



**TRANSPORT
AND THE
MILLENNIUM DEVELOPMENT GOALS**

**A Background Paper to the Task Force on Slum Dwellers
of the
Millennium Project**

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Walter Hook, PhD

Executive Director, Institute for Transportation and Development Policy,
Northern Co-Chair, UN NGO Caucus for Sustainable Transportation

John Howe, PhD

Professor Transport Engineering (1991-2001), International Institute for Infrastructural,
Hydraulic and Environmental Engineering, Delft, Netherlands.

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EXECUTIVE SUMMARY

While the Millennium Development Goals (MDG) do not specifically make reference to transportation issues, transportation projects and programs have an enormous impact on both the poverty alleviation and environmental sustainability goals.

This document first reviews how the United Nations process has addressed transportation in the past. It then reviews how the MDGs fits into this process. Transportation issues are dealt with directly in Agenda 21, the Global Plan of Action for Habitat II, and the proceedings of the Commission for Sustainable Development #9, and in the official policies of the development banks. The MDGs do not directly address transport issues because they accept the legitimacy of these earlier UN agreements.

The document then critiques the transport statements made in the Interim Report of Task Force One on Poverty and Economic Development. Many of the statements made by this MDP report posit a rather direct connection between road investments, poverty alleviation, and economic growth. These statements do not sufficiently specify conditions under which road investments will lead to positive growth or poverty alleviation outcomes. Nor do they identify those conditions where road investments may compromise economic growth and worsen poverty.

For all road systems, the frequent backlog of road maintenance needs should be met before new construction is considered. Further, unless a mechanism is in place to ensure that revenues from road users will cover the costs of debt service and all ongoing maintenance costs, the loans will only worsen indebtedness. While the use of grant funds for roads directly serving low income populations is less problematic, other interventions are likely to have more direct poverty alleviation benefits. Secondly, the roads should be designed to ensure safe travel and crossing by pedestrians and other vulnerable road users. Third, the construction process itself should encourage labor-based construction methods that employ the local low-income population.

For road projects in urban areas, further conditions should be applied. Before new urban roads should be built, high capacity vehicles, like buses and bicycles and pedestrians, and high value-added vehicles, like trucks, should be given priority access to the existing roads. Rationalization of the use of existing roads and rights of way is often sufficient to avoid expensive new road construction projects, saving money that can then be used for other purposes like low income housing and related infrastructure. Without putting exclusive bus lanes and bike lanes and sidewalks on existing roads, or allocating scarce road space through congestion charging, the benefits of roads are disproportionately captured by the wealthiest sector of population.

Expanding urban roads also frequently comes at the expense of slum dwellers. Transportation projects are the leading cause of involuntary resettlement of slum populations. The poor are generally relocated farther from their places of work, increasing their travel costs. Converting land from low income housing to roads also inevitably increases housing land prices.

Finally, the poor are the most frequent victims of vehicular air pollution and traffic accidents. Slum dwellers are over-represented among the 1.1 million annual premature deaths from upper respiratory illness associated with exposure to vehicular exhaust. Slum dwellers are also over-

represented among the 1.2 million annual victims of roadway fatalities. Before investing in urban road projects, a determination must be made that traffic generated by the new roadway will not drive a location into further violation of World Health Organization-recommended ambient air quality standards. Furthermore, road investments should be designed in such a way that they reduce rather than increase traffic fatalities, particularly among vulnerable non-motorized road users.

Investments into urban mass transportation may benefit the poor, but again, the conditions under which a mass transit investment will benefit the poor need to be carefully specified. As with roads, simply pouring loan funds into ill-targeted urban mass transit projects could also have adverse impacts on the poor and virtually no positive impacts. In all but a small number of very high-density traffic corridors, metro projects are targeted at the mobility needs of middle and upper income passengers rather than the poor. Most metro systems are unable to cover their operating or ongoing maintenance costs, let alone the capital costs. As such, for a developing country facing problems of indebtedness, metro projects that impose permanent debts and do little to address the mobility needs of the poor are generally ill-advised. There is probably no city in Sub-Saharan Africa where a metro could be justified.

Nor is there significant evidence that public investment into buses operated by public transit authorities is likely to have a sustainable impact on urban mass transit systems in developing countries. For a host of reasons, public operation of buses is both less necessary and less successful in developing countries than in developed countries.

Project experience in recent years indicates that public investment into mass transit systems in developing countries should prioritize building Bus Rapid Transit systems. These systems increase bus speeds and decrease bus-operating costs by giving them physical priority in the roadway, rapid boarding platforms, and sometimes traffic signal priority. Once infrastructure is constructed in this manner, bus fares are generally able to fully cover the cost of modern bus procurement and ongoing maintenance while generating a sufficient profit to attract private operators.

Cycling and walking facilities that improve the safety and comfort of these very low cost modes of travel have also proven to generate direct benefits for the urban poor. Poor families can in some situations save 1/3 of their income if given the option to replace transit trips with walking and cycling trips.

Infrastructure to implement congestion charging systems (enforcement cameras, etc) should also be prioritized. By directly charging private motorists for the use of scarce road space, congestion charging simultaneously discourages the appropriation of public space by wealthy motorists, discourages elite consumption, while encouraging more economically critical road uses like transit and trucking. At the same time it generates a revenue stream that can be invested into low-income housing, road maintenance, or transit priority systems, collected from those who can best afford it.

Meanwhile, more efforts should be made to facilitate access of the poor to low cost vehicles, such as bicycles. Comparative cost benefit analysis indicates that for a poor household, bicycle

ownership is much more important to household income than whether or not the road in front of their house is paved. *For the cost of one major highway, or 10 kilometers of a metro, every man, woman, and child in Senegal could be given a good quality bicycle.* While highway investments are poorly targeted to the needs of the poor, the bicycles could lift countless families out of poverty.

While roads are sometimes viewed as the only legitimate public intervention into the transport sector, a fresh look at successful governmental and donor activity shows many successes in the low cost vehicle sector. Credit facilities and buyers cooperatives among independent bicycle dealers have succeeded in bringing down the cost of good quality bicycles by 1/3. With more capital, these efforts could be dramatically scaled up. Employee purchase programs, bike vouchers for school children located farthest from schools, the incorporation of bicycles into health programs, and vouchers for other target populations have all proven successful means of directly reducing the mobility burden of the poor without undermining the local private sector.

Investments into low income housing in locations that are accessible to centers of employment or are well served by existing or planned mass transit or cycling facilities, can actually be more effective than road investments at directly reducing the mobility burden of low income families. Integrating low income housing programs into public transit and bicycle and pedestrian improvement plans through the master planning process is a best-practice example. Using the benefits generated by transit system improvements to finance adjacent low income housing through land banking or betterment taxes has also been done and should be more widely applied.

Finally, within slum upgrading projects, the roads in slums are much more than just arteries in a transportation system: they constitute the most important public space available to the poor. They are not only used for traveling, they are used for children to play, and the elderly to sit and socialize. As most people in slums do not own motor vehicles, the roads should be designed first and foremost to maximize safe public space, secondly for pedestrians and cyclists. Accommodation of private motor vehicles should be minimal, since they are few. Scarce public space occupied by parked vehicles could be used for sports facilities. Access by delivery trucks and transit vehicles and private vehicles should be accommodated, but at slow speeds that do not threaten the safety of children when they are playing. Such progressive street designs in slum communities not only dramatically reduce traffic deaths, they also reduce crime and improve quality of life.

LIST OF ACRONYMS

BNDES –Banco Nacional de Desenvolvimento Economico e Social (Brazilian National Development Bank)
BRT – Bus Rapid Transit
CEE – Central and Eastern Europe
CIS – Commonwealth of Independent States (Republics of the Former Soviet Union)
CSD – Commission on Sustainable Development
DfID – UK Department for International Development
GEF – Global Environmental Facility
GITE – Global Initiative on Transport Emissions
GTZ – Deutsche Gesellschaft fur Technische Zusammenarbeit GmbH (German Technical Assistance Agency)
IBD – Independent Bicycle Dealer
ICAO – International Civil Aviation Organization
JBIC – Japanese Bank for International Cooperation
JICA – Japanese International Cooperation Agency
MDGs – Millennium Development Goals
MDP – Millennium Project
NMT – Non-Motorized Transport
NRDC – Natural Resources Defense Council
PRSP – Poverty Reduction Strategy Papers
SIDA – Swedish International Development Cooperation
UN ECOSOC – United Nations Economic and Social Council
UNDP – United Nations Development Program
UNEP – United Nations Environment Program
US EPA – United States Environmental Protection Agency
US AID – United States Agency for International Development

I. INTRODUCTION: TRANSPORT AND THE UN AGENDA

In the Millennium Declaration of the UN Millennium Assembly, governments of the world committed themselves to achieving a set of Millennium Development Goals (MDGs), with specific targets, aimed at reducing the most serious aspects of poverty. The MDGs and their targets provide a unique opportunity to focus the attention of governments and the international development community on these critical issues, quantify the resources needed to address the problems, and holding them accountable for their progress.

Many of the MDGs and the targets will be heavily influenced by the transportation investment priorities of governments and development institutions. A paper from the DfID Transport Resource Center, “Transport’s Role in Achieving the Millennium Development Goals,” clearly outlines the many links between transport and the MDGs. It can be found at: http://econ.worldbank.org/files/22572_TransportsRole.pdf

That review, however, was written primarily by experts in rural transportation. Rural transport has long been the focus of DfID’s investments in the sector. It also did not set out to provide practical guidance regarding which transport sector interventions should be targeted and how to meet the MDGs.

Instead of extending the DfID review and further exploring widely accepted links between transport and the MDGs, this paper will focus instead on how development institutions can better help achieve the MDGs through targeted interventions in the transport sector. It also begins by outlining some of the major pitfalls of traditional approaches.

This paper is being written under the auspices of the Millennium Project Task Force Number 8 on Improving the Lives of Slum Dwellers. As such, it focuses primarily on urban transportation issues as they relate to poverty alleviation, and suggest concrete interventions to address them.

However, as there is limited transport-sector expertise or stakeholder representation on the other task forces, this paper also address issues being raised by the other task force members regarding transport, poverty alleviation and environmental sustainability. Furthermore, the Millennium Project Coordinator has made it clear that the mandate of Task Force # 8 is to provide guidance more broadly on economic growth issues.

This document tries to provide relevant guidance to the Millennium Project on the foregoing issues, on behalf of ITDP and the UN NGO Caucus for Sustainable Transportation. It concludes with some priority areas for further programmatic work. As none of the MDGs were specifically transport related, concrete targets and how to reach them have not been suggested, as any transport sector interventions would necessarily be part of a more comprehensive strategy.

First, however, some explanation for why there is very little specific transport-related language in the MDGs, and how transport relates to the UN agenda more broadly, may be helpful to those not entirely familiar with the UN process.

At the time of the Johannesburg Summit in 2002, the Secretary General indicated that ‘sectors’ were not to be discussed. In the end, some ‘sectors’ were discussed, but transport was not among them. Specific transport-related language is present in numerous UN agreements, but it is most prominent in Agenda 21, the Global Plan of Action of Habitat II, and in the report from CSD Number 9, each of which specifically addresses the issue of transport. As such, these documents remain the most current opinion on transport of the governments represented by the UN.

The officially UN ECOSOC-recognized forum for NGO input on transport into the Habitat II Conference in Istanbul in 1996, and into CSD #9, was the UN NGO Caucus for Sustainable Transportation. It was jointly chaired by a US and a European NGO (ITDP and UITP) and a Southern NGO (Sustran-Asia, hosted by Pelangi Indonesia). Focal points for Latin America (Ciudad Vive in Chile) and Africa (ITDG-Kenya) were also officially designated. The Caucus has been inactive since CSD 9 because the issue of transport has not specifically been taken up again by the UN.

Agenda 21, signed at the Earth Summit in Rio de Janeiro, serves as a framework for national policy, and outlines general principles and obligations in various areas. Agenda 21 laid out several transport-specific objectives. They are listed in Annex II. The UN Habitat Global Plan of Action provided somewhat more detail, but largely reiterated the points in Agenda 21.

In the spring of 2001, the CSD #9 then took up transport specifically. Little beyond what had already been said in the earlier agreements came out of CSD #9. The full transport-relevant text can be found at:

<http://www.un.org/esa/sustdev/csd/ecn172001-19e.htm#Decision%209/3>

There was an effort at CSD #9 to designate the Global Initiative on Transport Emissions (GITE) as the implementing agency responsible for the transport provisions of CSD #9. This was blocked by the NGO community on the grounds that the board of directors of the GITE was dominated by the automobile and oil industry through paid memberships, with no legitimate NGO participation.

Under the UN system, UN Habitat has been identified as the focal point for UN work on transport-related issues. There is a transport focal point at UN Habitat, and UN Habitat now also serves as the Chair of Sustran-Africa, a coalition of African NGOs and Governments working on sustainable transportation issues. However, UN Habitat has not been active as an implementing agency in the transport sector.

UNDP, under its mandate to provide technical assistance to developing countries, has on occasion provided transport-related expertise to its client countries, but this is done in a somewhat ad hoc manner that is not guided by a clearly articulated policy. A review of UNDP transport sector technical assistance showed that over 40% of their support went to civil aviation (training of control tower operators), which has little to do with UNDP’s mission and everything to do with the influence of ICAO. UNDP contracted ITDP to draft a transport policy for UNDP

in 1996. UNDP issued the document as a background paper (www.itdp.org) but it was never adopted as a policy.

The most significant work being done in the UN system on transportation-related issues is being financed by the Global Environmental Facility and its implementing agencies under the auspices of Operational Program #11 on Transport. UNDP, UNEP, and the World Bank all have large sustainable transportation projects under OP 11. A good summary of the guidance from the Standing Technical Advisory Panel on transport can be found at:

<http://www.itdp.org/read/Karakezi%20and%20Johnson%20GEF%20Africa.pdf>

The focus of this grant facility is primarily on air quality impacts rather than on poverty alleviation, though complimentary poverty alleviation impacts are encouraged.

By far the largest influence over transportation policy in developing countries comes from the World Bank, also the largest investor. World Bank policy in the transport sector is governed currently by three primary documents, none of which have the formal status of a ‘policy’ but which nonetheless loosely govern lending practices. Overall transport policy is governed by: “Sustainable Transport: Priorities for Policy Reform,” 1996.

http://publications.worldbank.org/e-commerce/catalog/product?item_id=202017

Urban transport policy is governed by “Cities on the Move,” 2000.

<http://publications.worldbank.org/e-commerce/catalog/product?context=drilldown&item%5fid=1067657>

Most recently, the World Bank issued “Reducing Air Pollution from Urban Transport,” 2004.

<http://www.cleanairnet.org/cai/1403/article-56396.html>

Some of the recommendations in this document are not accepted by US EPA, NRDC, and several leading environmental experts.

The regional development banks have also been active in the transport sector for many years and have adapted their policy stance to support the MDGs. Moreover the Asian Development Bank (ADB), in collaboration with the World Bank, Japan Bank for International Cooperation (JICA), and U.K. Department for International Development (DFID), is about to issue the findings of a two-year study on investments in the transport and energy sectors and poverty alleviation.

The European Bank for Reconstruction and Development (EBRD), which provides lending to the CEE (Central and Eastern Europe) and CIS (Commonwealth of Independent States) countries, has extensive loans in transport and has a specific transport policy, as well as a new Property Policy that will affect to some degree its role in the housing and urban development sectors. The Inter-American Development Bank (IDB) also has a large transportation portfolio. The European Investment Bank (EIB) and the European Union (EU) are lending more and more

heavily for transportation in developing countries, and their activities outside the EU are largely unaccountable and ungoverned by specific policies.

Many (perhaps most) bi-lateral development organizations are also heavily involved in the transport sector. Most heavily involved is JBIC (Japanese Bank for International Cooperation) and JICA), focused on transportation planning, highways, metros and railroads. French bilateral aid is also active in the sector, with a similar focus. DFID has long given prominence to the transport sector with a mix of investments in highways, rural roads, the Cairo metro, and urban traffic and safety research. SIDA, the Swedish development agency, has supported some urban mass transit projects. US AID has also recently become involved, largely via its support to ITDP. GTZ, the German technical assistance agency, also has a small but active program on urban transport.

This document is a summary of recent ITDP thinking with regards to development assistance in the transport sector, and how this relates to the concerns of slum dwellers.

II. HOW TRANSPORT RELATES TO POVERTY ALLEVIATION

The Millennium Project, in the Interim Report of Task Force One on Poverty and Economic Development, makes several assertions regarding the relationship between transportation and poverty alleviation; assertions increasingly questioned over the past two decades by practitioners, experts, and scholars.

While there is a general acknowledgement that public investment in the transport sector is an important and perhaps critical *compliment* to economic growth and poverty alleviation, there is very limited evidence that transport investments will actually *induce* economic growth or directly alleviate poverty [Bejakovic, 1970]. In fact, there is a significant risk that misguided transport investments will actually harm the development process and adversely impact the lives of the poor unless the conditions under which they will lead to positive growth and poverty alleviation outcomes are carefully specified.



This chapter aims to further specify those conditions.

Since the 1960s, international institutional involvement in the transport sector has been heavily dominated by investment in highways and roads. Much of this investment was justified on economic development grounds, which were initially assumed to translate directly into poverty alleviation. From 1956 to 1965, 40% of World Bank lending targeted transport, falling to about 30% in the 1970s, and still farther to 15% and below in the age of structural adjustment in the

1980s and early 1990s. It is now facing something of a renaissance [World Bank 1996, annual reports]. By 1996 the World Bank had spent about \$50 billion on the transport sector since its inception, and approximately 60% of this had gone to the highway and road sector [World Bank, 1996].

In the 1990s, as it became clear that economic growth did not necessarily translate directly into poverty alleviation, increased efforts began to target World Bank loans to poor beneficiaries. The World Bank, by far the largest international development institution working in the transportation sector, said:

“Poverty reduction must be the benchmark against which performance as a development institution is judged.” [World Bank, *Annual Report*, 1993].

While there was a shift in World Bank lending in the 1990s away from new road construction towards road maintenance and rehabilitation, the focus on roads as the primary instrument for alleviating poverty through transport interventions did not fundamentally change.

Belief in the critical role of investments in transport infrastructure as a mechanism for poverty reduction is again reflected in the Millennium Project’s *Interim Report of Task Force One on Poverty and Economic Development* (2004). While there is much to be commended in this



piece, the uncritical call for a return to investments in basic infrastructure without carefully specifying the conditions under which such investments can be justified is quite dangerous. The indicator used to determine whether more roads are needed is the *kilometers of paved roads per person*. Bringing African nations’ paved road figures up to ‘normal’ levels for a developing country would require a huge diversion of resources away from other competing uses for the

same funds. However, the supporting evidence that such investments would be an intelligent use of scarce resources is quite limited.

While discussing Tanzania, the report says:

“The country’s road network is small and in very poor condition. It requires urgent upgrading and extension. The total density of paved roads is estimated at 0.11 km per 1000 people compared to a developing country average of 0.40 for low-income countries. Across the country, 67% of the road network is either in fair or poor condition. The absence of a well functioning road transportation system makes it impossible for food surpluses generated in some regions to be transferred to food-insufficient regions at

acceptable cost, thus fuelling hunger and malnutrition in remote parts of the country...A successful MDG strategy therefore needs to focus on extending access to roads and transport services..." [Sachs, J., and M. Pangestu, 2004, p. 79]

The report goes on to state that:

"Roads connecting villages to local market centers are also critical for agricultural development in addition to external trade. They decrease the effective cost of inputs like fertilizers and increase farmers' ease of transporting goods to markets." [Sachs, J. and M. Pangestu, 2004. P. 42]

These statements contain the following implicit or explicit assumptions:

- a. The inadequacy of the road network is responsible for hunger and malnutrition.
- b. Road investments will induce economic development
- c. Road investments will alleviate poverty
- d. Kilometers of paved roads per 1000 people is a useful indicator of whether or not a country has an appropriate amount of paved roads
- e. Transport is important to economic development and poverty alleviation

Of these four assumptions, while e) is clearly true, a), b), c) and d) are largely myths. Before outlining those transport sector interventions that have clearly demonstrated a positive growth and poverty alleviation impact, debunking these myths is a useful introduction to the current debates in the field.

Finally, many of the important impacts of transportation on the poor are clearly negative. These negative impacts are thus far largely ignored in the poverty MDP paper, though it is raised in the environmental sustainability paper. ***Road and other transportation infrastructure projects are one of the leading causes of involuntary resettlement and forced evictions of slum populations.*** As such, avoidance of adverse impacts of transportation projects is a clear priority for a transportation policy aimed at improving the lives of the poor.

II. 1. Myth # 1: Inadequate road networks are responsible for hunger and malnutrition

Many people assume that people die of famine simply because it is difficult logistically to get food to these areas. This seems to make sense. It is expensive to ship food to locations where roads are poor, and maybe if it were cheaper poor people would be better able to feed themselves in times of trouble.

While there is some marginal truth to this argument, empirical evidence shows that transport costs are a relatively insignificant cause of famine. In Sen's seminal study of the famine in Ethiopia [Sen, 1981, p. 93-97], he discovered that while people were starving in the province of Wollo in 1970 – 1973, two reasonably good highways were being used not to ship food into the region, but in fact ***to ship food out.*** Despite their being a terrible drought in Wollo, when food became very scarce, its price only rose marginally. As such, private food markets were not

induced to ship more food to the region. The simple reason for this is that the problem was not the state of the roads: *it was the collapse of the earning power of the inhabitants*. Most of the inhabitants were either subsistence farmers or herders, and with the failure of their crops, they had no economic surplus. Farmers could not hire day laborers and they stopped buying animal products from the herders. While perhaps dramatically lower transportation costs would have allowed the herders and the day laborers to relocate to distant markets, this would not have addressed the main problem; a dramatic decrease in the value of their only assets (land, animals, and labor).

As such, most poverty researchers are looking increasingly at an ‘assets’ based approach to poverty alleviation. Thus, to determine how transport affects the poor, the focus should be on how different sector interventions affect household assets and earning power.

In terms of ongoing low income populations, (as opposed to emergency conditions), certainly under certain conditions good quality road access can reduce the cost of fertilizers and other agricultural inputs necessary to economic development, this cost reduction does not occur automatically. In order for this possible cost reduction to be realized by a low income population, a number of further changes must occur simultaneously in the vehicle sector. These conditions will be specified below.

