summary of advantages: improves load carrying capacity of bicycles (a well built trailer can increase the load carrying capacity of a bicycle by at least two to three times according to Howe and Dennis 1993:13).

Likely potential in the study villages: small in Gomoa due to low incomes, small in both Gomoa and Assin due to deficiencies in quality of manufacture. Most loads are probably better carried by a cycle with luggage rack alone, or possibly with panniers which are easy to dismantle if these can be made locally at low cost. If one load is too large for this, it is probably better carried either through a second trip by cycle, or by conventional vehicle.

4.4 Tricycles

Indicative characteristics across low-income countries: cost price , load 150-200 kg., speed 12 km/hr, range 12 km (all highly approximate, source: Beenhakker et al. 1987).

Ghana cost July 2000: \$1700 for a 12 HP Jinwa tricycle (more for other makes). Manual tricycle with trailer cost estimate \$160.

Ghana cost July 2001: non-motorised 700,000 cedis, motorised 8.4 million cedis.

Days required to achieve equivalent earnings at the official minimum rural wage of 5,500 Cedis: 127 days (non-motorised variety)

4.4.1 Limited use in Ghana, but reportedly expanding use in Tanzania and Latin America

Tricycles are rare in Ghana. Some experiments were made at TCC in Kumasi with a pedal tricycle, the Oxtrike, in the early 1980s, but appear to have been dropped (Hine and Barwell 1987:80). More recently, limited field trials of the motorised FEICEI tricycle in Ashanti Region, were carried out by SelfHelp Foundation. These trials suggested that the tricycles are unsuitable for rough terrain, because traction was poor on muddy roads, the gear-box was located beneath the vehicle and thus susceptible to damage from tree stumps, and construction materials were not strong enough. The principal advantage over the power tiller seemed to be higher achievable speeds. Further trials were considered necessary but the equipment was still recommended for inclusion in the menu of options for the rural transport component of the VIP (Self Help Foundation, no date.)

The R7575 research team did not encounter any tricycles - motorised or unmotorised - in use in Ghana in the period prior to the IMT introductions in February 2001, apart from the three wheelers used by disabled beggars in Ghana, mostly in major urban centres. These are only suitable for use on flat, preferably paved, surfaces. Discussions at the Ministry of Trade and Industry regarding a prototype tricycle being designed there which would carry up to 300 kg were reported in R7575 Interim Report no. 1.

According to Starkey (IFRTD email discussion group 27/10/2000) tricycles have recently been expanding in a number of countries in Latin America. In Peru and Cuba, where there has been rapid adoption, the establishment of good local supplies of components has reportedly been critical. In rural areas tricycles adoption only occurs when a critical mass has first been established in nearby urban centres (Starkey et al 2001:25).

Howe (IFRTD discussion group 29/11/2000) refers to the case of load-carrying three-wheelers in Tanzania (*gurudumu tatu*). These have apparently been imported from China since the early 90s, following a promotional video at an international trade fair, and are spreading in both urban and rural contexts. Commercial operating returns in urban areas are high, but problems include harassment by competing commercial motor operators and taxation (VAT at 20% and 20% import tax on spare parts and materials.)

4.4.2 Tricycle sales and use, Accra

One of the IMT importers in Accra, RST, has imported motorised tricycles into Ghana over the last 3 years, and has reportedly sold over 20 to date, mainly to corporate customers in Eastern Region, where they are used for example for carting palm fruits. They reportedly cost around 12 million cedis (March 2000) and some were under test at that time by MOFA Agricultural Services Department: provisional results suggested they were less versatile than the power tiller. One motorised tricycle was observed in an Accra suburb, carrying a water tank. In July 2001 MOFA had received 100 motorised and 100 non-motorised tricycles (reportedly through Chinese or Indian?? government assistance) which were available for purchase on the open market.

4.4.3 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: rare and thus likely to be expensive in Ghana; need relatively broad and even tracks (minimum 1 metre width).

Summary of advantages: more stable than bicycles and thus suitable particularly for older people and those who find conventional cycling difficult.

Likely potential in the study villages: low in the short term, because of low availability and related likely high cost. (N.B. In an IMT ranking study in the villages in 1997-8 there was widespread interest particularly among older women in a tricycle cart, but the availability of tricycles and spares would have to be much increased before their introduction as a sustainable IMT is viable.)

4.5 Motorcycles

Indicative characteristics across low-income countries: cost price \$900, load 100 kg., speed 40-90 km/hr, range 100 km (all highly approximate, source: Riverson and Carapetis 1991:9, Starkey 2000:12) .

Ghana cost (new)October 1999 (Tengey et al): 125 hp: 7-9 million cedis, 350 hp: 9-10 million cedis. May 2000: 1000\$ (Indian Radjoot model)

Days required to achieve equivalent earnings at the official minimum wage of 5,500 Cedis: 1636 days (125 hp @ 9million cedis, though note that rural earnings are probably at almost half this level.)

4.5.1 Motorcycle sales in Ghana

Motorcycles may offer another approach to provision of relatively cheap transport, given their relatively low capital and running costs. However, as Starkey et al. (2001:24,41) point out, motorcycles are generally associated with urban and peri-urban areas - i.e. commonly richer areas with relatively high population densities.

In October 1999 a 125 hp new motorbike cost 7-9 million cedis in Ghana, by comparison with a new saloon car at 20-50 million cedis (and second hand at 1.5 - 2 million as opposed to 10-40 million cedis from a car dealer, Tengey et al 1999). There are a number of dealers located in major urban centres. Adarkwa et al. (2000) note that Japan Motors is the most active dealer, importing and assembling a range of CDK (completely knock down) Yamaha motor cycles. A small study in Kumasi by Seini in 1998 found that the majority of motorbikes on sale were second-hand and that the dealers were supplying Ivorians as well as Ghanaians. Motorbike sales in Accra have expanded substantially in recent years. One dealer in Accra, for instance, had sold 4000 in the last two years.

4.5.2 Motorcycles in southern Ghana, northern Ghana and Burkina Faso

Motorcycles are not commonly encountered in southern Ghana, perhaps in part because of the high cost of imported machines (increased by the imposition of VAT- see Tengey et al. 1999:41). Howe and Barwell in their 1987 note a much higher incidence of motorbikes in northern than southern Ghana: at that time the three northern regions contained about 19.4% of the population, but had 35% of the motor cycle stock. Indeed, 47% of all vehicles in the northern regions were motorcycles. Howe and Barwell attribute this in part to the motorbike as a logical extension of the bicycle's popularity in the north and to the proximity of Burkina Faso where motor cycles are popular and from which they could be imported unofficially relatively easily. In Burkina Faso mopeds are commonly used in urban areas; in rural areas they may be used mainly for long distance social visits which are too far to undertake by bicycle (Dennis n.d. 1999?). Barwell (1996) found 33% of households in his Dedougou study area in Burkina Faso owned a moped.

There has been some effort to promote motorcycles in northern Ghana through the NGO Riders for Health which worked with the Ministry of Health in the 1990s in a programme of support to ministry outreach staff who use motorcycles (see sections 2.4 and 5.2.4). Training in safe riding and preventive maintenance are crucial to successful adoption of this mode of transport (Scholten 1997).

For the most part, motorcycles are likely to be seen as status symbols by men and, if used by them to transport goods to market, could remove control over market income from women (Doran 1990:34, and see section 5.2).

4.5.3 Motorcycle assembly in Ghana

Howe and Barwell (1987) referred to the local assembly of motor cycles in Ghana from imported Completely Knocked Down kits from Yugoslavia by the Tomos company in Kumasi, which opened in 1973 as a 50:50 venture between the Yugoslavian company and the Government of Ghana. In 1987 there was low demand for Tomos motorcycles apparently

because of their poor reputation for reliability. Spares for all types of motorcycle were also in short supply. The Tomos factory appears to be no longer operating and motorcycles are now generally imported - at least officially - through agents in Accra/Tema. Nonetheless, they view the motorcycle and sidecar as the best prospect for improving rural short-haul goods and passenger services in Ghana, particularly on routes where road conditions are inadequate and/or demand insufficient to support regular conventional motor services (ibid. 104-5)

4.5.4 Use of motorcycles by government staff in Ghana

The Ghana Ministry of Health has utilised motorcycles in its outreach work for many years (see sections 2.4 and 5.2). The Ministry of Agriculture is also apparently currently introducing motorbikes in conjunction with the NGO TRANSAID. This ministry has provided extension staff in the past with motorbikes too. A woman vet extension officer interviewed in October 2001 in Upper East purchased her first motorbike in 1991 through her salary: it took her 3 years to pay. In this region there are quite a few women extension officers (mostly from other regions of the north) riding motorcycles, and she reports that they experience no disapprobation from local people.

4.5.5 Motorcycles and motorcycle taxis in Nigeria and relevance for Ghana

Experience in Nigeria suggests motorcycles can have substantial impact in both rural and urban areas. Guyer's study of the Ibadan hinterland in Nigeria (where environmental conditions are not too dissimilar from Ghana's Central Region) observes the success of motor cycles among farmers in the early 1980s as both a farm to farm transport mode and for farm to market trips (Guyer 1997:88-89). This innovation was spontaneous, occurring without subsidies or credit. Subsequently, motorbikes have expanded dramatically in a number of other rural areas in Nigeria such as the Jos Plateau, in that case as a result of money being available from vegetable production (Porter 2001). Motorbike taxi services are now common across urban and rural Nigeria and in many areas represent a significant new source of income diversification (Howe and Oni 1996, Chukwuezi 1999:39, Fasakin 2001). Thus, the motorbike has become a complementary component of localised transport systems in many parts of Nigeria in a way which would seem to have relevance for Central Region. However, presumably some arrangement would have to be made with the very powerful GPRTU (Ghana Public Transport Union) if motorbike taxi services were to develop. Fasakin (2001) notes the way the road transport union and the Okada sub-unions in Nigeria each charge fees to motorbike operators.

To date I am not aware of any cases of motorbike taxis being reported in Ghana (though see 4.2.7 for the case of a bicycle passenger service operating in Greater Accra region.)

4.5.6 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: high cost of machine plus running costs; servicing requirements; safety issues associated with speed; limited load carrying capacity, unless add sidecar or trailer. If add trailer the load may extend to 250 kg, but the range would decline to around 60 km (Riverson and Carapetis 1991:9). In Asian urban areas pollution from two-stroke engines is a growing public health concern, since their inefficient combustion leads to emission of unburnt hydrocarbons (Down to Earth, Jan 31, 2002).

Summary of advantages: speed enables long distance travel; good for hilly areas; relatively cheap by comparison with other forms of motorised transport (about 12 motorcycles can be purchased for the equivalent cost of one landcruiser), potential to add sidecar to improve load/passenger capacity, high prestige usually conferred by ownership.

(Riders for Health staff suggest that the Yamaha AG 100, and the Yamaha AG200 in hilly regions, are particularly suitable for use in sub-Saharan Africa because their chain is covered and protected so it doesn't wear quickly and there is also protection round the gearbox and engine. They have found that these cycles operate efficiently for 40-45,000 kms, compared to 12-15,000 kms for many other models.)

Likely potential in the study villages: low because of cost, unless some form of motorbike taxi service was introduced on the lines of the Nigerian *okada* services.

4.6 Power tiller with trailer

Indicative characteristics across low-income countries: cost price \$5000, load 1000-1500 kg., speed 10-15 km/hr, range 15-25 km (all highly approximate, source: Beenhacker et al. 1987, Starkey 2000:12).

Ghana 16 hp tiller cost October 2000: 20,500,000 cedis (tiller with trailer).

(but 12 hp tillers with accessories were available in October 2001 at the subsidised price of 15,000,000 cedis with accessories through MOFA Agricultural Engineering Services.)

Days required to achieve equivalent earnings at the official minimum wage of 5,500 Cedis:

3,727 days (at unsubsidised price, though note that rural earnings are probably at almost half this level.)

4.6.1 Power tillers versus tractors

Tractors are often used for carrying freight and transporting passengers, but this is subsidiary generally to their principal agricultural purpose. The two-wheel power tiller, however, may be used principally for transport. They are much cheaper to purchase than a tractor and have a single cylinder diesel engine which is easily detached and used for a variety of purposes: transport, ploughing, pumping water, threshing, power generation etc. The technology was developed in Asia, where tillers were already being produced by a number of companies by the early 1980s (Ayre and Howe 1982). Ellis (1997:13 citing Crossley 1986 and Cheesman 1990) observes that both tractors and power-tillers can provide good alternatives to conventional motor vehicles on poorer quality roads, especially over relatively short distances of less than 50 km.

4.6.2 Experience in Cote d'Ivoire

Tillers are used for pulling trailers in South Asia, but to a much lesser extent in Africa. Starkey (2001:9,44) refers to tillers (*katakata*) in Cote d'Ivoire being used for transport. They were imported into the country with Japanese assistance to aid rice production and were sold there on credit at a subsidised price. Interestingly, they are increasingly used by youths to transport goods and people, reportedly a profitable operation. A safety issue raised in the Cote d'Ivoire context, where many accidents have occurred, is the fact that their single headlight can be mistaken for a motorcycle at night.

4.6.3 Power tillers in Ghana

In Ghana the power tiller has become increasingly popular among farmers in recent years, apparently because of its multi-purpose potential, including transport. The power tiller barely figures in Hine and Barwell's (1987) review of IMT potential in Ghana, but according to Anchirinah and Addison (1998) the power tiller is the most preferred IMT by farmers and farmer groups throughout the country. In Tengey et al.'s (1999: 46) study, power tillers are considered to have greater appeal than other IMTs in the coastal and forest zones due to the status appeal of motorised transport in those areas.

In the recent VIP pilot project, there was much interest among farmers in acquiring power tillers, partly due to their versatility (SelfHelp Ghana 1999:13). Forty-two power tillers were purchased under the pilot, most of which went to groups. Success of the innovation largely appears to have depended on the nature and cohesion of the group, itself a function of the group's origins (see sections 5.4.5- 5.4.8).

4.6.4 Purchase cost and other constraints in Ghana

Anchirinah et al (2000) report in their survey of 510 Ghanaian farmers that lack of capital was the most important constraint on purchase of the power tiller. Other constraints included poor roads and inadequate knowledge of equipment use and maintenance

4.6.5 Group farms as a means of meeting purchase cost in the VIP

Group farms of 2-5 acres were encouraged as a means by which groups could help pay for their tillers in the VIP scheme, but these do not seem to have been particularly successful, though whether this was due to inadequate attention rather than the stated causes of failure (e.g 'the rains failed' at Dawa) is unclear. Inputs for the farms were reportedly provided by the district administrations through the Common Fund (poverty alleviation fund). Although the pilot insisted on groups, a few tillers went to individual wealthy men.

4.6.6 Income-earning potential

Because of the cost of the power tiller, it appears that the tiller is frequently hired out for long periods at least in the early stages of ownership, in order to cover the cost of purchase. This was the case in the Greater Accra VIP project at Dawa in Dangbe West district which we visited and was similarly reported by Anchirinah and Yoder (2000) in the case of the Akete/Wurompo farmers group. According to Anchirinah and Yoder (2000:10), the power tiller has been most successful in villages where conventional transport services are poor and thus there is ample opportunity to earn income from goods transport services. In the case of the Dawa group, we found the tiller was used for carting in the village, but was moved to another village, Asutsuare, where it had remained for 4-5 months, and was used there mainly for ploughing. The group recognised that the tiller would wear out more quickly if it was used principally for ploughing, and were keen to return to carting once they had earned sufficient money to pay back the loan. According to Forster Boateng (SelfHelp Foundation) ploughing can ruin the tiller transmission box: the best return is on stationery power applications. At another village near Kumasi (Nyankwakum, Atwina district) where a tiller was obtained under the VIP pilot, we found the tiller is used mainly for carting and our discussions with the village committee suggested they made sufficient money with the tiller just from this activity. In this case the village is a major cocoa producer and the trees prevent use of the tiller for ploughing. Power tillers are now quite commonly seen in the suburbs of Accra being used to cart water: some have specially adapted carts. In some villages SelfHelp staff report that the tillers are sometimes used as ambulances.

4.6.7 Repairs, spares and maintenance

A crucial issue with the power tiller is availability of spare parts and repair services. In the VIP pilot, supplies for the Daedong power tiller were difficult to obtain and expensive (due to cedi depreciation) (Anchirinah and Yoder 2000:11). This was reported by both power tiller groups we interviewed in Dangbe West and by other individual owners interviewed in the coastal zone in R7575. There are now other (Chinese, Korean and Japanese) power tiller makes available in Ghana, but all parts are expensive. SelfHelp set up four satellite service

centres and young men from participating villages were selected to undertake a 2 week residential training course. An environmental issue related to servicing is disposal of oil at oil changes. When we questioned the VIP power tiller group near Kumasi about this they said they simply throw the oil on the ground.

4.6.8 Gender issues and power tiller operation

The power tiller groups under the VIP pilot were required to have 5 people in their machine committee, including a minimum of one woman who was to be chair or treasurer. This committee was trained on the farm on the basis that they could then train others, and also schedule the machine use, keep records and organise repairs.

All the power tillers we have encountered in coastal Ghana are driven by men, though women were usually members of the group (as required by VIP and MOFA), 'because women can't drive' (Informant, Dawa power tiller group, Dangbe West). One of the District officials told us, power tillers are 'mainly a man affair.. women won't have the courage to go in for it. Apparently the VIP pilot tiller groups did not include one woman driver despite efforts to involve women in the groups.

4.6.9 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: cost of purchase, spares and running costs; requires driving skills; needs regular servicing from a competent mechanic; safety issues especially re travel at night; high insurance cost; currently nearest repairer for coastal zone is Accra or Kumasi; may be less attractive to women because of cost etc. In Ghana there seems to be some confusion about the status of power tillers re registration licensing category in rural areas (tractor or motorbike): responsibility for registration of the tillers in the VIP pilot was disputed (between the supplier, AFCO, and the implementing NGO SelfHelp) and was apparently never sorted out. SelfHelp recommended that VIP undertake the registration of tillers in bulk in the main phase of that project.

