Module 5 –Findings and lessons from earlier projects

Abstract:

Module 5 gives examples of transport and gender projects and identifies the findings and lessons learned. The findings from some projects suggest that: (a) government incentives and tax regulations need to be applied uniformly; (b) projects should identify specific gender interventions in order for women to reap benefits; (c) IMTs must be gender-sensitive and appropriate; (d) training in IMT use is required; (e) financing IMTs may require support and needs to account for the borrower's ability to repay; (f) men tend to choose men for opportunities unless other methods or criteria are offered; (g) participatory planning ensures gender sensitivity in project choice and increases participation employment activities; and (h) women's participation can lead to equitable solutions.

Below is a list of more general projects that pertain to transport and gender undertaken by the World Bank and a number of donor countries. The findings and lessons learned from their implementation – as relates specifically to gender - are presented as well as some of the main issues identified.

Box 16 Initiatives in Gender Focus for IMTs and Improved Rural Transport Networks

Country/Project	Findings and Lessons	Issue
Mozambique: Rural Roads	- the project imported used bikes from the U.S. to take advantage of tax exemption status for such items. However the government refused to grant a tax waver, which negatively impacted project success.	- government incentives & tax regulations need to be transparent & applied uniformly
India: Study of 3 Forest Economy Villages	- bikes were allocated to communities but used exclusively by men as no effort was made to target women as well. - however as the project progressed the focus was changed to include women. - some successful options for women were included, such as: special buses to carry loads on market days; collectivizing the market; improving paths; bringing sources of water, health, & education facilities to the villages themselves, and protecting and re-generating village forests.	- not all options are applicable to women - transport needs to identify specific gender interventions i women are to reap any benefits
Zimbabwe: Report on Intermediate Technologies	- specific training for women is required in use of IMTs - when introducing IMTs consideration needs to be given to gender appropriateness - not many IMTs are rented out, more instances of shared IMTs was found, sometimes in exchange for labor.	- IMTs need to be gender sensitive and appropriate - identification of IMT options, demonstration & training is a req't.
Nepal: Rural	- rural roads brought new opportunities to households, but	- desegregating data enables

Transport	these required more travel & transport tasks which fell more onto women, i.e. opportunity to sell more dairy products led to increases in cattle which led to increased at- home work for women who tended cattle.	task managers to identify role & responsibilities of beneficiaries omitting potentia negative impacts of women
Ghana: Development of IMTs	- IDA-financed, Ghana's Technology Consultancy Center promoted production and use for women of: (a) bikes with trailers; and (b) hand -pushed farm vehicles. - designs were adapted to local conditions and demos were set up. - credit lines were established and Technical Assistance provided to start-up firms to manufacture vehicles given - NGOs were used, they were found to be experienced in financial management but lacked the capability of maintaining appropriate accounts.	- IMTs require support in financing and promotion. - loan terms and conditions need to take into account borrowers ability to repay, witl interest rate's kept at the real loan value level - NGOs are useful but need to be competence in all key areas.
Rwanda: Strategy for Using Female Labor in Road Construction	- past recruitment was undertaken by "bourgmestre" who preferred men who paid taxes and belonged to certain political parties. - new recruitment process involved: (a) massive publicity using multiple media on recruitment procedures and women's eligibility; (b) public meeting where people chose poorest or most needy by a "people's" choice criteria; and (c) submission of list to commune chief for approval.	- men tend to choose men for opportunities unless some other methods or criteria are presented.
Botswana: Rural Roads Project	- NORAD-funded project used female laborers in rural roads construction and maintenance. - 20% target chosen for women's participation. But this was not exceeded because overseers had no incentive to exceed quotas - it was found that women were equally productive, although work patterns were accommodated to meet agricultural labor needs and cycles. - women were more literate and prepared to receive training as gang leaders, but they were not considered as men supervisors chose men.	- women need to be targeted for inclusion or it does not happen - targeting does work howeve it needs to be used as a “minimum" guideline.
Nicaragua: Women's Participation in Infrastructure Planning and Construction	- DANIDA-funded effort to improve rural infrastructure in roads and water canals - elected committees with women participants, and together projects were prioritized.	- female participation ensures not only gender sensitivity in project choice but also increases women's participation in employment activities.