II. 2. Myth #2: Road Investments Will Induce Economic Development

There has been considerable theoretical speculation [Kranton 1991, Gannon and Zhi Liu 1997, Booth et. al. 2000, van de Walle 2002] that road investments can induce economic development. However, this has been little complemented by monitored results from actual investments or by well-structured research.¹

The World Bank’s World Development Report of 1994 [p. 15] sites two sources of evidence for such a connection: a host of econometric analyses showing a correlation between public investment into infrastructure and economic growth, and the average projected economic rate of return on World Bank road projects. While the econometric analysis does indicate a relationship between infrastructure investment and growth, there is a huge variation in the observed results, the direction of causality is difficult to determine, and the data sets tend to be more robust in developed countries, while those from poor countries are of low quality.

Where careful research has been done, such as by the Brookings Institute, [Wilson 1965, Wilson et. al. 1966], the results have shown that investment in major highways is at best a blunt instrument for engineering economic development. At worst, as predicted by Hirschmann, there is a risk of huge losses if investment is expected to *catalyze*, rather than complement already planned, development [Hirschmann, 1958]. Brazil and Nigeria are examples of countries that did not heed these warnings, and their current massive foreign indebtedness is to some degree a

¹ With the exception of China, poverty-focused transport sector investment dates from the mid-to late 1990s. Much is still being implemented and little has been formally evaluated [Cook et. al., 2004].

direct result of large-scale investment in non-performing highways and lower level rural road networks [Howe, 1997].

Cost benefit analysis: Cost benefit analysis, despite its flaws, is a reasonable first indicator of development impacts. While in practice cost benefit analysis focuses exclusively on vehicle operating costs, and frequently ignores important impacts such as those on non-motorized road users, methodologies have been developed to correct these problems [Hook, 1994].



Nswam Road, Accra, Ghana: Traditional cost-benefit analysis did not justify the inclusion of bicycle infrastructure in a road-widening project here

When methodologically-sound cost benefit analysis is used, it is rarely possible to justify investments into rural roads in poor countries such as in Sub-Saharan Africa. Research indicates that in most countries it is a small proportion of the road system that carries the bulk of the traffic. On average, the busiest 30% of the road length will carry about 85% of the total veh-kms, and the busiest 10% of the road length as much as 60% of the total travel. The most accurate figures from the UK indicate that about 30% of the road system carries less than 1% of the total travel. Correspondingly 70% of the road length carries only 15% of the total travel [Howe, 1971].

In Africa, where vehicle fleets per capita are a fraction of those in developed countries, few roads can be expected to carry sufficient traffic to produce an acceptable return on invested capital. Those roads that can are concentrated in or connect major urban areas, and are concentrated in the wealthiest parts of the country. This sits poorly with the focus of development banks on poverty alleviation. The historical reliance of development banks on cost benefit analysis has thus led to a concentration on those small parts of the trunk road network in developing countries that do have a reasonable amount of traffic.

In the 1990s, tightening mandates by the World Bank and other development institutions to target investments to poverty alleviation led to re-evaluation of transport portfolios by transport divisions of the development banks, who were forced to justify their remaining portfolio of rural roads investments. They dealt with this in a variety of ways; by packaging rural roads with major intercity roads so that the average economic rate of return was high enough to justify the overall investment, and by focusing on countries like China where even in rural areas vehicle levels were sufficiently high to justify road investments.

There is a second, more serious difficulty with using cost benefit analysis to justify investments in the road sector. Cost benefit analysis can determine the aggregate social costs and aggregate social benefits, but reveals nothing about whether the institution making the investment is able to recoup the funds invested. If a government invests in a road, and uses borrowed money to do so, then no matter what the road's social benefit, if it is unable to capture part of this in the form of higher tax revenues, the government may not be able to repay the loan, and hence may be locking itself into a debt trap. A World Bank analysis of Zambia, for example, showed the following:

“In Zambia, a quick review of the transport sector revealed one of poor health. In FY 91 it imposed a financial burden of US\$98 million on government in the form of direct grant requirements, overdrafts in government-owned banks, or government guaranteed short-term debts. This was equivalent to 13% of the government's total current revenues, excluding grants. When shortfalls in regular maintenance were included, the financial burden rose to \$131 million. This was equivalent to 17% of the government's total current revenues,” [Creightney, 1993, p.28].

While the government might be able to cover these debts by general tax revenues in good times, if at the same time it experiences a loss of public revenue, either because of a downturn in the overall macro economy, or because of an increase in corruption, or political instability, or all three, these loans can trap the country in debts. This is largely what has happened in many African countries. As a result, *some of the roads build with loans from development banks had actually disintegrated before the loans could be repaid.* [Flores, M. 1998].

Transport mechanism: With the exception of direct employment from road works, the economic and social benefits resulting from investment in infrastructure only manifest themselves through changes in the transport system operating on the roads. That is, they result from transport services becoming *cheaper, quicker, more frequent, or more reliable.*

While change in the *efficiency* of transport is the means by which investment in roads is translated into longer-term socio-economic impacts, the operation of the mechanism is easily frustrated. There has been a tendency to assume that road investment alone will lead naturally, through spontaneous interventions by the private sector, to improved transport services, without the need for complementary actions by government and its financial supporters. This was shown to be false more than two decades ago [Beenhakker et. al., 1984], but only recently has there been an attempt to change policy [Starkey et. al., 2002].

Recent research in Sub-Saharan Africa has identified the characteristic problems confronting the provision of efficient rural transport services [Ellis and Hine, 1998]. The main constraints are

the low density of demand, poor diversity of vehicle types, uncompetitive transport markets, poor quality of infrastructure, and a lack of understanding by government, donors and other agencies of these problems. ***While road improvements are part of the solution, if implemented in isolation from interventions that address the other problems, they are unlikely to be effective and may instead make the problem worse.***

Throughout Africa, in the 1980s and early 1990s vehicle fleets and transport trips actually declined. While much of this was due to general economic deterioration, the situation was exacerbated by problems specific to road transport service provision. The economic evaluations of road investments could hardly have anticipated this, but an accurate post-facto appraisal of the economic impact of many road investments would have been negative, given declining vehicle fleets. The net result was that after the loans were completed, not only could the governments not repay the loans, they could not even maintain the roads that had been built. Total kilometers of paved roads in Africa actually decreased in much of the 1980s and early 1990s due to deterioration.

Maintenance: Development banks originally had the attitude that they would only fund new construction because ongoing maintenance should be the responsibility of the national or local government. Yet, how sustainable is a road investment if local revenues cannot even maintain it? Constructing new roads in locations where user fees do not cover ongoing maintenance is imposing a permanent debt burden onto the government.

By the 1990s, however, there was such a huge backlog of unmet maintenance needs that the economic rate of return on maintenance and reconstruction was often much higher than for new road construction. As a result, countries were forced to borrow money just to maintain the roads that had been built decades earlier with loans that had still not been fully repaid. In such conditions, building new roads is hardly a good idea.

The development banks were not purely benign actors in this process. Sometimes the technical specifications for road construction imposed on the country by the development banks required the use of imported materials like asphalt, which in turn required special machinery that also had to be imported. More labor-intensive methods and the use of locally available materials like concrete could have yielded lower long run maintenance costs and larger multiplier effects through the local economy [Flores, L. M., 1998].

Much of the research on roads in Africa during this time shifted its focus away from aggregate investment levels to a more careful look at the degree to which investment into ongoing maintenance could be sustained by road user fees. More interest arose in road user charges. Many countries had some sort of gasoline tax, but their level and the degree to which they were earmarked to road maintenance or diverted to other purposes varied greatly. Some experiments involving road users, such as trucking associations, in the management of road user funds were somewhat effective in ensuring these were actually used for road maintenance, though economists debated the wisdom of this earmarking in circumstances of dire economic conditions [Heggie, 1996].

Current situational analysis: In the mid-1990s, some parts of Africa managed to achieve a reasonable level of political stability, and began to witness a degree of economic recovery. This was clearly not a response to transport sector investments, which if anything helped create an

overhanging debt burden. As the economies prospered, vehicle fleets again began to grow, but these were inevitably concentrated among upper income populations in urban areas.

Despite repeated challenges, the ‘road investment = transport improvement = economic development’ paradigm remains the predominant mindset among most politicians and planners [Ellis and Hine 1998, Dawson and Barwell 1993]. Physical infrastructure provision continues to dominate development thinking mainly because it has been uncontroversial and this is what governments and international development agencies have traditionally done. Investment in roads continues to be seen as a key *deterministic* event without discrimination as to whether this is for new roads, the rehabilitation of those that have fallen into disuse, or are simply in need of maintenance. This defies both common sense and experience. More than thirty years ago, the conditions under which investment in roads was likely to stimulate a positive socio-economic response were clearly set out [Wilson 1973]:

First, a positive response could only be expected in areas in which a prior dynamism existed. If a particular region is growing rapidly in terms of population, output, and so forth, the probability is very great that existing transport facilities will soon constitute a true bottleneck even if there is some excess capacity at the moment. The existence of overall dynamism implies, *inter alia*, an environment in which economic opportunity tends to be sought and quickly exploited when found. ***By definition this is not normally a characteristic associated with areas in which poverty is prevalent on a significant scale.*** As such, road investments are an awkward poverty-fighting tool.

Second, one of the important ingredients in inducing increased production is often a sharp reduction in transport rates usually associated with an expansion of vehicle supply capacity. In other words, ***the coming into existence of a highly competitive vehicle industry, whether for cars, trucks, buses, or bicycles, is a key mechanism whereby cost savings are passed on to producers. This aspect of transport investment has been systematically underestimated.*** Booming economies like those of China and India have highly competitive motorized and non-motorized vehicle industries. Africa, by contrast, has no self-sufficient bicycle factories, let alone motor vehicle manufacturers, and is almost entirely dependent on imports. Since the foreign exchange rationing imposed by the oil price crises of the 1970s, most of the low-income countries experienced real stagnation or decline in their trucking fleets in the 1980s and early 1990s [Howe 1995].

Finally, unless the government is able to recover the benefits of new roads in the form of higher tax or road user revenues, the investment is unlikely to be sustainable. The use of cost benefit analysis, without further analysis of the project’s direct cost recovery, risks leaving the borrowing country even more deeply indebted. ***A financial assessment of the road’s impact on government finances should be a necessary part of road investment appraisal, and project loans made only where increased government revenues will be sufficient to service the new debt.***

Thus, while investments in roads may play an important role in sustaining economic development, they should be targeted to areas where a process of growth has already been

initiated. They are unlikely to play a role in initiating such a process in isolation from simultaneous interventions to the vehicle supply system and other efforts.

II. 3. Myth #3: Road Investments Will Alleviate Poverty

Highways and roads: Until the early 1980's, investment in major highway and road construction had few identifiable poverty alleviation benefits (Box 1) [Howe and Richards, 1984]. Subsequent efforts to encourage the wider use of labor-intensive methods of road improvement and maintenance, with a consequent emphasis on minor roads, have undoubtedly brought benefits to the poor (Box 2). Wage targeting can ensure that only the poorest compete for the work. There is also a growing body of knowledge about how women can share in the benefits of such work [Bryceson and Howe, 1993].

Box 1: Highway investment and wealth concentration

- The fundamental effects of investment in highways are the reinforcement of capitalism, widening of income disparities, and the concentration and centralization of capital.
- Those in a better position to take advantage – truckers, traders, businessmen, large landowners – will profit most without specific counteracting programs.
- Land tenancy is a major factor in determining who benefits; if land is unevenly distributed, landless or land poor receive little benefit.

[Wilson 1965, Wilson et. al. 1966]

The most successful modern example of investment in transport infrastructure as a specific component of poverty alleviation has been in China. Since 1985 it has constructed in excess of 250,000 kms of rural roads and numerous bridges as components of programs to reduce rural poverty [Ling and Zhongyi 1996, Hajj and Pendakur 2000]. Investment has been focused on the 28% of the poorest districts measured in population terms and according to agreed poverty criteria. Within each district there was a further ranking of projects based on criteria representing income, poverty, and social and economic development. Priority was given to projects in which there was identifiable resource development in terms of agriculture, mining, forestry or tourism. This was based on the principle that there can be no sustainable reduction in poverty without economic growth, and is termed *efficient poverty reduction*. Variable road design standards were used to provide differing degrees of access reliability, depending on traffic levels. Labor-intensive methods of working were the norm.

Box 2: Labour-intensive rural road construction benefits the poor

- Employs 5 times more labor than machine-based construction.
- Can be wage targeted on poorest groups.
- With new construction or major rural road rehabilitation US\$ 3,000 - 5000 per km injected into local economy via wages.
- Forward -linkages – spending earnings during construction – generates income multipliers in range 1.5 – 2.8.
- 25-30% cheaper than comparable capital-intensive methods.

[Source: Keddeman, 1998].

However, for a number of reasons, the scale or duration of the benefits from labor-based works should not be exaggerated. First, with the exception of China, the scale of investments in labor-based works is comparatively modest in relation to the sub-sector total. Precise figures are not available, but, as with other aid sectors, it is doubtful if poverty-focused lending of this nature amounts to even 5% of the total [Cox and Healey 1998].² Second, most of the associated income benefits are short-term, and tend to be used by the poorest on immediate consumption needs rather than for productive investment.³ Longer-term economic benefits associated with the improved access itself tend to accrue mainly to wealthy residents – traders, vehicle owners, business people, and some farmers [Howe and Richards 1984, Howe, et. al. 1998]. Third, whilst there are frequently immediate social benefits associated with such projects – such as the improved access to and viability of education and health facilities – they depend on the flow of such services being planned to complement road improvement. Longer-term social and economic benefits often depend on the sustainability of road maintenance. Fourth, there have been few sustained labor-based maintenance programs. These would provide a drip-feed of investment which creates time to effect changes in the lives of the poor.

For example, in Bangladesh, special – typically 15-member – crews of destitute women have been formed for the preventative maintenance of flood control embankments and rural roads. They normally work for four years during which time they are entered into a compulsory savings scheme that accumulates a sixth of their earnings in a special bank account. They are given training in income diversification activities so that when they ‘graduate’ from the program, making way for others, they have both the savings and training to become self-sufficient. In excess of 60,000 women are currently engaged in such works.

² While there are dangers in reading too much into figures from a single year, data presented at the World Bank Transport Forum 7-9, 1998 are instructive. In 1997, lending for highways was 83% of the sector total. Second place was urban transport (7%), followed by rural roads (4%). Lending for railways, ports and others accounted for about 6%.

³ Between 1985-1990 labor-based works focused on the poor in China resulted in the construction of 131,000 kms of rural road and 8,000 bridges. About a quarter of earnings were used for productive investments and just 4% for fixed assets. The remaining three-quarters of income were used on consumption goods [Ling and Zhongyi, 1996].

The international effort to develop efficient employment-intensive methods for rural roads has been sustained for more than three decades. However, they are still not widespread, and in many countries remain in the pilot project stage. They are certainly not used in many circumstances where it would be technically and economically justified to do so. Yet they have been shown to be an effective way of bringing short-term benefits to the poorest. Institutionalization of labor-based routine maintenance could, as in Bangladesh, bring more long-term benefits, especially to women.



Vehicle ownership: Another key reason why road investments alone are unlikely to yield significant economic benefits in very poor countries is also the main reason that these investments are unlikely to do much to alleviate poverty. In very poor countries, *the majority of the population does not own or have access to vehicles of any kind*. As such, relatively wealthy vehicle owners will be the primary beneficiaries of road investments.

Most road construction projects benefit only the elite and do not employ local labor. Sometimes everything from the construction equipment to the asphalt had to be imported to meet World Bank technical standards.

Anyone who lacks the basic human capacity necessary for survival, or who has an income below \$1 per day (two typical definitions of ‘the poor’), is very unlikely to be in possession of a private motor vehicle. The very poor cannot even afford bicycles, and are dependent on walking and headloading to meet their basic transportation needs. This situation is the rule rather than the exception in much of Sub-Saharan Africa.



After completion, roads serve primarily the minority who can afford to drive, while the poor continue to rely heavily on walking and headloading

For those who can afford a bicycle, research has shown that earth roads are actually better for cycling than paved roads. Earth roads impose lower costs for bicycle maintenance and are easier to cycle on than both paved roads and gravel [DFID, May 2003].

Transport dichotomy: Starting in the 1980s, researchers began to look beyond the notion of transport as roads and motor vehicles, and started looking at the nature of demands at the household level [Hathway 1985, Barwell et. al. 1985]. This work and more recent research at the level of the individual household [Barwell 1996, Dennis 1998, De Langen 1998] emphasizes that the transport systems of all developing countries can be characterized as a dichotomy between the *modern* and *traditional* sectors, operating largely in parallel. The first caters mostly for the long-distance, bulk carriage of people and goods, is motorized, and in the poorest countries is used by a *minority* both in urban and rural areas. This sector is largely the beneficiary of most governmental and development institution investments to date. The second serves mainly short-distance and small load carriage needs, is predominantly non-motorized, and is used by the great *majority* in the same countries.

This dichotomy has, until recently, rarely been acknowledged in official studies of the transport sector. In particular the *traditional* system has been largely invisible and ignored both in investment terms and as an object of study. The unspoken implication is that it is in some way *unimportant*. Nothing could be further from the truth in either a social or economic sense.

Data from India provides a rare example, which allows the relative size of the transport outputs produced by the two systems to be quantified at the level of the household (Table 1). In 1977-78 the traditional system dominated rural *goods* movement, accounting for 90% of the tons and 78% of the ton-km moved. Even in 1995 the traditional transport system remained dominant with 75% of the tons and 55% of the ton-km [Asian Institute of Transport Development, 1997]. Similar proportions would be expected in many other of the world's least developed countries.

Table 2 Goods transport by mode in India (1977-78)

Mode of Transport	Transport output				
	Average trip distance (km)	million tones	% share	million tonne-km	% share
Headloading	1.5	113	17.7	170	9.0
Bicycle, tricycle	4.5	4	0.5	10	0.6
Pack animals	1.0	2	0.3	2	0.1
Animal carts	2.6	462	71.8	1307	68.6
Tractor-trailer	5.4	59	9.3	353	18.5
Truck, light commercial vehicle	18.5	4	0.5	64	3.3

[Source : National Council of Applied Economic Research, 1981].

There is now abundant evidence from Asia and Africa to show that in the poorest countries *personal* travel also exhibits a similar dependence on non-motorized transport (NMT) [Dennis 1998, De Langen 1998].⁴ In the rural areas of most developing countries, the small size of the functioning motor vehicle fleets virtually ensures that the vast majority of trips will be made by walking, although bicycle and animal traction is also used in some areas. Kenya surveys showed that over 90% of rural trips were by foot [Beenhakker, Carapetis, and Howe, 1984]. The movement of rural household goods is also heavily dominated in Africa by women's headloading. A study in Tanzania found that headloading accounted for more than 70% of ton-kilometers traveled [Creightney, 1993].

⁴ Recent research in Zambia shows that because of affordability considerations most rural households would only use motorized transport services a couple of time a year. Many households would not use transport services, motorized or non-motorized, at all [Ellis 1998].



Transport in rural Mozambique. A road will not automatically help.

Whilst this dependence is less acute in the largest urban areas, this is mainly because non-motorized vehicles, especially bicycles, have been intimidated from using the streets [Dennis and Howe, 1993].



Planning against NMT in Asia: Rickshaws collected after they are banned (left) and bicycle restrictions in Shanghai (right, photo, Karl Fjellstrom, GTZ)

In 1996 the World Bank proposed policies to eliminate the impediments to non-motorized transport, and this sentiment was echoed in Agenda 21, and in the Global Plan of Action for Habitat II. However, despite the successful change in rhetoric, non-motorized transport in most of the world remains something to be *planned against* rather than *planned for* [World Bank 1996]. China, for example, is systematically banning bicycles on a growing number of urban roads, while Bangladesh, India, and Indonesia There is, extend bans on cycle rickshaws to more and more streets. This prejudice betrays a widespread lack of understanding about the mechanism by which investments in transport can reach all sections of the community.

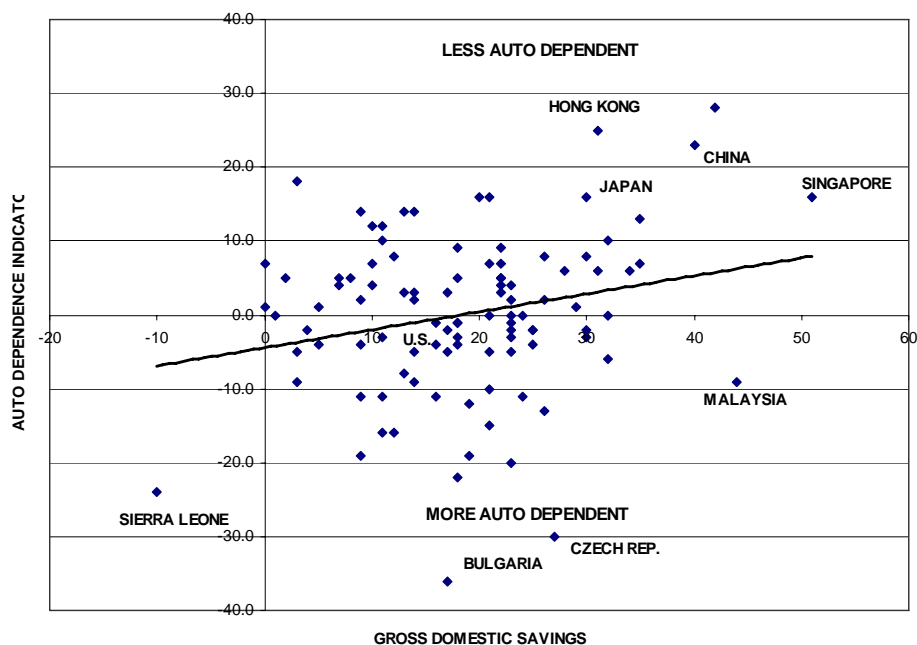
There is, however, one well documented mechanism for significantly improving the poverty alleviation benefits of road projects: by hiring the poor themselves as laborers using labor-based construction methods.

In the absence of a concerted effort to directly employ the poor in road construction using labor-based construction methods, and in the absence of interventions to reduce the cost of vehicle use and transport services, the benefits of investments into roads are likely to be captured largely by the wealthiest, motor-vehicle owning population, and do little for the poor, or actually drive them into further destitution.

II.4. Myth #4. Kilometers of paved roads per 1000 people is a useful indicator of whether or not a country has an appropriate road network.