Summary of advantages: multipurpose; relative speed, load carrying capacity, increasingly common in Ghana so spares, servicing etc. likely to be available; positive (status) perceptions as a motorised IMT.

Likely potential in the study villages: purchase cost is probably the main inhibiting factor, but distance (and associated cost) from mechanics and spares could be a further issue.

4.7 Animal drawn carts

Indicative characteristics for donkey carts across low-income countries: cost price \$300, load 400 kg., speed 2- 6 km/hr, range 15 km (all highly approximate, source: Beenhakker et al. 1987, Starkey 2000:12) .

Donkey and cart 1999 (Tengey et al.): 250,000

Donkey and cart Accra, March 2000: 900,000

Tamale cart March 2000: 500,000 cedis

Kumasi cart (made from scrap) March 2000: 200,000 cedis

1 pair bullocks, Accra, March 2000: 1.6 million cedis excluding cart and implements

Ghana cost December 2000:

4.7.1 Experiences with animal drawn carts in sub-Saharan Africa

One of the most successful IMT innovations reported in sub-Saharan Africa to date is the improved ox cart made with steel axles introduced into north-west Zambia (Starkey 2001: 20). Other recently reported successes include the expansion of locally produced ox carts

over the 1990s in Gokwe district, Zimbabwe: this appears to be related to trade liberalisation and the expansion of cotton production (Pederson 2001). Donkey transport has also expanded considerably in many areas of Africa, such as the West African Sahel, due to the donkey's ability to withstand drought, in the context of changing environmental conditions (decreased rainfall, less dense vegetation) (Noyes 1999; Starkey 2001: 28).

4.7.2 Donkey cart production in Francophone West Africa

The SISCOA factory in Senegal designed and produces a simple donkey cart in the 1960s which has had 'a major impact on the rural transport sector in much of West Africa' and similar carts are now produced in other Francophone countries (Noyes 1999:6). Originally, dissemination was encouraged by widespread subsidy and credit, but even after these were cut the cart continued to be successful because of its simple design and the ease with which it could be repaired. Thus in Mali, for example, approximately 10% of rural households own an animal cart (mostly donkey-drawn). Although the carts are expensive they have been affordable through various NGO and cotton parastatal credit schemes. The simple carts, built on the same design principles across the region, have achieved a critical mass of demand sufficient to support spare parts and repair services across many rural districts. In a small Burkina Faso study relatively low ownership of donkey carts compared to cycles was attributed partly to cost (\$320 compared to \$106 for a Chinese bicycle), partly to limited demand for carriage of large loads, the priority given to bicycles and the practice of neighbours loaning carts: there was no difficulty in finding carts which are made by local SMEs (Dennis n.d. 1999?). In Burkina Faso donkey carts are commonly operated by women, but in northern Ghana this is much less common. For instance, women operate carts just north of Upper West Region in Burkina Faso, but are rarely seen with them south of the border (Rachel Flanary, pers. comm).

4.7.3 Cultural and other constraints on animal traction

There are various practical and cultural issues to be considered when looking to introduce animal traction. For example, there are still animal health considerations, particularly in wetter areas which remain, to an extent (as in the case of Gomoa, according to the DCE), tse-tse infested, and there are cultural issues regarding acceptability of animal husbandry and the potential for women to be involved in animal traction enterprises. Most animal traction in Africa is supervised by men. Since donkey ownership usually lacks prestige, Starkey (2001: 3) suggests their adoption by women could become socially acceptable. Mahapa (2000), for example, notes that the widespread operation of donkey carts in Northern Province, South Africa is mostly conducted by men and boy children, though women are not prohibited from driving carts.

Another issue relates to animal welfare. In an experiment with donkey panniers in the Makete Integrated Rural Transport Project (Ayre and Malmberg Calvo 1988) it was concluded that the most serious constraint on effective donkey use was lack of knowledge of donkeys and consequent ill-treatment.

4.7.4 Animal carts in northern Ghana

Animal drawn carts are common in the Northern Region of Ghana, where they are used for a range of purposes including carrying passengers, firewood, farm produce and for visiting markets and social events (Adarkwa 1989 cited in Buabeng et al. 1995). Donkey drawn carts are particularly common. An implement factory to produce carts (Tamale Implement Factory) was set up in Tamale with German technical assistance in 1982. It initially focussed

on ox-carts but swapped emphasis to donkey-carts due to local demand (Howe and Barwell 1987: 79). Donkey carts are also now produced at the University of Legon's agricultural research station and at Kumasi's Suame Magazine. Kumasi manufacturers make carts from local materials and apparently can produce a cart in around 3 hours (4 people working on it). They sell their carts mostly to farmers from northern Ghana and Burkina Faso (Seini, pers. comm. 1998).

4.7.5 The University of Ghana's animal traction programme

The University of Ghana Agricultural Research Station near Accra has had an animal traction programme since 1985. The programme was initially supported by German assistance, but since 1995 has been run by the university, supported by MOFA Agricultural Services Department. In 2000 they had 51 donkeys and three pairs of oxen and were selling on average 10 donkeys per annum, purchasers coming from both southern and northern Ghana. The programme offers free training courses for the animals and their drivers. Carts are also manufactured for sale. There are apparently no problems with tsetse in Greater Accra region (though minor problems apparently exist in Central Region). The programme used to make follow up visits to participants but no longer has funds for transport. Because of funding shortages it only trains around 10 farmers now per annum instead of the previous 50. Despite the presence of this programme, there are very few farmers using donkeys in the Greater Accra region. (Interview, Mr Sawyer Ndamele, university farm).

4.7.6 The VIP pilot and animal traction

In their baseline survey for the VIP pilot phase, Anchirinah and Addison (1998) noted strong negative attitudes to the donkey in the coastal savanna and forest areas of Ghana. Nonetheless, they suggest that education will reduce overcome fears of the donkey in the south and 'by and large, the donkey cart will be the most sustainable form of technology, since that will require the least foreign exchange component'.

Subsequently, in the VIP pilot, single axle donkey carts were introduced in Ashanti and Brong Ahafo regions. According to Anchirinah and Yoder's review, this was a successful innovation. The carts were being used regularly, principally to convey produce from farm to house and for transport services for customers but also for hauling water and firewood, garbage collection and ploughing. Fear of donkeys which had been identified as a constraint in the project baseline survey seemed to have been overcome, they suggest, in the pilot phase.

SelfHelp Foundation, which has worked with the university farm on provision of donkey carts for the VIP pilot, reports that the farmers buy cheaper single axle carts and then overload them, so that the weight on the donkey is excessive: the more expensive double axle carts would be preferable even when working with just one donkey. Under the VIP pilot about 20 carts were in operation (c. 4 in Ashanti Region, 3 in Greater Accra, the remainder in Brong Ahafo and the north.) Most carts for the VIP pilot came from Swame Magazine in Kumasi where they are made by local artisans because these were the cheapest. The university had limited capacity to make more than a few carts and the carts from Tamale (Implements Factory) were apparently too expensive.

SelfHelp found very negative perceptions of the donkey carts when they began the pilot, among farmers who 'said it was for the north' (Forster Boateng, Self Help Foundation). However, two farmers took them and subsequently there has been more interest: 'they just need a lot of education'. In an interview with one of the two donkey owners (at Atwim

Agogo near Kumasi) we discovered that the donkey adopter - a relatively wealthy man - had in fact lived in Burkina Faso, and his father was Burkinabe. His donkey was in excellent condition and in use two to three times every day for water collection and also to collect harvested oil palm produce from the farm. He said that although one of his daughters could work the donkey, it was mostly his sons who did so. He observed that 'people want it [the donkey and cart] but don't want the job of keeping and feeding it'. The other adopter was reportedly an ex-serviceman who saw donkeys at work in Kenya.

4.7.7 Low levels of animal traction in southern Ghana

Throughout southern Ghana animal traction is rare, and there is little tradition of animal husbandry. In the forest zone this is, in part, due to the prevalence of tsetse fly and other diseases which affect animals. It is argued that tsetse has declined with land clearance, but resistance to animal husbandry clearly remains strong. VORADEP tried to promote animal traction (ploughing) in Volta Region without success (Howe and Barwell 1987:77).

4.7.8 Perception of draught animals in the study villages

In the study villages during the R7149 project men were asked about the potential value of draught animals. The donkey cart was generally dismissed as being totally unsuitable for use in southern Ghana. A male car owner and large farmer interviewed at Sampa observed with reference to the donkey cart, 'That would be no use. These things are used in the Saharan area, no one could use it here. Noone here is trained to cater for these types of animals'. At Aworabo in Assin we were told about an experiment three years previously when the Cocoa Research Station brought a cart drawn by a 'cow'. It was used to transport cocoa to the fermenting point. According to villagers two of the four cows purchased died, and the other two were sent away. When we followed this story up at the Cocoa Research Station, we were told that they had introduced two bullock-drawn carts, each drawn by two bullocks, but the terrain was found to be too rough and the carts overturned frequently. The Animal Research Institute at Achimota was thought to have introduced the experiment. They helped instruct the Cocoa station workers about how to look after the animals, which had been brought down from Northern Region. Apparently there were also problems because the bullocks ate the young cocoa pods on the trees. After one year the experiment was brought to an end, two of the bullocks were eaten and two sent back to the north (Porter 1999). Thus, not surprisingly, when the district administration in Assin Fosu solicited interest in donkey carts in the district as a potential part of their VIP district proposal, they reported absolutely no success: no community wanted one: 'It is a question of animal husbandry'.

4.7.9 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: needs animal husbandry skills

Summary of advantages: capacity for moving heavy loads (greater payload capacity than any other IMT of similar cost), versatility of animals for other (e.g. on-field) work,

Likely potential in the study villages: low, because of lack of animal husbandry skills and associated cultural inhibitions. In time these might be overcome, but any programme would require enormous investment in training.

4.8 Wheelbarrow

Indicative characteristics across low-income countries: cost price \$30, load 100 kg., speed 3-5 km/hr, range 1 km (all highly approximate, source: Beenhakker et al. 1987, Starkey 2000:12).

Ghana cost October 2000: 200,000 cedis

Days required to achieve equivalent earnings at the official minimum wage of 5,500 Cedis: 36 days (though note that rural earnings are probably at almost half this level.)

4.8.1 Wheelbarrow types

Doran (1996:30) notes the two main types of wheelbarrow: the conventional 'Western' wheelbarrow with a relatively small diameter wheel and the 'Chinese' wheelbarrow with a larger wheel under the barrow which takes the load and thus requires less effort to push, though it can be more difficult to manoeuvre with a heavy load. However, the maximum load for a Chinese barrow is c. 180 kg, compared to 120 kg for the Western type (www.gtz.de/gate/publications/BicycleManual/brm/rura/ayrehowe/ru_ayr1.htm).

4.8.2 Wheelbarrows in southern Ghana: types and usage

In southern Ghana villages 'Western' wheelbarrows are the common type and seem to be used mainly for within village transport of construction materials, rather than for agricultural purposes, though they are occasionally used to move produce within the village. In Accra wheelbarrows are reportedly hired out - mainly for construction purposes. Barwell (1996:33) similarly finds the main use of wheelbarrows in 5 study areas in Burkina Faso, Uganda and Zambia to be transport of materials for brick-making (including water) and house construction. In Tamale and Kumasi metal wheelbarrows can be seen being used by hawkers as mobile stalls for groceries.

4.8.3 Potential for the Small Farm Vehicle type

Howe and Barwell (1987:93) in their review of IMT potential in Ghana put particular emphasis on the single wheeled device they term 'the Small Farm Vehicle' (a version of the wheelbarrow with improved load distribution over the wheel, instead of behind it to increase energy efficiency) for transporting goods over short distances in rural areas because of its facility of operation on unimproved infrastructure. However, locally constructed wheelbarrows of the Small Farm Vehicle type tested in Tanzania in the Makete Integrated Rural Transport Project (Ayre and Malmberg Calvo 1988) were not particularly successful in some locations, partly because the source of the two most important perceived loads, water and firewood, were often too difficult (rugged topography) and distant to reach with a wheelbarrow. One conclusion reached in this study by villagers was that a two-wheel barrow would be more stable and thus more useful.

4.8.4 Positive experience with wheelbarrows in Zimbabwe and northern Nigeria

One study where very positive assessments of the wheelbarrow were found relates to Zimbabwe. Here wheelbarrows were found to have widespread use for a range of subsistence needs by both men and women, particularly among wealthy households. The wheelbarrow is often used first for construction purposes but is then as a general load carrier among wealthier households (Mannock Management Consultants and ILO 1997).

In northern Nigeria's Jos Plateau, the wheelbarrow is used extensively on irrigation farms for transporting inputs (Porter 2001).

4.8.5 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: possibly low status (for men), limited range and speed, limited load capacity.

Summary of advantages: low cost, ease of manufacture locally, easily and cheaply maintained, can be used on unimproved narrow paths, SFV can provide 3-5 times the load capacity of headloading at same speed, unlikely to be constraints on use by women.

Likely potential in the study villages: some potential, especially for women re movements of produce associated with preliminary processing in and close to the village, e.g. possibly cocoa in Assin district, cassava in Gomoa.

4.9 Two wheeled hand carts

Indicative characteristics across low-income countries: cost price \$60, load 100 kg., speed 4 km/hr, range 1 km (all highly approximate).

Ghana cost October 2000: 800,000 cedis (cost of prototype)

Days required to achieve equivalent earnings at the official minimum wage of 5,500 Cedis: 145 days (though note that rural earnings are probably at almost half this level.)

4.9.1 Positive views of carts in R7149 and subsequent prototype development

These carts are not generally available in Ghana. They are generally lighter, but more difficult to load than the four wheel push trucks currently in use. In the R7149 study villagers were asked to rank a set of photographs of IMTs, including a photograph of a 2-wheel handcart with a large mesh container shown being pushed by an African woman (see Appendix 2). Women were extremely interested in this 'kencart' and often ranked it as the most useful IMT, potentially helpful for taking produce to the nearest road junction etc. Consequently, GRATIS was commissioned to make a version of the kencart, using drawings of a pushcart provided by Mr Ron Dennis of IT Transport. The cart was eventually constructed and then tested by a group of women in one of the survey villages. In February 2001, during the first weeks of its trial, it was used mainly for carrying water from the nearest water point (about 2 kms from the village) and, possibly as a result of overloading, has had many problems with punctures. A variety of tyres were experimented with. The original strengthened wheels made by GRATIS were unsuccessful and were eventually replaced by ordinary bicycle tyres. The cart has been used for water collection by men as well as women. Further details on this experimental cart and the tyre/rim issue will be made available in the Final Technical Report.

4.9.2 Tyre problems on the hand cart and other IMTs

Tyres often suffer numerous punctures when used on IMTs in rural areas, for a number of reasons: most tyres are designed for use on smooth tarmac roads, the tyre/rim specification on IMTs tends to be below that used in engine-powered vehicles and the tyre is often a worn tyre with a much repaired tube (Muckle 1997). In East Africa there has been recent work to develop solid tyre technology: discussions are in progress between our collaborators at MOFA Agricultural Engineering and a linked CPHP IMT project in Kenya to extend studies to Ghana.

4.9.3 Summary of advantages, disadvantages and potential in the R7575 study villages

Summary of disadvantages: possibly low status (for men), limited range and speed, limited load.

Summary of advantages: light and manoeverable, relatively low cost when made in larger numbers, could manufacture locally, can be used on unimproved narrow paths, can provide

about 6 times the load capacity of headloading at same speed, unlikely to be constraints on use by women.

Likely potential in the study villages: some potential, especially for elderly women, if cost is reduced by bulk manufacture. * n.b. a decision was made to offer this cart to villagers at the same price as the Kumasi four-wheeled push truck, although individual carts manufactured by GRATIS cost double this sum. Were the cart to take off, it could be produced in large numbers by informal sector artisans at Swame Magazine in Kumasi for a far lower price than currently being charged by GRATIS.

5. FACTORS INFLUENCING IMT ADOPTION

5.1 Introduction

Despite the numerous IMT schemes which have been implemented in sub-Saharan Africa, remarkable little sustained monitoring and evaluation has occurred (one of the reasons behind R7575). Although this may change, following the recent dissemination of M&E guidelines by the SSATP (Maramba and Bamberger 2001), there is, as yet, little detailed information of individual projects to show how and why they failed or succeeded. In this section I aim to review the main factors commonly seen as being likely to influence successful IMT adoption.

5.2 Cultural considerations in IMT adoption: status and gender issues

5.2.1 Men, women and IMT promotion

There is ample evidence of remarkably limited access to IMTs by women, which is often attributed to cultural constraints. However, the reality is often more complex. Anchirinah and Addison (1998) in their baseline survey for the pilot phase of the VIP in Ghana note, 'There is not a single taboo concerning the use of any of the IMTs [bicycle trailer, donkey cart, power tiller] in the study areas [which cover four regions of Ghana: Greater Accra, Ashanti, Brong Ahafo and Northern]. Both men and women can therefore use any of the IMTs.' This ignores possible, often interrelated, issues of status and gender relations which may complicate the adoption and use of IMTs in the short term. The VIP pilot review (SelfHelp Ghana 1999:10) suggests only a limited involvement of women was actually achieved in the project.

There is currently particular interest in promoting IMT use among women because of their disproportionately heavy transport burden, low income and often (associated) restricted access to motorised transport, and the tendency for men to be the main beneficiaries of IMT schemes (Bryceson and Howe 1993). Whitehead (1985 cited in Bryceson and McCall 1994) refers to the contractual inferiority of women which (like lack of access to land, credit and labour and inheritance patterns) affects their access to technology: the fact that they do not have the same opportunities as men to make connections with development professionals. Moreover, most development professionals - particularly in fields like transport - are strongly male-dominated. Although, to an extent this has changed, since the gender agenda is now high on the checklist for development professionals, and more women development professionals are being recruited, consultation of women - even by women - is often superficial and reduced since women are less likely than men to speak English/French.