	- women participated in local construction works leading to greater representation among local-level decision-makers - construction jobs were allocated so that women could work part-time, closest to their villages, and where possible on all-female gangs.	- road construction works can be carried out equally by men and women
Peru: Participatory Workshops in rural roads development	- participatory workshops were organized to involve local communities in planning, project commitment and maintenance road projects - men and women were involved and encouraged to take part and take leadership roles to find solutions for both groups.	- gender-sensitive participatio can lead to equitable solutions which include labor-based maintenance methods which include women as workers, and funding for IMTs for women as well as men.

Appendix 1

The following Boxes present additional information on IMT projects not included in the main text.

Box 1
Wheelbarrows: slow early diffusion, much subsequent adaptation

Wheelbarrows, made of wood, metal or plastic are seen worldwide. They are often used for short-distance transport of heavy goods, such as construction materials, water or agricultural produce. Wheelbarrows are often employed around markets to move goods between larger vehicles and market stalls. Petty traders may use them for selling wares. Wheelbarrows have not always been used in this way. It is quite possible that wheelbarrows have been 'invented' many times and in many different countries, but there do seem to have been patterns in their spread and adoption.

The first records of wheelbarrows appear to come from China in the 3rd Century. In the traditional Chinese wheelbarrow, the load is balanced high over a central wheel. Although the centre of gravity is high, making it somewhat unstable, the operator does not have to bear much of the load. This design is not commonly seen outside Eastern Asia, although some modern single-wheel water carriers have adopted the design principal. It seems that the wheelbarrow concept gradually spread westwards in Asia.

There seem to be few, if any, records of wheelbarrows being used in Europe before the 13th Century. Prior to this, on construction sites large loads were transported using rollers or carts, while two people sometimes transported smaller loads using a wooden platform or stretcher. Soldiers returning from crusades may have brought the wheelbarrow idea to Western Europe from the Middle East. The first recorded medieval wheelbarrows comprised a long load-bearing stretcher, supported at one end by a wheel and at the other

by the operator. The idea of the wheelbarrow then spread, the design being modified and re-invented numerous times. Wheelbarrows became common in Europe and navigators and colonialists subsequently carried technology throughout the world. Numerous variations on the design have been made, and new designs are still being 'invented' each year.

Lessons Learned:

- Simple technologies may not arise spontaneously, but they may spread once an idea is shared.
- Once a technological idea has been introduced, there is great scope for local adaptation.
- IMT programs may need time: wheelbarrows and carts evolved and spread over centuries!

Reference: Matthies, 1991

Box 2
Animal-drawn toolcarriers: combined 'bullock tractors' and carts

Animal-drawn wheeled toolcarriers are multipurpose devices designed for both tillage and transport. The wheeled chassis can be used as a cart and also for ride-on agricultural operations. Early designs were produced in Senegal in 1955 and researchers in Europe, Africa, Asia and Latin America subsequently developed over 45 designs. Early toolcarriers were tested in many countries in the world, and they were actively promoted with credit and subsidies in Senegal, Uganda, The Gambia and Botswana. In the 1970s the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) started a major research programme involving wheeled toolcarriers which resulted in the development and refinement of the Tropicultor and Nikart designs. In India, credit and subsidies of up to 80% were offered to stimulate demand and encourage local manufacture. Projects disseminated 1200 toolcarriers in this way. The wheeled toolcarriers were technically competent and often proved highly effective under the optimal conditions of research stations. The technical successes were widely reported, together with some enthusiastic comments of local farmers. Economic models demonstrated the potential profitability of the implements (given optimal assumptions on utilisation patterns). Encouraging reports of the 'successes' of wheeled toolcarriers stimulated much wider international interest in the technology. Toolcarriers were subsequently imported or made in almost all African and Latin American countries. Significant numbers were imported by development projects in Mozambique and Angola and large-scale manufacture was started in Brazil and Mexico. In all, over 10,000 wheeled toolcarriers were made, but in no country was there successful adoption. The number ever used

by farmers as multipurpose implements for several years was negligible. Most were either abandoned or only used as carts. Wheeled toolcarriers were rejected because of their high cost, heavy weight, lack of manoeuvrability, inconvenience in operation, complication of adjustment and difficulty in changing between modes. Their designs involved compromises between the many different requirements. In many cases for a similar cost a farmer could use a simple cart and a range of single-purpose implements to achieve similar results with greater convenience and with less risk. These lessons were apparent as early as the 1960s but published reports were invariably highly optimistic and created an illusion of success. Over a period of thirty years projects in many countries spent much time and money trying to achieve similar 'success'. However the technology that had been 'perfected' by engineers was invariably rejected by the users.