Highway-sector interests have frequently employed this indicator to justify government spending on roads. This indicator ignores completely whether there are any vehicles to operate on the roads. Basic cost benefit analysis on existing and planned roads would be a better indicator. Kilometers of paved roads per 1000 vehicles would be moderately better, but some highly developed countries like Hong Kong, Singapore, and Japan also have very few kilometers of paved roads per 1000 population, and very few kilometers of paved roads per 1000 vehicles, yet have had extremely fast growth rates over the last three decades. Rather than being an indication of backwardness, such a figure might well be an indication of extremely efficient, mass transit and non-motorized transport-oriented transport systems. Heavy investments into roads may lead to low-density auto-dependent urban forms that undermine the realization of agglomeration economies. This may be sub-optimal from both a growth and an environmental perspective, particularly if, as is highly likely, there are further future oil shocks.

In fact, some preliminary analysis indicates that there is a correlation between higher gross domestic savings rates, higher growth rates, and lower levels of automobile use and ownership. (See chart below). Because automobile ownership constitutes 'consumption' rather than 'investment', governments like Japan (prior to 1990) which used urban policies to discourage private motor vehicle consumption to increase savings rates showed faster rates of economic growth than some countries which invested heavily in roads, only to find themselves deeply in debt [Hook, 1996].



There is a relationship between Asia's lower levels of automobile dependence and its higher savings rates.

In order to develop more appropriate indicators that capture not only total roads but also the efficiency with which they are used, some better indicators would be:

- the percentage of roads needing significant rehabilitation
- kilometers of transit routes, bike lanes, and sidewalks
- percentage of total road system expenditures recovered from road user fees and fuel taxation.
- Transit vehicles, trucks, and bicycles per 1000 population
- Traffic fatalities per 10,000 population and per 10,000 vehicles
- Population exposed to particulate emissions (PM 10 and PM2.5) levels above WHO-recommended levels.

II.5. Avoiding Adverse Impacts of Transport Projects

Many poverty experts become nervous about unqualified recommendations for the expansion of roads as a poverty alleviation measure because this frequently leads to worsening poverty and loss of housing stock. *The World Bank has identified transport as the largest single cause of resettlement in its portfolio of projects.* Transport accounted for 25 percent of projects active in 1993 that involved resettlement [World Bank, 1994]. Between 1988 and 1995, at least 120,000 people were forcibly resettled in China alone as a result only of World Bank-funded road projects [Cernea, 1993]. These official figures probably underestimate transport's contribution to the resettlement problem. Transport infrastructure is also often the primary cause of

resettlement attributed to urban and industrial development projects; for example, 67% of the resettlement in the World Bank's Surabaya Urban Development project is associated with the project's transport components [World Bank, 1996].



New road in Bombay. Bogota Ring Road would have razed the community (right) if not made unnecessary by TransMilenio.



Eviction Watch Asia [Murphy, 1995] identifies infrastructure demands, such as the construction of roads, airports, railways and water stations, as an important cause of displacement in India. In Mumbai 6,000 families faced displacement to make way for five link roads. The same source mentions the Jogeshwari – Vikhori link road that affected about 800 families. They were given a resettlement site close to their original residences, but only after a struggle of 25 years. The rehabilitation scheme also called for houses that were more expensive than most could afford. In Manila, of the evictions listed systematically in the Year 2000 Demolition Monitor by Urban Poor Associates, 7.2% (or 436 out of 6,059 families) were evicted for transport-related projects (Box 3).

Box 3: Transport-related eviction and eviction threats in Metro Manila

Metro Manila is one urban area where an unusually close and efficient watch is kept on evictions by civil society, in particular by Urban Poor Associates. While there is no special burst of infrastructure construction in Metro Manila, 7.2 % of evictions in 2000 (or 436 out of 6,059 families) were explicitly due to transport-related projects).

The Department of Public Works and Highways (DPWH) estimates that *Radial Road 10* (a road expansion project funded by the National Government) will require resettlement of 10,000 families, who have stayed in the area for a minimum of two years and a maximum of ten years. During early 2000, the DPWH evicted several hundred families along R-10 but then stopped, saying that they did not have a resettlement site for those who would be evicted because the North Hills resettlement was already full.

The *Philippine National Railways Road Widening, Skyway and Beautification project* (a road and railway project) extends from the PNR head office in Tutuban Center, Divisoria, Manila, connecting to Espana St., Blumentritt up to Sangandaan, Manila in the north then goes to Magallanes in Makati until Nichols Area in the south. The whole stretch has an estimated population of about 15,000 families who would need to make way for the project. Sixty percent of the population has stayed in the area for 10 years. Ten percent has stayed between three and seven years, while the rest are relatively new.

Circumferential Road 5 (C-5) is a project requiring the construction of a circumferential road which starts from C.P. Garcia Street at the University of the Philippines in Diliman, Quezon City and ends at Letre Road in Malabon. The number of urban poor families affected is estimated at more than 10,000. Their lengths of stay in the area average from seven to 15 years.

Two major rail projects (to upgrade and provide fast trains on existing PNR routes) in and beyond the Manila region threaten large numbers with eviction. These are the *Northrail project* (20,000 families threatened) and the *Southrail project* (24,000 families). In the North Rail project the government sent out demolition notices to squatter families living along the railroad tracks in Caloocan and Malabon in the middle of 2000. However, no actual demolition operation took place.

In April 2000 the government demolished some 500 structures along Commonwealth Avenue and IBP Road because of its plan to construct an interchange.

Sources: Taken from Barter, 2000, based on reports from Urban Poor Associates (1999-2001); and UPA, COPE & CO-TRAIN (ca. 2000)

One of the ironies of urban road investments is that they frequently make the mobility problems of the very poor much worse. While in China victims of involuntary resettlement are generally re-housed in somewhat better conditions, evidence from interviews indicates that their housing is much farther from the city center. This imposes a significant additional travel time and cost burden, which is not compensated [Hook, W. & J. Ernst, 2001].

A study of official resettlements of low-income communities from inner Bangkok provides some evidence of resettlement impacts. Of the 61 cases examined from between 1984 and 1995, only 6 involved resettlement on-site via land-sharing arrangements. The other 55 involved resettlement

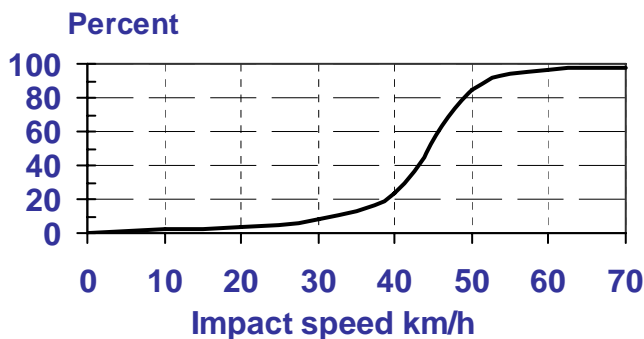
to locations between 14 and 48 km from the Central Business District (CBD) with an average of 24 km. One site was 6.7 km from the nearest main road. Of those who were relocated, about 40% subsequently moved away from the relocation site. Of 23 sites for which the cause of the eviction is listed, six were a direct result of expressway or interchange projects. In five of these the community was relocated at least 32 km from the CBD [Viratkanan, V. 2000].

The poor are also much more likely to be the victims of serious traffic accidents than they are likely to be the beneficiaries of new roads. Traffic safety is reaching pandemic proportions in developing countries, with 1.2 million deaths and 50 million seriously injured annually [WHO, 2004]. In less motorized regions like South Asia and Africa, over half the victims are generally pedestrians and cyclists. In India in 1994, 42% of the traffic victims were pedestrians and 12% were cyclists [Mohan, D, & G. Tewari, 1998, p. 35.]. In Sao Paulo, of the 2715 road deaths a year in 1990, 60% were pedestrians [Vasconcellos, 1997a].

When a poor person is injured by a traffic accident in a developing country, it frequently drives the family into destitution. With minimal health care and no disability or welfare benefits available, the family's income is likely to fall catastrophically if its key members are unable to work.

There is clear evidence of a correlation between increased vehicle speeds and the severity of traffic accidents. Despite this, cost benefit analysis as practiced by development institutions tends to encourage projects that promote vehicle speeds at the expense of pedestrian safety. Safety impacts and non-motorized road users are generally absent from the equation. Major World Bank urban transport projects typically include area traffic control (ATC) schemes, for example, the primary objective of which is to increase vehicular speed despite its negative impacts on traffic safety.

The Impact of Speed on Percentage of Traffic Accidents that Cause Death



Source: IIT Delhi

Because pressure to expand roads, particularly urban roads, tends to lead directly to attacks on the land occupied by slum dwellers, maximizing the efficiency with which the existing road infrastructure is used is critical to minimizing adverse impacts of transportation investments on the poor. Moreover, as increased vehicle speeds and an increase in traffic deaths and injuries among the poor are a frequent outcome of urban road widening and ATC projects, including

concrete safety targets, clear traffic calming measures and safe pedestrian facilities in urban road projects is critical to avoid adverse outcomes for the poor.

III. HOW TRANSPORT RELATES TO IMPROVING THE LIVES OF SLUM DWELLERS

III.1. The Travel Burden of the Urban Poor

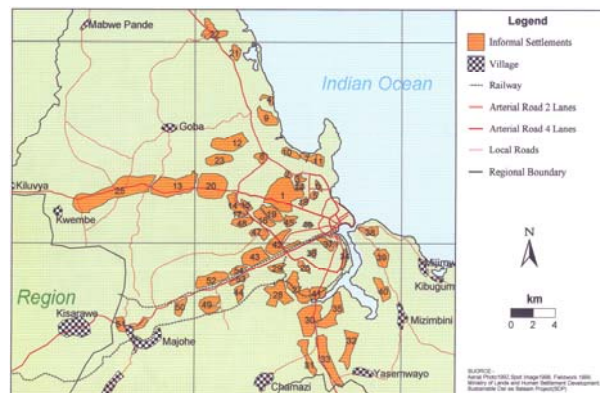
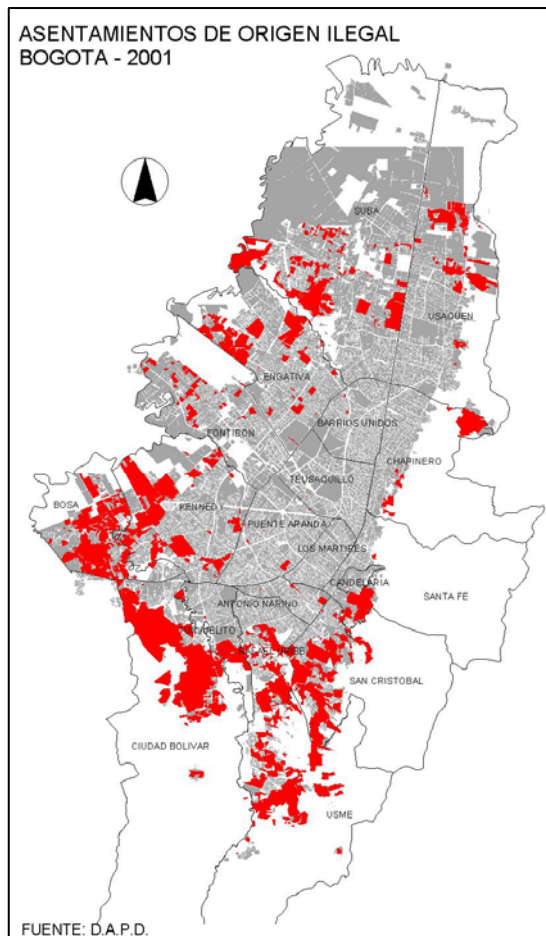
Basic mobility needs frequently impose a heavy burden on both the pocketbook and the time budget of the urban poor. Housing far from markets and employment centers can impose a heavy travel burden on poor urban families, and can present a significant obstacle to employment. Poor infrastructure and services (water, sanitation, health, education) within poor communities also frequently imposes a huge cost and time burden on the urban family. Women have to walk long distances carrying water that in better housing would be piped into the home, or the family has to pay water vendors for local delivery.



Women and girls often travel long distances to reach water. Providing more accessible water, carts, and bicycles will relieve this transport burden. A paved road won't.

The mobility burden of the urban poor varies widely, however. While often the poor can be found in settlements on the urban periphery, where frequently the mobility burden of the poor is the heaviest, it is a stereotype to assume that this characterizes a general settlement pattern of the urban poor. Kibera, one of Nairobi's oldest and largest (1993 population 251,040) informal settlements is located just 5 kms from the CBD. Many of Rio's *favelas*, like Rocine, are located immediately adjacent to the high income South Zone. Detailed mapping generally indicates that in most cities the poor are widely dispersed, even where informal settlements are spatially concentrated.

Nor are all of the urban poor concentrated into slums. The pavement dwellers found in many Indian cities are often not categorized as the residents of a slum. The groups are usually small, isolated and linear.



Varying low-income housing development patterns, in Bogota (left) and Dar es Salaam (right)

Barter, in a draft report for UN Habitat, [Barter, 2001], describes the following frequent patterns of settlement among the poor:

- **Concentrations of Poverty Scattered throughout the Metro Area:** In Asia, it is typical to find low-income people clustered into distinct, impoverished neighborhoods, but throughout the urban area, some centrally, some on the periphery, and some in radial sectors.
- **Income-Heterogeneous Neighborhoods:** In some cities, the poor are mixed into middle and even upper income areas in a fine-grained way. A common pattern, in large parts of Indonesian cities for example, has higher-income people fronting onto roads (with four-wheel vehicle access) and the poor living along alleyways behind and lacking road frontage.

- **Concentric rings:** where the poor are disproportionately located within certain rings of development from the centre. There are two contrasting patterns:
 - o located in the **inner ring of the city** (although beyond the central commercial and office districts) as is common in the USA and the UK.
 - o located on or near the **periphery** (or what was until recently the periphery). Examples include Paris and many western European cities, South African cities (where Apartheid was a key reason for this pattern), certain other southern and eastern African cities, and many large Latin American cities, most famously Lima, Mexico City and to some extent Sao Paulo. Several informants mentioned a trend towards this pattern in Seoul and Bangkok.
- **Sectors:** the poor may be concentrated in certain sectors radiating outward from city centers, while higher-income groups are located in other sectors. Examples include Tehran and Bogotá, Colombia. Radial spines of high or low-income housing were also a feature of generalized models of both Latin American and Southeast Asian urban structure.
- In practice, most cities show a **combination** of some or all of these patterns at the same time.

The mobility burden facing the urban poor affects them in two ways. First, transportation **affects the delivered cost of basic necessities and services necessary for healthy living**. The cost of food, water, heating and cooking fuel, and building materials faced by the poor household includes the cost of bringing these materials from where ever they are available to the household. This cost usually manifests itself in the very constrained time budgets of poor urban women.

"The collection of water, the obtaining of fuel, the disposal of refuse, and queuing for services in conditions of overall scarcity, these tasks all fall heavily upon the time budgets of the urban poor household. Time is a valuable commodity in such circumstances, and all these activities need to be organized and coordinated within a household to minimize the amount of hard-earned income spent carrying them out," [Turner and Kwakye, 1996].

Obtaining basic necessities like food, water, and firewood also consumes most of the poor's disposable income. Reducing the cost of transport in terms of both time and money can also reduce the cost of these basic necessities.

Secondly, **commuting to jobs represents a huge time and cost burden on the working poor in developing countries**. Because commuting is necessary to generate income, reducing commuting time increases the time that can be spent working, getting education, or educating children. Reducing commuting costs directly increases disposable income.

The degree to which the travel burden of the poor consumes a substantial share of household income and household time budgets varies greatly depending on their location pattern, on whether or not the people are employed, the size of the city, and other factors. Nonetheless, some basic points can be made.

- a. The poor tend to travel less frequently than higher income groups
- b. They travel more slowly than higher income groups
- c. Whether their total daily travel time is higher or lower than for higher income groups depends on how much and how far they need to travel daily.
- d. The travel burden on the working poor seems to be more severe in larger, more heavily motorized cities and in very poor rural areas (particularly in Africa) than in smaller and secondary cities with lower levels of private motor vehicle use.
- e. Around the world, the poor rely heavily on walking and some form of transit or shared taxi service. If bicycling, bicycle taxi, or cycle rickshaw is an option, the poor will often use these modes.
- f. The transport sector is also a critical source of employment for the poor.

A recent study of Sao Paulo, for example, showed that families with incomes in the bottom quintile made fewer trips per person per day (1.51) than people of all other income quintiles. Those in the top income quintile average roughly 3 trips per day. The same study, comparing the travel patterns of an upper-middle class family (top quintile) with those of a working class family (just above the bottom quintile), showed that the working class family made fewer trips per day (8) than the upper-middle class family (20), and traveled less far (16.3 km compared to 51.8 km), but the amount of time spent traveling each day was higher for the low income family (4 hours, 25 minutes compared to 3 hours, fifty minutes) [Vasconcellos, 1997.a. p. 251].

A similarly detailed study done in a few primary cities in Africa (Kampala, Jinja, and Harare) indicated that the daily trips of the poor were also lower than for the wealthy in some, but not all, cases. In Zimbabwe total travel times of the urban poor (70 minutes per day) were higher than for the middle (40 minutes) and upper classes (55 minutes), but in Uganda the urban poor spent less time traveling (40 minutes) than the middle (50 minutes) and upper income groups (55 minutes) [Bryceson, et.al., 2003].

The working poor in developing countries *may* spend an enormous amount of their time and income on commuting. In a peripheral lot on the outskirts of Rio de Janeiro, lower income people spend roughly a third of their income on commuting [Peters, et. al. 1994]. In Jakarta, families living on the periphery may spend 45% of their income on commuting. A study of Accra found that the working poor spend 24% of their daily expenditures on transport. In Sao Paulo, the working poor spent on average 4 hours and 25 minutes commuting [Vasconcellos, 1997.a. p.251].

Among the non-working poor, only 14% of their income was spent on transport. [Kwakye, Fouracre, and Ofosu-Dorte, 1997]. Surveys from India indicate virtually no money was being spent by the poorest on transport, as they were dependent on walking for all of their transport needs [Hathway, 1996].

This big divergence between the travel time and travel cost of the working and the non-working poor indicates that commuting costs constitute a significant barrier to employment. A survey from Dhaka, for example, indicated that employment among housewives in peripheral communities would be increased by 10% if improved transport was made available [Majumder and Shefali, 1997].

Travel time burdens also inhibit the ability of children to get an education. Recent studies indicate that girl children bear a disproportionate share of the burden of meeting basic household mobility needs, collecting water and removing garbage. As a result, they have no time left for schooling, compromising permanently their capacity to earn income [Turner, et.al. 1996; World Bank, *Morocco...* 1996].

Thus, while there is no question that basic mobility is a major burden on many of the urban poor, and that reducing this burden is critical to poverty alleviation, the measures that are likely to be the most effective needs to be clarified.

From the perspective of the household, it is quite clear that road investments are not always the most direct mechanism. There are actually several ways in which governments and other institutional actors (other than private investors) can affect the time and money spent by the poor to meet their basic mobility needs:

- 1) Investments into roads
- 2) Public transport system investments
- 3) Investments into housing and slum upgrading, including water provision
- 4) Expansion of public services, whether public transit, garbage collection, or postal delivery,
- 5) Changing transport and land use regulation
- 6) Interventions into the vehicle supply system.

One study in the Makete District in Tanzania compared the costs and benefits of different transport sector interventions. This analysis showed that investments in water pipes saved households 235 hours per year, while an investment in a feeder road saved them only 120 hours per year. An investment into a bicycle saved the family 200 hours per year. Investing in a grinding mill saved the family 110 hours per year. Some local footpaths that overcame severance problems saved them 30 hours a year. [Sieber, 1997, p. 17 – 18]. This analysis clearly shows that the solution to the transportation problem may not lie in road investments alone.

Per dollar of public investment, the economic and poverty alleviation benefits of publicly subsidizing bicycle or donkey ownership, or providing piped in water, may in fact be far higher than publicly subsidizing road infrastructure. Developing effective interventions in the transport sector is far more complicated than simply investing in new roads.

That being said, interviews with poor families in slum areas indicate that paving the roads and paths in the slums is a priority for them, largely because mud on their shoes and clothing immediately identifies them as slum dwellers, and hence subjects them to social stigma.

III. 2. How the Urban Poor Travel

The poor have a very limited number of choices for making trips. Because each mode represents a specific trade-off between travel time and travel cost, and there are a limited number of modal options, most individuals are forced to take modes that represent a sub-optimal trade off between travel time and cost. This problem is particularly acute in Africa, where the modal options are quite limited. In Asia, by contrast, there is a much wider range of modal diversity, with a generally positive impact on the poor.

Reducing the mobility burden of the urban poor requires reducing the travel time and/or cost of an existing mode, or the introduction of a new mode that offers a different trade off between travel time and cost. The overwhelming majority of the world's poor depend on walking for a majority of their trips. In most poor cities, walking trips dominate, followed by some form of informal transit service. Motorcycle use is also growing rapidly in many poor cities. Recent studies from Dar es Salaam, and Nairobi (primary cities) and Eldoret, Kenya, and Morogoro, Tanzania (secondary cities) show that walking dominates. Transit or shared taxi is next in importance, with cycling as the next most important mode (Table 2).



In most developing cities, walking and informal public transit account for most trips by the poor. Accra (above), Dakar (right).

Table 2 Trip modal shares

Mode	% share			
	Metropolitan cities		Secondary cities	
	Dar es Salaam	Nairobi	Eldoret	Morogoro
Walking	46	47	48	67
Transit/shared taxi	44	42	24	12
Private car	6	7	10	4
Bicycle	3	1	12	23
Other*		2	6	

* employers bus and other means

While studies that disaggregate modal split by income group are few, and their methodologies inconsistent, these studies confirm that the majority of poor people, even in relatively wealthy cities, depend first on walking, then on transit, and in a few selected cities also on bicycle, bicycle taxi, and cycle rickshaw. Private motorcycle and particularly motorcycle taxi use is also growing rapidly even among the poor in many developing country cities.

In a study of two low income neighborhoods in Surabaya, Indonesia, for example, walking trips accounted for 33% of trips, cycle rickshaws for 5%, bicycles for 4%, all forms of transit only about 18%, private car and taxi for 2%, and motorbike and motorcycle taxi trips ('ojek' motorcycle taxi) for 39% of trips [Hook, et. al., 2000]. In a study of secondary cities in India, an average of 54% of the trips made by the lowest income people were made by walking. Bus use increased among the poor as incomes increased, accounting for 17% of trips of the poorest, and 40% of trips for those just below the poverty line [Hathway, 1996].