There is also still a tendency to treat women as 'welfare objects' rather than 'decision-making actors' (Bryceson and McCall 1994). As Starkey (2001: 36) notes, 'there remains considerable inertia, gender-insensitivity, and even overt sexism among transport-related

organisations and within target communities.' And many transport policies, programmes and projects still commonly adopt a supposedly 'gender neutral' approach which assumes men and women will benefit equally from interventions (Maramba and Bamberger 2001:2). In some cases, even if women ostensibly obtain their own bicycle through a project loan in their own name, they may have only limited control over its use, as a study in Malawi emphasised (Edmonds et al. 1995, cited in Leyland 1996).

5.2.2. The implications of IMT interventions for women

Introduction of IMTs has important but complex implications for the gender division of labour. This is linked to the status gained by possession and use of the new transport equipment and to the mobility which IMT access implies. Traditional roles in transport may change once IMTs are introduced, with broader implications for gender relations in the village.

Men may retain total control of the IMT and use it only for their own purposes. This is hardly surprising given that men generally acquire IMTs for commercial purposes and not for domestic tasks. Thus, IMT ownership may result in no alteration in women's work loads or gender relations. In R7149 most bicycle owners did not let their wives ride their bicycles. And as one District Chief Executive put it, 'If you give [the bicycle] to the woman, her husband gets it anyway; if you give to the man, it's just his'. Doran's (1990:31) review of surveys by IT Transport (1990), which covers farm to village as well as village to market centre travel in Ghana, suggests women seem to have greater control over low status transport like donkeys and wheelbarrows than over bicycles.

One question raised by Bryceson and McCall, regarding IMT use by women for non-market tasks such as water collection and journeys to the grinding mill, is whether these usually exclusively female activities have important social companionship benefits which women would not wish to forego through adoption of IMTs. The answer may well vary substantially, of course, both within and across communities and regions.

Another issue is whether any one individual IMT will adequately serve women's commonly diverse work pattern and multi-tasking (Ellis 1997:10). It may make more sense for men to purchase an IMT because the range of tasks they undertake is more restricted than women's and is thus more likely to be adequately served by a single IMT type, such as a bicycle. Again, this is an issue which will be reviewed in R7575.

Like many forms of technological change, the impact on women may be not merely neutral but negative (Jiggins 1986, cited by Howe 1989). One situation where IMTs are reported to have marginalised women is in Mali where men's use of donkey carts changed the marketing system and women became relegated to local marketing only (Ruthven and Kone 1995, cited in Starkey 2001: 19). Another negative impact is recorded by Mahapa and Mashiri (2001) in Northern Province, South Africa, where men using animal drawn carts collect wood for sale. The commercialisation of firewood assisted by the carts has placed increased demands on women's labour time for domestic fuelwood collection. And when fuelwood collection is commercialised, women may have to walk even further to obtain their domestic requirements, as traders are likely to monopolise the most easily accessible sources. This is a potential issue which is being monitored in the R7575 survey villages, particularly Abora where fuelwood is collected for sale. IT Transport (1996:32) suggest that it may be necessary to design different types of intervention - possibly including different types of

IMT- targeted at different strata of beneficiary, in order to avoid sharpening polarities in income distribution.

Where the IMT introduced has high status, transport services traditionally undertaken by women may pass to men. Bicycle trailers in Northern Region were appropriated and used mostly by men and in some cases transportation of rice and water previously undertaken by women thus became a man's job (Buabeng et al.1995). SelfHelp Foundation has observed some redistribution of tasks from women to men in its VIP pilot where power tillers have been introduced. In an M&E Institutionalisation study for the VIP pilot, it was observed that 'The IMT will also create job opportunities for young males in the transport business' (RICU M& E Unit, reported by Freyhold 1999: 3/4). The potential impact of this on women was not considered. In Nigerian Hausaland bicycles and motorcycles "have dispensed with the need for women to carry food and water to men working in the fields: men now return to eat and rest in the village at midday" (Robson 2000). Such change may be beneficial if it means a reduced transport burden for women, but there can also be disadvantageous aspects for women if they lose control over activities such as produce movements to market, if they lose income from portage or simply lose just reasons for travelling beyond the confines of the home. Booth et al 2000 cites one of the IFRTD 1999 case studies of tribal women in Bihar who have lost control over sale of forest products. Regarding loss of income from portage see Doran 1996, cited in Booth et al. 2000 for the case of women fuelwood carriers in Addis Ababa. Robson (2000) illustrates how transport developments can support wife seclusion in the Moslem Hausa context.

Howe emphasises that whether women benefit or not depends on how widely the IMT is distributed (scarcity conveys status) and the manner in which it is introduced. There is a growing literature which points to the advantages women can gain from access to IMTs in economic, social and even political terms (see for example studies by Chingozho and Rao in IFRTD 1999). The literature suggests there are both practical and strategic advantages. At the strategic level, improved transport can positively influence gender relations by increasing women's asset base and mobility, with knock on impacts on education, health and political participation, as Noyes and Fernando illustrate by reference to a Kenyan example where women started using donkeys to fetch water (cited in Fernando 2000).

5.2.3 Status issues in southern Ghana and Zambia

Tengey et al. (1999) refer to a prevalent view concerning lack of status of IMTs like the bicycle in the forest belt and coastal savanna of Ghana. We found in discussions on this issue that certainly among urban Akans, 'a bicycle makes you low status'. A Chinese informant in Accra who finds the lack of interest in cycles remarkable observed, 'here they open their eyes and only see the car: it is different in China'.

IT Transport (1996:24) refer to a similar situation in Zambia where bicycles are regarded as inferior: a view they attribute to high aspirations which developed when Zambians were benefitting from the country's mineral wealth. In our survey of off-road villages in R7149, however, we found rather more positive attitudes, particularly among women.

5.2.4 Specific IMTs and their use by women (draught animals, trucks, bicycles, motorcycles)

IMTs involving draught animals may introduce various cultural problems: local customs and taboos forbade women touching animals in a Ghanaian bullock plough programme (ibid: 33).

In the case of push trucks there is an interesting issue around women's strength. Apt et al. (1998, cited in Booth et al 2000) refers to women's lack of use of push trucks in Accra markets as being possibly influenced by the 'brute strength' needed to push a truck. This is intriguing, given the dominant role women play in head portering of heavy loads which requires enormous strength: as they suggest, untangling practical difficulties and gender stereotypes is not easy. This is an issue being pursued further in R7575.

There has been some debate in recent years about women and bicycle riding (for example discussions on the GREAT network) and the difficulties of women - particularly women in traditional dress - riding men's bicycles (i.e. with a cross-bar) which are often more widely available and tend to be stronger than women's bicycles. Malmberg-Calvo (1992) describes the constraints on women in eastern Uganda, for whom to ride a bicycle is to be 'acting like men'. Salifu (1994) implied that in northern Ghana the lack of success with the bicycle trailer among Moslem women can be partly attributed to the failure to provide women's bicycles.

It is not just a matter of propriety re dress and posture (sitting with legs astride): there may also be the issue of women's being shouted at or hooted at by drivers of motorised vehicles, which places them in a situation of shame (Apt et al 1998 re urban Accra, cited by Booth et al. 2000). However, a recent review of a literacy project in a Tamil Nadu district which included a successful mass campaign on cycling for women - over 50,000 women learned to ride a bicycle within a few months - describes how women took to riding men's bicycles, still wearing their saris: 'The women have all got used to riding gents bicycles, and in fact now feel that it gives them better balance while carrying a load' (Nitya Rao, in press). On a smaller scale, there is anecdotal evidence of a large increase in women riding bicycles in northern Ghana. According to a project officer of Amasachina in Tamale, prior to 1980 when NGOs started to train women to ride bicycles, virtually none in the north cycled (reported in White et al. 2000). White et al. also suggest that where more than one bicycle is owned per family, women's usage is 'dramatically increased'. Further information on women and bicycle riding is provided in section 4.2.9 and 4.2.10.

Motorcycle riding by women has faced similar problems in Ghana. Women staff in Ghana's Ministry of Health were initially very resistant to the idea of riding motorbikes so Riders for Health brought in a woman trainer from Lesotho in 1993. The trainer reportedly overcame resistance in northern Ghana and Volta Region. Resistance among women in southern Ghana was stronger but eventually overcome by implementing a training programme in southern Ghana with northern Ghana women trainers (interview, Saaka Dumba, Ministry of Health, Accra, February 2001).

5.2.5 The need for consultation, demonstration and observation

While cultural conventions may change it is important to consider potential problems when introducing innovative forms of transport. There is still very little data on the impact of low-cost transport on women and Doran makes the point that, in looking to improve conditions through transport and non-transport interventions, it is important to consult women themselves, a point which is now regularly made by IMT specialists (see eg. Starkey 2001: 3), though implementation on the ground is not yet much in evidence.

Bryceson and McCall (1994) also emphasise the importance of detailed observation and analysis of women's work over a period sufficiently long to encompass seasonality: the need for understanding rather than 'just more statistics' on their labour time, physical effort and

multi-tasking: 'At present the complexities of African women's working day are still largely uncharted territory'. An important point to add to this is the need to appreciate the heterogeneity (by age, occupation, marital status, position in the household, etc.) of women within individual communities in Africa and their different roles, opportunities and responsibilities (Warner et al. 1997). Such factors will probably have important influence on their potential to adopt IMTs.

Moreover, innovative forms of transport have to be demonstrated so that people can see their usefulness (Doran 1990:39): pilot projects will need to be established more widely - and credit schemes put in place - if uptake is to be rapid. This may be particularly important in off-road contexts, since populations here are arguably less regularly exposed to new experiences and practices and the conservative influence of customary authority patterns is greater (Platteau 1996).

5.2.6 The importance of marketing and promotion

It seems feasible that effective marketing and promotion can do much to raise the status of IMTs and could reduce cultural barriers. Crossley (2000: 2.1/12) cites the case of Burkina Faso which has relatively high IMT ownership and use, despite being one of the poorest countries in the world - donkey carts, bicycles and mopeds are all widespread, albeit used principally by men. He attributes bicycle popularity there in part to its promotion in the colonial period: they were apparently used by French missionaries and heavily promoted by a French marketing agency. Since the establishment of a Peugeot bicycle assembly plant in 19964 there has been further active promotion which is apparently still ongoing due to increased competition from Indian and Chinese imports. A current campaign in rural areas uses lights, music and entertainment. Starkey (2000: 37) argues that critical mass can do much to aid IMT adoption, also utilising a Burkina Faso example: he argues that women in Ouagadougou, the capital, now found it quite easy to ride there, 'for there are thousands of women cycling every day. A critical mass of adoption already exists.' This is developed further in section 5.12.

5.2.7 The role of public education components in technology projects

Bryceson and McCall (1994) emphasise that cultural restrictions should not be considered 'brickwall obstacles': they suggest public education components in technology projects which challenge cultural attitudes barring women's access to technology and positive gender discrimination.

Bryceson's stress on the advantages of spreading innovation through rural unmarried teenage girls who have more time to participate in training appears to have particular potential in the case of cycling.

5.2.8 Recognising heterogeneity: local solutions for local problems

To conclude, quasi-cultural factors such as extreme conservatism and risk aversion may in some cases explain limited demand for IMTs in sub-Saharan Africa (ITTransport 1996:10). Although these and other cultural factors - notably status and gender issues - may be relevant to slow rates of adoption of specific IMTs by some groups in some African societies, innovations which are immediately perceived as beneficial tend to be taken up rapidly if funds/resources are available. But we need to know far more about which specific groups of women and men are able to take up new intermediate transport technologies and why. As Doss (2001) emphasises in a recent review of technology adoption by African women, we

must constantly bear in mind the complexity, heterogeneity and dynamism of African societies: "technology adoption and technology impacts depend on complex interactions that defy simple characterisations". Technology gender impacts will depend on many factors including individual men and women's varying access to labour, land and inputs. This does not deny the possibility of identifying factors which encourage or limit adoption of new technologies and the impact they will have within households and communities. But, ultimately, local solutions have to be found for local problems.

5.3 Economic considerations: questions of IMT capital cost, credit availability and income generation

5.3.1 IMT initial purchase cost in Ghana

This is a crucial issue. In Ghana cedi devaluation has had enormous impact on IMT import costs (and cost of spare parts) over the second half of the 1990s. Thus IMTs, including bicycles, despite their low status among urban elite groups, are generally not within the reach of the rural poor.

For women, with their generally lower purchasing power than men, the cost of an IMT represents a major outlay, a point made clear to us in Central Region during fieldwork in off-road settlements in R7149. One potential solution may be to make funds available to villagers through a related road maintenance programme, as was done in the case of donkey carts in the Tanga Animal Draft Power Project, where farmers were contracted to bring gravel to resurface the roads (Starkey 2001:38). Ghana is committed to a labour-based feeder roads programme, which suggests there would be considerable opportunity to inject money into village economies for IMT purchase. However, anecdotal information in Central Region villages collected in R7149 and R7575 suggests most labour-based contractors and their labour come from urban centres. Even in Accra, cycle owners tend to have to save for six to nine months or more before purchasing a cycle (Turner et al. 1996).

Howe (1994:7) notes the immediate positive impact on demand for bicycles when substantial reductions in retail prices were made possible by drastic *reductions on import taxes* in Ghana (and also in other sub-Saharan countries).

5.3.2 Credit availability

In countries like India, IMT adoption seems to have been aided substantially by private and public sector credit provision for IMT purchases (Philpott 1994). There are also a growing number of examples in Africa where uptake has been encouraged by credit provision, in this case mostly provided by targeted donor-supported programmes.

Crossley (2000: 2.1/7) found in central Malawi that demand for IMTs is severely constrained by limited availability of credit. In this region, the cost of a bicycle appears to be less than 2 months income, but there are apparently higher priority demands on household income: 'the main factor changing potential demand into real demand for ownership of IMT is the availability of credit'. The Pilot Integrated Rural Transport project, implemented 1991-6, set up a credit scheme and had over 2000 outstanding applications for credit for IMTs. Credit terms in that scheme were quite generous: 10-20% deposit, up to 3 years repayment for a wheelbarrow or bicycle and up to 5 years for an animal-drawn cart, and an effective interest rate of 10-15% p.a. A survey of IMT owners in the scheme suggested that provision of credit

was crucial to acquisition, though other factors, notably improvements to local infrastructure to allow use of IMTs were also significant (thus emphasising the importance of an integrated approach to IMT promotion.)

The high incidence of bicycles in Burkina Faso (approximately 75% of households owned at least one bicycle in one study area- see Crossley 2000: 2.1/8) has been attributed partly to availability of credit to rural households (Howe and Dennis 1993:12), though in a small survey in south-east Burkina Faso no IMT in the survey had been purchased on credit and it was reported to be very difficult to obtain credit for purchase of an IMT (Dennis n.d. 1999). Credit per se may not stimulate IMT adoption if the IMT being promoted is for some reason inappropriate or unpopular (as in the case of bicycle trailers in northern Ghana, or the attempt to introduce wheeled tool carriers in the Gambia - Starkey 2001: 30). Also, as Starkey (2001:30) emphasises, credit can distort markets for IMTs, resulting in a less appropriate and/or less preferred IMT being adopted because credit is available for that item.

Starkey et al. (2001: 49) observe that a cost-effective way of increasing access to credit targeted for transport technologies would be through cooperation between agricultural and transport agencies, so that resources from the transport sector are piggy-backed onto existing agricultural credit programmes. They cite the case of the Bank of Agriculture and Cooperatives in Thailand which lends for a variety of agricultural/transport machinery as a good model which could be expanded to include a range of IMTs.

5.3.3 Credit availability for IMTs in Ghana

In Ghana, some credit has been made available for IMT purchases, notably bicycles, by international development agencies. Howe and Barwell (1987:70), for example, refer to the World Bank RIC2 credit which was reportedly providing \$500,000 to import about 8,500 bicycles to the general public. The World Bank VIP pilot scheme focused on three different IMTs (see above, section 2.5).

Commercial credit for IMTs has been made available in a few reported cases. Howe and Barwell (1987:70, 75) cite one case of an experimental scheme for bicycle sales on credit by a private company, Kojo Bruce, in Accra, and White et al. (2000) refer to 'lay-away' purchases of bicycles at one of the main retail dealers in Kumasi. In Tamale, the Fatawu Bicycle Company sells cycles on credit over 6 months to salaried workers and to societies, but not to individuals who are not salaried. The repayment is split into 6 equal parts and interest charged at a surprisingly low 2% (field interview, October 2001).

White et al. (2000) emphasise that, in the few pilot schemes where bicycle loans were made available, repayment rates have reportedly been close to 100%, yet micro credit for cycle purchase is rare outside the context of these few pilot projects. They suggest that *susu* (traditional rotating credit, the majority of whose participants are women) is rarely used for bicycle purchase, though this statement probably needs further verification. In Teney et al.'s (1999) survey of 1000 villagers across Ghana of the 263 who owned IMTs, only 2.6% obtained them on credit: 78.8% purchased them from savings and 13.8% from remittance receipts or as a gift. However, in Accra, Turner et al. (1996) found many men had purchased cycles through traditional *susu* and other group saving systems, though *susu* saving was recognised to be vulnerable to loss through absconding *susumen*.

Those with formal sector jobs can more easily obtain credit from official sources than others for most purposes. The importance of credit availability for Ghanaian farmers and produce traders is a theme taken up in much recent literature. Sarris and Shams (1991:131) and Grieco et al (1996:120, citing Steel and Aryeetey) suggest interest rates for informal credit as high as 100% over 9 to 12 months.

5.3.4 Improving access to credit and banking facilities: gender issues

For women access to credit is generally much lower than for men (Baden et al. 1994), though in recent years the rapid expansion of micro-credit schemes in northern Ghana has brought small-scale credit to many more rural women. However, there are usually other calls on its use. In R7149 younger women had indicated that lack of credit was a major reason for not obtaining bicycles.

Difficulties for women in obtaining formal credit are particularly great, partly because of their low social status, partly because they lack collateral. Grieco et al. (1996:33) make the important point that lack of access to capital among women traders has consequences for the size of load generally transported and the frequency of trips made.