Lessons Learned:

- Technologies developed by researchers tend to over-emphasise technical efficiency rather than appropriateness to the users within the realities of their environments

- Users must be involved at all stages of planning, implementing and evaluating IMT programmes.
- Enthusiasm for IMT innovations must be balanced with constructively-critical monitoring and evaluation.
- Organisations should report disappointing IMT adoption patterns so the lessons are shared.
- Credit and subsidies can stimulate initial sales but long-term adoption requires user satisfaction.

Reference: Starkey, 1988

Box 3
"Appropriate technology" and "Flintstone" ox carts

Most animal-drawn carts in Botswana, Namibia, Nigeria, South Africa, Tanzania, Zambia have been made by local workshops using old automotive parts (old pick-up axles or car stub bearings together with old wheels and tyres). These carts have generally been quite heavy but strong and long-lasting. The limiting factor has usually been the shortage of scrap axles, wheels and tyres.

During the 1970s and 1980s, several ox carts were developed in these countries that were considered "appropriate technology" designs. They were intended to be low-cost carts that used mainly local resources and designed to be puncture proof. Some used wooden wheels, some used metal-spoked wheels and others made use of old tyre rubber. One prototype used spokes made of sisal.

They generally used wooden bushes or bearings soaked in old oil. Examples include the Camartec, Iringa and TAMTU carts (Tanzania), Kasisi Mission carts (Zambia), the Katopola cart (Zambia) and the Technology Development Advisory Unit (TDAU) carts (Zambia). In Zambia, some of these were colloquially referred to as "Flintstone" carts, as they were of low prestige and people likened them to the Stone Age transportation devices seen in cartoons. While there were examples of carts lasting for over ten years, with little maintenance, this type of cart generally suffered from serious problems with their wheels and bearings.

Despite many local promotional attempts, these "appropriate technology" designs were seldom popular and there was little sustained adoption. The wooden bush bearing wore very quickly. Unless alignment was unusually good, wooden block bearings were considered ‘heavy’, with high draft requirements. They were generally cheaper than carts made with automotive parts, but they were not as effective (they were heavy, with high draft and wore quickly). Certain ‘improved’ "appropriate technology" designs (e.g., TDAU cart) became comparable in complexity and cost to cheap automotive carts. All were more expensive than really simple sledges and village-made carts that used tree-trunk wheels.

Lessons Learned:

- While traditional wooden artisanal technologies have remained popular in some countries (Madagascar, India) and modern automotive artisanal technologies have proved popular in most of sub-Saharan Africa, attempts to introduce "appropriate technology" wooden wheels and bearings have not been very successful.
- Carts are expensive but transport can be profitable and farmers/transporters may be willing to pay extra for more efficient products.
- Technologies perceived as backwards are liable to be mocked or rejected for their low prestige.

References: ITDG undated; Thoma, 1979; SFMP, 1984; Hinz, 1988; Starkey 1989; Dogger, 1990; Starkey, Dibbits and Mwenya, 1991; Starkey and Mutagubya, 1992; Helsloot, Sichembe and Chelemu, 1993; Wirth, 1994; Mujemula, 1994. Vroom, 1994.

Box 4
Artisanal cart production and marketing in Shinyanga, Tanzania

In Tanzania, Shinyanga market became a center for the manufacture and sale of animal-drawn carts due to local

entrepreneurial activity, rather than any public sector initiatives. Some small workshops manufacture cart axles using old vehicle bearings and water pipes and there are traders which specialise in selling the axles, bearings, rims, tyres, tubes and spare parts. Carpenters make complete cart bodies, and paint them with distinctive blue and black patterns (decorative cart design is a characteristic of indigenous cart industries in several countries including Madagascar, Costa Rica, and Portugal). Painting their carts distinctively has helped the manufacturers develop a recognised and known brand image known as *Masale* carts. Entrepreneurial skills have been exhibited in an unusual marketing system for carts that has developed. Traders travel out to villages with ox carts, and exchange them for cattle (for example, four animals for a cart). The animals are taken back to Shinyanga and sold. The traders take some profit as income, but most of the proceeds are reinvested in the purchase/manufacture of more carts and cart components. This simple barter system is said to increase sales and benefit all concerned.

Lessons Learned:

- Sustainable private sector IMT manufacturing and marketing systems may arise spontaneously.
- IMTs can be given clear brand images, stimulating pride in manufacture and ownership.
- Innovative marketing systems, including bartering, can assist IMT adoption.