A recent study from low income families in primary cities in Uganda showed that 60% of the trips were made by walking, while 14.5% were made by bicycle, 16.4% by *combi* taxi, 3.9% by minibus, and only 0.7% by bus [Bryceson, et. al. 2003]. Older but broader data collected in the late 1980s indicated that for secondary cities in Sub-Saharan Africa, more than half of the trips of low income people were by walking, 17% of the trips of low income people were made by bus, and another 24% by shared taxis and paratransit. [Barrett, 1991]. In some larger, more motorized cities, like Accra, there is a slightly lower level of walking among the poorest income quintile, accounting for only 26% total trips, while some 40% of the trips by low income people were by informal transit and another 35% by shared taxi [Kwakye, et.al., 1997]. Even in Sao Paulo, the bottom quintile relied on walking for 53.9% of their trips, and on public transit (mostly bus) for 37.3% [Vasconcellos, 1997a].

Bicycle use varies widely depending on the availability of low cost bicycles, road safety conditions, and cultural attitudes towards cycling. Because bicycles are used by both poor people for basic travel and also by rich people for recreational purposes, income is often a poor predictor of bicycle use and ownership levels. In China, bicycle ownership among even very poor families is quite high, and 7 in 10 households own at least one bike. In India one in six

households in a low income squatter areas in Delhi own a bicycle, while only one in 82 own a motorcycle. [Hathway, 1996] Evidence from Uganda indicates that nationally about 45% of the households own a bicycle, [Bryceson, et. al. 2003] and that the level of bicycle ownership among the poor varies widely from village to village, with bicycle ownership concentrated among the poor in some villages, and among higher income groups in other villages. [Malmberg-Calvo, 1994, p. 13] In some parts of Africa, bicycle use is concentrated in urban areas among the elite (Zimbabwe, for example), and in other countries (Ghana, for example) it is concentrated among the poor.



Afribike Project, S. Africa
(Above). **Bike lanes in Tamale, Ghana** (right).



Bicycle use among the poor will therefore parallel trends in bike use among the general population, and will be highly sensitive to the risk of theft and the degree to which the street environment is safe for non-motorized vehicle use. While rarely are the majority of non-motorized vehicle owners from the lowest income groups, nonetheless, the poor, to the extent that they are not walking or taking public transport, are likely to be on some form of non-motorized vehicle.

In some cities, primarily in Asia, both motorized and non-motorized rickshaws are an important form of transport that is occasionally used by the poor, particularly by poor women and schoolchildren. In Dhaka, Bangladesh, the high up front purchase cost of bicycles and the risk of theft have made cycle rickshaws three times as popular for daily trips. India, Bangladesh, Indonesia, the Philippines, Vietnam, and China all use cycle rickshaws extensively. While the majority of cycle rickshaw and motor rickshaw customers tend to be lower middle class, rather than poor, they also serve an important function for women and the elderly carrying children and parcels.



Cycle rickshaws are often used by the poor in Asian cities.
(Modernized Vehicle, Vrindavan)

In India, where a cycle rickshaw costs only about \$0.03 per kilometer, these services are affordable for short trips to all but the poorest. Cycle rickshaw services have the important advantage over the bicycle that the passenger bears no risk for the theft of the vehicle, they have to come up with sufficient capital to purchase the vehicle, nor do they have to know how to operate it [Gallagher, 1992].

Improving the travel speed and reducing the cost of transit services is clearly one mechanism for reducing the mobility burden of the poor. The introduction of new transit services, such as motorcycle 'ojec' or 'boda boda' taxi services may create a new trade-off of travel time and cost that is attractive to some poor people. Alternatively, safety measures and vehicle supply interventions that allow people to upgrade their walking trips to cycling trips can also save them considerable time with a minimum of additional expense. Another possibility is that transit passengers will switch to cycling trips to avoid having to make a trip by a motorized transit mode in order to save money.



Boda Boda bicycle taxi

III.3. Transport and Employment Among Slum Dwellers

Dramatic changes in the nature of employment have affected transport services used by the poor. Furthermore, changes in the nature of transport service provision have strongly affected the nature and level of employment among the poor. Changes in transport regulations can also dramatically affect the level of employment in the sector among the poor.

The increasing importance of informal sector activities as a source of income for the poor is changing the nature of travel behavior. In 1990 the informal sector was estimated to provide 75% of urban employment in Sub Saharan Africa [World Bank 1990]. More recent evidence suggests that this proportion has probably increased due to the continuing decline in the importance of formal sector employment. For example, between 1990 and 2001 the labor absorption rate in the formal sector in South Africa is estimated to have declined from 64% to 44 %.⁵



Informal public transit is a major source of employment. (Dakar)

⁵ Source: Development Bank of South Africa.

With the decline of formal sector employment, jobs have become more dispersed. This process has further undermined the viability of full size bus services, many of which are being replaced by *combi* taxis and minibus services. Formal sector employment, and with it the symmetry of peak hour flows towards the city centre in the morning and out in the evening, have declined in importance. Commuting peaks remain, but they are overlaid, in both space and time, by more complex irregular movements associated with trading, hawking or work-seeking. These spatially and temporally diversified activities are little understood, but they appear to require more flexible transport systems for people and goods than the heavily radial movements provided by existing public transport systems.

Just as changing labor trends have affected transport services, changes in transport services have affected labor trends. There are many low-income people involved in the provision of various transport-related services. The relatively low level of skills needed to drive a bus or a *combi* taxi or minibus has opened up these occupations to at least a few of the poor. As a rule of thumb, the lower the cost of the vehicle, the higher the chances that the operator will be of lower income. Getting a job as a bus driver or a *combi* driver is often the first step out of poverty, and *combis* provide a huge source of employment for low and moderate-income people [Turner and Kwayke, 1996].

In Uganda, recent research indicates that with a national fleet of 200,000 bicycle and 70,000 motorcycle *boda boda* taxis, about 1.7 million people depend for part of their livelihood on the industry, or about 7% of the population [Howe, 2000].

In India, for example, the job of rickshaw puller or cycle-rickshaw driver is typical of the poorest, who are often recent migrants to urban areas. There are an estimated 3 million cycle rickshaws in India, providing an estimated 6 to 9 million jobs for low-income people [AITD, 1996, p. 124]. As the average income of an Indian cycle rickshaw driver is around \$1 per day, [Author's Field Notes, 1996] they are close to the World Bank's poverty line. In Indonesia, the *becak* (cycle rickshaw) drivers were also from among the lowest income class, generally recent migrants to the cities. Employment provided by the *becak* industry peaked in Jakarta in the 1970s at as much as 200,000 jobs [est. from Dimitriou, 1996].



Rickshaw drivers are typically recent migrants, and among the poorest city residents

Regulatory changes to restrict modes like *combi* taxis, minibuses, cycle rickshaws, motorcycle taxis, and other modes should take into careful consideration the labor ramifications of such

measures. Outright bans on these modes are extremely hostile to the interests of the poor, but some regulation is often welcomed by the poor and can be largely self-enforcing. In an increasing number of Latin American cities, *combi* drivers are being regulated and formalized, organized into legitimate corporate entities or cooperatives, and staff are getting benefits and greater job security.

While cycle rickshaws are spreading to Western European and US cities largely as a mode for tourists in downtown locations, these modes continue to be phased out in Asia through discriminatory regulatory measures. Cycle rickshaws were banned in the 1960s in Bangkok, and bans followed in subsequent decades in more and more Asian cities. They are banned in several Indian cities, such as Bombay and Bangalore, and in large parts of New Delhi, with recent announcements that the ban may be expanded to old Delhi. Jakarta, Indonesia banned them in 1988, then lifted the ban in 1997, then re-imposed it in 1999. Surabaya banned them on some streets. Dhaka is in the midst of trying to ban them on major arterials.



Rickshaw bans remove a source of income for the poor without providing alternatives

Outright bans are disastrous for the poor, though such policies are frequently justified on the grounds of removing ‘exploitation’, or to alleviate traffic congestion. However, the poor cycle rickshaw operators themselves, when interviewed, by a significant margin prefer this form of work to alternative work options available to them. Working as a cycle rickshaw operator may appear a terrible burden to elites, but relative to working on construction or in poorly ventilated factories, usually under constant supervision, the working conditions of a cycle rickshaw operator are relatively easy, a healthier working environment, and allow for a much greater level of independence.

The traffic congestion alleviation argument is also mostly spurious, as nothing is done to ban single-occupancy motor vehicles that arguably consume even more road space.



Segregated lanes for bicycles and motorized vehicles in Shanghai demonstrate a rational integration of motorized and non-motorized transport

Another frequently vocalized justification for these bans is to introduce controls on rural-urban migration, precisely because cycle rickshaw operator is one of the few jobs available to very poor recent urban migrants.

While outright bans on cycle rickshaws are very anti-poor, some regulation of the sector is supported by cycle rickshaw operators themselves. Restricting their numbers can ensure that operators can make a reasonable living. Furthermore, in some cases an oversupply of cycle rickshaws will create needless congestion from unoccupied or idling vehicles. There are also ways of physically integrating bicycles and cycle rickshaws into the traffic system rationally, banning them on high speed limited access arterials while providing alternative low-speed routes, but in practice bans have followed no apparent traffic rationality.

Bans on other modes used and operated by the poor are also typical. For example, the Bajaj (three-seat motorized rickshaw) has been banned on many streets in Jakarta, and the Vikram (five-seat motorized rickshaw) has been banned on many streets in Agra. These modes are generally banned because they are highly polluting, but too often little is done to mitigate the adverse impacts of these bans on low income users and operators.

Box 3: The *boda boda* bicycle and motorcycle taxis of Uganda

Uganda developed bicycle-based passenger and goods transport services in the 1960s. They were complemented by a motorcycle-based version in the 1990s. These have extended the range and capacity of services, known locally as boda boda. Both have spread over the entire country and the bicycle version into neighboring Kenya.

Boda boda operate where more conventional services are uneconomic or physically impossible. They are found in urban and rural areas where they act as feeder services to the towns or major public transport routes. Because of limited capacity and short trips fares per km are 2-7 times those of large capacity buses. Popularity derives from their ability to meet demands other services cannot. While the poorest make only occasional use, due to low incomes and high costs, for many they enhance income by extending the range and intensity of productive activities. Their main impact on the poor is through the employment provided. Operators are drawn from the least educated classes and each supports an average of five dependants. About 1.7 million, or 7% of the population, get part of their livelihood from the industry.

[Source: Howe 2003].

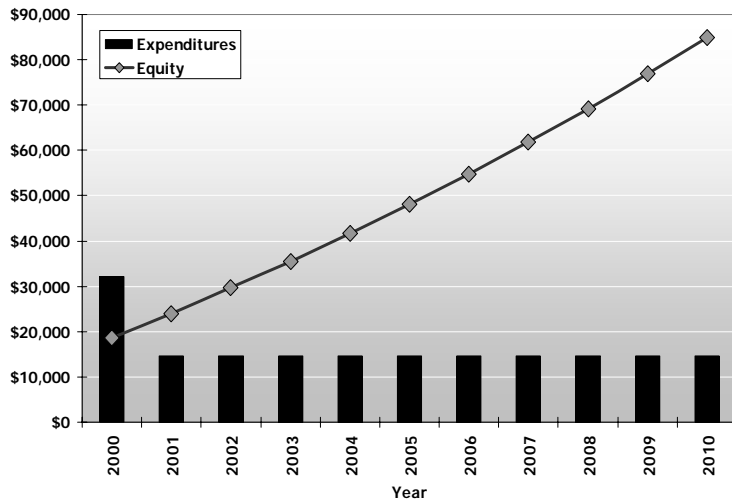
III.4. Transport and the Accumulation of Assets Among the Poor

Often, the underlying cause of the mobility problem is that **the poor lack the up-front funds necessary to buy or build capital assets that could permanently reduce their mobility burden**. They lack the capital to buy a house in a development close to their job that already has water, sewerage, and paved roads, so they move to a house without these services in the distant periphery. As a result, they end up paying much higher costs for transport, water, sewage disposal, garbage collection, heating oil, and food locking them into poverty. They lack the up-front capital to buy a bicycle, wheelbarrow, animal cart, or motorcycle, so they spend a lot more

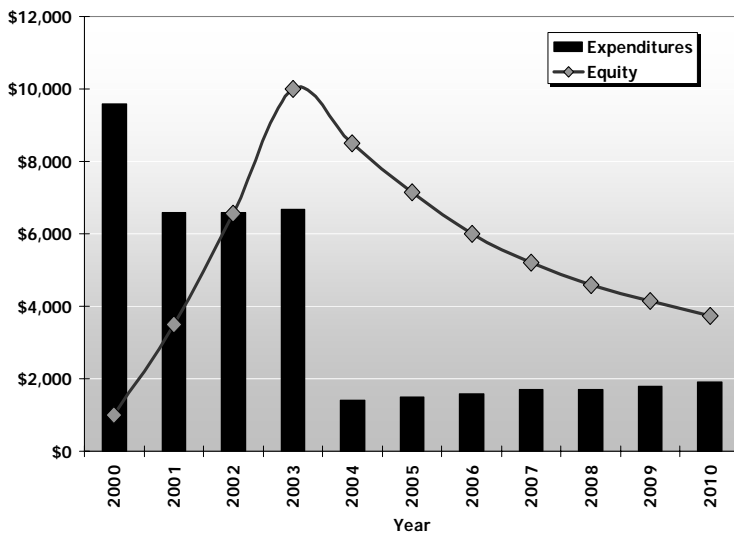
time and income headloading or commuting by bus or paratransit, reducing their disposable income into perpetuity.

Increasingly, poverty researchers are finding that lifting people out of poverty requires not only an increase in their income, but also in their personal assets. Personal assets cannot only permanently reduce their cost of living, but can also be passed on from generation to generation [Oliver and Shapiro, 1995; Smith, 1992].

In urban economics, there is something known as a 'bid-rent' curve. This curve appears to indicate that people are largely indifferent to spending more on accessible housing and less on transport, and spending less for inaccessible housing and more on transport. This trade off, however, is not neutral in terms of the family's ability to accumulate assets over time. If a family purchases a home in a central location, after 20 years of paying for more expensive housing, the family now owns a valuable asset, made more valuable because it is easily accessible. If, on the other hand, the family spends the money on bus fares, at the end of 20 years the family has no asset. As such, *from a growth and poverty alleviation perspective, the bid-rent curve is not a neutral trade off, but is in fact a mechanism by which the poor in developing countries are trapped in poverty.* Not having the access to capital to finance formal home ownership in an accessible location, the poor family frequently has little option but to choose inaccessible housing or informal, insecure housing or both. The former locks the family into transportation costs that the family must pay in both time and money into perpetuity. The latter undermines the value of their housing as an asset in other ways [De Soto, 2000]. Families that can afford accessible housing, by contrast, not only has avoided transportation costs, they have also acquired a valuable asset that will be passed on from generation to generation, providing a permanent security cushion against penury.



Increase in U.S. family assets from investment in home.



Impact on family assets of car purchase, US. (Source: STPP)

As such, *public investments into accessible housing and giving the poor land tenure in accessible locations are far more important to permanently reducing the transport burden of the poor than all sorts of investments into roads.* Subsidizing low income housing in more central neighborhoods or around public transit stations will inevitably be a more cost-effective way of permanently reducing the mobility needs of the poor than building more roads. Unfortunately, the sectoral approach to poverty alleviation too often leads to housing policies that ignore the mobility ramifications of different housing policies. Low density, self-help sites and services projects located on the distant periphery of major urban areas make a lot of sense

from a housing-only perspective, but such low density settlements of the poor create a permanent mobility burden.

Vehicles are also important capital assets that can be accumulated by the poor. In developing countries, owning a bicycle, motorcycle, cycle rickshaw, minivan, or car can dramatically increase the income of the poor. First, ownership of a vehicle can permanently reduce travel costs by avoiding the need to pay for public transit, just as owning a plot of land and a house avoids the need to pay rent. A study in Malaysia indicated that an average low-income household could cover the cost of a basic bicycle with 6 to 8 months of the bus fares required to make the same trip, while the bicycle would last a minimum of ten years with minimal maintenance. A similar study in Masaya, Nicaragua, indicated that savings from bus fares would be able to cover the cost of the bicycle in less than four months. Thus, the obstacle to affordability among the poor is generally the lack of sufficient savings to purchase the vehicle outright, rather than the comparative cost of cycling over time [Replogle, 1992; Hook, 1995].

Secondly, directly owning a commercial passenger or freight delivery vehicle can be a ticket to reasonably remunerated employment. Bicycle and workbike ownership among self-employed micro-entrepreneurs was able to increase the income of the families of fishermen in Beira, Mozambique by 33% by bypassing middlemen, [Overton, 1994], and to double the income of paper recyclers in Johannesburg, South Africa, by dramatically increasing both the collection area and the weight of materials they could carry [White, 1998].



South African paper recyclers doubled their income through a workbike ownership program

Direct ownership of a cycle rickshaw in India or a becak in Indonesia has proven to significantly increase the income of poor cycle rickshaw operators. Even paying very high interest rates, cycle rickshaw drivers can usually pay the entire cost of their vehicle in 9 - 12 months if some form of credit is available. Ownership also allows an individual to sell the vehicle to operators in poorer cities after several years of operation.



Ownership of cycle rickshaws in India (left) and becaks in Indonesia (right) provides a steady source of income for families

In parts of Africa and Asia motorcycles are also used as taxis, some regulated and some not. They are probably the lowest cost motor vehicle, and hence closest to being within the reach of the relatively poor (though not the poorest). Most bicycle *boda boda* (71%) are operated by the owner, compared to 44% of motorcycles. A further 13% of bicycles belong to the family or close relative, and a similar proportion of motorcycles. Correspondingly, hiring of bicycles for operation comprises about 16% of the total, but 56% of motorcycles [Howe, 2000].

The importance of informal transit vehicle ownership as a source of income for low-income families, and the importance of bringing these services into the formal sector, can not be overstated. In Brazil, the increase in small informal sector minivan services (*combi taxis* or *clandestinos*) was critical to large numbers of former state employees avoiding destitution in the aftermath of structural adjustment. According to an interview with Cesar from the Bangu Combi Cooperative,

“The *combi* phenomenon started with the privatizations of large scale enterprises. There was a severance package that the employees used to buy the vehicle. It was just about enough money. The drivers operating on a particular line then started banding together to fight against the extortion of fees by police. They banded together on their own.”

In Rio, as part of the process of integrating these operators into the formal sector, financing from BNDES, a state development bank, became available. Low interest loans (4%) were provided to members of cooperatives. The cooperative guarantees the loan. In this way, all members of the cooperatives were able to own vehicles.

In South Africa, where private business ownership was all but illegal among blacks, the taxi industry was virtually the only mechanism through which black South Africans were able to accumulate capital assets [Smith, 1992]. The insecure regulatory environment is a major

complicating factor faced by low-income *combi* owners, just as insecure land tenure compromises the accumulation of capital among slum dwellers [De Soto, 2000].

The main reason that the poor have trouble accumulating such assets is that they lack the necessary up-front capital to purchase them. Facilitating the availability of credit facilities can therefore be a viable intervention, not only to facilitate housing and land ownership, but also vehicle ownership.

IV. HOW INVESTMENTS IN MASS TRANSIT AFFECT URBAN DEVELOPMENT

Investment in mass transit can reduce the transportation costs of both individuals and private firms. These investments reduce the cash and time cost of transit use and reduce the costs of vehicle procurement, vehicle operation, road construction, road maintenance, and environmental externalities. By reducing these costs, the same level of production can be achieved with lower inputs of capital and labor, hence pushing outward the aggregate production function and thus wealth.

However, as with road investments, the conditions whereby these productivity gains can be realized are highly specific. In practice, stimulating sustained investment into mass transit in a developing country context is even more complex for the transit sector than for the road sector.

Mass transit systems create the possibility of returns to scale in the provision of passenger transportation services. For example, if a firm has 1000 workers, and all of them drive to work in separate cars down the same road, the cost of the annual commute is likely to be over \$3000 per worker, or \$3,000,000. If all of them come to work on the same highway and drive 15 kilometers, this would roughly consume all of a single lane 15 km road during the peak hour. If these same workers could all be carried in articulated buses, 7 buses would be sufficient. In the developing world, this trip on a bus can be supplied at a profit in uncongested areas at an average cost of about \$0.30. Thus, this trip for all 1000 workers all year both directions would cost about \$180,000. If the travel time for the two trips were the same, the mass transit option would make possible a savings of \$2,820,000 per year. In addition, it would free up the available road infrastructure for the use of at least some 200 more vehicles during the peak hour. Because so many fewer vehicles are used, less pollution externalities are generated.

Unlike in the developed world, in the developing world most investment into collective transport today comes from the private sector. The difficulty, of course, is to determine how, when, and under what conditions *public* investment into collective transport can stimulate urban development, and how the public sector can create an investment climate that also stimulates *private* investment into the sector.

Metros and elevated light rail systems were recently introduced in India, China, several Southeast Asian cities, and in some Latin American megacities like Mexico City, Sao Paulo, and Santiago. In Asia, some of these systems leveraged high levels of private investment, but most of them subsequently went bankrupt, had to be bailed out, or involved very high levels of public

investment from the inception. Private and public investment into metro or light rail systems is unknown in Africa. Commuter rail is fairly ubiquitous in developing countries, but usually does not carry a large share of urban trips.

The large majority of public transit trips in developing countries are therefore made by bus or minibus. In Latin America, large buses predominate, but minibuses have a growing share of the market. In African cities, normal buses represent a marginal share of the public transport market, and minibuses or *combi* taxis heavily dominate. In Senegal, for example, some 58% of total passenger trips are currently made by 10 to 15-seater paratransit vehicles called Car Rapides or Ndiaga Ndiayes, and large buses account for only 2.7% of the total motorized trips (Table 3).

Table 3 : Modal share in Dakar 2000

mode	%	Mode	%
Bus sotrac	2.7%	Bicycle	0.8%
Car rapide	35.5%	Motorbike	4%
Ndiaga Ndiaye	22.3%	Private car	9.2%
Shared taxi	12.2%	Caleches, carts	0.9%
Other	3.2%	Metered taxi	9.2%
Total collective modes	75.9%	Total individual modes	24.1%
		Total	100%

Source: Syscom, 2002

Following trends in vehicle ownership overall, efforts to initiate modern *public* bus services in Africa in the 1960s and 1970s had all but collapsed by the 1990s. During times of relative economic prosperity, many national governments tried to set up public or quasi-public transit authorities similar to those in the US and Western Europe. These public companies often took monopoly control over the most lucrative corridors and downtown routes, pushing informal operators to less profitable areas. In major cities throughout francophone West Africa—Dakar (Senegal), Abidjan (Cote d’Ivoire) Douala and Yaounde (Cameroon) — the transit agencies were jointly owned by the national government and Renault Vehicle Industries, which held a monopoly over vehicle procurement. The investments from Renault were more about locking these ex-colonies into a permanent dependence on Renault spare parts than they were about providing good quality transit services. French expatriates held key management positions. In many Anglophone countries, government-sponsored companies competed with private buses and paratransit services. Throughout Africa, full size bus companies relied on government funds for purchasing the buses, and in many major cities such as Dakar, Lagos, and Abidjan they also relied on millions of dollars in annual operating subsidies.