5.3.4 Repayment scheduling

Where credit is provided to women for IMTs *repayment scheduling* will need to be designed to suit women's income receipt patterns. Mosley and Hulme (1994, cited in Ellis 1997:17) suggest that loan instalments need to be collected weekly for effective credit schemes. This is certainly likely to be the case for women with tiny incomes. However, studies in R7575 indicate that repayment collection is particularly difficult to organise in remote areas at some distance from the nearest bank, since a village-based collector may not wish to keep large sums at home and cost/difficulties of taking transport to the bank are high. Externally-based collectors face similar transport difficulties.

In Upper East district, villagers who were provided with bullock carts through an IFAD scheme asked to make a down-payment and then the outstanding payment at harvest: they did not wish to pay in instalments. Repayment commitments need to be clearly stated: the villagers say they were shocked to find they were expected to pay compound interest: they were not, they said, told this when the equipment was introduced (field interview, Tarsaw village.)

5.3.5 Access to credit in remote locations

A World Bank/ASIP report on Ghana (1993) additionally observes that farmers in remote areas have particular difficulties in obtaining formal bank credit for setting up storage and processing activities (see also Hine and Riverson 1982). As Richards (1985:127) pointed out in the context of rural Sierra Leone, this is hardly surprising since loan recovery is more difficult from distant creditors and the costs in transport and staff time may exceed the cost of the loan. This is, of course, a particularly pertinent point with reference to creditors in off-road villages.

5.3.6 Diverse sources and cost of credit in Ghana

It is important to recognise the wide range of credit /finance used by farmers and others. A recent study of financial service provision and needs (Jones et al. 1997) provides important detail on current conditions. In the Winneba area of Central Region, for example, it indicates

that people in the fishing industry utilise a variety of different sources of credit including loans from moneylenders, friends, wives, in-laws, relatives, in addition to formal banks and susu (see below). Sources of loans to an extent depended on nature of the credit required, it being observed, for example, that informal sources were utilised where rapid access to credit is needed and limited collateral available, although the cost of credit is substantially higher and the lack of discretion of lenders is considered an additional disadvantage. Loans from friends, it was noted, could be extremely expensive: as much as 50% interest over a 3-6 month period (Jones et al. 1997).

5.3.7 Informal credit and its potential for IMT purchases

Informal savings and credit through rotating credit associations (susu) and more recently developed susu collector schemes are a common source of credit for people who cannot obtain access to formal credit across Ghana, particularly women (Duggleby et al. 1992). The value of such associations is now beginning to be recognised. Dennis and Peprah (1995), for example, note the way a wide range of organisations have started to establish credit groups similar to traditional susu in Techiman (Brong Ahafo). A new programme to strengthen the capacity of susu collectors in Ghana has been introduced under the auspices of the Micro-Finance Institutions Action Research Network and coordinated by TechnoServe. This will provide training for susu collectors (TechnoServe newsletter, February 1998).

Among many farmers and traders interviewed in R7149, susu was considered an unreliable method of saving. Aryetey and Aryetey (1996) and Jones (1997) similarly note lack of faith in susu, especially in rural periodic markets. It thus seems necessary to consider ways of improving the reliability of susu organisers, and to increase the opportunities for the rural poor, particularly women, to access some of the alternative routes to credit described above. Training programmes specifically focussed on potential women organisers might be one step forward.

5.3.8 Rural banks and credit access in Ghana

Nikoi (1996) considers the potential significance of rural banks which were established in Ghana in 1976, in response to the need and demand to make institutional credit and banking services accessible to small farmers and other small-scale rural entrepreneurs. They are community institutions, locally owned, controlled and managed by the people of the locality, mobilising resources from the catchment area (c. 20 miles radius) and on-lending to customers in the same area. The banks have been required to give a minimum of 50% of their loans and advances to agriculture, 30% to cottage industries, and the remaining 20% to trading, transport and other sectors. By 1994 there were 125 banks in existence: Central and Ashanti had the largest number of banks, with 22 situated in each.

Nikoi's work focuses on Akwapem in Eastern Region, but her conclusions have relevance for the current research in Central Region, notably the impact of reforms in 1988, which relaxed the sectoral allocation of loans and advances, and the decision in 1990 to pay salaried workers through the banking system: the latter, in particular, has 'opened to the bank avenues of extending virtually risk free advances to its customers. More and more of the bank's advances are going to the miscellaneous sector, the beneficiaries of whom are mainly workers whose salaries pass through the bank...agreed fixed monthly deductions are made from their salaries'. Few permanent off-road residents have jobs in the formal sector and thus have very little opportunity to access credit from these banks.

5.3.9 Case study of rural bank lending for a conventional transport purchase

Nikoi provides an interesting case of one bank lending scheme at Akwuapem which has helped women traders with conventional motorised transport. Under the rural bank's Women in Development programme (instituted in 1987) the bank purchased a long-haul vehicle for the women crop farmers/traders who trade in northern markets. The vehicle was run on commercial lines by the WID programme. The women paid for the vehicle's use from loans extended to them and this reduced their turn-around from 4-6 weeks to about 5 days and greatly reduced spoilage. This intervention took place within the regular lending programme of the bank, assisted by a grant from a donor. The scheme obviously focussed on motorised transport for large-scale traders but there may be grounds for attempting pilot programmes with farmers and smaller traders which focus on assistance with IMTs.

5.3.10 Banking services in the R7575 survey districts

In Gomoa district banking services are limited to a few (7) branches of the Akyempim Rural Bank. The majority of the district's people do not have access to banking services (Gomoa District Assembly 1996). In Assin district there are a number of different banks, including the Agricultural Development Bank and the Ghana Commercial Bank at Assin Foso, the Akoti Rural Bank at Foso and Akropong, Manso Rural Bank at Manso and Ahenkro Rural Bank at Nyankomasi Ahenkro (Assin District Assembly 1996) but these appear to principally serve wage earners in the formal sector and large-scale (generally male) cocoa farmers.

One district chief executive favoured the involvement of the banks in any loan scheme introduced in R7575 for IMT purchase: *'any relationship with whites is free, free, free...so better to go through the Rural Bank. We had another credit scheme - RAMSAR site - we gave it directly - up to now they have not paid a pesawa - but that allocated through the rural banks they are repaying. It was all given to groups.'*

5.3.11 Loan recovery in the VIP

VIP used the NGO Self Help Foundation and the district assemblies to handle credit in its pilot phase: SelfHelp staff found collecting repayments was a difficult problem partly, they suggested, because recovery was not in their initial ToR, so they simply collected when they were monitoring (field interviews). SelfHelp's review of the pilot programme (1999:12) refers to particular problems encountered in District Assembly and farmer group linkages with financial institutions, notably ADB, which failed to attend collaborative workshops and meetings. The District Assemblies suggested, at that stage, that financial linkages could be extended in the main phase of the VIP to the rural banks.

At the R7575 Consultative Group meeting in July 2001 we were told that the main project intended to pass loan recovery to the rural financial institutions (banks with a 'track record'), though VIP would continue with the animation work. This was on the basis that the district assemblies did not have the capacity to deliver credit. Private goods were apparently to be transferred to financial institutions to manage. The banks were thus likely to undertake appraisal and recovery and to earn their fees as a percentage of recovery achieved.

By October 2001 VIP were also talking about a pilot targeting selected districts for public goods (i.e. all components of the VIP together) in a more integrated effort at rural development (interview, VIP director). At this meeting the possibility of channelling credit through bicycle shops was also raised. We reviewed the difficulties of organising deposits

for remote and off-road communities and the potential for community development officers to take on the job of carrying funds to the bank.

In January/February 2002 an IFAD team visited Ghana to review the private goods component of the VIP and made specific recommendations on the role of the participating rural financial institutions (approved rural banks, financial NGOs and cooperative credit unions) and the district assemblies. If implemented these will limit the DAs to areas like coordination of client information campaigns and management of NGO contracts. Participating financial institutions would take charge of loan appraisal, approval and recovery.

5.3.12 Income-generating capacity of IMTs

This is a crucial issue when considering loans for IMT purchase. Even when credit is provided, there is generally need for the IMT to pay its way, in order to cover both the initial cost of purchase and running and maintenance costs. In the case of mechanical equipment, income-generating capacity is likely to be particularly significant. This is especially the case for power-operated IMTs like the power tiller.

Earning an income from operating an IMT is likely to be less easy for women than men due to women's multi-tasking, which often means they can not use an IMT as intensively as men (who can work all day generating an income with the IMT). Often, however, income can be obtained through hiring out. This may also enable poorer individuals who do not have sufficient funds to purchase an IMT to benefit from IMT introductions in their village. While hiring out may have a positive impact on the IMT-owning household in the long term, in the short term it often means that there is little immediate benefit for example in terms of a reduction in women's transport burdens.

Of course, income benefits from the IMT may derive indirectly from its ability to improve the owner's agricultural productivity (e.g. more labour time to spend on the farm, easier transport of manure and fertiliser). The degree of benefit will partly relate to local labour conditions: gender divisions of labour, individual access to household labour and local costs and availability of hired labour. However, such benefits generally take longer to accrue than those derived from hiring out the IMT to others. Thus, in the VIP pilot in Greater Accra region, the power tiller group hired its tiller to other villages in order to earn an immediate income to pay back the capital cost of purchase: direct benefit to the farmers themselves would have to wait (source: field interview).

5.3.13 Transport for 'non-productive' purposes

Despite the crucial importance of income-generation for IMT ownership, the need for transport for 'non-productive' purposes is often of paramount significance to villagers, particularly in off-road areas.

In most village discussions about poor access in West Africa, the problems of transporting sick people to hospitals and health centres are among the first raised (Porter 2002). And in addition to emergencies there are potentially many domestic uses for IMTs, for example for moving water and firewood for household consumption, and for construction. Donors promoting IMTs are generally looking for a direct economic return to the household from

their ownership: IMT-induced time saving and impacts such as increased access to health services and schools may provide an important contribution to long term economic growth, but it is difficult to prove this within the limited time span of project monitoring and evaluation. Booth et al. (2000:38) cite an interesting example provided by Priyanthi Fernando of IFRTD. This concerns a group of Maasai women in Kajiada, Kenya, who adopted donkey transport for carrying water and have used time released from water carrying to build a school in their village. As Fernando points out, methodologies used to assess economic returns to households from ownership of IMTs will not capture gains of this kind.

Additionally, IMTs may be used for so-called leisure purposes: in Ghana this includes church attendance, visits to relatives and attendance at funerals. It is important to recognise that such visits, although not directly productive, often play an important role in building and cementing social capital (Porter 2002).

As Starkey (2000: 19) points out, investment in IMTs for domestic tasks tends to increase in richer communities: thus, ironically there is often more use of IMTs in richer peri-urban areas for water transport over relatively short distances than in remote rural areas where distances to water points can be relatively long. This is certainly the case in coastal Ghana. In the Accra area power tillers are increasingly purchased to transport water.

5.3.14 Status versus financial considerations

Finally, it has to be borne in mind that status considerations may override financial ones when decisions are made to purchase an IMT (Starkey 2001: 22). In Kaya, Burkina Faso, a bicycle costs nearly 1.8 times local annual household income but nearly 70% of households own a bicycle: bicycles are sufficiently popular and socially desirable as a status good to make them a priority purchase among men (IT Transport 1996: 20).

5.4 Reducing transport costs: the potential for group IMT purchase, hiring centres, transport subsidies

5.4.1 The role of subsidies

Like many other writers in this field Doran (1990) observes the enormous difficulty women have in accessing credit and thus suggests that transport interventions must consider the possibility of subsidising low-cost transport (a theme taken up by John Hine in a recent DFID transport workshop, March 1999). This may well be a more realistic approach than group purchase of vehicles, a potential intervention also explored in our current project. Nonetheless, subsidies are a difficult issue. Starkey (2001: 31) recognises that they can help launch IMTs (where product development and initial small batch production costs are high but uncharged). He observes that high levels of subsidy tend to distort choices and markets: when given for formal-sector and imported products they may lead to unfair competition with informal sector indigenous products. They can stimulate initial sales of an unsuitable product, but will not prevent ultimate rejection, as in the case of cycle trailers in Ghana. Currently the Government of Ghana does not favour subsidies, in accordance with donor policies.

5.4.2 Subsidy issues in R7575

The question of subsidy was discussed with reference to R7575 at a number of the preliminary and Consultative Group meetings. Discussion focussed around the point that a

pilot project may be subsidised in order to promote wider acceptance, but that in a research project where impact is at issue, subsidy will distort the results. Nonetheless, it was agreed that it would be necessary to fix interest charges on the equipment and these could be viewed as a subsidy, depending on the rate at which they were set. At the Consultative Group meeting in March 2000 we were advised to charge the same rate that VIP would be charging in their main project, since 'different interest rates create confusion'. There was a common view at that meeting that there had to be a balance between need and capability to repay. This was subsequently debated but the common view has remained that we should keep to VIP rates. These are set at the same rate as the Local Government Poverty Alleviation Fund. In September 2000, just prior to our inception workshops this was at 22%, so our interest rate was set at this figure. There are also 'hidden' subsidies in R7575: (i) the equipment was transported from suppliers to beneficiaries free of charge, (ii) the equipment was charged at prices quoted in the November workshop. However, by the time orders were placed, suppliers had already raised their prices due to cedi inflation, (iii) the specially designed handcart was priced at the same rate as the Kumasi push trucks, on the basis that although it had cost double that sum to make a prototype, costs would come down if a number of hand carts were ordered together and numbers in production increased subsequently.

5.4.3 Hire centres

Hire centres may be another way of circumventing the problem of cost of IMTs among very poor populations. In Tanzania, IT Transport introduced a wheelbarrow for water carrying, but found a lack of demand due to low incomes. However, a survey suggested a good demand for hiring wheelbarrows on an hourly basis, and hire centres were set up in three villages, run by the villagers for a fee. The centres were found to operate satisfactorily, but experienced only a low level of demand for the barrows due to the depressed local economy. Nonetheless, IT Transport suggest the concept of hiring centres has much potential, in areas with access to central markets and adequate economic activity (DFID Transport KAR Newsletter, November 2001.) In India, village bicycle hiring centres appear well established and in important means for women with low incomes to access bicycles (Rao, in press).

5.4.4 Hiring in Ghana

In the R7575 survey area in coastal Ghana, young men from small urban centres take bicycles out to outlying villages at the weekend and hire them out at so much per 5 minutes, mainly to children who thus learn to ride. There is therefore some precedent for the development of hiring centres. However, the success of a hiring scheme may depend on village family structures. In Abora village, for example, the ADRA motivator who owns a broken cycle says she could not possibly hire it out because 'this village is like one big family...' This also causes problems in maintenance since 'as soon as I mend it it will be spoilt because people keep borrowing it'. The pilot handcart in Abora (see section) is, nonetheless, being hired out by the women's group who look after it, on a trial basis. Progress is being monitored. Grieco, Turner and Kwakye (n.d. 1996?) refer to hiring of cycles in Accra on a similar basis (short intervals between fixed points) to the village hiring we observed. They contend that this has negative aspects, however, since this does not aid development of 'childhood routines of purposeful cycle journeying' (p. 7) nor the necessary motivation to acquire maintenance skills.

There is also the issue, however, of how to set up and fund such centres. Subsidised IMTs might have to be provided, initially, in order to illustrate the viability of the enterprise. The DFID support team in the Feeder Roads Department, Accra, is currently exploring the potential of establishing hire centres for IMTs in conjunction with its feeder road improvement programme in northern Ghana (O. Kenny, pers. comm.) Such pilot projects would appear to be the best way forward.

5.4.5 Experience in Group transport purchase schemes

Group transport purchase schemes, whether for conventional or intermediate means of transport, are commonly seen as a solution to purchase cost problems but appear rarely successful (see for example the Mraru women's bus service case study in Doran 1996:58-9). Howe (1989: 10) refers to work in Tanzania indicating that ownership of carts by more than a few individuals is an unsuccessful means of distributing their impact on either women or farm communities at large (Howe 1989 citing Munzinger 1986 and Shetto and Kwiligwa 1988). Dawson and Barwell (1993:50) suggest that maintenance is a problem with group ownership unless arrangements and responsibilities are clearly established. An alternative approach, they suggest, is to encourage ownership by small, self-selected and sustainable groups of villagers. Where IMT cost precludes individual ownership, IT Transport (1996) proposes starting by examining the size, nature, and purpose of existing household groupings and their adaptability to collaboration in transport; it also emphasises the need to minimise conflict on access to a shared IMT at periods of peak demand.

5.4.6 Group ownership in northern Ghana and the VIP pilot

So far as IMT purchase is concerned group schemes have reportedly had limited success in northern Ghana because loans were very difficult to recover (Feeder Roads/United Consultancy 1997). Despite these previous problems associated with group IMT purchase in northern Ghana, the VIP pilot scheme introduced for the supply of IMTs in 1997 encouraged group ownership. Groups were required to show proof of 'existence and vibrancy' by providing a list of all registered member, a list of executive members, a constitution and a bank account. The group was required to make a 20% deposit and if their loan was repaid in one year, no interest was to be charged. (By contrast individuals were required to make a 50% initial deposit). In the pilot scheme SelfHelp monitored the groups and liaised with local banks to ensure the group had no outstanding debts on IFAD or Global 2000 projects before allowing them to participate in the VIP pilot.

By contrast, Anchirinah et al. (2000), in their survey of 510 Ghanaian farmers, report that of those farmers who could not raise the initial capital to purchase an IMT, 64% preferred a farmers association or cooperative ownership of equipment to individual ownership. However, in another review of the Village Infrastructure Pilot Project in Ashanti and Brong Ahafo, Anchirinah and Yoder (2000) note that issues of group formation, dynamism and cohesion were identified as of crucial importance. Groups formed prior to the introduction of the IMTs by farmers themselves, such as nnoboa work groups, functioned far more effectively than those formed by outsiders such as district extension officers purely for acquisition of an IMT. This finding accords more closely with that of Lyon (1999). Church groups could possibly offer one of the most effective vehicles for a range of cooperative efforts including IMT schemes in Ghana currently.