Reference: Starkey and Mutagubya, 1992

Box 5
Introducing donkeys for transport in Tanzania

When the Tanga Animal Draft Power Project began operation in north-eastern Tanzania in 1981, lack of farm power and transport were identified as crucial constraints for smallholder farmers. The Project therefore started to introduce work oxen and ox carts. Farmers did not use donkeys, although pack donkeys had been in the area for many years, owned by Masai pastoralists and some traders on the coast. During appraisal discussions, farmers expressed interest in using donkeys, but they were sceptical. They doubted that donkeys could pull carts. There were few axles available in Tanga, so the project imported cheap scrap axles from German cars, complete with tyres and rims. This seemed a good short-term solution for the project, but it provided farmers with long-term problems. The axles used were of a type rarely found in Tanzania, and farmers struggled to find spare parts. (Another project in Tanzania imported Canadian axles with very unusual bearings, rims and tyres).The Tanga project tested designs of cart with two shafts, suitable for single donkeys. Following favourable

farmer reaction, local artisans were contracted to make relatively light cart bodies, mounted on the imported axles. The donkey carts proved more popular than the ox carts.

Farmers wanted donkey carts but could not really afford them. Rural incomes and employment opportunities were low, so even credit repayments were difficult for such expensive items. This was partly solved by a labour-intensive, rural road maintenance program. Farmers were contracted to bring gravel to resurface roads, and the income from this program made it possible for farmers to repay loans. The carts were used for many other purposes besides gravel haulage.

The project began at a time when it was normal to work mainly with male farmers. However, project gender sensitivity increased, and more attention was paid to women farmers. Women started to benefit from the spread of donkey carts and found it easier (socially, economically and practically) to own and manage donkeys than oxen. The donkey carts could be used for carrying water and fuel wood, harvest products, forage for animals, goods for trading and people themselves. The donkeys could also be used for plowing and weeding. Initial prejudice against donkeys was rapidly overcome through practical demonstrations of donkey employment.

Lessons Learned:

- The need for IMT spares should be considered when designing/importing components
  (imported scrap axles, wheels or tyres should be similar to those used by local vehicles).
- Cart introduction can be assisted through the contracts/credit of labour-based road programs.
- Women can be major beneficiaries of donkey adoption and IMT use.

References: Starkey and Mutagubya, 1992; Starkey and Grimm, 1994; Fischer, 1994a, 1994b; Makwanda, 1994

Box 6
IMTs in Guinea: influences of climate, terrain and neighbouring countries

There are relatively few IMTs in Guinea. Most are locally manufactured by artisans and are used in urban areas to assist marketing and the distribution of materials and water. Wheelbarrows and hand carts of various sizes are used in all towns. Small numbers of motorcycles are used in urban and rural

areas, mainly for personal transport. Cycles are rare in Conakry and the west of the country. They are most common in the north-east, which is a relatively flat and dry area. It is also close to Mali, and some bicycles may be entering the country from Mali. Donkeys can only survive in the north of the country and some farmers/transporters have brought in carts privately from Guinea Bissau and Senegal. Ox carts are not very common, and they are generally found in the eastern and central areas. There are few cattle in southern and western areas, while the north tends to be mountainous. In the south of Guinea, rainfall is heavy and forest growth is strong. Village paths are often narrow and muddy, and very few IMTs are used.

Lessons Learned:

- Adoption of IMTs often starts in urban areas where there are both manufacturing facilities and economic opportunities.
- Cross-border influences can be strong.
- Climate and topography influence the distribution of animals and the suitability of certain IMTs.

Source: Reports of field visit and discussions, RTTP workshop, Guinea Conakry, June 1998.

Box 7
Donkeys, horses, mules and animal-drawn carts in Ethiopia

The main IMTs in Ethiopia use animal power. With five million donkeys, Ethiopia has the second largest population of donkeys in the world. Pack donkeys are extremely important in both rural and urban economies carrying grains, forage, wood, water and construction materials. The packing technology is very simple: most loads are balanced on back blankets, although wooden panniers are used for carrying water containers and stones. Pack donkeys are well suited to transport in the rural highlands: few other IMTs can operate in areas with many steep paths and few roads. However, even in and around the city of Addis Ababa, several thousand pack donkeys operate, bringing in and distributing produce. The success of recent military campaigns in Ethiopia and Eritrea owed much to the use of pack donkeys for carrying munitions and supplies. Despite the large numbers of pack animals employed in Ethiopia, transport of heavy loads by humans (mainly women) is still common in rural and urban areas.