By the mid-1980s most of these public transit fleets were so dilapidated and so short of spare parts that more than 50% of the vehicles were inoperable. As more and more of West Africa faced a deepening fiscal crisis (and often World Bank and IMF-imposed austerity measures as well) more and more of these systems collapsed or shrank dramatically. In their place rose minibus paratransit vehicles that go by such names as *Danfoss* (Nigeria), *Matatus*, (Kenya), *Trotros* (Ghana), *Dala-Dalas*, (Tanzania), *Combis* (S. Africa), *Car Rapides* (Senegal), or *black taxis* (South Africa).

Motorcycle-based passenger services have also arisen in both West (Benin, Nigeria) and East (Uganda) Africa [Howe and Oni 1996, Howe 2003]. Although they give rise to significant environmental problems – air pollution, accidents – their low vehicle procurement and operating costs, their ability to operate under low demand densities, penetrate congested areas, and general flexibility gives them inherent advantages over conventional services. While deploring the danger inherent in their use, users cite convenience and availability as the reasons for their popularity. Women also value the security compared to walking. In Uganda some operators are equipped with mobile phones so that regular users can avail a demand responsive service. Because of their flexibility it is thus likely to be difficult to resist their more widespread introduction although they are seldom used by the really poor. For them the main benefit is simply employment in the industry.



Like the public bus companies before them, private paratransit in Africa also suffers from insufficient investment, though for different reasons. Thus, before proposing *public* transit investment into a developing country, and particularly in an African context, it is important to understand why these earlier efforts to establish public transit authorities failed, and how projects to modernize the paratransit vehicles have also largely failed. Only then can some new initiatives that may offer more hope be discussed.

African cities by and large are not as dense as cities in Latin America, Asia, or Europe, particularly not in their central business district. Oddly enough, Dakar, Accra, and Dar es Salaam have urban density levels similar to US cities, much lower than most European and Asian cities, though high densities may exist in select slum areas. Dakar has about 24 people per hectare, (Barrett, 1992) while New York has about 20 people per hectare. Densities in Europe run from 40 (Frankfurt) to 80 (Vienna). In Asia they run from 60 (Kuala Lumpur) to 300 (Hong Kong) per hectare [Newman and Kenworthy, 1996]. Latin American megacities run from about 100 (Mexico City is 127) to 250 people (Bogota is 210). [estimates from the Municipality of Bogota and the Federal District of Mexico City]

While low density in the US is largely a function of a population 90% dependent on private motor vehicle trips, in Africa this low density occurs where 90% of the population will never in their lifetimes be able to afford a motor vehicle of any kind, and where the majority of trips are made by walking. With the exception of a few large cities like Johannesburg and Lagos, however, these African cities are quite small. With low density and low levels of motorization,

travel times in smaller cities are not unreasonable. However, motorization in African cities has taken off dramatically in the last five years, primarily driven by imports of used cars from Europe, and travel times are increasing rapidly.

This combination of low population density, rapid motorization, growing congestion, and low-income compromises the profitability of mass transit in African cities. Total public transit demand levels on major arterials in many African cities may be as high as 10,000 – 12,000 passengers per direction per hour on a few corridors, but most corridors have demand levels closer to 5000. In the US, 5000 transit passengers *per day* in a single corridor is considered a high level. By contrast, in Bogota, the hourly figure is closer to 50,000, in Hong Kong it is closer to 80,000, and in Bombay closer to 90,000.

A second factor is that people are simply poorer on average in Africa than in much of Latin America and Asia. These low incomes tend to put downward pressures on fares, both through the political/regulatory and also through the market process. While subsidizing public transit fares can be a reasonable social policy when government resources are sufficient to cover these losses, as more and more African countries faced escalating public sector debts, and with political pressure not to raise fares, investment into the maintenance of the transit rolling stock tended to suffer.

If public sector employees were given decent benefits and paid reasonable wages, labor costs in public systems also tended to be higher than in private systems where transit operators are frequently poorly paid, largely transient populations with minimal job security or benefits.

Fourth, poor quality public sector governance caused abuse in the management of public transit systems. Bus authority assets were often misused for political or private purposes.

Finally, the rapid rise in private motor vehicle ownership and urban traffic congestion undermined the profitability of bus operations. Since the mid-1990s, more and more African cities are seeing a huge influx of imported used cars and motorcycles in West [Howe and Oni, 1995] and East Africa, and these vehicles are causing serious traffic congestion. Motorization has an adverse affect on bus system profitability the world over. Yet in Africa, with very limited and poor quality mass transit alternatives available, individuals will tend to switch to private motor vehicles at lower income levels than in countries where better quality mass transit systems are available.



In Dakar, and in most developing cities, public transit is increasingly stuck in congestion from private vehicles

All these reasons undermined the profitability of mass transit in African cities, and contributed to the collapse of full size bus services and public bus authorities in most African cities by the 1990s, and their replacement by private, often informal sector minibus or *combi* taxi and motorcycle taxi operations.

These informal *combi* taxi operators manage to make a profit and attract a low level of private investment. They fill a critical transportation need in Africa, and show that even with low densities, low incomes and growing traffic congestion, some form of collective transport can still show a profit. It does this with no public investment at all other than for the roads on which they operate.

As a result, some economists, and many development institutions such as the World Bank, concluded that there was no appropriate public investment role in the transit sector, particularly in Africa. World Bank support for public transit systems virtually ended in the 1980s, only to revive somewhat in the 1990s with loans to metro systems in a few Latin American countries.

However, transit systems dependent entirely on paratransit are unpopular. The vehicles are frequently old, polluting, dangerous and uncomfortable, earning them derisive nicknames like *Flying coffins*, *Moving morgues* and the like. They do not follow a schedule, and frequently wait until they are full to begin their journey, wasting passengers' valuable time. Their informal, loosely regulated routes engender fierce competition and reckless driving that kills thousands of waiting passengers, pedestrians, and cyclists every year. In South Africa, competition among operators often erupts in violence, sometimes killing innocent passengers. Anyone who has

spent any time traveling in African cities knows the danger, frustration, discomfort and delay associated with the paratransits.

Because the vehicles are small and concentrate on the major arterials, they are also less efficient users of road space than larger buses. While on balance these vehicles help rather than hurt the traffic congestion problem, the public transit system would occupy less road space if passengers were concentrated on a smaller number of larger buses.

In more developed countries, the profitability of individual bus lines is reinforced by regulatory barriers to market entry. Even if bus lines are operated by the private sector, in many countries the right to operate a particular line is regulated by license or concession agreements either by the formal sector or by informal monopolies. This will tend to concentrate existing demand onto a smaller number of vehicles, increasing the profitability per vehicle.

In many developing country cities, however, relatively unrestricted access to the paratransit market leads to an oversupply of low quality vehicles on major corridors. Destructive competition among paratransit operators and growing traffic congestion undermines the profitability of paratransit, so in the end the aggregate level of investment into mass transit rolling stock with paratransit is little better than it was under the old public systems.

Finally, with weak regulatory structures, with no effective road-worthiness testing or vehicle emission standards or vehicle specifications, there is little incentive for bus operators to invest in better rolling stock.

In the new Millennium, with many countries in Africa beginning to recover from the economic downturn of the 1980s and 1990s, and public sector budgets also recovering, Dakar, Accra, Dar es Salaam, and a few other African cities are once again exploring investing public funds into full size buses both through cash injections to old public systems and by giving operating licenses to private operators. However, it would be unfortunate to repeat the mistakes of past public investment into mass transit in Africa that did not lead to the emergence of sustainable systems.

V. MEASURES THAT MINIMIZE THE SOCIAL COST OF TRANSPORT

If transportation services could be provided more efficiently, not only could families and businesses spend more time and money meeting their mobility needs, they could meet these needs using less land (road space) and fewer public resources. Because the transport system is also dependent on oil, which is a limited natural resource, maximizing the efficiency of transportation services is critical to avoiding the risk of inevitable oil price increases and minimizing the level of greenhouse gas emissions. The public and private resources saved would then be available for more direct support to the poor, including investments into housing, water, sewerage, public space, schools, and other public services.

Land is a scarce resource. Roads, being public land, have an opportunity cost. Whenever land is taken to expand a road network, land is taken away from some other economic function, and

historically, this land tends to be occupied, though not necessarily owned, by the poor. As such, expanding roads, particularly urban roads, should be done only with the greatest of care, and after a thorough review of the costs and benefits of alternative options.

Because roads are a public good that are generally supplied free of charge, they have the usual problem associated with public goods: over-consumption and lack of rational allocation of this scarce resource. Buses and pedestrians use about 1/20 the road space of a normal car per passenger, while bicycles use about 1/5 of the road space of a passenger car. Free road use means that there is no pricing mechanism to encourage people to use these less space-intensive modes of transport.



Road space occupied by the same number of people: transit versus private cars

Some vehicles using the roads are of greater economic importance than others, and some vehicles are more heavily utilized by the poor than others. From both an equity and an economic perspective, trucks, buses, minibuses, and non-motorized transport are the most important modes, as they carry capital and labor inputs into the production process, are efficient users of road space, and are of the most direct importance to the mobility of the poor.

Private motor vehicles, meanwhile, are largely a form of elite consumption. Private motor vehicles not only consume private resources, they also rapidly consume scarce public road space, and parking consumes scarce urban space. In poor African countries without a motor vehicle industry, consumption of these vehicles does little to stimulate local domestic investment, and in fact it drains foreign exchange reserves.

Without specific measures to avoid it, the benefits of new urban roads will quickly be consumed by elite motorists, often at the expense of mass transit, trucking, and non-motorized modes. If these roads are subsidized by the state, as they are in much of the world, then the primary economic impact of new urban road construction will be to subsidize elite consumption. If the vehicle production that this stimulates is largely outside the country, this will have little or no positive economic growth impact.

Furthermore, in the absence of some sort of road user charges that internalize the cost of providing and maintaining the road, firms and individuals will make travel and investment location decisions

based on distorted price signals [Coase, 1992]. This pricing distortion is further exacerbated in developing countries due to heavy state involvement in the oil sector.

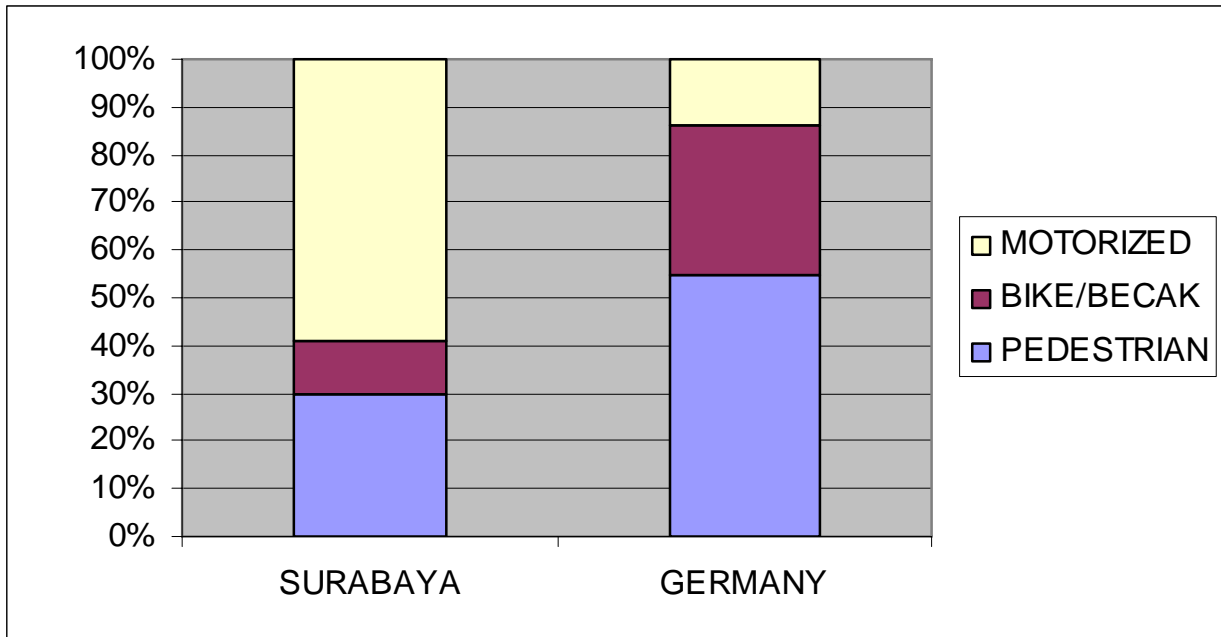
According to a recent GTZ study, while vehicle prices globally vary by a factor of 2:1, the price of oil varies by a factor of 100:1 [Metchies,1999]. Over time this could result in a sub-optimal land use pattern that locks people, firms and governments into a costly dependence on motorized travel that can only become more problematic as oil reserves dwindle. These inefficiencies in urban form can become locked-in, just as sub-optimal technologies can become locked in by a pattern of historically mistaken investment [Arthur, 1988]. As Howe points out, despite the uncertainty about how much longer global oil supplies will last, there is now a considerable likelihood that oil prices will begin a permanent increase in price within the productive lifetime of any new road assets. Cost benefit analysis on roads, however, continues to be performed with the assumption that oil prices will remain stable for the productive life of the road asset (ie. vehicle demand will not drop as a result of an oil price increase) [Howe, 2000]. Hence, there is a strong argument for transferring the costs of road construction and maintenance onto the road user so that it affects the long-term investment decisions of firms and individuals in a way that maximizes the efficient use of scarce land and oil resources.

Free road use becomes even more problematic once the roadway becomes congested. On a congested road, each additional road user slows down not only his own travel time but also the travel time of all the other vehicles currently on the road. As such, because the marginal cost to the last motorist of his decision to enter the roadway is far less than the social cost of this decision, individual decision-making leads to a sub-optimal result, ie. road congestion.

There are really only a few ways to deal with these distortions. A simple method is to ***prioritize road investments on trucking and bus routes***. Japan, by clustering industries in special zones, and investing most heavily in road infrastructure to serve these areas, managed to prioritize the use of scarce road space for trucking. As a result, as late as 1990 over half of the vehicles on Japanese roads were trucks [Hook, 1996]. This method, however, is not effective in the long run, as eventually these roads will also congest with private motor vehicles.

A second method is to ***physically allocate scarce road space to vehicles that are more spatially efficient***; in other words, through ***exclusive bus lanes, bike lanes and sidewalks***. Good walking and cycling facilities make it possible for people to make short trips safely basically for free. Without such facilities, poor people are forced to take more expensive motorized modes, driving up their costs of living and also the cost of labor. Some surprising studies from Surabaya, Indonesia, indicated that for short trips under 3km, which represent roughly half of total trips, over 60% of the trips were made by motorized modes, whereas in comparable cities in Germany over 60% of trips of the same distance were made by non-motorized modes. This is due to the fact that 60% of the roads have no sidewalks or the sidewalks are unusable. ***If poor Indonesians were able to make the same number of short trips using non-motorized modes as are made by Germans, they would save roughly \$0.30 per day, which is about 20% of their income*** [Hook, 2000].

Table 4: Modal split for trips less than 3 km, Surabaya vs Germany



A road that does not have an exclusive bus lane on it can move perhaps only 2000 passengers per lane per direction, or perhaps 3000 or 4000 if a lot of the vehicles are buses. An exclusive bus lane, in very specific operating conditions, can move up to 20,000 passengers per direction per peak hour. Hence, *the introduction of exclusive bus facilities on an existing right of way can dramatically increase the throughput of that facility, and hence the economic value of that asset and all the land area it serves.*



Passengers on Jakarta's new Bus Rapid Transit system pass by congestion caused by private vehicles

A third option is to restrain trips by private motor vehicles, either through regulatory measures or by charging for the use of congested roads. Congestion pricing has been suggested as a possible solution to the distortions in investment resulting from the current structure of road financing [Vickery, 1963, 1967; Hau, 1992a, 1992b]. Without charging, congestion manifests itself as pure waste. This waste takes the form of lost travel time, increased fuel consumption, and inefficient bus and truck operations. Congestion pricing has the added benefit from an economic development point of view of generating a social surplus that can be invested back into the city; either into modernizing mass transit systems, maintaining roads, or into accessible low income housing. Since most owners and operators of motor vehicles in developing countries are already among the wealthiest classes of society, such road user charges also represent a progressive form of taxation.

In the absence of these measures, there will be continual pressure on municipalities to expand road infrastructure as a mechanism for alleviating congestion. Not only is expanding roads extremely expensive, it is also likely that the land consumed for this road expansion will currently be occupied by slum dwellers, as was discussed above. *In other words, measures to prioritize public transit use and charge for road use are critical not only to ensure the development of an efficient transportation system but also to avoid making the low income housing problem worse.*

V.1. Transit Priority Measures

Governments in developing countries aiming to increase transit system speeds or reduce transit costs have a limited range of possible public investment options. As mentioned before, simply subsidizing bus procurement either for a public operator or a private concessionaire, without dealing with the growing traffic congestion, is unlikely to lead to a long-term improvement in transit services, nor a sustainable investment.

In very high density corridors with origins and destinations highly concentrated in a few discrete locations, and with existing or at least potential transit passengers over 45,000 per direction per peak hour (ppdph), governments should consider investing in rail-based systems such as commuter rail, light rail, or metro. These rail-based systems are extremely expensive to construct, maintain, and operate, and therefore tend to only break even on their operating expenses at very high passenger volumes. Roughly, no rail-based transit system can be built for less than \$50 million per kilometer, and in some specific situations may cost as much as \$1 billion per kilometer. The highest volume rail-based commuter systems in the world are the Bombay commuter rail system, with over 90,000 (uncomfortably packed) passengers pphpd, and Hong Kong with roughly 80,000 pphpd. The only metro systems that currently cover their operating costs are Hong Kong, some lines in Sao Paulo (not including maintenance), and some lines in Santiago. The spate of privately-financed light rail and elevated light rail lines, in Bangkok and Kuala Lumpur, for example, have either ended in bankruptcy or are threatened with bankruptcy. The Delhi Metro, currently carrying at most 100,000 passengers per day, is subsidizing each daily rider by about \$500 per year, roughly the equivalent of per capita income [Wright, GTZ, 2003a].



Delhi Metro, 9 a.m., Monday morning.

For this reason, metro and light rail systems tend to lock cities into permanent government subsidies for maintenance and operations, above and beyond the initial capital costs. This can only be justified in very high density cities on high volume corridors with no balance of payments issues. As a rule of thumb, only corridors with over 30,000 passengers per direction at peak hour (ppdph) should ever consider metro or other rail-based options. It is safe to say that there are no cities in Sub-Saharan Africa and few elsewhere in the developing world that will meet these criteria.

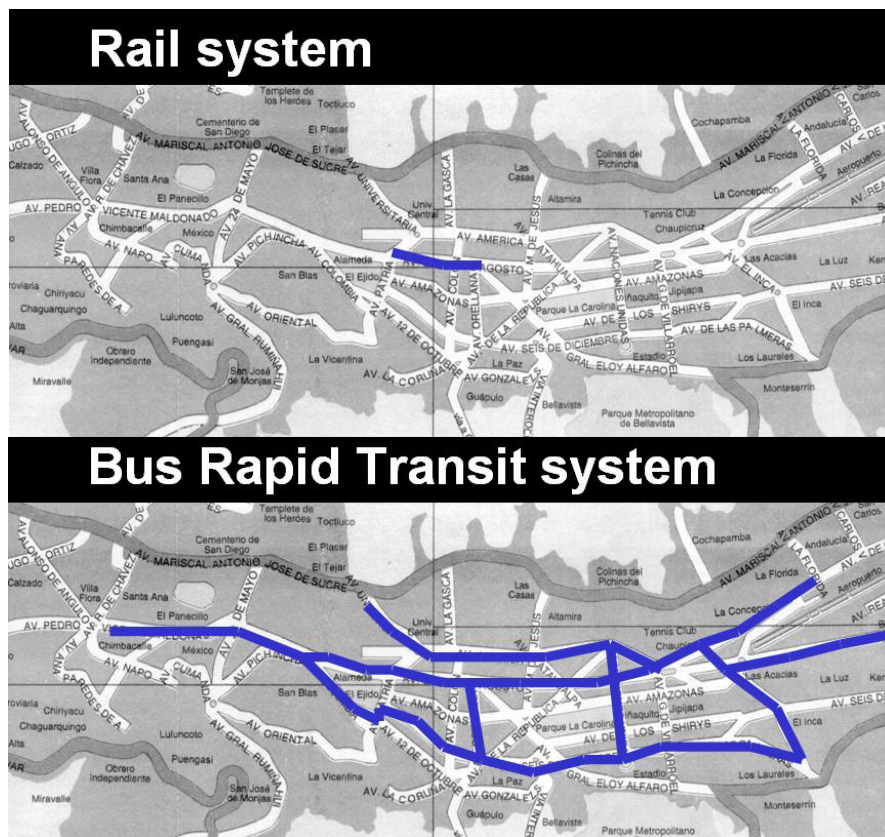
For existing or potential public transit volumes up to 45,000 ppdph, it has now been proven that two-lane per direction busway systems or Bus Rapid Transit (BRT) systems can satisfy this level of demand at commercial speeds competitive with rail-based systems (25 – 30kph). This level of service and capacity has been achieved on Bogota's TransMilenio system, which is currently the world's most state-of-the art BRT system.



Bogota's TransMilenio system moves 45, 000 passengers per hour, more than most metro systems

On any road corridor with transit passenger demands at levels anywhere between 5,000 and 45,000 ppdp, different busway systems can be used to reach these capacity levels at different speeds. Below 5000, bus priority lanes become more problematic as they are moving little more traffic than mixed traffic lanes, and hence are no longer improving the efficiency of the road's use and may actually be compromising it.

The cost and operational characteristics vary widely among different BRT systems, and it is this wide diversity of cost, quality and speed options that allows BRT to serve a wide variety of mass transit needs. At the high end, Bogota is currently building Phase II, at a cost of roughly \$10 million per kilometer. This is because new bridges and tunnels are being built. A standard high-end system that does not require major new infrastructure will cost around \$6 million per kilometer. However, significant improvements in vehicle speeds can be achieved with simple road dividers or even on-board camera-based enforcement measures. This can reduce the price to under \$1 million per kilometer.