The return on loans on the VIP pilot to October 1999 was as follows:

Power tiller: 53% recovery

Bicycles: 76% (presumably discounting trailers entirely)
Donkey/cart: 63%

The overall recovery rate reported by SelfHelp in October 2001 was 41.7%. No interest was charged on the loans, apart from estimated inflation. Payments were to the district assembly (whereas funding is to go through the banks in the main phase of the project.) SelfHelp Foundation found it difficult to obtain repayment on the loans: "farmers thought the loans were for free: now we are happy to get them doing some payment" (Interview, Kumasi).

5.4.7 Group ownership in R7149 and R7575

Discussions with district assemblies and administrative officers in R7149 and R7575 in both survey districts suggest that they also favour group loans because of the pressure applied to defaulting individuals by the group to pay. However, some thought that maintenance would be better with individual ownership. They argue that loans to individuals may need collateral and guarantors. They are particularly positive about the reliability of women's groups in meeting repayments.

At a Consultative Group meeting in March 2000 VIP staff said that, on a large project like VIP, groups are necessary, and that since VIP is focussing on the 'poorest of the poor', groups are necessary because individuals are not able to afford IMTs. However, the VIP pilot provided donkeys with carts to individuals rather than groups, recognising that donkey health would require individual commitment. Bicycles with carts were provided in the VIP pilot to individuals but the group guaranteed the loan. They would prefer small groups with 5-10 members: a group of 20 tends to be too large because people don't come to meetings and conflict is more likely to develop. They and MOFA Agricultural Services were keen to see R7575 trying both a group and individual loans, as a useful comparison re credit recovery etc. A representative from MOFA ASIP observed that in their experience of agro-processing, individuals operated and managed the equipment better than groups, although project staff find groups easier to manage. One of the District Chief Executives, during discussions at a meeting in August 2000, expressed some disillusionment with the groups approach - he felt that the VIP regulations re long-standing groups operating their own account were too difficult and that it would be better to work through individuals. Even if the IMTs went to outsiders, he thought this would be acceptable if they were used in the community.

5.4.8 Issues of group formation and the dynamics of groups

The issue of group ownership is one which needs much more careful consideration in view of the popularity of group initiatives among donors like the World Bank. There are now many examples across Africa of project failures as a result of farmers being expected to join a group in order to gain benefits such as access to (subsidised) inputs: such groups typically attract those who are primarily interested in the subsidy, rather than in cooperative principles. Problems usually quickly ensue around the issue of ownership and responsibilities of group members. In part, this may be due to the common focus on rapid group formation given numerical targets among donors keen to achieve rapid disbursement of funds. In a recent (non-transport) study of women's participation in local development groups in Chad, for example, it is emphasised that the opportunity costs for the poor to join group based projects are high and that groups are most successful where experience with group membership already exists, so there is some trust between members (Weinberger and Jutting 2001). There is need for more research about group formation and operation and components which make

for successful group operations. This links to broader ongoing discussions about the potential for growing social capital and supporting civil society.

Aryeetey and Appiah (1995) make the point that the success of groups seems to be very dependent on 'the extent to which prevailing local norms and values regarding group formation and action are taken into account'. (A detailed review of the literature on groups and associated issues of trust in Central Region was provided as a separate report in Project R7149, see Lyon 1999). Apt et al (cited in Booth et al. 2000) suggests Accra's (northern migrant) women market porters, the kayayoos, comprise a set of women who do not adopt IMTs because they view their work as a temporary livelihood strategy and (consequently?) wish to work alone. Their position is contrasted with that of men market porters who work in teams and split the cost of technology (push carts) (though they suggest that there may be other factors such as traffic conditions and the strength needed to push a truck (!) which also militate against women's use of IMTs here.)

5.5 IMTs and poverty alleviation: potential positive and negative impacts

5.5.1 Difficulties reaching the poorest

Although there is a tendency in the literature to assume that successful introduction of IMTs will have widespread community benefits, the review of financial issues above suggests that IMT ownership and the provision of IMT services are most likely to directly benefit the relatively well off in rural communities (which usually includes a far higher proportion of men than women), rather than the very poor. Thus although VIP is focussing on the 'poorest of the poor' according to discussion at the Consultative Group, its reliance on groups may prevent it doing so. A growing literature suggest that even community-based micro-credit schemes tend not to reach the very poorest because of fears among group members about their abilities in repayment. The issue of reaching the poor was debated substantially at the Consultative Group meeting, with the importance of distinctions being made, for instance, between the 'lazy' and 'people with potential', and the need for some work on wealth studies in the villages prior to introduction of the IMTs was emphasised.

5.5.2 Potential for IMTs to improve government service provision

Notwithstanding remarks in 5.5.1 above, provision of IMTs to agricultural extension, health and education service staff, arguably could improve levels of support and consequent welfare in remoter locations for all sectors of the population, not merely the richer sector in villages who can afford to purchase an IMT individually or as members in a group scheme.

5.5.3 Potential impacts on income from portage

One major issue which may arise in some areas is the possible detrimental impact of IMT introductions, particularly with regard to the extent to which IMTs substitute for portage services. In areas like coastal Ghana it is often the very poor - particularly poor women and their children - who undertake paid labour in the form of portage services to larger farmers. A serious question arises as to whether the introduction of IMTs reduces incomes to such groups. There seems to be no published literature on this topic, apart from a small ILO study of women fuelwood carriers in Addis Ababa reported by Doran (1996:61) which hypothesises the possible vulnerability of women porters if IMTs were to be introduced (i.e. it is not a study of IMT impact on porters.) The topic is being explored in R7575. In an early R7575 Consultative Group meeting Assin District Chief Executives made the point that it would be difficult to stop the big Accra women traders who come in to some of the villages

from time to time - particularly Aworabo in Assin - to buy produce 'hijacking' the scheme by obtaining the equipment under the false pretence of being local, then hiring it out.

5.5.4 Potential positive health impacts of IMT usage and livelihood implications

The potential for IMTs to impact positively on health by reducing women's load carrying and thus promote their livelihood opportunities is another interesting issue, though it would be difficult to isolate the impact of improved transport.

5.6 Other institutional and policy issues

5.6.1 The policy climate in Ghana

The policy climate in Ghana, as elsewhere in most of sub-Saharan Africa, has not been conducive to the expansion of IMT ownership and use (Howe 1994). This is expressed both in perceptions of IMT acceptability and in taxation and import duty regimes. Nonetheless, the situation has improved in recent years: for instance, there is no import duty on bicycles now and there is a commitment to encouraging bicycles through construction of cycle lanes in major urban centres. In the last census exercise (2000) teachers who acted as rural enumerators were provided with cycles (though no maintenance training was provided), again a positive step. Some were subsequently allowed to keep the cycles (following dispute about their return) for a sum well below the market price. MOFA extension agents are also now being supplied with motorcycles, but there remains the question of adequate funds for fuel to run them.

5.6.2 Government staff perspectives on IMTs

In Accra's ministries many officials see IMTs as, at most, only of value to the poor of northern Ghana, and specifically as distinctly inferior to motorised transport. Although IMTs are now receiving more attention as a result of the Village Infrastructure Project, it is specifically in terms of poverty alleviation. The potential value of IMTs in terms of reduced pollution in urban areas and of reduced fuel imports is barely recognised.

5.6.3 Taxation policies re imports

These continue to militate against IMT expansion. In Guinea where import duties on complete bicycles are 33.5% (there is no local production) bicycles are fairly uncommon (Noyes 2000). In Ghana, although taxes on bicycles imported in knock-down form were abolished some years ago, taxes on bicycle spare parts reportedly remain at 23%. Motorbikes are subject to VAT and while imported power tillers appear to be free of taxes and tariffs, any associated trailer used for load carrying is apparently not (there is some confusion among importers on this point.) There is ample evidence in many sub-Saharan countries of government taxes and tariffs acting as a barrier to IMT adoption (Hine 1994, Booth et al. 2000).

5.6.4 Local government perspectives on IMTs

At local government level in Ghana there appears to be similarly little interest in IMTs, apart from the tax raising potential of bicycle and push truck registration. District assemblies now tax cyclists through an annual registration fee (10,000 cedis p.a.): cyclists obtain a sticker which they must display on the handlebars. This is mostly enforced in district headquarters and other major centres and is less of an issue in rural areas. Push trucks are also registered by district assemblies. Commercial push truck operators in urban centres are apparently charged 10,000 cedis registration and 4000 cedis per month by district assemblies [July 2001

Government attitudes are an important issue, since NGO/donor initiatives alone are insufficient to sustain IMT and related infrastructure programmes. Ghana's VIP programme linked directly to local government in its pilot phase, but experience to date has not been encouraging in most districts and it seems likely that in the main phase of the VIP project the DA role will simply be to link prospective recipients to the rural banks. Given the enquiries into many district assembly financial operations following the elections in December 2000, this move is probably partly about increasing transparency and accountability. The rural banks are to be supervised by the Bank of Ghana. Whether this can help build capacity in the rural banks, however, remains to be seen.

5.6.5 Harassment of IMT users by petty officialdom

The low status and relatively low speed of most IMTs seem, moreover, to encourage harassment of their operators by petty officialdom, as in the case of the push truck boys in Accra who frequently have to dash city council officials to reduce delays (Amponsah et al. 1996). Police harassment associated with minor traffic offences and the potential for extorting bribes is often a related issue, as Fasoyin (2001) notes with reference to urban motorbike taxi operations in Nigeria.

5.6.6 Attitudes of Transport Unions

This is an issue which needs careful consideration in countries with strong transport unions. In Ghana the Ghana Private Road Transport Union's role is pervasive in regulation of routes and prices and potentially a hindrance to the expansion of motorised IMTs (Pederson 2001a). In one of the study villages in R7575 where a power tiller was introduced and has been used to convey passengers to market, the local GPRTU objected. Ellis (1996: 107) noted a similar problem in a village in Volta Region where power tillers were introduced but were not used for transport services on feeder roads in part due to regulations on route licenses and price controls imposed by the GPRTU. However, he also suggests (1996: 117) that the GPRTU may play a role in enforcing driving standards (they can take away the license of a driver reported for reckless driving) and in some areas are involved in road maintenance.

In Nigeria Fasoyin (2001) notes the dual taxation of motorbike taxis by the road transport union and the okada sub unions. IMT unions are likely to grow and gain power as commercial IMT services expand. In Kisumu, western Kenya, there is a cycle taxi association which operates a registration scheme and has defended riders involved in accidents and provided passenger compensation for injury or loss (Iga 1999). Such associations will be important for the development of IMT services in rural areas.

5.6.7 NGO contributions to IMT promotion in Ghana

NGOs now play a major role in many areas of poverty alleviation in Ghana. The main Ghanaian NGO with current expertise in promotion of IMTs in rural areas is the SelfHelp Foundation, a US funded organisation based in Kumasi which worked initially on tractors and then was enlisted to assist with the pilot scheme of the Village Infrastructure Project. NGOs could and probably would assist more with IMT promotion among low income communities if access to reliable and appropriate IMTs at reasonable cost were assured (see below). A small US-based NGO - Village Bicycle Project - linked to local NGOs is importing small consignments of second hand cycles (about one third of which tend to be mountain bikes, because this is what they have been told are the preferred type, though parts are only available in major centres) from the US. They have trained a number of cycle

mechanics in Volta Region: mostly men and boys: girl children have apparently been unable to come for training because of housework commitments.

5.6.8 Transport projects versus integrated rural development projects

Leyland (1996) and others are increasingly emphasising the value of a more holistic approach to transport issues, while recognising that integrated transport projects can pilot approaches and advise on methodology. Leyland cites the advantages of an holistic approach as including more time and a wider range of activities and resources, a broader view of the socio-economic situation and a greater emphasis on empowering rural women than is the case with conventional transport projects.

As reported above (section 5.3.11), by October 2001 it seemed VIP were considering a pilot for targeting selected districts for public goods (i.e. all components of the VIP together) in a more integrated effort at rural development (interview, VIP director).

5.7 IMT supply and the production of local IMTs

5.7.1 The significance of local supply (as opposed to local manufacture)

Supply is a crucial issue: it does not matter how appropriate an IMT may be if there is no potential to access supplies. While local supply is important, local manufacture is not necessarily always appropriate, because demand may be insufficient to allow economies of scale and adequate quality control. Efforts to encourage artisanal development through IMT production in areas where the IMT in question needs substantial promotion are unlikely to work (Noyes, pers. comm.)

5.7.2 Limited local IMT supply in Anglophone West Africa

In much of anglophone West Africa, in particular, local IMT supply is very poor. Indeed in much of sub-Saharan Africa the choice of IMTs locally available is generally very limited and commercial suppliers are cautious about importing stock which may not sell. In Nigeria the main bicycle factory (the Raleigh factory in Kano, established in 1975 with the capacity to manufacture around 450,000 bicycles pa from imported materials) was reportedly closed in the early 90s despite the massive market for bicycles in northern Nigeria (www.gtz.de/gate/publications/BicycleManual/brm/afri/asuquo/af_asu1.htm; Howe 1994). In Ghana there a report in 1987 suggests local production of cycles was mainly restricted to about 8 companies assembling imported completely knocked down (CKD) parts (Ministry of Transport and Communications Bicycle Assembly Study, cited by Adarkwa et al. 2000). Between c.1976 and 1986, Fatawu Bicycle Co. in Tamale made cycle frames using imported steel pipes, but when importation was relaxed in the 1980s the market for their cycles dried up. The other cycle manufacturer in Ghana, based in Kumasi (Sulemana Industries) also collapsed at this time.

One of the main cycle importers in Accra reportedly recently wanted to establish a factory to manufacture cycles in a joint venture with a Chinese company, but found limited enthusiasm for the project from the Chinese side, which they attributed to a concern to protect Chinese trade.

There are very few dealers in Ghana who supply IMTs (apart from bicycles): thus there is little competition between them. Most of these dealers are importers based in Accra and usually stock, at most, single examples of a few types of IMT, such as the power tiller or motorised three wheeler. Their main IMT stock is usually the motorbike.

Local manufacturing capacity depends on the presence of facilities such as welding equipment, the skills of carpenters and blacksmiths, the availability of materials (which may include scrap.) Hine (1994) talks of the need for "industrial vision and skill of the type most developed countries have forgotten: efficient mass production for the poor masses." He suggests the need for Chinese bicycle factories in Africa and regional agreements in ECOWAS etc. to allow large scale production and the potential for the World Bank to play a role in financing mass production and improvement of IMTs.

Similarly, Starkey (2001:47) refers to the chicken and egg situation of low IMT demand and low supply. He suggests technical training may need to be combined with credit and/or training in marketing, management skills and the establishment of stocks of raw materials. Credit provision (to users, workshops, IMT dealers), income-generating schemes and subsidies may be needed to encourage supply. Barwell (1996:60) suggests that the production of motor vehicle spare parts in the informal sector in Ghana provides one model for the development of the bicycle component manufacturing and that NGOs may have a role to play in demonstrating the commercial potential of cycle and other IMT marketing operations.

5.7.3 IMT supply in Burkina Faso

The case of Burkina Faso - where IMT usage is high - is particularly interesting. Here an assembly plant for Peugeot cycles was established in 1964 and the local product is marketed actively. Apparently there has been strong promotion in rural areas recently, involving lights, music and entertainment in order to withstand competition from (cheaper) imported Chinese and Indian cycles (Dennis n.d. 1999?). A Peugeot cycle cost \$140 compared to \$106 for a Chinese model (ibid.) According to staff at Fatawu cycle factory in Tamale, the Burkinabe model is smaller and not popular in rural northern Ghana because it is not sturdy enough.

5.7.4 IMT manufacturers in Ghana

In Ghana there are few local IMT manufacturers, apart from the roadside workshops which make local push trucks, notably in Kumasi Magazine and in Accra. Kumasi Magazine has expanded its interest in IMTs in recent years, and is now also making donkey carts for the northern markets. The workshops are highly dependent on scrap axles.

In Tamale the Fatawu Bicycle Factory makes cycle trailers and a small number of rural ambulances (perhaps 100 p.a.). The cycle trailers are sold in Ghana and some are exported to Sierra Leone. The ambulance trailers have all been for export to Sierra Leone: none have been purchased in Ghana.

5.7.5 NGOs and IMT manufacture

NGOs could possibly make a stronger contribution in this field. GRATIS in Tema has engineering workshops and was involved in the pilot VIP project to a limited extent and has made prototype garbage trucks for the Accra Metropolitan Authority. However, experience in R7575 with GRATIS re construction of a handcart designed by ITTransport has not been wholly positive (delays and lack of a wheel bending machine.)

5.8 Maintenance and repair services

Presence of affordable and good maintenance and repair services is crucial for the sustainability of IMTs and IMT schemes.

5.8.1 High levels of out-of-order equipment in Africa: absence of a maintenance culture

Many IMTs across Africa are currently out of use and lying idle. In a Zimbabwean study 90% of such equipment was not working because of lack of available spare parts or lack of affordable spare parts (Mannock Management Consultants and ILO 1997: 23). One of the interesting findings from that study is that wheelbarrows are the exception to this pattern: 94% of wheelbarrows in the study were reported to be in good working order, a fact attributed in the study to their value and easily managed maintenance and repair (ibid: 23). Fear of breakdowns was noted, in a related study, to be the reason that women could only use carts and sledges in the company of men (Mudzamba and ILO 1998: 9) and emphasises the need for maintenance training to be provided for women as well as men. Referring to an earlier study of women health workers use of bicycles in Zimbabwe, Doran (1996:57-8) noted that only 29 out of 174 cycles in one study area were in working order a few years after their introduction. In part this was due to the fact that the women were supplied with 26" wheel cycles for which spares were generally unavailable, but was also related to lack of maintenance training.