In rural areas, horses and mules are primarily used for riding (mainly by men). Simple passenger-carrying two-wheel horse-drawn carts became common in Ethiopian cities about fifty years

ago. The authorities banned them from central Addis Ababa around 1963, but they remain common outside the prohibited area and in other towns. They are generally used as passenger taxis for hire, and there is little use of horse carts for freight purposes.

There has not been a tradition of using donkeys to pull carts in the Ethiopian highlands. However, an innovative design of low-cost donkey cart appeared in the relatively flat Rift Valley in the 1970s. In most of the world, carts pulled by one donkey have two parallel shafts with a load-bearing saddle. The donkey pulls the cart using a collar or breast band. In contrast, the Ethiopian carts have converging shafts attached to a simple packsaddle. The carts, made from wooden poles, appear of recent, indigenous design, and have evolved in a country where donkeys have always been used to carry on their backs rather than pull from harnesses. These carts, that have steel spoke wheels without elaborate bearings, have been spreading rapidly in the Rift Valley. They are used for the transport of water, straw and other materials. They sometimes serve as ambulances. The development and rapid spread of these carts has been within the informal sector. It contrasts with the very low uptake of cheap 'appropriate technology' ox carts developed in 1988. To date, the adoption of relatively expensive steel ox carts with pneumatic tyres promoted by government agencies in the 1980s and 1990s has been minimal.

Lessons Learned:

- Simple pack animal technologies suited to hilly areas can also operate in an urban environment.
- Urban horse cart taxis are economically viable unless the authorities prohibit them.
- Appropriate and affordable indigenous IMT innovations can spread quite rapidly.
- The success of a simple (technologically inefficient) donkey cart contrasts with the lack of uptake of more expensive, higher quality ox carts.

References: Bierig, Derebe Kasai and Tadelle Dereba, 1988; Wilson, 1991; Kebede Desta, 1994; Starkey, 1998b; Geta Kidanmariam, 1999; Sisay Zenebe and Tilahun Fekade, 1999.

Box 8
Cycle trailers in India: what happened and why?

India has a significant number of bicycles and cycle-based transport technologies. Bicycle production is about ten million/year and there are about five million cycle rickshaws in use. All towns and many villages have small workshops capable of servicing cycle

technologies. Entrepreneurial activity in the small-scale manufacturing sector is high. The environment and infrastructure appears ideal for supporting cycle trailers, provided there is economic demand for them.

1987: Popular demand for the IT Transport-designed cycle trailer prompted an engineering company in Andhra Pradesh to take up production. The cycle trailer proved very popular for a wide range of agricultural and small business uses. Sale of the first batch of 100 generated substantial interest from a number of NGOs.

1988: Cycle trailer manufacture was accelerated in India with some 200 units in circulation. Most users reported considerable savings on transportation of goods associated with businesses, as well as improved convenience and speed, in comparison with other available methods of transporting goods. A promotional campaign to make the cycle trailer more widely known to potential users has begun.

1990: The cycle trailer developed by IT Transport and tested in partnership with organisations in India .became well established in four states: Andhra Pradesh, Uttar Pradesh, Bihar and Tamil Nadu.

1992: The Water Development Society (WDS) in Andhra Pradesh trained small-scale cycle trailer manufacturers. The Council for Advancement of People's Action and Rural Technology (CAPART), a Government of India body involved in technology transfer had provided funding for this. CAPART however considered the cycle trailer project a failure, primarily because it was a "weak technology". In addition, the various partner organisations (WDS, MACE, IERT) did not actively network with each other. The lack of success was due to lack of programme coordination (by IT Transport), competition from cycle rickshaws, lack of marketing and too much individualism/hobbyism. The trailers were relatively expensive due to costly jigs and fixtures. The target group of users lacked purchasing power and credit, making the market outlook poor. There were no large-scale production and marketing initiatives.

1999: The external organisations involved in the funding and implementation of the Indian cycle trailer initiative during the 1980s were unaware of the existing situation.

Lessons Learned:

- There should be many valuable lessons to learn from the attempts to introduce cycle trailers into India, but there appears to be insufficient accessible information to allow this.
- There is a need to follow-up and evaluate IMT programmes, and share the lessons learned.

References: IT News, 1987, 1988, 1990; de Silva, 1992.