Two systems at the same cost: building rail vs Bus Rapid Transit

BRT systems of varying operational characteristics now exist in dozens of countries around the world. They are widespread in Latin America, with the most famous systems in Bogota, Quito, and Curitiba, but with good systems also in Porto Allegre, Sao Paulo, Goiana, Leon, and Guayaquil, and with new systems being planned in a dozen other cities.



Bus Rapid Transit systems share many of the benefits of metros

In the developed world, systems have been built in Los Angeles, Honolulu, Ottawa, Pittsburgh, Brisbane, Nagoya, and dozens more are in the planning stages. In Asia, there are successful BRT systems now in Kunming, Taipei, Jakarta, and Shejiazhuang, while plans are far advanced in Beijing, Delhi, and Chengdu.

There are four cities in Africa developing BRT systems: Cape Town, Dar es Salaam, Dakar, and Accra. Cape Town is the farthest advanced, and the government has allocated \$70 million dollars for its

construction. Dar es Salaam is the next most advanced, with funding from the World Bank and the municipality. Dakar already has a completed feasibility study, and some preliminary funds committed by the Global Environmental Facility and the World Bank. While the demand estimates are currently being done, it appears that some corridors will have demand levels in the 12,000 ppdp/h range. At this level, reasonable systems should be profitable even at quite low fares.

In Africa, it is important to realize that the new interest in BRT is largely driven by the failure of other development institution efforts to modernize the public transit system. A \$95 million urban mobility loan from the World Bank to Senegal intended to be a model for Africa created a revolving loan fund for private paratransit operators to modernize their vehicles. Signed in 1998, the loan to date has failed to expend any of the money. It is becoming clear that only by offering the carrot of access to uncongested, highly lucrative bus lanes with the stick of new regulatory controls on transit routes for unlicensed vehicles, will governments be able to induce the private sector to invest in modern buses.

Because of these two critical changes, congestion-free operation and exclusive rights to operate in a given corridor, virtually *all of the BRT systems in Latin America fully cover their operating expenses entirely from passenger revenues*. With the exception of the Quito electric trolleybus BRT line, all of them are operated by private bus operators who make a healthy profit. *In most of the systems private bus operators covered the investment into the buses*, and there was no public money involved in the procurement of new buses. In a few cities the municipalities procured the buses then gradually sold them to the operators on a lease-to-buy arrangement. Ticketing systems also were covered by private investors. In all of the systems,

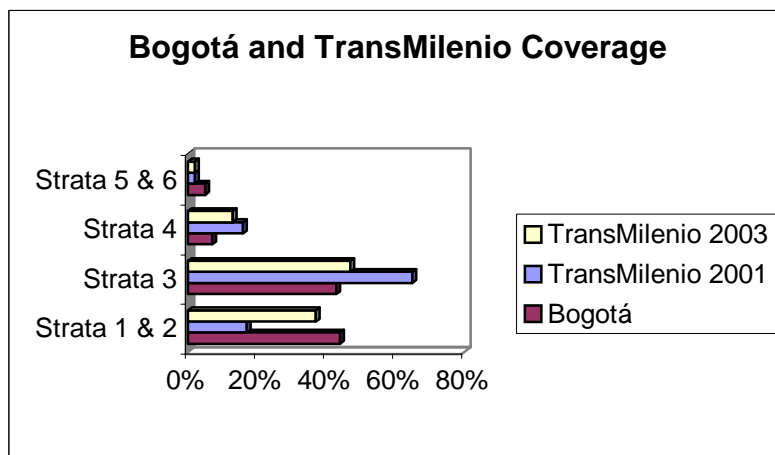
however, the *public sector paid for the reconstruction of the road infrastructure, the construction of the bus stations and bus terminals, and for system planning.*



Bogotá's informal transit operators used to work 16 hour days in difficult conditions (left), but in the formalized system, now work six hour days and earn more

Whether a specific BRT system will improve the lives of slum dwellers or not depends entirely on how the system is designed. Certainly it *could* deliver huge benefits, but a positive poverty alleviation outcome should not be taken for granted. Detailed data from TransMilenio and TransJakarta demonstrates.

Colombia divides its population into 6 income groups. Category 1 and 2 are considered 'poor' under Colombian law. Of all TransMilenio passengers, 37% are from these two lowest income categories, 47% are from category 3, (which represents 66% of the total population), 13% are from category 4, and 3% are from categories 5 – 6. On average, TransMilenio passengers save roughly \$134 per year and 325 hours per year over their previous travel time and travel cost [Unpublished data from TransMilenio, 2003].



We also have some data from a 350 person JICA study on TransJakarta. On this very short system, roughly 40% of passengers were defined as 'low income' based on some proxy indicators. Some 87% of respondents said their travel time was slightly shorter, and only 2% said it was longer. In terms of travel cost, 47% said their travel cost was slightly lower, 29% said it was the same, and 21% said their travel cost was higher than before [unpublished survey data, JICA, 2004].

The specific situation will depend on: a) the level of poor people using the bus system, and the degree to which the BRT system serves the corridors used by poor people; b) the level of congestion in that corridor; c) the degree to which the new BRT system has increased or reduced the number of fully-paid transfers that the passenger needs to make; e) the fare price before and after the system was introduced; and f) travel time before and after the system was introduced.

Often when a city introduces a 'closed' BRT system, one that resembles a metro system with closed, pre-paid boarding stations, there is a simultaneous conversion from direct bus service to trunk and feeder services. In certain conditions this transition can dramatically increase the efficiency of the system, its profitability, and decrease the bus fare. But it can also force costly and slow transfers on passengers currently able to make a single seat trip.

V.2. Congestion Charging and Traffic Demand Management

Instead of giving priority to transit in the traffic system, governments can also penalize the use of private vehicles either through charging mechanisms or regulatory controls. In the long run congestion charging offers the greatest hope for a long-term solution, but to date it has only been implemented in developed countries.



The recent success of the London congestion-charging scheme has proved that a politician can impose a fee on private vehicles entering a downtown area and still get re-elected. The London congestion charging scheme today has an approval rating of roughly 75%, and largely on the strength of its success, Mayor Ken Livingston won re-election in 2004 by a wide margin. The scheme imposes a £5 fee for a vehicle to enter the central business district.

The fee has to be paid in advance via a number of payment mechanisms, and is enforced by cameras that identify the vehicle license plate, both in a cordon ring around the CBD and also at strategic points within the CBD.

The system has cut traffic levels by 15%, delays by 20%, and importantly, increased bus speeds by 20%. Most of the low income people in London are bus passengers, who are key beneficiaries of the plan. The London system did require some £280 million in up front capital investment, largely for the payment system and the cameras for the enforcement system, but

these costs are dropping rapidly due to the decreasing prices of electronics and telecommunications. All of the costs of the system can be paid back with two years of revenue, but in fact the costs have been amortized over 5 years, and began yielding a £130 million profit from the first year. While this money is 80% earmarked to public transit improvements and 20% to road maintenance, this frees up municipal funds that can now be used for alternative needs, such as low income housing.

Other cities that have successful systems include the Singapore electronic road pricing scheme, and the Oslo, Thuringen, and Bergen, Norway cordon tolling schemes. Singapore's system has worked since the 1970s using only an extra license enforced by street level police stationed at gantries, demonstrating that high technology is not necessary to implement these schemes, though it does introduce a lot more flexibility and control.



Congestion charging in Singapore

To date, congestion charging has not yet been implemented in any developing countries. What have been used are regulatory restrictions. Mexico City, Sao Paulo, Bogota, and Jakarta all have various license plate restrictions. All of them restrict access to certain parts of the city for cars with license plates ending in different numbers. The Jakarta system only restricts vehicles with less than three passengers on board, and it only affects the main north-south arterial. Many of these cities, inspired by the London example, are exploring congestion charging schemes.

Another simple way for cities to discourage private vehicle use while raising revenues is to increase parking charges on public roads, or to simply remove illegal parking from city sidewalks through the use of bollards and high curbs. Municipal parking in most developing country cities represents a huge lost opportunity for revenue generation by the local government that would not only help to better regulate traffic, it could also be invested in infrastructure, maintenance, public services, and low income housing. In many developing country cities these revenues are collected through informal systems of control of public space by what might be called parking mafias. Bringing parking under municipal control takes enormous political courage, but has proven to be politically popular where a strong mayor is willing to take it on. Bogota, prior to implementing its TransMilenio busway, cut downtown parking units almost in half. The Mayor was nearly impeached, but after he survived this, he became extremely popular.



Bogota brought illegal parking under control, making space for pedestrians

V. 3. Vehicle Sector Interventions

As was pointed out in earlier sections, the problem of basic mobility among both the rural and urban poor, particularly in Africa, is as much a problem of the vehicle as of the road sector. The situation with vehicle manufacturing and assembly is widely different between Latin America, Asia, and Africa. China, India and Brazil have developed powerful automobile, bus, truck, motorcycle, and bicycle manufacturing industries that are beginning to win market share in other developing countries away from first world manufacturers like Japan, the US, and Europe. All three of these countries are gearing up to dominate these sectors, but China and India are still too new to the field to have developed skilled export credit agencies. China dominates global bicycle production with over 60% of the market, and India is second at 12%.

A key lesson from this experience is that success was achieved largely through carefully controlled joint ventures with international manufacturing conglomerates, not as isolated national industries. Each of these countries had large domestic markets for these vehicles, and they used access to this market to negotiate favorable joint venture agreements with the international conglomerates that forced the transfer of skills and technology. Though initially these industries were protected, tariff barriers are being rapidly phased out. Other keys to their success include huge low interest loan support from state development banks, and other state support including direct investment in motor vehicle manufacturing.

In Africa, Bangladesh, and poorer Central and Latin American countries, however, motor vehicle and bicycle manufacturing are dominated largely by imports. Outside of South Africa, there is no motor vehicle manufacturing in Africa. Bicycle manufacturing also disappeared in the early 1990s, with the exception of a few mostly Indian-owned factories (Tanzania, Senegal and Uganda) that make old English roadster bicycles from imported low grade Indian steel and imported Indian or Chinese components. As a result, many of the poorest countries experience significant problem with the supply of an adequate quantity and diversity of vehicles suitable to

provide the services their poorest citizens need. Furthermore, the procurement of vehicles does much less in Africa to stimulate local employment than it does in Asia.

The vehicles most suited to enhancing the personal movement efficiency of the poor must, by definition, be of comparatively low capital value. Disseminating innovative means of transport to a scattered and poor clientele is a difficult exercise, and efforts not initiated in close cooperation with the private sector have not proven to be sustainable. ***Public sector or development institution involvement in vehicle supply interventions therefore must work directly with the private sector and must focus on changing regulatory regimes, and on partially subsidizing and insulating private suppliers from the risks of investing in the industry.***

From the point of view of poverty alleviation, ***the focus of such interventions should obviously be on those vehicles that most directly benefit the poor, such as buses, minibuses, perhaps motorcycles, bicycles, and other small load carrying vehicles.***

Finally, ***the process of developing any local vehicle manufacturing and assembly capacity has to start gradually, increasing the local labor content as the market for locally assembled vehicles becomes established, before moving on to riskier investments or hoping that high tariff barriers will attract investors.*** As this problem is the most severe in Africa, most of the discussion will focus on project experience there.

V.3.a. Motorcycle and Bus Manufacturing in Africa

While the authors' knowledge about efforts to intervene in the motorized vehicle manufacturing industry in Africa are fairly limited, and further research is called for, what limited experience is at our disposal is shared below.

The introduction of motorcycle-based services in Uganda is widely reported to have resulted from the initiative of a local firm, BMK (Uganda) Ltd.⁶ An interview with the firm's General Manager established that they have been vehicle and spare parts importers and retailers since 1986. A trade visit to Cyprus in 1992 exposed the owner to the use by local farmers of motorcycles. This example, and the knowledge that Japan disposed of large numbers of second-hand and reconditioned motorcycles, led to their introduction into Uganda in the same year. BMK was alone in the market until 1994 when several other firms followed. It was at this time that the phenomenon appears to have taken off. There are now thought to be about 35 firms, large and small, in the motorcycle import trade. Most bring in 20 (60-65 bikes) or 40 (130-132 bikes) foot containers, but some simply fill the back of a truck (20-30 bikes) that they are also importing.

Undoubtedly a contributory factor to the previous growth of the industry was ease of entry to the market. Government restrictions on the import of vehicles more than five years old were

⁶ There is some uncertainty as to whether or not motorcycle services pre-date the BMK initiative. One school of opinion asserts that the firm merely capitalized on a trend started by others. However, BMK certainly played a significant role in the rapid expansion of the industry.

relaxed in 1991. A recent sample analysis of the Ministry of Finance vehicle database, established in 1994, shows that the import of used vehicles is now the principal means of supplying the Ugandan market. In 1999, some 90% of newly registered vehicles were secondhand. Of the 10% of new vehicles, half were imported by the government. Over 80% of the newly registered cars, vans, pick-ups and mini-buses were declared as used. With motorcycles for commercial use it is thought, by informed observers, that almost 100% are secondhand, although this is likely to change if new Chinese-made vehicles are able to capture market share. The only vehicle category where new vehicles continue to be in the majority is large capacity buses.

A recent development has been the introduction of new 'Jiange' brand motorcycles from China. Market penetration has been slow due to client conservatism (strong local brand loyalty) and slightly higher prices than for the used motorcycles. However, some of the large fleet clients are showing a preference for new vehicle purchases because of their reliability and assured spare parts supply. Their superior operating costs ought to give them a marketing edge over the secondhand machines, but this is only likely if efforts are made to change the 'economic' perceptions of operators.

There are also reported to be plans to open an assembly plant for Indian-made motorcycles in the 50 – 75cc range. The aim would be to undercut current import prices, but they would also face the problems of brand loyalty, operator fears about their weakness, and their distorted view of the economics of operating old rather than new machines.

Bus assembly, let alone bus manufacturing, is also almost unknown in Sub-Saharan Africa. A major reason for this is that there is a very small market for full size buses in Africa. To the extent that buses are used, they are imported, largely second hand from Europe and sometimes from Middle Eastern countries. With the growth of low cost Indian and Chinese bus manufacturers, it is likely that imports from these countries may soon appear.



Unregistered bus operator in Accra, Ghana (left) and Car Rapides in Dakar (right)

There is a market for minibuses, but even this market is constrained to some extent by the lack of investment in new minibuses by the private operators, for reasons discussed above. In countries with fairly open trade regimes, like Ghana, the minibus market is dominated by imported Japanese minivans. In countries with fairly closed trade regimes, like Senegal, the minibus

market is dominated by aging Renault and Mercedes trucks, imported used from Europe or simply maintained over long periods of time by continually replacing the imported used Japanese engines.

The Senegalese Government is intent on promoting local vehicle assembly if not manufacturing. One Senegalese investor with Indian partners set up Senbus, which is assembling minibuses entirely manufactured and painted in India by Tata Telco, then assembled locally. The government supplied the land for the facility at no cost. The assembly plant is big news in Senegal, even though the vehicles are not currently selling very well. The investors are perhaps hoping that the World Bank funds to modernize the minibus fleet will be usable to procure the Senbus vehicles, but it is not yet clear if the operators would want to procure these vehicles or if the technical specifications will allow it.

The key to solving the local assembly problem is to first create a stronger *market* for public transit vehicles. This can only be done by increasing the profitability of bus operations by both creating exclusive bus lanes and bus rapid transit systems, by regulating transit routes to ensure that operators do not face destructive competition, and by gradually improving the vehicle specifications required to obtain transit operating licenses. Only in this way can a market for better buses develop. Only after a market for better buses and minibuses is established can private sector interest in bus assembly be expected to emerge.

In other words, Bus Rapid Transit is critical not only to solving congestion problems and road allocation issues, it is also critical to creating a market for better vehicles, and hence for leveraging private investment into local bus assembly. Curitiba, Brazil, Sao Paulo, Brazil, and Bogota, Colombia all became centers of bus assembly after the introduction of exclusive busways in those cities. While the first buses were imported, the demand for more profitable, high quality buses eventually lured investors to focus on assembly.

V. 4. Non-Motorized Vehicle Sector Interventions

Because private motor vehicle ownership is likely to be out of reach for most of the poorest in Africa and Asia, and motorcycles have significant environmental and safety externalities, efforts to provide improved vehicle access have focused more on non-motorized vehicles like bicycles and cycle rickshaws and load carrying vehicles.

The availability and affordability of non-motorized vehicles like bicycles, carts or rickshaws is affected by numerous factors. There are significant differences in the cost structure of existing non-motorized vehicle suppliers between different African regions.

The most important factor affecting the structure of the industry in most of Africa is the level of the import tariff and other consumption taxes on bicycles. The import tariff on bicycles still varies widely between countries. Restrictions on the use of foreign exchange for bicycle procurement and the taxation of bicycle consumption are also critical factors.

In the 1970s taxation on imported bicycles varied from 40% to 400%. In many countries the bicycle was regarded as a “luxury good”, and tariffs were often even higher than on motor vehicles. Such tariffs, along with restrictions on the use of foreign exchange, led to extraordinarily high bicycle prices in Mozambique, Tanzania, Ethiopia, Ghana, Kenya, Uganda, and much of Francophone Africa. This depressed demand significantly. In Mozambique, for example, bicycle sales fell from 40,000 in 1970 to less than 1,000 in 1990. This was not a function of shifting to motorized modes, as the motorized fleets grew only marginally during the same period. The price



Reducing or eliminating import tariffs on bicycles increases ownership

elasticity of demand on bikes is indicated by the case of Kenya. That country reduced bicycle import duties in the late 1980s from 80% to 20% - which was followed by an increase of bicycle imports of 1500%. Ghana, which eliminated tariffs on bicycles in 1996, saw a 1000% increase in bicycle sales, and rapidly became the hub of bicycle importation throughout West Africa.

Pursuing an import substitution strategy, some governments were protecting domestic bicycle industries. The result of these policies was a dramatic reduction in bicycle use, and few of the indigenous manufacturers have survived. The handful of so-called manufacturers that remain in Africa actually only weld frames. The steel (generally from India) is imported, as are 100% of the components, including the wheels. The difference in terms of value added between this and simple assembly of a completely knocked down bicycle (CKD) is marginal. In Senegal, the one remaining frame manufacturer generates less than 15 jobs, selling only about 2000 bicycles annually. In exchange for these 15 jobs, the cost of bicycles in Senegal is roughly 50% higher than in nearby Ghana, with the majority of this cost picked up by poor rural laborers. Roughly half of this is due to the tariff and half to value added taxes. To make matters worse, certain commercial groups (largely from the Middle East or India) have sufficient influence with customs officials to get around the tariff by lying about the commercial value of imported merchandise. This undermines the competitiveness of anyone who does pay, is not willing to act illegally, and who does not have the requisite connections at the port.

Another related reason for high bicycle costs is that the volume of sales per retailer is also extremely low in most of Africa. This is in turn related to low overall sales volumes. Many, but not all, of these businesses are owned by people of Middle Eastern or Indian and a few of Chinese descent, with cultural or family ties to their home countries. They tend to be general importers and not bicycle specialists, and hence do not provide a full array of bicycle-oriented services. Some indigenously-owned Independent Bike Dealers (IBDs) exist, but they are relatively few.

Because the volume of bicycle sales by these general importers and the few indigenous IBDs that do exist are relatively small, and their capital is too limited to meet the payment terms of the large factories (they rarely offer credit terms unless they have a long established business relationship), it is difficult for them to buy bicycles by the shipping container load, which is the minimum order for a direct purchase from a Chinese or Indian factory. As a result, they

purchase a container of not only bicycles but also toys and light industrial goods from a middleman, normally in Dubai or some other duty free zone. As a result, the end user is paying for a bike that has changed hands through several middlemen. The larger importers and assemblers who are able to buy full containers of Completely Knocked Down (CKD) bicycles from China or India still tend to buy through middlemen, usually Chinese agents based in Hong Kong or Shenzhen, or sometimes in Europe. The margins on these businesses are generally too low to make possible the cost of traveling to China or India, hiring translators, and negotiating deals directly with factories.

The situation in South Africa and neighboring countries is markedly different, and has to be discussed separately. There, the largest bicycle importers are already moving high volumes of reasonable quality bicycles primarily through mass-market chain stores or hypermarkets. The vast majority of customers are recreational upper and middle-income white young people. These bicycle companies hold the licensing and/or distribution rights to brand names like Raleigh, Trek, etc. for the Southern Africa region. One or two of them are part owners of factories in China, and the others have sufficient resources to contract significant production from Chinese factories where they have long-standing relations. They import CKD in very high volume, assemble locally, and sell in high volume to mass-market retailers. South Africa used to have domestic bicycle manufacturing under the Raleigh brand name, which lasted into the late 1980's. Raleigh factories in the United States and England have been similarly dissolved, with all of the production moving to Taiwan or China.

These South African importer/assemblers are gradually taking over the market in the neighboring countries of Botswana and Lesotho, and are moving into Kenya, Zimbabwe, Angola, and other neighboring countries on the backs of the South African mass-market retailers.

In South Africa itself, during apartheid, black South Africans were not allowed to own and operate their own businesses in the townships, so no class of small black entrepreneurs ever emerged. Those small enterprises that have emerged all deal in low-cost non-durable goods such as candy, cigarettes, and other foodstuffs. Hence, the legacy of apartheid undermined the emergence of IBDs. Poor security in the townships has left the mass-market retailers in virtual monopoly control of the bicycle retail trade. While some lower income black South Africans shop in the mass market stores, shoppers have to travel long distances to reach these retailers, an arduous journey for those without access to a motor vehicle. The other market mechanism that serves the townships for more expensive items like furniture and appliances operates in the following manner. The vendor will have a showroom with display models, and customers will place a purchase order there. They usually have to buy on credit, which is supplied directly by the vendor at very high interest rates. The goods are then delivered by truck to their home. Someone then comes and collects the payments on a regular basis, and if the payments are not met the goods are repossessed. The extremely high interest rates, generate anger and resentment among the populace. Nonetheless, one has to recognize that this and the heavily guarded mass-market stores are the two business models that currently supply durable goods to low income black South Africans.

As a result, bicycles do not reach lower income black South Africans, who primarily live in townships. Bicycle use remains very low in the townships also due to the threat of crime and

lack of safe cycling facilities. Over time, these conditions have resulted in a situation where most black South Africans do not know how to operate a bicycle, let alone maintain or repair them.

The problem in South Africa then, from a supply perspective, is not so much the lack of availability of low cost bicycles, but the lack of IBDs or other sales mechanisms serving lower income black South African communities. Linked to this is a lack of facilities for small repairs.