5.8.2 Maintenance monopolies in Ghana's VIP

Anchirinah and Yoder (2000) in their review of the VIP pilot in Ashanti and Brong Ahafo, point to the monopoly powers of the single group of mechanics in each of these regions who are charging exorbitant fees for their services (re tiller maintenance). They suggest the need to train more mechanics, including some in the beneficiary communities.

Ellis (1996: 116-7) found similar problems in his Ghana survey: he observes that vehicle servicing skills are highly concentrated in Kumasi Magazine and that lack of routine maintenance was a major cause of high vehicle operating costs in the case of power tillers and tractors in his two study villages in the Afram Plains and Volta Region.

5.8.3 Cycle maintenance in Ghana

The Village Bicycle Project is a small NGO activity based in Kopeyia, in coastal Ghana, introduced by US cycle enthusiasts which is looking to support cycle maintenance development with tool imports (which are taxed at 10%) and training: unfortunately, such initiatives make little impact on their own.

The VBP aims to let the market take over in supplying bicycle tools but importers say the market is too small currently (VBP report, 25/12/2000). In southern Ghana's rural areas the common bicycle is the Phoenix which is relatively easily maintained. Although mountain bikes are commonly now seen as a smart option, they are not only more expensive to buy new, but also more difficult to repair.

5.8.4 Cost, availability and use of spares in Ghana

It is difficult to determine the extent to which high cost of spares and servicing deters maintenance and the extent to which lack of maintenance deters widespread provision of spares in Ghana. We were told by a member of the Chinese community in Accra that plans for a Chinese cycle tyre factory in Ghana were aborted following market research: 'here the

bicycle is just for transport till it finishes. In China the cycle may get 10 new tyres before the cycle is changed for a new one.' (General Manager, Trio, Accra).

In the VIP pilot, the mechanics were provided with credit to buy spare parts and this system seems to have worked effectively (Anchirinah and Yoder 2000: 11). However, in the case of the power tiller, shortages of spares has been a major problem.

5.8.5 Maintenance of communally owned IMTs

In the case of communal ownership of equipment such as power tillers the difficulties of ensuring maintenance are likely to be particularly great. There is little evidence about this re IMTs in Ghana, but the issue has arisen with reference to agricultural processing machinery (Altshul 1999).

5.8.6 Critical mass and parts standardisation

Critical mass (see below) and standardisation of parts is clearly an issue of major significance where IMT maintenance and repair is concerned. Only where demand is substantial will repair services develop. Noyes (1999) suggests that the high degree of standardisation in parts used in donkey carts across the West African Sahel has been critical in enabling affordable services to develop widely, despite low population densities. So far as imported IMTs are concerned, it may thus be appropriate to encourage dealers to limit the ranges of IMTs on sale.

5.8.7 IMT maintenance and repair as an adult male occupation

Finally, vehicle and cycle maintenance is generally a male occupation in Africa. The potential for women's training programmes needs consideration and action. Simple cycle repairs could also be taught to boys and girls in school.

5.8.8 Budgeting for the costs of maintenance and repairs

Availability of maintenance/repair services and parts is of little relevance if transport owners do not have the funds to pay for such services. This is probably one of the biggest issues for both IMT and motorised transport expansion in Africa, since there is ample evidence that a large proportion of IMT and conventional vehicles are off the road at any point in time due to owners having inadequate funds to pay for maintenance and repairs (see section 5.8.1).

Raising awareness among new and potential transport owners about the need for budgeting for the inevitable eventuality of maintenance and repair costs is perhaps one of the most crucial tasks which needs undertaking in IMT schemes. Ellis (1997:18) points out that motorised transport operators often default on bank loans when breakdowns occur and that this is commonly due to inadequate training and education. However, even in a formal development project context, inadequate attention may be given to budgeting for maintenance of project motorcycles and cycles as Botchwey (2001) describes in the context of the Ghana Northern Region Rural Integrated Project (NORRIP).

5.9 Safety and security

Safety issues for pedestrians, load carriers and IMT users have received little attention in sub-Saharan Africa. In the survey villages women reported many accidents while headloading, particularly in the wet season when paths are slippery. This can lead to such injuries as slipped disks, broken backs and necks and injury to children who are being carried on the back at the time of the accident (Ellis 1997:10).

5.9.1 Road safety and IMT users

Lack of attention to road safety can have particular implications for IMT users who may be more vulnerable in accidents than those riding in covered motor vehicles. In rural Ghana bicycle crashes are reportedly a major source of transport-related injury, usually associated with falls rather than collision. A study of communities in Brong Ahafo region (Mock et al. 1999) found 50% of all reported injuries involved bicycles and most of these occurred when cycles were ridden on unpaved roads. This study of injuries among over 9000 individuals found 9.4% had experienced injury resulting in loss of one or more day's activity in the year preceding the survey and that 10% (88) of these injuries were transport-related. In a comparable study of injury among over 11,000 individual in the Kumasi area, Mock et al. found a rather higher percentage of transport-related injury (16%), but only 5% of injuries were cycle-related (the majority of urban injuries being motor-vehicle related).

Few IMT interventions have been accompanied by training programmes. Indeed safety in IMT operation is rarely addressed, yet it can be a major issue, particularly when the IMT is motor operated, as in the case of motorbikes and power tillers. Common problems include inadequate or absence of brakes: this was reported by Grieco et al (1996) as a factor inhibiting women's use of push trucks in Accra.

5.9.2 IMTs operating alongside other road users

Where IMTs operate alongside conventional motor vehicles along busy roads there are further dangers. Common dangers include absence of lights at night, overloading, unstable loads etc. As Starkey (2001: 39) suggests, many of these issues are ignored because of the costs to users of compliance. In the urban context of Accra there is a report (Turner et al. 1996) that aggressive driving and pedestrian behaviour towards cyclists is an outcome of the negative attitude towards cycling within the greater urban community: human transporters and vendors have more status than cyclists. Cyclists and other IMT operators (e.g. push truck operators) are often verbally or physically abused for travelling in crowded pedestrian areas and may also suffer discrimination from junior officials (Amponsah et al. 1996; Turner et al. 1996). Critical mass tends to confer increased safety on IMT users, for instance through provision of cycle lanes. Where dedicated cycle lanes have been introduced, as in Tamale in northern Ghana, this can apparently be to good effect.

5.9.3 Economic impact of transport-related accidents

In both urban and rural areas, the economic impact of transport-related accidents is notable. In Ghana the study by Mock et al (1999) found that 56% of those injured reported a decline in family income due to the injured, or their carer, missing work. Thirty four percent of families had to borrow money as a result of the accident, and 34% reported a decline in food consumption as a result of the injury. Work in Uganda by Kwamusi (2002, in press) has emphasised the gendered impact of traffic accidents: women bear the brunt of the burden of caring for injured family members.

5.9.4 Theft and security

Security is another matter which is rarely considered in IMT studies. IMT theft has been an occasional issue, especially regarding cycles. The cycle repairer at Swedro, for example, stopped hiring cycles partly because of theft problems. In the VIP pilot, IMT recipients were required to have a secure place to keep their equipment. More recently, motorcycle thefts

have reportedly become an issue at the Ministry of Health (where an average of over 30 motorcycles were reportedly stolen every year in the late 90s, see Ministry of Health 2002).

5.10 Supporting (physical) infrastructure for IMTs in rural areas

IMTs generally need less costly physical infrastructure than conventional motorised transport. Nonetheless, appropriate physical infrastructure is still an important issue, particularly for IMTs with more than two wheels. Hine (pers. comm.) points out that IMTs have greater use in rural Asia, in part, because rural population densities are usually much higher and thus villagers are often able to keep paths and tracks well maintained and that path and track improvement is probably critical to the introduction of 'more productive' IMTs.

Anchirinah and Yoder (2000) emphasise the problem of lack of improvement in farm tracks in Ghana for use by IMTs in the VIP, though provision for track improvements was included in the VIP pilot phase. They note that only two farm tracks had been improved by the end of the pilot phase in the project areas, although 225 kilometres had been identified for improvement. As a result of poor roads in one area, the bicycle cart could not be used.

Discussions in R7575 indicate that there may still be some resistance among urban -based officials to spending money on tracks and trails which are viewed as glorified footpaths as opposed to 'proper roads'. There may also be a tendency to look to do expensive work re culvert construction etc. where low technology solutions are more appropriate (Consultative Group discussion, March 2000). Moreover, if the route is improved by external agencies, questions arise as to who is responsible for maintenance. At Aworabo we were told that if one of the main footpaths was improved by Feeder Roads it would become their road: 'when they cut it, it becomes their road'. This issue of ownership is now recognised to be of crucial significance to community maintenance contributions (Malmberg- Calvo 1998) and will need careful review by both central government and district administrations in Ghana.

Another issue re track improvement for IMTs in areas with extensive farming systems like parts of Central Region is that routes to the farms change regularly as farmers move to cultivate different land. In the study districts only major routes are maintained by the community: farm tracks are maintained by the farmers who have land along the track in question. It is difficult for farmers to commit effort to track improvement when the track may only be used intermittently.

At the August 2000 Consultative Group meeting of R7575 Mr Ashong (Feeder Roads) suggested that IMTs need dedicated paths: that once motor vehicles use a road it 'drives away IMTs'. He thus suggested the need to limit the width of village tracks and trails. However, this seems to be more relevant in urban and peri-urban areas where vehicular traffic is heavier. A second point he raised about road widths has greater relevance to the survey districts: that new broad tracks may encourage chain saw operators to move in to extract timber, with environmental implications. This problem could be circumvented, he suggested, by restricting road width at (concrete) culverts. The creation of upgraded tracks for IMT use may be of some concern to Feeder Roads Department if they are then expected to take responsibility for their maintenance. Again this is a policy issue which will need resolution at a number of levels re community versus government responsibilities.

In some IMT schemes (including the 80s cycle trailer project in northern Ghana), funds for IMT purchase have been obtained in part through labour contributions to track/road improvements. Ghana has a labour-based feeder roads programme which encourages local labour contributions. However, evidence from the study districts suggests that local contractors tend to bring their workforce with them from urban centres, rather than employing villagers.

Project R7575 has established formal links to the MOFA RICU. RICU Zone III (Western and Central Region) has designated farm tracks in three of the survey villages in Gomoa district as potential improvement projects under the VIP project, to aid synergy between VIP and our project. Two of these (Abora to Apam and Lome to Oguan) had been approved by February 12, 2001, with work due to commence in May 2001 (RICU 2001). However, in March 2002 work had yet to commence.

5.11 Topography, climate and IMT use

In much of northern Ghana topography is sufficiently flat and rainfall sufficiently low that tracks are somewhat more amenable to use by IMTs than in many southern areas of Ghana where tracks can become inundated and stream beds will have to be crossed more frequently. In Tamale, the northern capital, there are over 40 km of purpose built cycle tracks (White 2001, Sustran bulletin). In the survey districts in southern Ghana conditions are somewhat more difficult because of the rolling topography and - notably in Assin district - higher rainfall. Nonetheless, there are areas of sub-Saharan Africa with conditions not very dissimilar from Gomoa district where IMTs are more commonly used: for example, the Jos Plateau in Nigeria. In south-east Nigeria, despite high rainfall, bicycles are quite widely used: Ugorji and Achinivu (1977), for example, find 95% of men and 25% of women in a sample survey in one Ibo village own at least one bicycle, and also report the presence of at least 20 taxi bicyclists and 5 cycle repairmen. However, Urasa's description of conditions at Makete in Tanzania, the site of a substantial IMT programme from the late 1980s suggests conditions similar to parts of Assin: "the combination of steep slopes and the nature of the wet, slippery soils compounded by the wet climate" (Urasa 1990:16). In Makete locally produced wooden wheelbarrows and pack donkeys were introduced but never had much success (Starkey 2001:36).

5.12 The 'critical mass' argument

Starkey (2001:31-2) argues that critical mass is often crucial to IMT adoption, not just in terms of encouraging cultural change (see above re women and bicycles in Ouagadougou) but also in terms of supporting infrastructure for manufacture, supply and repair. On these grounds, he suggests that IMT innovations may occur more easily in big cities than in sparsely populated rural areas, since dense populations allow customers a wide choice of service providers for both purchases and repairs. (Booth et al (2000) similarly emphasise the significance of the concept for gendered access: as the novelty and scarcity of a new technology declines, so the potential for women to obtain direct access to it increases).

Starkey emphasises the difficulty of the 'chicken and egg' situation in which it is difficult for a critical mass of adopters to develop without support services, yet sustainable support services are unlikely to be established without a critical mass of users. Thus he suggests that

it may be better to concentrate resources on a few villages or areas, e.g. to put 10 carts in one village, rather than one cart in each of 10 villages, since then there is more likelihood of a village puncture repair workshop being established. On the other hand, he also suggests that some isolated demonstration examples may be worthwhile, 'as chaos theory suggests these may increase the chance of adoption by a random combination of events.' Starkey (2001: 33), refers to some attempts to introduce individual ox carts in poor remote villages in Sierra Leone and Guinea in the 1980s and 90s. He suggests that the projects failed due to lack of critical mass and that a focus on one village with more favourable conditions (e.g. villages in flat areas about 5 km from a weekly market or main road) to form a local nucleus of adoption, 'available for all to see' might have had greater success. However, he also notes the enormous optimism and lack of self-criticism in previous transport programmes and recognises (ibid:49-51) that if achieving critical mass is accepted as an important adoption strategy, this implies massive introductions which go against the notions of participatory evolution and development, and risks large-scale failure (though such failure would induce faster recognition of inappropriate technologies such as animal-drawn wheeled toolcarriers.) Barwell (1996:60) suggests, where appropriate, IMT use for official travel by government personnel as a way of not only increasing the mobility and effectiveness of many officials, but also as having a demonstration effect. In areas where status of IMTs is an issue, this could be highly advantageous, if incentives can be provided to encourage such use. The use of IMTs by women officials and women's organisations could be very advantageous in areas where women's use of IMTs is low.

6. CONCLUSION: SUMMARY OF THE POTENTIAL FOR IMTS IN GHANA

The conclusions and recommendations which follow are based on R7149, preparatory work in R7575 and the literature review.

6.1 Broad recommendations for IMT development in Ghana, based on R7149, preparatory work in R7575 and the literature review (to be reviewed following completion of the field component of R7575).**

- So-called 'spontaneous' adoption in conducive local circumstances seems far more successful in leading to widespread diffusion than IMT promotional projects, which tend to be small-scale and stay small-scale in impact (perhaps because of lack of critical mass etc.). The diffusion of motorcycle okada/achaba services in Nigeria provides a prime example of a highly successful spontaneous IMT innovation. We need detailed studies of these 'spontaneous' developments in order to understand the critical factors which sparked adoption.
- IT Transport (1996:6) propose (and other literature supports the view) that the most formidable challenge in designing an IMT intervention is to introduce an IMT which is completely unfamiliar. Given the limited funds and support available for IMT programmes in Ghana, it is probably wiser to avoid such equipment in the short-term.
- There may be a need to think more broadly about the potential range of IMTs and accessories made available in IMT schemes, including locally developed equipment which is already available in-country. Ghana's locally produced push-trucks are a case in point. However, locally manufactured items may not be appropriate if cost is too high and quality control is inadequate.
- Equipment needs to be simple and robust enough to allow cheap home maintenance: in the case of cycles, for instance, basic models without gears are probably currently the best choice in rural Ghana.
- The development of local capacity for manufacture and distribution of accessories such as sturdy cycle panniers (similar to the panniers which have recently been reportedly imported from Nepal), simple luggage racks and child seats for cycles could be a very useful complementary measure, if supported by careful prior market research and subsequent market promotion.
- Animal traction programmes are unlikely to be successful in areas where there is no tradition of animal husbandry unless the programme is committed to very substantial investments in training and support over a long period.
- The potential of non-transport interventions and conventional transport interventions should be considered in conjunction with and as alternatives to IMT introductions. In particular, non-transport interventions can form an important complementary intervention to IMTs, where funding is available. In some cases they may usefully substitute for IMT interventions.

- An integrated approach will often be highly advantageous, combining simple road/path improvements with IMT promotion. This is likely to be particularly important where appropriate IMTs have more than 2 wheels. If the associated road/path improvement is labour-based and utilises local labour, this may enable local purchase of IMTs.
- The Department of Feeder Roads does not have the capacity to maintain vast numbers of upgraded paths and tracks. The continuation of local ownership will need to be emphasised when tracks are upgraded in conjunction with IMT schemes, since in southern Ghana there is a tendency among villagers to assume that government work on local routes constitutes a change of ownership and that, henceforth, government will undertake all maintenance and repairs.
- Careful research into local preferences and conditions is essential, prior to large-scale IMT introductions: technological solutions imposed by outsiders are very likely to fail. It is important to take into account the diversity of potential IMT users: their age, sex, income, occupations, the work they do at different times of year, ethnic group, religion and education (Starkey 2001: 21). Careful ‘fitting’ of IMT type to the characteristics and requirements of the user, further bearing in mind the specificities of the local context, will then be required. Local solutions have to be found for local problems.
- Disadvantaged groups of all types - women, the elderly, disabled and children - should be taken fully into consideration when planning and implementing transport interventions, including IMT schemes. Much information is now emerging about women's mobility needs and constraints: more studies are also needed about the specific requirements of the elderly, the disabled and children. It is important that such disadvantaged groups are treated as decision-makers, rather than merely as welfare objects (see 5.2.1). To achieve this, gender sensitisation and sensitisation to the requirements of other disadvantaged groups is needed by transport planners: training in this field should be an integral part of professional training programmes.
- It is important to analyse intra-household dynamics around the control of household income, ownership and control of means of transport, disaggregation of transport demand and latent transport demand among household members when considering IMT interventions. Status issues and gender relations, in particular, may complicate the adoption and use of IMTs in the short term, even when specific cultural constraints appear to be absent.
- Women’s access to credit is crucial if IMT adoption is to be widespread among women users. Even very simple low-cost equipment is often beyond the resources of women unless credit is made available. Repayment scheduling needs to be designed to accommodate women's income patterns. Terms needed to be clearly stated.
- Improvements to informal credit organisation are probably more viable in the short term for improving credit access for most women than looking to greater assistance from formal institutions. Training is needed for women so that they can run informal credit schemes without (the common current) recourse to male treasurers. Another possibility may be to look to ways of promoting commercial credit for women (given that women's payment record is commonly much better than that of men.) However, credit is a complex

issue: much closer consultation with both poor women and poor men is needed in order to devise workable strategies for supporting IMT purchases.

- Promotion of IMT use among women could be encouraged through major women's organisations: e.g. 31st December Women's Movement and Christian Mothers Association (both of which are membership organisations well established across rural Ghana). Use of IMTs by the leaders and staff of such organisations could boost IMT visibility and acceptability among women.
- The recently established Ministry of Women and Children's Affairs could aid IMT promotion among women and children.
- There are remarkably few women professionals in transport: more women need to be encouraged to specialise in this field. Consultation of women by women can represent an important step towards improved transport planning.
- Specific training programmes are needed to allow and encourage girls and women to ride cycles, and to drive motorised equipment such as motorbikes and power tillers. Public education programmes - particularly those targeting teenage schoolchildren - could probably do much to challenge prevailing inhibitions and restrictions (5.2.7).
- Involving men in interventions aimed at assisting women is likely to be crucial. [This is exemplified by the situation in Kajiado, Kenya where men resisted women's adoption of new practices of using donkeys to carry firewood and water until they were involved in a visit to see the impact of this intervention elsewhere (Leyland 1996).]
- Given the perceived difficulties of group purchase in terms of use and maintenance of equipment, there is need for further research around ways of building trust for effective group formation. Church groups often appear to have more sustainability than other types of group, but there may be equity issues around church groups.
- Hire centres based at cycle shops could have an important role to play in circumventing cost constraints on IMT purchase among very poor populations. However, the success of hiring schemes may depend substantially on settlement family structures. Pilot projects (run by government or NGOs) which establish and initially fund hiring centres (similar to those developed in India) may be valuable.
- There is need for full, seasonal, Monitoring and Evaluation of IMT introductions over the next few years in Ghana: their uptake, sales and use patterns and associated impacts: impact on agricultural production, marketed output, incomes, gender relations (including women's control over household resources), reallocation of any time savings, women's and children's health and educational access i.e. productive and so-called 'non-productive' uses. Assessment of impacts on non-owners, including those who make a significant portion of their income from head portage will probably be particularly important. Impacts on conventional transport services should also be assessed. Monitoring and evaluation exercises need to include longer-term assessments of project impact: there is a tendency to review projects only within the life of the project. (Longer term assessments will be particularly important with reference to environmental impacts.) Comparisons of

pre-project attitudinal surveys with actual user uptake both within the project life and post-project could be particularly valuable.

- If IMTs are introduced in areas where they are likely to increase pressure on environmental resources (as, for example, in the case of expanded fuelwood extraction), accompanying environmental management projects and training are advisable. This will require collaboration with government departments and agencies such as the Environmental Protection Agency, the Forestry department and environmental NGOs.
- There is an urgent need for a more coordinated approach to transport and within that to IMT work in Ghana. This applies to work by ministries (notably agriculture and transport) and NGOs. The exchange of information across ministries and NGOs - including information about problems and potential problems, rather than merely about successes - at planning, inception and Monitoring and Evaluation stages could be enormously beneficial. Joint programmes between the agriculture and transport ministries (e.g. combining credit access for transport IMTs with agricultural machinery) could similarly aid progress towards successful rural development.
- Synergies between VIP and RTTP need to be encouraged for improved IMT promotion. This will require improved linkages between MOFA VIP and the Department of Feeder Roads.
- NGOs need to become more involved in transport/access issues and IMT promotion. Most NGOs are based in locations along paved roads and very few NGOs in Ghana have expertise in the transport field. This might be addressed partially through the provision of short University-based training courses in participatory transport planning which include a practical field component.
- The local institutional context is also crucial. The potential enabling or disabling role of district administrations needs to be recognised and district administrative staff sensitised to the potential benefits of IMTs. They could have an important role to play in encouraging and supporting IMT introductions (if staff are able to perceive IMTs as more than mere revenue generators through licensing requirements).
- Transport Trade Union policy toward IMTs and their operators needs to be clarified. There may be need for a union for IMT operators. A formal consultation with the GPRTU and other transport unions is likely to be essential.
- Many Government staff at all levels in southern Ghana continue to display negative perceptions of IMTs as (backward) technology for backward areas. Regular circulation of IMT promotional material and specific loans for IMT purchase could be beneficial in improving the status of IMTs and promoting acceptability among this group. Extended provision of IMTs to men and women government staff in the agricultural, health and education services (accompanied by adequate training on operation and maintenance) could do much to raising the status of IMTs and supporting the development of critical mass, while also improving welfare, particularly in terms of improved services to remoter locations (Porter 2002).

- Government rules on the licensing of IMTs need clarification, particularly with respect to power tillers (see 4.6.9). Rules and regulations relating to use of IMTs on public roads need to be reviewed.
- Taxation of IMTs also needs review. Current VAT on bicycle spare parts, on trailers for power tillers and on motorbikes probably discourages IMT expansion in Ghana.
- Safety issues are widely underestimated in an IMT context. Schools might have a substantial role to play in raising awareness of dangers and teaching children about road safety for cyclists. Insurance for IMT owners is a related issue which has not been adequately addressed.
- Maintenance is a major problem, because of the lack of a culture of maintenance. Again, schools could play an important role in teaching about cycle maintenance and the importance of budgeting for maintenance and repair costs. Broader vocational training courses in schools and colleges focused on IMT repair and maintenance could help capacity building for IMTs substantially. Tool kits and maintenance training need to be made available whenever equipment is provided under an IMT scheme.
- The Ghana National Forum for Rural Transport and Development was inaugurated in September 2001. [The group's founder members were R7575's Consultative Group: its members include MOFA VIP and Feeder Roads Department (which runs RTTP in Ghana).] The NFG should aid the development of a more co-ordinated approach to IMT development in Ghana. However, it will need continued support both from within Ghana and through the International Forum for Rural Transport and Development if it is to have any sustained impact.
- A detailed review of IMT developments in nearby countries - notably Nigeria (re the dramatic expansion of motorbike taxi services across the country) and Burkina Faso (re the marketing and promotion of a range of IMTs) - could help to identify lessons for IMT promotion in Ghana. The potential for supporting development of bicycle and motorbike taxi services in areas with insufficient demand to support conventional motor services would appear particularly worthy of exploration.

6.2 IMT potential among target groups in Central Region: conclusions impacting on R7575 project design/implementation

- Our target group was initially defined as low-income women in off-road villages in Central Region. However, substantial devaluation of the cedi suggested the need to move our target slightly upwards, so far as IMT ownership is concerned, because the very low-income women are now totally unable to afford the equipment.
- Despite these financial constraints, it is still important to prioritise IMT assistance to women since they are the principal crop transporters (wherever vehicles are unavailable) and the principal crop traders.

- Given the rapidly rising cost of IMTs associated with devaluation, we aim to encourage the situation where ACCESS to IMTs (as opposed to ownership) is within reach of a significant proportion of women in the settlements concerned.
- Our study settlements are nucleated, so it is feasible for IMT interventions to focus on *groups* from a logistical viewpoint (re sharing IMTs) but research in R7149 villages indicated group approaches would not be widely favoured. We have thus decided to make IMT credit available in the study villages to both individuals and groups. The success of both types of arrangement are being monitored through the project.
- Given the importance of maintenance we have made the decision to focus mainly on equipment which is known in the region and is - for the most part - commonly available and serviced at roadside workshops in the nearest small town/roadside village service centres: i.e. basic bicycles, push trucks and wheelbarrows. IT Transport (1996:19) suggest that it is usually easier, in any case, to build on what already exists, rather than trying to introduce wholly new technologies and systems.
- MOFA VIP, our project collaborators, were keen for us to include donkeys in the project, but we have made a decision after substantial discussions with our Consultative Group to exclude all animal traction because of our findings in R7149 and subsequent discussions with villagers. Draught animals would not be acceptable in these villages without major efforts to change attitudes and substantial training in animal care (thus possibly better avoided in this research project, given limited time and funds available for such a programme).
- The most useful items in these off road villages would appear to be relatively multi-purpose IMTs which can be used both for passengers and a variety of loads.
- There will need to be safety and maintenance training at the time we introduce the IMTs.
- The district administrations will have an important role to play in encouraging and supporting IMT introductions, rather than perceiving them as mere revenue generators through licensing requirements.
- Areas of hilly terrain and dense tree cover such as Assin Aworabo will need special attention. The power tiller is probably useful in the forest zone, but there may be impediments to women gaining access because it is motorised.
- Leyland (1996) and IT Transport (1996:7) suggest that the preferred option is to integrate promotion of IMTs with broader rural development interventions. In the case of R7575, however, this option is restricted both by our research focus and by funding constraints: we wish to identify and explore changes wrought by transport improvements, rather than to promote IMTs *per se*. The proposed VIP work on associated paths is an appropriate supporting intervention which links directly to the IMTs. Where funding or other limitations preclude a full-scale rural development project and require a narrower focus on transport, as in this study, the need for a broad view of the rural context remains an essential prerequisite to intervention.

- As Doss (2001) notes, the vast majority of technological impact studies have been conducted ex post: there is a need for detailed baseline surveys before new technology is introduced. The ongoing study in R7575 aims to provide such information.

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Notes

***This report was prepared January 2001, with an update on general IMT material [i.e. excluding S. Ghana project-based material] through to March 2002. It will be reviewed and extended following completion of the field study in January 2003.**

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APPENDIX

INFORMATION ON TRANSPORT IN THE 5 STUDY VILLAGES BASED ON DATA COLLECTED IN 1998-9 IN PROJECT R7149 **

[** Further detail is available in R7149 project reports]

A. Non -motorised transport use in the study villages in 1999

Adabra

In Adabra just six men own bicycles and in September 1998 all except one (the primary school headmaster's, which he mends himself) were reportedly off the road. There is no bicycle repairer in the village. By November three had been mended. Women in Adabra say they can neither ride nor afford to buy bicycles, though some have occasionally borrowed a husband's to ride within the village. However, a woman at the satellite village of Kuma Akora rides her husband's bicycle more extensively and said she had used it once to travel to Kasoa market with 2 rubbers of maize when she had no transport money. She enjoys riding the bicycle and 'when people see me (on it) they commend me'.

One man owns a small four-wheeled hand cart which he purchased for cash from a local manufacturer in Accra and rents out at between 1,500 and 3000 cedis per day (according to load and distance) to men and women (who use it mainly to transport crops to neighbouring villages and from their farms to the village). The cart cost 150,000 cedis and third-hand tyres from the vulcaniser cost 8-10,000 cedis per tyre. They have been changed several times since purchase of the cart eighteen months ago. Nonetheless, the owner is pleased with his investment.

Sampa

In Sampa there are only three bicycle owners, all men, and as in Adabra their wives only ride the bicycles very occasionally ('for pleasure') and only within the village. Women say they are simply too poor to buy bicycles. Owners in Sampa hire out their bicycles to other men at c. 200 cedis per 5 minutes. They are hired for cycling to nearby settlements. There are no hand-carts in the settlement.

Lome

Lome has about ten bicycles, again all owned by men. These are mostly the standard Chinese/Asian makes, but two men have apparently recently purchased mountain bicycles with gears which are much admired. However, one has already broken. Some of the bicycles are rented out to young boys in town and seem to have been purchased with this in mind. According to discussions with women in Lome, husbands do not usually loan their bicycles to their wives, though the women were unclear about the reasons (they noted that many women do not know how to ride). Very occasionally women get the chance to try riding round the village for pleasure, when a bicycle has been brought into town for hire. The Chief's niece, a major trader in her 40s, described how she had taken such a bicycle on one occasion and ridden it to the next village, 'just for fun'.

One bicycle owner at Lome, a hunter/farmer who has an unusually sturdy Raleigh with a double cross-bar, said that he loans his bicycle to his wife and she rides it occasionally to a nearby farm but 'because she has a child on her back she cannot take it very far'. He admits

that she would like to use it more, but argues that he needs it himself. He never loans it out, which may partly explain why it is in such good condition. He purchased the bicycle for cash, new, five years ago at Swedru, the nearest major town, and paid 80,000 cedis for it: bicycle prices have risen substantially over the last few years. He buys second hand tyres at 4,500 cedis per tyre from Swedru (sending money with any of the drivers who come to Lome) and has to change his tyres every two months; fortunately, Lome has its own bicycle repairer who repairs the spokes when they break. The bicycle is used for riding to the paved road and onwards to nearby centres such as Afransi and Apam Junction, but also nearly every time the owner goes to his farm. He uses it in this case for carrying small quantities of goods (carrying some things on his head, others on the bicycle) but observed that the footpaths are potholed in places, making cycling with a load difficult. When harvesting is in full swing headloaders are employed (mostly women) rather than the bicycle.

Lome also has two small hand carts. These were made by the owner himself, a mason/farmer, in the village about a year ago. The wheels are solid and made of wood (unlike the standard manufactured cart), and rubber tread has been pasted on. They cost the owner 55,000 cedis in total for the two carts in construction costs. Like that at Adabra, these carts are hired out to men and women who use them to take their maize over the four miles to the junction (for which a charge of 6,000 cedis is made for a full load), or from their farm to the village (charged at between 2,500 and 5,000 cedis, depending on the distance). However, the carts are principally used for transport of construction materials during house building, since only those who do not have relatives available to help carry their produce will pay to hire the cart. (Relatives are simply given a small portion of maize for their assistance.) The owner or his brother always accompanies the cart when it is hired out.

Abora

In Abora there are no hand carts, but the village now has three bicycle owners (five years ago there were none): one man (a hunter), one schoolboy (whose brother in Takoradi had purchased it for him) and the only woman cycle owner encountered in the district. The latter, an ADRA (Adventist Relief Agency) 'motivator', is purchasing the machine, a Chinese 'Hero', at a total cost of 130,000 cedis on installments through her work. She had had the bicycle for one year at the time of first interview in May 1998 and for the previous two months it had been out of use due to loose bolts, a broken pedal and a split inner tube. She did not have the 12 - 18,000 cedis estimated repair cost and had not received assistance from her employer for the repair. She blamed the damage to the bicycle on the fact that she loans it out often to friends and the village children (without charge). In September her bicycle was still broken. The hunter, who has a Phoenix cycle, purchased it new two years ago for 105,000 cedis cash, travelling to Accra to make this purchase. He uses the bicycle to transport game to the village and to the roadside for sale. He loans it out regularly, almost every day, without charge to his (male) friends, but never to his wife. When it breaks down he makes simple repairs himself, but otherwise must take it to the nearest mechanic, located at Apam Junction. He has recently seen a three-wheeler tricycle on television and has an ambition to purchase one.

Aworabo (Assin district)

In Aworabo there are six male bicycle owners - all young men - and no women owners. As in some of the Gomoa villages, bicycles are hired out at 5 minutes for 100 cedis. Apparently no woman has ever hired a bicycle, and this idea caused much laughter among the group of

men and women interviewed on the topic.(Though the District Chief Executive at Foso says he has seen women there riding bicycles. There are no carts whatsoever.

B. Results of a traffic survey in 1998

A small village traffic survey was conducted in November 1998. This involved identifying the three main routes out of each of the off-road villages. Student enumerators were stationed at each of the three routes and counted inward and outward traffic on one day when villagers normally attend a major local market and one day when little movement to markets is likely to take place. Counting started at c. 6 a.m. and finished at 5 p.m. and thus does not capture all movement to and from the village, but gives some indication of the relative importance of different modes of transport. The results are presented for each settlement in turn.

Abora traffic survey: (market day at Apam) 22/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Apam Junction	42	26	11	0	6
Footpath to Apam	76	100	0	0	0
Footpath to Brofoyedur	9	63	9	0	0

Abora traffic survey: (non-market day) 18/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Apam Junction	56	53	5	0	4
Footpath to Apam	29	21	0	0	0
Footpath to Brofoyedur	14	14	0	0	0

Sampa traffic survey: (market day Kyiren Nkwanta) 20/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Sampa Junction	85	74	2	0	25*
Road to Akropong	117	93	1	0	0
Footpath to farms	46	69	0	0	0

* 23 Taxis and tro-tros, 2 motor bikes

Traffic survey Sampa: (non-market day) 19/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
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Road to Sampa Junction	34	39	0	0	19
Road to Akropong	39	155	0	0	5
Footpath to farms	91	131	0	0	0

Traffic survey Adabra: (market day Kasoa) 27/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Kotsi Junction (Kasoa-Accra road)	85	57	36	0	65*
Road to Duafo etc.	166	101	32	0	67**
Footpath to Kuma	80	53	14	0	0

* 60 taxis and tro-tros, 5 motor bikes

** 63 taxis and tro-tros, 4 motor bikes

Traffic survey Adabra: (non-market day) 23/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Kotsi Junction (Kasoa-Accra road)	98	77	22	0	56
Road to Duafo etc.	133	106	19	0	51*
Footpath to Kuma	59	71	11	0	0

* 47 taxis and tro-tros, 4 motor bikes

Traffic survey Lome: (market day Dawurampong) 24/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Dawurampong	55	74	1	0	39*
Path to Oguaa	104	88	1	0	0
Footpath to farms	108	192	0	0	0

* Almost all vehicles are tro-tros

Traffic survey Lome: (non market day - Saturday*) 21/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
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Road to Dawurampong	70	91	0	0	40
Path to Oguaa	68	73	0	0	0
Footpath to farms	85	201	0	0	0

* The surprisingly high number of vehicles on this non-market day is related to the fact that a number of funerals were taking place that day - Saturday is the day for funerals in this region.