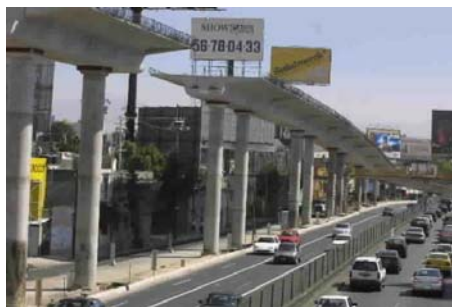
Various efforts by development agencies and NGOs have been made to try and address these problems. These interventions can be grouped into the following categories:

- Donating or subsidizing new and used bicycles
- Reducing the tariffs and other discriminatory taxation against bicycles
- Starting new independent bicycle dealers (IBDs) and forming buyers cooperatives
- Underwriting the costs of promotional activities
- Underwriting credit and new business development risks

V.4.a. Donating or subsidizing new and used bicycles

Bicycles and other non-motorized vehicles can fulfill many basic human mobility needs, just as basic housing can provide shelter. Furthermore, even the poorest families, once given access to a bike, can usually cover the costs of its maintenance. These are the baseline conditions where government or donor-agency subsidies can be to some extent justified.

It costs \$10 million to construct a single highway flyover. The beneficiaries of this flyover will be quite mixed, but concentrated among wealthy motorists. This same \$10 million could buy 150,000 good quality bicycles, or cut the price in half for 300,000 bicycles. It would also buy 100,000 modernized cycle rickshaws, creating 100,000 jobs. Why should the general taxpayers subsidize one and not the other?



Price comparison: \$10 million will buy one flyover, 150,000 bicycles or 100,000 cycle rickshaws

Put another way, you could give every man, woman, and child in Senegal a bike for \$500,000,000, roughly the cost of 10 kilometers of metro, or one major highway. The subsidies in the vehicle procurement would have a much more direct impact on the income and quality of life of the poor.

Some governments have had programs to subsidize bicycle and cycle rickshaw procurement among specific populations like school children with homes located far from a new school, or among the very poor in certain regions. They can also be targeted to health care workers, like AIDS education workers. Such interventions have been shown to roughly double the number of clients that can be reached.



Bicycles doubled the number of patients reached by HIV/AIDS workers in South Africa

The largest government program of this kind is probably South Africa's Shova Kalula program. The South African DOT agreed to give a \$25 a bike subsidy to help school children purchase a bike to get to school. Roughly 6000 bicycles were distributed to schoolchildren at half price. In India, it is typical of many regional development authorities and Mayors to give away cycle rickshaws to untouchables just prior to elections as a way of shoring up support. The Japanese government has donated thousands of bicycles to partner NGOs in Africa over the years. There were also numerous projects where US, Japanese, and European NGOs collected used bicycles and shipped them to developing countries where they were sometimes donated and sometimes sold at below full market cost. ITDP's Bikes Not Bombs programs in Nicaragua, Haiti, and Mozambique were some of the first. ITDP, while it has moved away from distributing used bikes, continues with support from Alternative Gifts International to donate some bikes to health care NGOs and other service providers in Senegal, Ghana, and South Africa. Local Bikes Not Bombs chapters did turn into independent projects. The Boston Chapter remains Bikes Not Bombs, and continues its relationship with Nicaragua and Haiti (www.bikesnotbombs.org). The New Jersey chapter became Pedals for Progress, which has sent over 75,000 used bicycles to over a dozen countries, mostly in Latin America but a few in Africa and the Caribbean (www.pfp.org). The Seattle Chapter became the Village Bicycle Cooperative, with a project in Ghana. ITDP also set up the Afribike project in South Africa, which became independent in 2000 (www.afribike.org). Afribike became the first implementing agency for the government Shova Kalula program before it was restructured. There is also a large Australian Christian charity that is donating over 1000 cycle rickshaws a year to the poor in India. Jaipur Foot, a well known Indian NGO, is also donating a large number of cycle rickshaws and hand-powered tricycles to poor indigents and disabled people, giving them basic mobility and sometimes a livelihood. Since 1992 thousands of German families have donated bicycles to families in

almost all districts in Uganda. With their funding, raised by the German partner organisation *Jugendhilfe Ostafrika e.V.* (Youth Aid East Africa, Karlsruhe), the Uganda based BSPW (Bicycle Sponsorship Project and Workshop) has distributed bicycles to poor rural and urban households and to community grass-roots groups. By the beginning of 2003, BSPW had distributed roughly 11,000 bicycles throughout the country. These programs vary widely in terms of the relationship of the programs to local bicycle retailers, whether they are new or used bikes, and whether they are donating or subsidizing the bikes.

Over 20 years of project experience have yielded the following lessons:

- a. Unless the local and international bicycle industry is directly involved in the program, then it might actually undermine the emergence of a viable private sector bike distribution network. For this reason, vouchers for donated or subsidized bikes should be distributed directly to the intended end-user and made usable at eligible private sector vendors. If no independent bicycle dealers (IBDs) exist in the region, then the program should be used to develop them. Otherwise, there will be problems with replacement parts, maintenance, and no development of the private sector.
- b. Donations of used bikes can work but only if done on a sufficient scale. In countries like Ghana and Nicaragua, where there are already a large number of small bike dealers importing used and donated bikes from Europe and America, there are vendors with a sufficient array of tools and spare parts for a wide variety of bicycles that can usually cover the costs of shipping. For the donation of a smaller number of bikes to a remote location or a targeted population, importing new, uniform bicycles will be cheaper, much less headache, and greatly simplifies the amount of tools and spare parts needed for ongoing maintenance.
- c. Few of the programs simply give away any significant number of bikes. Time and again project experience shows that unless the end user is willing to pay something for the bike, they will not take care of it. Charging something is an important allocation mechanism to get them to the hands of those with the most commitment. Most of these programs do involve some form of subsidy, however. Often, someone in the first world is donating their old bike and giving a small donation to cover part of the shipping. The NGO itself does not work on a profit margin but it does pay staff. While sometimes the bikes are donated to end users, more often than not they are simply sold in the market for the local value, which is usually around \$25.

V. 4.b. Efforts to reduce the tariffs and other discriminatory taxation against bicycles

Several institutions and individuals have played a role in convincing government authorities in some African countries to reduce the tariffs on bicycles or spare parts. In Ghana, the World Bank played an informal role in convincing the government authorities to remove the tariff on bicycles (now about 2%) in 1996.

In Kenya, the National Forum Group of the International Forum for Rural Transport and Development played a key role in convincing the government to reduce the bicycle tariff. The

National Forum Group included members of UN-HABITAT, the Intermediate Technology Development Group's Kenya office, several leading academics, and a key government representative from the Bureau of Statistics named David Nalo. Mr. Nalo was not a transport expert but he was persuaded by the members of the National Forum Group, and had access to the data which proved to the budget agency that the revenues on bicycle imports were not a significant source of government revenues. He convinced the government to make this minor change in policy.

In Tanzania, the Association for the Advancement of Low Cost Mobility (AALOCOM) helped convince the Tanzanian government to reduce the duty on bicycle tires by 10%, though it has not removed bicycle import duties. Because tires are the most expensive part that needs routine replacement, this policy change makes it more affordable for people to keep their bikes on the road. In Zimbabwe bicycle tariffs were recently eliminated, mainly to give people an alternative option to motorized travel after oil supply dwindled due to a lack of foreign exchange reserves to pay for it. As in the Kenya case, some documentation of the relative costs and benefits of the tariff on bicycles, put into the right hands, could make a significant difference.

V.4.c. Starting new IBDs and forming buyers cooperatives

Independent bicycle dealers are critical to bicycling because they provide a full range of bicycling services to their customers. At the low end of the market, internationally they face competitive pressure from mass-market retailers who offer no services to the bicycling community and have no particular commitment to cycling in general. They are however, able to bring the cost of bicycles down because of large returns to scale in their purchasing and trucking. IBDs are extremely weak in virtually all of Africa. In South Africa, they exist only to service the upper and middle income white population.

Stimulating the creation of IBDs, and consolidating existing IBDs into a formal or informal cooperative can help bring down the obstacles to the emergence of a cycling culture and bring down the costs of bicycles and parts by allowing independent IBDs reach economies of scale. This allows them to:

- Reach container-load shipment sizes, reducing freight costs and unit costs
- Negotiate direct access to foreign factories
- Increasing leverage with foreign factories to decrease costs and ensure better quality control.

ITDP and, later, Afribike tried to use the Shova Kalula project to develop new IBDs in township areas where there was limited retail activity. The model was to use a refurbished shipping container outfit with tools and turn it into a secure bike shop. While Afribike was mismanaged and ran into financial difficulties, some of these efforts to create new IBDs continue to survive, though most of them remain affiliated to one of several NGOs and remain dependent on some form of support from the parent NGO.

ITDP also initiated a program in 2002 called the California Bicycle Cooperative. ITDP in cooperation with the Trek Bicycle Corporation developed a bicycle specifically designed for urban Africa, and named it the “California Bike”. We imported on our own account six containers of California Bikes from the Giant #1 Factory in Shanghai, three to South Africa, two to Ghana and one to Senegal. We then warehoused the bikes and sold them at wholesale prices to IBDs, to government agencies, and to large companies who supply them to employees through payroll deduction plans. In this way, the California bike Cooperative has been able to make a good quality bicycle available in Ghana and South Africa and retail at a 32% lower price, and in Senegal at a 50% lower price.



Independent Bicycle Dealers are forming a buyers’ cooperative to access better bikes

In the California Bicycle Cooperative, ITDP essentially functions as a regional distributor, but instead of taking a standard distributors profit (anywhere from 10% to 30%), we are doing it at cost. Trek, SRAM, the IBDs and other companies also donated time and gave us near cost prices as an effort to boost the new African market.

Ultimately, this project could be scaled up with an infusion of seed capital, and could be spun off and managed by professional risk managers. In the US there is some domestic experience with two IBD buyers cooperatives. One of the two US efforts is called YaYa! Bikes, started by Cooperative Solutions. Its members include some 200 US-based IBDs that cooperatively own the rights to the YaYa! Bikes brand name, and are also using their cooperative buying power to get better deals on brand name suppliers. The other is the Bicycle Product Shippers Association, which consolidates shipments from China and Taiwan to the United States to bring down shipping costs.

V.4.d. Underwriting the costs of promotional activities

Increasingly, IBDs make much of their money selling bicycles just prior to high-profile bicycling events. In South Africa, a large share of bicycle industry profits are made just prior to the Argus Bike Tour in Cape Town. Governments, NGOs, the private sector, and international agencies have all played key roles in organizing and hosting these events. These events are increasingly popular with Mayors who can say they are doing something about traffic problems at very modest cost, and also with the bicycle industry. Growing in popularity are Bicycle Caravans (2 in Accra, one being planned in Dakar), Car Free Days (Two held in Cape Town and numerous others around the world), and Car Free Sundays (ubiquitous).



Accra Mayor Solomon Darko during a bicycle caravan

These events not only increase the de facto public space in cities where there is often a critical shortage, they provide residents of a vision of what the city can look like when car use is constrained. They also get people back into the habit of cycling. Also important is the low cost form of exercise it offers to an increasingly obese global population. Obesity is actually a growing international public health crisis as exercise opportunities diminish, caloric intake increases while the quality of diet does not, etc.



Bicycle caravan in Accra (left) and new cyclists during Cape Town's Car-Free Day (right)

V.4.e. Underwriting Credit and New Business Development Risks

Absorbing IBD credit risk is a critical component of the California Bicycle Cooperative initiative. One of the main reasons IBDs unit costs are so high is that they do not have the capital to purchase full containers of bicycles and allow that capital to be idle for the estimated one year it takes to sell all the units.

ITDP, by providing the up-front capital, absorbs a large part of this credit risk in a controlled manner. By maintaining physical control over the bicycles and providing them in small numbers to members of the California Bicycle Cooperative (CBC) on consignment, ITDP is able to manage its credit risk by simply not releasing further bicycles to clients who are not paying. These numbers are kept within a credit cap, which is based on the capital we have from donor agencies to cover this risk. With access to more low interest credit or base capital, this program could be greatly expanded, to cover Kenya, Uganda, Tanzania, Mali, and other countries. Thus far, there have been minimal problems with bad credit, and a few minor isolated problems of theft.

While in theory, any existing micro-credit facility can provide low interest loans for the procurement of vehicles, be they bicycles, motorcycles, cycle rickshaws, goats, or traction animals, in practice the unit value of these vehicles is too low to make this effort worthwhile as an NGO activity. In India, there is already a thriving market for cycle rickshaw financiers and they in fact are one of the largest markets for the modernized cycle rickshaws. While they charge rates that we would consider usury (20% annual interest or more), in fact for very small transactions to largely itinerant populations, this is probably a reasonable estimate of risk, and these financiers play an important role in that market, allowing small cycle rickshaw operators to pay for their vehicles sometimes on a daily basis.

With support from the German Ministry of Economic Cooperation and Development, FABIO, the First African Bicycle Information Office, was able to introduce an ongoing credit scheme for bicycles in Uganda. Since November 2000 FABIO has given out nearly 1000 bikes. Under the Bicycle Credit Scheme, the beneficiary receives a bike after making an initial deposit of USh 40,000 (US\$ 22) and pays the balance over a period of one year in monthly installments of USh7,300 (US\$ 4). The bike is used by the beneficiary to generate income some of which is kept by the beneficiary as savings. This scheme is in operation in urban, peri-urban and also rural areas and the recovery rate is above 75%.

The bicycles are distributed via categorized groups, like farmers, Boda-Boda operators, and teachers, to make sure there is social control. Therefore the interest rate on the credit-scheme is kept as low as possible to avoid hardships for the recipients of the bike. The new owners either start a small business, using the bike as a taxi or a transporter for goods (Boda-Boda) or are using the bikes for transporting their own harvest to and from urban markets (see Diagram below). The latter are mainly rural and peri-urban peasants who can improve on marketing their harvest, if they have access to bikes. For both groups of beneficiaries one of the most important issues within the credit scheme is the training component. It is critical since the major objective is to

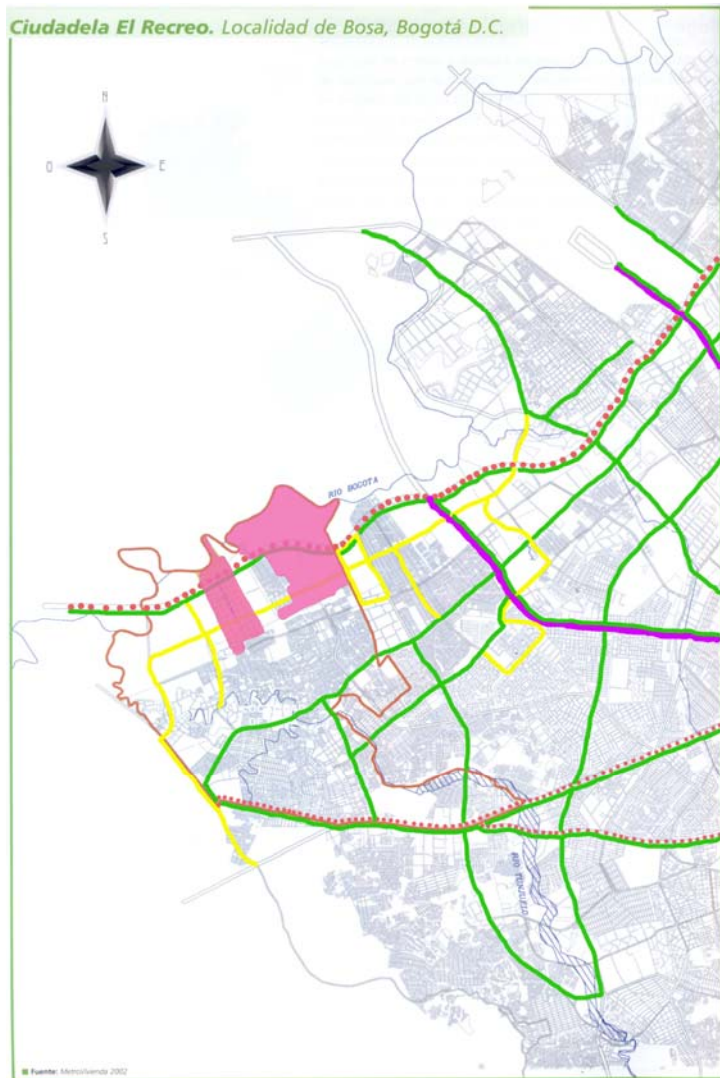
not only give out bicycles but also to create awareness and skills to use the bicycle economically and so ensure a regular repayment.

There is a high number of interested people who want to participate in the credit scheme as many of the professional bicycle-taxi riders, the Boda-Boda are facing hard conditions in their business. Most of them don't own their bike, but have to pay a high daily rent to businessmen who provide the bikes. Additional to this, the Boda-Boda have to pay any repairs on the bikes themselves and they have to pay registration fees to town councils where they operate. With the credit scheme, FABIO improves the working conditions of the Boda-Boda, mainly young boys, who are now able to save more money with their business.

The World Bank also supported a bicycle credit scheme as part of its bicycle lanes and bicycle promotion project in Lima. They created a fund worth US\$ 600,000 or so. In the end, it proved untenable for individuals to access this fund, and it became used only by larger employees to finance employee payroll deduction schemes for bicycle purchases. It was not heavily subscribed but there was minimal default.

V. 5. Integrating Safe and Efficient Transport with Low Income Housing: Making the Connection

One way to reduce the transport burden of the poor is to prioritize low income housing and legalization of tenure programs on locations that are central and/or are served by good quality public transportation. Coordination of state-sponsored low income housing programs with planned mass transit improvements through the master planning process is one way that has proven successful. For example, in the 2000 Master Plan for Bogota, low income housing areas were located near planned BRT corridors and around bicycle and pedestrian-only arterials known as '*cyclovias*'.



Bogota’s MetroVivienda housing projects are accessible by transit as well as extensive new bicycle and pedestrian paths (photo above)

These *cyclovias* were constructed in advance of purely private development at the urban periphery. In a very short time, new formal and informal housing was constructed around and along these *cyclovias*, ensuring that poor residents of these new development zones would have excellent quality bicycle and pedestrian access to BRT stations and to the city center. At the same time, low income housing projects financed by the parastatal Metrovivienda were located in the Master Plan on plots of land adjacent to the first BRT corridors. Metrovivienda procured this land while it was still low in cost, then hired private developers to design and construct housing on this land. It then restricted the sale price of these houses at a fixed profit margin. This process allowed for the creation of accessible low income housing in transit and bicycle facility-accessible locations at a price some 25% lower than had the state not intervened to insulate the poor from the impact of the transit investments on the land cost.

Increasing the density of low income housing in transit-friendly locations would also ensure that more low income people would live in accessible locations. It is clear that very high density, high rise housing is not fully compatible with the sort of maintenance issues that tend to plague low income units, nor with the lifestyle of recent rural migrants who are used to keeping gardens for vegetables and chickens to minimize their food costs. Nonetheless, recent public and private efforts to develop moderate density low-income housing units have been successful in resolving most of these issues. To a certain extent a process of densification is happening as a market driven process. There is evidence of the densification of centrally located *favelas* in many Brazilian cities.

Land banking for low-income housing is another possibility too frequently pursued. Where excessive condemnation of land for low income housing purposes is legal, cities can procure land around mass transit improvements, sell off part of this land as it appreciates in value, and use the profit on the land sale to finance low-income housing units on the remainder of the land. This was done on a limited scale in Curitiba, Singapore, Hong Kong, and Korea. A similar result can be achieved through betterment taxes imposed on property owners that benefit from transit investments. Sao Paulo is also using fees collected in exchange for the issuance of zoning variances for higher rise development to finance improvements in adjacent low-income housing areas.

It is also important for experts in low income housing to become more familiar with the sort of modern traffic calming methodologies that are used to protect families, particularly children and the elderly, from traffic deaths. As many of the roads in slums are upgraded in slum upgrading programs by the housing department rather than the transportation department, the basic toolkit of traffic safety measures should be made widely available to housing developers. As the residents of slum areas are almost ubiquitously dependent on non-motorized modes of travel, access trips into and out of slum areas are generally mostly non-motorized.



Upgraded slum area, Bogotá.

While some streets need to be widened in order to allow access by trucks for the delivery of products to shops, for solid waste removal, and for access by *combi* taxis, these streets should be designed not in a way that maximizes high speed and irresponsible driving, but rather that forces drivers to operate at speeds safe for areas with high volumes of pedestrian trips by children and the elderly. Wide sidewalks, slow speed bumps, meandering streets, built out curbs, and the whole host of well documented traffic calming measures should be employed as part of slum upgrading projects, and not only in upper income residential areas. Some streets where there are no significant motor vehicle trips should be closed to motorized traffic entirely to expand limited public space. Other streets should be designed as public spaces that allow slow speed motor vehicles to enter but forces them to operate at slow speeds. Efforts along these lines in Bogotá not only dramatically reduced traffic deaths, but neighborhoods designed with more public space also showed sharp reductions in crime.

VII. THE PLAN OF ACTION: TRANSPORT INTERVENTIONS CRITICAL TO MEETING THE MILLENNIUM DEVELOPMENT GOALS

The Millennium Project has asked the authors to lay out what transport sector measures would be required to meet the Millennium Development Goals, and how much they would cost. While such a task is beyond the ability of a single paper, below we attempt to lay out a possible program of investments for an unspecified country in Africa. To begin, let us start with what has already been suggested by the Millennium Project. In “Letter from Sauri, Kenya,” Jeffrey Sachs proposes purchasing a \$15,000 village truck for the village.

In the Poverty Report on meeting the MDG’s in Tanzania, the report limits possible investments into transportation to “Roads”, although it is possible that some expenditures listed under other categories such as health, education, etc. are actually transportation expenditures related to these programs. This report suggests that \$19.4 per capita is needed to meet the basic need for roads, of which roughly \$13.3 per capita would be needed from the international donor community, and roughly \$6.1 per capita from local sources. This is roughly \$557 million per year from international sources and \$257 million from government sources. In order for these figures to be compatible, we must assume that the international funds are in the form of a grant rather than in the form of a loan, since there is no discussion of possible unsustainable accumulation of additional debt.

While the methodology is not entirely clear, what seems to be suggested is that this level of investment would be needed to increase Tanzania’s road network to .4 km of roads for every 1000 people from a current .11 km. In other words, the suggestion is being made that Tanzania and the international donor community not only bring all of Tanzania’s roads up to a state of good repair, but also to expand the existing network of roads by roughly four times.

Until now, no donor country has in recent years considered providing grants for road construction on this magnitude, and the primary source of financing for roads has been loans, albeit some of them at very low interest. Therefore, we will suggest below how a government such as Tanzania should use both grant and loan funds in the transport sector.