Traffic survey Aworabo (Assin): market day 25/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Odumase etc.	150	91	1	0	30*
Footpath to Nkukuasa	159	85	0	0	0
Footpath to Ayitey and farms	274	269	0	0	0

*26 motor vehicles (mainly taxis and tro-tros), 4 motor bikes

Traffic survey Aworabo (Assin): (non-market day) 26/11/98

	Ped. Male	Ped. Female	Bicycle Male	Bicycle Female	Motor vehicle
Road to Odumase etc.	178	76	2	0	21*
Footpath to Nkukuasa	144	106	0	0	0
Footpath to Ayitey and farms	230	249	2	0	0

* 19 motor vehicles (mostly taxis and tro-tros) , 2 tractors.

It would be unwise to attach too much weight to the surveys: they took place on only two days at one point in the year, in a period when there had been little rainfall for some time and consequently roads were relatively passable. Nonetheless, they suggest the overwhelming significance of pedestrian travel. Pedestrians were counted as they travelled to the farms etc. in the morning carrying cutlasses and headpans, and returning home in the afternoon with mixed head loads including harvested crops and firewood. The counts were made outside the village, beyond local water sources, in order to exclude travel for water which would have given far higher pedestrian counts. (The figures would be even higher, but a decision was taken to exclude large groups of school children making small excursions with school teachers to farms outside the village - school teachers used children at break time in Aworabo, for example, to carry cocoa into the village, and in Sampa to do work on their farm.)

Bicycles, the surveys suggest, are generally few and ridden wholly by males: they appear to be rarely taken to the farm. Motor vehicles counted per day never exceeded 60 and frequently the vehicles appear twice in the counting, as they travel into and out of the village: this is particularly the case for Abora, Lome and Aworabo where the only motorable road stops at the village, there being no through route to other villages. The vast majority of vehicles counted were tro-tros and taxis, though an occasional mammy wagon or lorry passed through Adabra. The tractor noted at Aworabo belongs to the Cocoa Research Station nearby and was counted twice, going into and returning from the village. Few motorbikes were encountered.

C. Assessing attitudes to IMTs in the survey villages: results from survey work

Photographs of five different types of IMT, selected from a set provided by the International Forum for Rural Transport and Development (IFRTD), were initially shown to a group of eight to twelve women and men of varying age and economic status in each of the five off-road study villages. The aim was then to repeat the exercise with different, smaller groups of homogeneous socio-economic status and age, in order to check the findings. Some difficulty was experienced with the smaller groups in maintaining homogeneity in age and socio-economic status, however, since as is so often the case with group discussions in villages, people tended to leave and join at will, according to interest and responsibilities. In the event, because of these problems, the exercise was pursued further only with women, who are the main transporters of goods to market.

Villagers were first asked to comment on each of the pictures, and then to put them in rank order according to their potential value for use among that group in the village. The five photographs were selected to illustrate a range of transport options and were shown in varying order: the 'Kencart' (a large-mesh container on wheels, shown being pushed by a woman), the tricycle-cart (shown piled high with goods and ridden by a man), the wheelbarrow (shown by itself, laden with what appears to be crop residue), the bicycle (shown with a long flat rear metal carrier and a man, presumably the owner, standing by), and finally a shoulder pole (shown with a heavy load being carried by a man).

A sixth photograph of a donkey cart was subsequently included and reviewed in a second set of group discussions because, although draught animals are not commonly used in coastal Ghana, and there is little tradition of animal husbandry, there was a substantial interest in their potential among MOFA VIP coordinators. [Mr Oppong [MOFA VIP] reported, at a project consultative group meeting in September 1998, that pilot programmes using draught animals were underway in some areas of southern Ghana, including Greater Accra and Volta Region and that there is a University of Ghana donkey breeding project.]

A summary of IMT preferences among off-road village women

Particular emphasis was placed on learning about attitudes to IMTs among women, since women undertake most of the crop marketing in Central Region. A summary of preferences is provided below. In the first (mixed age and status) group discussions it was generally possible to establish a clear ranking of preferences among the five IMTs discussed.

Ranked IMT preference among off-road village women

	Abora	Sampa	Adabra	Lome	Aworabo
Kencart	1	1	1	2	3
Tricycle cart	1	2	2	3	1
Wheelbarrow	4	3	3	4	1
Bicycle	3	4	4	1	4
Shoulder pole	5	5	5	5	5

Gomoa district

In Gomoa, the Kencart was the most favoured IMT among women in all villages, with the exception of Lome, where the bicycle was ranked first. It was perceived by most women to be a really valuable means of transport for crops from field to village and also onwards to nearby markets. When, the groups were asked about potential difficulties in negotiating the cart along village paths, they generally responded that the cart could be parked on the junction with the nearest broad track and would still ease their work considerably. In the two villages which do not have carts currently, it was suggested that the paths could be easily widened to allow passage of the cart, but in one of the villages where there is a small hand cart, Adabra, this was considered less of an option, and in the other village which has two home-made carts, Lome, there were some reservations about access, probably in both cases reflecting past experience with the carts.

The tricycle-cart was generally the popular second choice, especially with older women, and seen as having a good potential, like the Kencart, for both farm to village and village to market transport. The wheelbarrow tended to generate less interest and comment than either the Kencart or the tricycle-cart. The bicycle, by contrast, attracted considerable debate. Its long carrier was usually admired, but only in one village (Lome, see below) was the bicycle ranked above the Kencart or tricycle. Elsewhere, it was generally ranked fourth, behind the Kencart, tricycle and wheelbarrow, by both younger and older women, because of such factors as its perceived restricted load-carrying capacity, the unevenness of farm paths and the need to tie the load on the bicycle as opposed to simply putting it inside the Kencart basket.

Interestingly, women did not anticipate any opposition from men if they had bicycles to ride, but many (especially older women) were rather uncertain as to whether they would be able to learn to ride them. (It is possible that if women obtained bicycles, for instance through a loan scheme, these would be commandeered by men. Women's ownership would have to be firmly established and a training programme made compulsory so that women were confident about riding bicycles).

By contrast with the bicycle, the carrying pole was rejected everywhere. It was immediately and unanimously condemned by women in every village as being obviously uncomfortable, too heavy and a device which would make it impossible to carry a baby on one's back while transporting goods. The details of perceptions of IMTS for each village are provided below.

Adabra

In Adabra the Kencart was the preferred IMT among women, identified as being particularly useful for moving crops from farm to village. On being asked about the feasibility of using the cart along narrow farm paths women said they would load it at the nearest major track or road to the farm, which is the usual practice when people hire the current four-wheel cart. (This cart is often in use every day at harvest time and there is reportedly need for more carts.) Widening paths was not considered a sound option since 'you can't just weed anywhere'.

The tricycle and wheelbarrow were also seen as farm to village transport, but as less satisfactory than the Kencart for this purpose. The women liked the bicycle which they ranked fourth. They noted the useful size of the carrier and observed that none of the bicycles in their village had this. The shoulder pole was firmly rejected, however, on the grounds that the load would be too heavy for the neck and that if carrying a baby on the back it would be impossible to carry the pole as well. (It was acknowledged that headloading is very damaging to the neck - 'you get neck pains, it even goes to the waist'. Women say they just buy a rub and massage their neck when it is particularly painful.)

Sampa

In Sampa the Kencart was ranked first, the tricycle second and the wheelbarrow third with respect to their usefulness to women. Women liked the Kencart because they could use it for transporting goods both from the farm and to market (which is just over 5 miles away). Women here report that men generally widen the footpaths and undertake general maintenance. They do this at approximately three monthly intervals, so the carts would be able to pass through to most farms and nearby villages. The tricycle-cart was seen as having a potential role particularly for moving goods to market: 'even if she doesn't know how to ride, she can put her goods [in] and find someone to take it'. The wheelbarrow was seen more as a farm to village transporter, though one member of the group, a larger produce dealer said that if her car didn't come, she could put her goods in it and take it to the junction herself.

Bicycles were considered impractical for journeys to market with produce, particularly cassava because of its weight: 'bicycles cannot carry a heavy load'. The paths to the farms were also considered too rough for bicycle riding, though 'some young ladies might use it to go to the farm, but it is men who could use it more than women'. The middle-aged dealer observed that most women have no idea how to ride a bicycle, though young women might learn and use it for pleasure. She could not see how anyone would be able to carry a load and ride as well! Another woman trader said, very firmly, that what she needed was a motor, not a bicycle!

The carrying pole drew shouts of laughter from the women and the observation that 'carrying is better than tying your load to a stick'. They could not imagine any benefits from distribution of the load in this manner and said they would never use anything like it, though they complain of chest, waist and head as well as neck pains from headloading. (The common remedy in this village, they say, is to buy 50 cedis worth of paracetamol, then go and sit down somewhere and chew them. At another village in this area women described how they prepare an enema from herbs collected from the bush and a little pepper and ginger and use this when the pain from headloading is particularly severe.)

Lome

In Lome the bicycle, followed by the Kencart, were considered by women to be the most useful machines. The bicycle, they observed, could be used to travel to Swedru if no transport arrived, or to go to the next village or their farms. No one in the village had such a long carrier on their bicycle. They reckoned they could fit the 5 rubbers of maize they usually transport as one headload on the back of the carrier and even a goat or sheep could be tied across it. No objections from men were anticipated to women riding bicycles. It is possible that the views of the group here were somewhat influenced, however, by the Chief's niece who had obviously enjoyed her one experience of cycling tremendously.

Women in Lome thought the Kencart would also be suitable for farm to village transport of crops, since their paths are quite wide when they have been weeded, and even to take crops to the paved road. However, they pointed out that there is a stream outside the village which has to be crossed to reach many of the more productive farmlands and this would be impossible to negotiate with a cart when in full spate. The tricycle and wheelbarrow were also considered to be potentially useful but the shoulder pole was dismissed as impractical, since maize and cassava if carried by this means would put too much weight on the neck.

Abora

At Abora the tricycle-cart and Kencart were preferred by the group of women interviewed. The tricycle was seen as particularly useful for taking maize to the grinders (in Abora there is no grinding mill in the village so women walk two miles along the road to Apam Junction to grind their maize about two or three times per week). The Kencart was seen to be useful for moving produce from farms to granaries (which are mostly built in the village at Abora) and firewood to Apam along the footpath.

When asked about the problems of negotiating narrow footpaths the women said they would widen the path (though it is actually men who generally do footpath weeding). Both tricycle cart and Kencart were seen as preferable to a bicycle, because it would not be necessary to tie on the load. Nonetheless, the bicycle carrier was admired and it was observed that the bicycle could be used by children if the women themselves couldn't ride it. The one woman cycle owner encountered in the study villages, an ADRA motivator who lives in Abora, appears to be a useful role model: a number of young girls have learnt to ride on her bicycle. She says that when women see her on it they 'admire me and fancy it and at times are surprised; old ladies even encourage me'.

The wheelbarrow was less favoured but only the carrying pole, as in the other villages, was disliked. The women said they would fall down if they tried to use it, 'it weighs you down'. Headloading is considered a better option than the pole, though physical neck problems associated with headloading are acknowledged.

Aworabo, Assin district

In Aworabo, the conclusions varied somewhat from the Gomoa groups. The tricycle cart and wheelbarrow were strongly favoured here. The wheelbarrow was admired because it could be used to carry fermented cocoa and cassava from the farms to the village. The Kencart was considered particularly appropriate for large quantities of cassava, but the tricycle cart was seen to be likely to have more advantages than the Kencart. There were strong doubts expressed about the stability of the bicycle, particularly among the older women. As in Gomoa the shoulder pole was disliked, 'only men can use it; it's for men'.

IMT studies with homogeneous groups

Subsequently, when an attempt was made to work with groups of women of similar age and socio-economic status, the photograph of the donkey cart was shown in addition to the five photographs previously discussed. In Aworabo in Assin district unfortunately it was not possible to find relatively homogeneous groups of women for additional interviews.

Abora

A group of four young women, all farmer-traders selling food, pestles and firewood on a small scale, were interviewed at Abora. They were not in the previous group discussions and were keen to learn ride the bicycle and envisaged riding it to Apam Junction, even for bringing firewood from the farm, if the path was clear; they would park the bicycle at the junction if the path was difficult. However, they still ranked the Kencart first.

The donkey cart photograph caused much laughter, though they thought it a ‘fine idea’. However, Abina questioned: ‘If you don’t understand the language of the horse, how does it move’. They knew no one in the village with any experience of animals. The table indicates the slight difference in perspective between the younger women in this group and the mixed group where the older women probably had a stronger influence.

Variations in ranked IMT preference, Abora

	Mixed women’s group, Abora	Group of women under 30, Abora
Kencart	1	1
Tricycle cart	1	4
Wheelbarrow	4	3
Bicycle	3	2
Shoulder pole	5	5

Sampa

In Sampa a small group of three elderly women cooked food sellers, not previously interviewed, ranked the donkey cart higher than the shoulder pole but dismissed both as totally unsuitable for them. They were very strongly in favour of the tricycle cart because of its stability.

A group of three young women, all in their late teens and early twenties, all farmers with young children, who traded mostly on behalf of their mothers had only slightly different perceptions.

The Kencart was obviously generally highly favoured, in Sampa as in Abora, the older women preferring the tricycle cart simply because they would not have to push it.

Variations in ranked IMT preference, Sampa

	Mixed women’s group, Sampa	Elderly women’s group, Sampa	Young women under 30, Sampa
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Kencart	1	2	1
Tricycle cart	1	1	3
Wheelbarrow	4	3	2
Bicycle	3	4	4
Shoulder Pole	5	6	5
Donkey cart	n.a.	5	6

Lome

A group of six young women petty traders interviewed in the market place at Lome were less interested in the Kencart than in the tricycle cart and bicycle. Two older Moslem women petty traders here were overwhelmingly in favour of the tricycle and Kencart and viewed the bicycle with firm disfavour, while still seeing it as preferable to the remaining three options.

Variations in ranked IMT preference, Lome

	Mixed women's group, Lome	Elderly women's group, Lome	Young women under 30, Lome
Kencart	2	2	3
Tricycle cart	3	1	1
Wheelbarrow	4	4	4
Bicycle	1	3	2
Shoulder Pole	5	5	6
Donkey cart	n.a.	6	5

Adabra/Kuma Akora

At the Ewe satellite village Kuma Akora, about half a mile from the main Adabra settlement, it was possible to work with three groups of elderly, middle-aged and young women, all of whom were involved in petty trade. Their observations can be compared with that of the initial group of mixed Ewe and Fanti women interviewed in the main settlement.

Interestingly, among middle-aged women and young women, bicycles were very popular in Kuma Akora. This could possibly be related to the fact that bicycles are much more common in Ewe areas of Volta Region. Moreover, there is an Ewe woman in another satellite village close by who rides her husband's bicycle and has even ventured to market on it (see Part 1 of the report, Section 5.3.1).

Among elderly women, as was commonly the case elsewhere, the bicycle is less popular than other interventions, though this was the only case in which the bicycle was ranked even below the shoulder pole and donkey cart (neither of which were considered by any group to be remotely sensible as a means of transport).

Variations in ranked IMT preference Adabra/Kuma Akora

	Adabra mixed group	Kuma Akora elderly women	Kuma Akora middle-aged women	Kuma Akora young women under 30
Kencart	1	1	2	3
Tricycle cart	2	3	4	1
Wheelbarrow	3	2	3	4
Bicycle	4	6	1	2
Shoulder Pole	5	4	6	6
Donkey cart	n.a.	5	5	5

IMT preferences among women by age

Viable IMTs for women are perceived to include carts on the lines of the Kencart and tricycle cart, which are seen as useful for moving substantial amounts of goods around the village, along some of the broader farm paths to the village and, in the case of the tricycle cart, to nearby markets. Bicycles are likely to be a feasible option for younger women, who often take only small quantities of goods to market, and generally expressed an interest in learning how to ride, but are clearly unsuitable for older women who have never ridden a bicycle. The shoulder pole and donkey cart were both viewed as so alien to local practices as to be totally unsuitable for adoption.

Men's IMT preferences

Men were also asked about their views on the IMT photographs. The overall picture was as follows:

Ranked IMT preference among off-road men

	Abora	Sampa	Adabra	Lome	Aworabo
Kencart	3	3	3	2	5
Tricycle cart	1	1	2	1	1
Wheelbarrow	4	4	4	5	3
Bicycle	2	1	1	3	2
Shoulder pole	5	5	5	5	5

Men viewed the Kencart generally much less favourably than women, except at Lome where it was considered a useful piece of equipment which would be relatively easy to push. At Abora they pointed out that it would only be useful for the road to Apam Junction: they also

sell goods at Apam, which is accessible only by narrow footpath. Also, it would be difficult to push over long distances. Similar comments were made at the other villages, though the Kencart's stability was noted at Adabra. At Aworabo (Assin district) men considered the Kencart totally unsuitable because of the long distance to market and the narrowness of farm paths. (Among women there was similarly less interest in Aworabo in the Kencart than in Gomoa villages).

The tricycle cart was overwhelmingly popular among men - even more popular than among women. Its stability and the potential size of load were noted with favour. The only possible difficulty was seen to be negotiating the tricycle along narrow paths. The bicycle was almost as popular among men as the tricycle: some men, of course, already own bicycles in these settlements.

The wheelbarrow was seen in most villages by men as just a tool for construction and 'community work' in the village, though in Aworabo it was also seen to have a potential role when gathering cocoa fruits. Its lack of stability was pointed out in Lome and Adabra.

The shoulder pole was universally condemned, as among women in the study villages. Comments indicated that it would be too heavy and unsuitable on narrow roads and far more tedious as a means of carrying goods than headloading.

Summary of attitudes to IMTs among off-road village women and men

To conclude, it is clear that some IMTs elicited considerable interest among villagers, notably the tricycle and (among women) the Kencart, though many men, and a few women, emphasised that a conventional motor vehicle would be of far more use. The overwhelming dismissal of animal drawn vehicles by respondents (and the experience of the Cocoa Research Station at Aworabo) suggests it could be extremely difficult to achieve sustained use of animal-drawn IMTs in Central Region.

Given the very small sample taken in this study it is difficult to make generalisations, but variations in attitudes to IMTs were evident among women according to age in the study villages and it would be probably important to take age into account when introducing IMT programmes. Elderly women are often among the poorest in such villages and their perceptions and needs may require special attention.