VII. 1. Determining a reasonable level of aggregate annual road investment

As discussed at length above, we do not agree that expanding the road network to some average kilometers per 1000 population level makes any sense. If this is indeed the basis for the determination of the total level of support for the transport sector, then the aggregate numbers have little connection to optimizing economic benefits of road sector.

The economics literature suggests that while economic activity increases the needs for roads, but roads do not necessarily increase economic activity, the following methodology for determining aggregate transport sector expenditures would be as follows:

a. Governments should spend a maximum of 2% of GDP on public investments on transportation and a minimum of 1%, using 1.5% as a benchmark. (Total GDP spent on transport is more likely to be around 5% - 10%, but the majority of this is likely to be private investment into vehicles). The guideline suggested by the highway lobby in the European Union was 2% of GDP per country as being ‘sustainable’, so we are more comfortable with a more conservative 1.5% of GDP spent by the public sector on infrastructure.

In the scenario for Tanzania, the government has proposed spending 1.4% of GDP on transport. This is a reasonable level, however we do not agree that it should all be earmarked for transportation.

b. All of this domestic spending should be covered by fuel tax revenues, and these funds can be put in a Road Fund managed with some independence from the general budgeting process and with road user representation on the Board.

c. International donor support should provide no more than a 1:1 match for the funds being put up by the national government in the road sector. These should be channeled through the same fund for transparency in accounting.

d. The fix—it-first rule should apply to the Road Fund, meaning that these expenditures should be first targeted to bringing the existing road network into a state of good repair, and paving unpaved roads.

e. Transport sector investments should not be restricted to roads but should consider the entire range of transport sector interventions.

VII.2. Guidelines for Investments into Intercity Roads.

Given the above program experience, governments should not *borrow* money from development banks for urban or rural roads unless ALL of the following conditions are met:

- a. Cost benefit analysis accounting for all significantly affected parties indicates that the economic benefits will be greater than the cost of capital.
- b. The government's debt service on road loans and all ongoing maintenance can be entirely recovered from road user revenues even using conservative economic forecasts.
- c. The facilities are designed to facilitate safe travel and crossing by non-motorized modes if these modes are present.
- d. Governance structures must be in place that can ensure that the maintenance of the road will occur.

In urban areas, further conditions should be applied, including:

- a. Roads should be primarily used by buses, trucks, or non-motorized modes of travel.
- b. Roads are designed to give priority to these modes.
- c. Displaced populations are fully compensated for the full long term costs incurred as a result of the relocation, whether or not they are the owners of the property.
- d. The environmental impact assessment of the new road must show that it will not drive ambient air quality in the location into violation or further violation of World Health Organization-recommended standards.

Further, *priority should be given to projects using labor-based road construction methods, using locally procured materials and equipment.*

Facilities which do not meet these criteria but where, through geographical targeting, the beneficiary population can clearly be identified to be poor, could still consider using **GRANT** funds to maintain, rehabilitate, or pave roads, under the condition that

- a. Road-user fees will be sufficient to at least cover ongoing maintenance
- b. Governance structures are in place that can ensure this maintenance will take place.
- c. The poverty alleviation and economic development impact of these investments is comparable to other possible uses of these grant funds.

In the absence of these conditions, road investments not only cannot be guaranteed to reduce poverty, they could make it worse.

Currently, there is no shortage of loan financing available for road projects meeting these criteria, as this is the bread and butter of most of the development banks. The problem is much more that loan financing is also available for roads that do not meet these criteria.

Grant financing for this purpose, while much less problematic since there is no debt burden, is also far more limited. To the extent that grant funds are made available, they should focus on

local pathways and streets in slums, sidewalks, cycleways, traffic calming measures, and local streets in low-income neighborhoods, and should encourage the use of labor-based construction and locally-procured materials and equipment. There is some successful project experience in this area. The costs of these facilities are not generally the problem: the problem is the lack of awareness among government officials regarding their importance.

VII.2 Guidelines for Investments into Urban Mass Transit

As with roads, simply pouring loan funds into urban mass transit could have disastrous impacts if not carefully specified. Misguided, extremely expensive under-utilized metro projects are proliferating in some developing countries, contributing to rather than addressing government indebtedness and poverty. Nor is there significant evidence that public investment into buses operated by public transit authorities alone is likely to have a sustainable impact on urban mass transit systems in developing countries.

Most successful project experience in recent years indicates that public investment into mass transit systems should be prioritized first on building robust infrastructure which physically gives buses priority access to the existing or newly constructed road network, i.e. on BRT systems. Once infrastructure is constructed in this manner, user fees should be able to fully cover the procurement and ongoing maintenance and depreciation of reasonable quality rolling stock. To the extent that subsidies for rolling stock are provided by government support, evidence suggests that this is most sustainable when subsidies are negotiated with private sector operators on a competitive bidding basis. As a minimum, the private operator should be held responsible for depreciation and of meeting ongoing quality of service standards set by a government authority.

Often, when a corridor is being reconstructed to build a BRT system, pedestrian and cycling facilities in the corridor are included simultaneously. This is a very positive trend, and donor funds should encourage this.

Recently, the donor community has proven to be quite open to financing busway or bus rapid transit projects. The World Bank is currently funding BRT projects in Lima, Peru, (in conjunction with the GEF), Shejiazhuang, China, five cities in Colombia, and in Dar es Salaam, Tanzania. US AID (through ITDP) is funding technical support for BRT projects in Jakarta, Delhi, Dakar, Accra, Dar es Salaam, and Cape Town. SIDA is funding a project in Bangalore. The Shell Foundation (through WRI-EMBARQ) is funding a project in Mexico City and Shanghai. The Energy Foundation is funding projects in Beijing, Kunming, and Chengdu. The Global Environmental Facility is also considering projects in Dakar, Dar es Salaam, Accra, and a few other cities. UNDP is providing technical assistance to BRT projects in several cities in Ecuador and Colombia.

While there is a high level of donor community interest and support for these projects, it is very project-driven. BRT projects, to be done well, require a reasonably high level of technical sophistication within the regulatory body planning and managing the system. Building this technical capacity, requiring moderately high level skills in traffic modeling, engineering, legal contracting, systems operations, and public relations, remains the main hurdle. Using pilot BRT

projects to build this local capacity will be slower and more expensive than relying solely on international experts but ultimately is an investment into better-managed systems in the long run.

VII.3. Investments into Traffic Demand Management

Congestion charging provides a solution to developing country transportation problems too little explored. DFID and the British Government, with the successful London example, and a major successful experience in integrating enforcement cameras and telecommunications technology into traffic management, should be doing much more to promote this solution in developing countries. ITDP has already had some success sending British experts to developing countries with support from the Hewlett Foundation. International donor assistance for technical experts, trade missions, and the costs of procuring the technology, the cameras, and other key software would all be an excellent investment into projects that would generate revenues for other social needs including low income housing while managing traffic.

VII.4. Investments in the Vehicle Sector

While NGOs have been quite active in donating and subsidizing bikes for poor people, particularly in Africa, much more high-level government-to-government and large development agency efforts in this area could yield rapid and direct poverty alleviation benefits. Interventions to also stimulate the motorcycle sector could have a huge poverty alleviation pay off, though at an environmental and safety cost. The environmental costs however, are specific to urban areas and can be somewhat mitigated by banning two-stroke engines. The safety issue can also be partially mitigated by traffic engineering.

Specific initiatives that should be pursued, given the support of large donor sponsors, include the following:

VII.4 .a. Investments into Bicycles

The bike industry has expressed interest in investing in emerging markets in Africa, but it is not a high priority for them. They are waiting for ITDP and others to work out the logistical details, prove the viability of the market, and establish a network of reliable business contacts. Most needed right now is an injection of capital into a credit facility for independent African bicycle dealers. The International Finance Corporation has a GEF program but it is not set up to handle loans of such small size. The Chinese Bicycle Association was also approached, as such a credit facility would probably most directly benefit Chinese manufacturers, but no mechanism for this currently exists. Indian export credit agencies could also be approached. US AID has given ITDP some grants to get this started, so work is progressing but at a modest pace.

Donating bicycles channeled through local IBDs to governments and NGOs for AIDS outreach workers, health care education volunteers, other service providers, and school children in remote locations, is also a reasonable use of public and donor expenditures if part of a good program. While direct full donations to individuals are not generally sustainable, if done through a voucher system they do not hurt and actually help local IBDs. Many governments and development

institutions currently have budgets for the mobility needs of their staff. In some cases, these budgets could be re-allocated to use bicycles in a way that could reduce the transport cost burden on these agencies. Targeted pilot donations of bicycles to interested governments and agencies are underway but could be ramped up significantly.

VII. 4 .b. Facilitating Business - to - Business Contacts in the Vehicle Sector

The cost of meeting and negotiating agreements with international vehicle suppliers is prohibitive for developing country small businesses, many of which operate on small profit margins. First world governments with extensive export promotion apparatus at departments of trade and commerce often are not interested in emerging markets, and their vehicles are not well specified for this market. Again, India and China and perhaps Brazil would have the most to gain from such trade contacts but these countries are not geared up well for this sort of exchange. Increasing African business participation in transit, motorcycle, and bicycle trade shows might prove a shot in the arm to these sectors. Efforts by the GEF to do this around hydrogen vehicles largely failed because the vehicles were very poorly specified for a developing country context – a measure that does not apply to bicycles and motorcycles.

VII. 4 .c. Facilitating Direct Investment into the Vehicle Sector

While infant industry protection has not proved very successful in the vehicle sector in Africa, nonetheless the goal of increasing local labor content is still valid. More flexible instruments for encouraging private sector investment into bus, bicycle, motorcycle and truck assembly and perhaps eventually manufacturing should be developed. The IFC of the World Bank and the export credit agencies of the US and European countries are usually more than willing to get involved in viable projects of this type if first world corporations are involved. The cost is in setting up the deal, and generally private investors don't see Africa as a sufficiently lucrative market to justify the investment of time and energy. Investments into bicycle assembly facilities are generally too small scale to justify the bureaucratic complexity of involving the IFC. One IFC project, to support an Indian company investing in a bicycle factory in Rwanda, was caught up in greater problems in the country.

Getting the large multinational vehicle manufacturers even interested in developing products specified for the African market has been extremely difficult. Part of the problem is that the governments of the vehicle supplier are the most likely source of credit risk guarantees, which means the whole negotiation process has to start over again when the supplier is changed from one country to another. Some sort of medium and small scale credit and risk guarantee facility for joint ventures in the lower cost vehicle sector may be worth exploring under the auspices of an international donor or lending agency.

VII. 5. Priorities for Housing and Transportation Linkages

The first priority is to focus government attention on mechanisms for more efficiently using existing road infrastructure. Interventions such as BRT and congestion charging are a mechanism for avoiding the huge demands on land occupied by low-income people for housing.

The second priority is to use the charging of upper income motorists as a form of progressive taxation to finance slum upgrading.

The third priority is to target programs for low income housing at locations that are served by existing or planned mass transit or cycling facilities. Integrating these programs through the master planning process, or by putting housing program directors on the board of a transit authority, will help. Using the benefits generated by transit system improvements to finance low income housing through land banking or betterment taxes should be more widely applied.

Finally, within slum upgrading projects, recognition that the majority of slum residents are first and foremost pedestrians, and secondly transit riders and pedestrians, calls for a reevaluation of how the road facilities in low-income neighborhoods are designed. Pedestrianization of some roads, widening sidewalks, and traffic calming on important access roads are all measures that will increase critical public space while dramatically reducing road fatalities, particularly among children and the elderly.

ANNEX I: MAKING THE TRANSPORT COMPONENT OF PRSP's MORE EFFECTIVE.

Analysis of three sample Poverty Reduction Strategy Papers (PRSP's) (Ghana, Senegal and Tanzania) indicated that they had adopted highly conservative approaches towards support from the transport sector to achieve their objectives with little apparent connection between the proposed investments (mostly non-specific road construction or improvement) and the other measures designed to influence poverty reduction. The purpose of this section of the paper is to address the issue of how investments in transport might be made more sensitive to poverty reduction objectives.

In essence the task is fairly simple and reduces to (i) better intervention targeting; and (ii) better diagnosis of interventions. Achievement of these requires answers to two fundamental questions. First, 'where - in a geographic sense - are the poor?'; with a subsidiary check to determine if they are concentrated in sufficient numbers to justify intervention either on a cost-effective or cost-benefit basis. Second, 'in what way are they poor?'

Targeting of interventions. With the extensive monitoring of poverty characteristics that is becoming almost routine in most poor countries, information is either increasingly available as a GIS data base or can readily be converted to that format using proprietary software. This means that it is possible to search for and rank different characteristics of the poor and to match the results with overlays depicting the extent and condition of the existing transport system, be this its route network, services or even personal vehicle ownership.

There are well-established precedents for manipulating information in this way for poverty targeting in a wide range of disciplines [Bigman and Fofack, 2000]. However, the principle does not yet seem to have been applied to the transport sector.

Prescription of interventions. To date interventions in the transport sector in support of poverty reduction objectives have been drawn from a very limited menu. Most have revolved around various forms of public route provision, rehabilitation and maintenance. There are isolated examples of footbridge construction (Lesotho, Malawi, Nepal) to relieve acute access problems, and there have been some experiments with the provision of innovative transport services or NMT, but only on a pilot or demonstration scale. These latter measures are most definitely not part of a widely recognized, established menu of sectoral interventions.

The crudeness of current intervention policy is exacerbated by the customary casualness in determining if individual interventions are actually appropriate to the mobility or access needs of those on whom they are nominally targeted. The crucial issue is the extent to which a particular group that is experiencing poverty can be said to be *transport poor* and what form this takes. For example, some forms of chronic poverty – the blind, elderly, orphans, etc – are effectively *insensitive* to most conventional forms of transport intervention. They are simply unable to respond to whatever opportunities improvement might create. Equally, the livelihoods of nomadic pastoralists that have lost all their cattle in a drought - which has happened in Ethiopia, Kenya, Sudan and Uganda among other countries - can only realistically be revived by restoring

their herds. More efficient transport is sensibly irrelevant to the only way they know of sustaining their existence.

Different forms of poverty evidently require different types of transport sector interventions, or, perhaps, *none at all*. Emergency public works, including road construction, rehabilitation and maintenance, have a well-established and successful history of addressing the *transient* poverty that can arise from floods, storms, drought, locusts, or other forms of natural disaster [Ravallion 1990]. Experience shows that the wages or food aid paid to workers gives them a breathing space to re-establish their asset base and former livelihoods. In making the transport components of PRSPs more effective the challenge is to categorize poverty in all its variants and to match these with appropriate transport sector interventions. For example, those for health related objectives are likely to be different to those made in support of educational objectives (Box 4).

Box 4 : Addressing the educational constraints experienced by girl pupils in Pakistan.

In 1994, a local NGO, working in the union council of Darsano Channo in Sindh, undertook an innovative transport intervention to enroll and keep both women teachers and girls in primary and secondary schools. Even before transport and access interventions, as means of addressing poverty, became acceptable within the development sector in Pakistan, some local NGOs got together and developed an innovative program with the local communities.

Their premise was simple: whatever keeps girls from going to schools has to be changed. They found two basic problems: there were no teachers in the local primary government schools, and the secondary schools were too far for girls to walk to. In both cases, they found the same issue: lack of transportation. So they invested in two cheap second-hand Suzuki vans, to which the communities contributed. The teachers got pick-and-drop, and the older girls were carted to secondary schools. The local NGOs claim that primary level enrolment among girls in the villages served by these vans (that have now grown in number) is close to 100 percent and that many have gone on to secondary schools outside their villages.

[Source: Howe, 2002].

Studies of those experiencing social exclusion in developed societies indicate surprising similarities with both the rural and urban poor in least developed countries [Social Exclusion Unit, 2003]. The catalogue of problems – the availability and physical accessibility of transport, cost of transport, services and activities located in inaccessible places, safety and security, ignorance of service possibilities and restricted travel horizons – feature in both groups of countries. The main differences are in the severity and consequences of the effects of these problems. There is, however, another major difference. The restricted responses typically found in developing countries contrasts with the range of interventions found in developed societies [Social Exclusion Unit, 2003].

Wealth is a partial explanation for the difference, but it also has to do with the traditionally perceived role of government, society and even international development assistance. However, since the fundamental problems are the same it is apparent that much could be learnt from collating international experience with innovative attempts to solve them.

Individual PRSPs: There are some broad similarities in the structure of the three PRSPs and the manner in which they were compiled, but also significant differences in the definitions of poverty, and ways it is to be addressed. All recognize multiple aspects of poverty, which include income or consumption as one major aspect, but also identify lack of access to basic services, and human deprivation as others. They also agree that it is still largely a *rural* phenomenon and give relatively little attention to treatment of its *urban* symptoms.

All estimates of the level of poverty and changes over time are contestable because of variations in the way they are estimated [Kakwani, 2003]. The figures quoted are simply those presented in the PRSP's, some of which acknowledge their uncertainty.

AI.1. Ghana's PRSP⁷

This is the longest and most detailed of the PRSP's [Ghana Poverty Reduction Strategy 2003-2005, 2003]. It views poverty as having three dimensions: income or consumption, lack of access to basic services, and deprivations in human development. It also distinguishes *extreme poverty*, being those people who are unable to meet basic nutritional requirements even if the entire consumption budget is devoted to food. Interestingly it considers *slum abatement* as a cross cutting issue, and their inhabitants to be among the vulnerable and excluded classes. Emerging forms of exclusion also depict worsening vulnerability.

The PRSP makes clear that efforts to reduce poverty take place against a daunting historical legacy. "Per capita income in Ghana today is less than what existed at the time we achieved independence 44 years ago."

"Spending on social programs for poverty reduction such as health and education has been low and constraining to poverty reduction. For instance, the levels of spending on health and education at 2.0% and 2.8 % of GDP respectively are much lower than African averages with a disproportionate amount of the resources used for personnel emoluments and administration".

"Over the past ten years, Ghana has experienced growing and deepening poverty an evidence of intensification of vulnerability and exclusion among some groups and in some areas, especially in the north of the country and the Central region. Moreover, population growth during the period far outstripped the rate of decrease in poverty levels. Five out of ten regions in Ghana had more than 40% of their population living in poverty in 1999."

The PRSP acknowledges that the feeder roads are in very bad condition and trunk roads in bad condition. Also, that despite being one of the continental pioneers in the use of labor-based road works, based on the use of small private sector contractors, it has been unable to translate project success into sustainable programs.

⁷ These have been obtained from the World Bank web site on PRSP.

Against this background, government's medium term priorities (2003-2005) for the sector see international trade with its regional (ECOWAS) neighbors as the key to growth and have opted to develop and restore major highways as their first priority. Further investment is to be devoted to developing its ports and "A complimentary network of trunk and urban roads will be rehabilitated and maintained alongside feeder road construction and maintenance."

An innovation in the PRSP is an attempt to provide an analytical basis for sectoral, sub-sectoral and locational expenditure priorities. This is in the form of a series of rankings based on various indices of consumption, health, social and economic infrastructure, education and household budgets. Since the advice is couched as assistance to Ministries, Departments and Agencies the implication is that it comes from the drafting team and may reflect donor rather than local priority perceptions. It also uses a number of contestable terms, such as 'better balance' or 'more effective utilization', in justifying its proposed approach.

AI.2 Senegal's PRSP

This is the shortest and least detailed of the PRSP's [Republic of Senegal, 2002]. Poverty is seen as being largely a rural phenomenon – 72-88% of the population compared with 44-59% in urban areas. Interestingly the perception obtained from participatory groups appears to equate the poor with a state of destitution (Box 5).

Box 5 Perceptions of poverty in Senegal

'Someone who lives, but has nothing'.

'The poor person lives in a state of total economic and social destitution'.

'His dominant characteristic is that he excludes himself from the fabric of society, preferring to live in the most total anonymity'.

The PRSP identifies with the overriding seven objectives of the New Partnership for Africa's Development (NEPAD), with the transport sector posited under the strengthening of basic infrastructure. The PRSP aims to:

- Double per capita income by 2015 with better distributed growth;
- Accelerate the establishment of basic infrastructure by 2010 to strengthen human capital; and
- Eradicate all forms of exclusion.

In the latter context it perceives an especially vulnerable group as existing on the fringes of cities. They comprise children, women, the handicapped, the elderly young people, displaced persons and refugees.

The PRSP admits to the poor quality of local roads. It intends an ambitious program of rural road construction and electrification, especially to tourist areas. This will be complimented by an 'open skies' policy on air transport to further encourage tourism.

It further states that growth must be highly labor-intensive (HLI) in the construction, rehabilitation and maintenance of productive, economic and social infrastructure facilities. One aspect of this policy is to specifically target unemployed urban young people.

AI.3. Tanzania's PRSP

This is the oldest of the PRSP's, but has since been qualified by two progress reports [Tanzania 2000, THE UNITED REPUBLIC OF TANZANIA 2003]. Poverty is conceived as having income and non-income (human development) components. Severe data problems are admitted so the proffered estimates are based on 1991/1992 surveys.

Poverty is again seen as being largely a rural phenomenon with subsistence agriculture as the main repository. In 1991/1992 basic needs poverty incidence was estimated at 57%, and food poverty incidence at about 32%. Tentative estimates for 2000 suggest that the incidence of poverty in rural areas may have increased. Urban poverty is however, acknowledged to be widespread and increasing. In 1991/1992 the basic needs poverty incidence for Dar es Salaam was 6% and for other urban areas 41%. Again 2000 estimates suggest that the incidence of poverty may have increased further. The poor themselves see poor roads and limited access to markets as characteristics of their poverty.

The original PRSP saw it as being, to a large extent, an integral part of ongoing macroeconomic and structural reforms that were being supported by Tanzania's multilateral and bilateral partners. The most prominent specific mention of the transport sector was the intention for local communities to play a more active role in rehabilitating and maintaining rural roads, and for international help to be sort for training and other forms of support. Food-for-work infrastructure programs were also seen as a suitable mechanism for addressing the plight of vulnerable groups.

The second progress report on the PRSP makes clear that there has been innovation in its implementation. Rural road improvements have been focused on the eight most vulnerable (poor) regions out of a total of twenty. Special attention has also been given to footpaths, tracks and trails and to mobilizing communities in carrying out needed improvements.⁸ However, resort to community assistance is admitted as being because the Local Government Authorities lack the capacity to manage district, urban and feeder roads.

AI. 4. Comments on the Three PRSPs

With the exception of Tanzania the treatment of transport as an influencing mechanism is largely traditional and not well integrated with interventions in other sectors. Road construction and rehabilitation are the preferred actions with some attempts to link this to employment creation by

⁸ This has been in the nature of a pilot program with Swiss technical assistance and finance. It has also included experimentation with the provision of non-motorized transport (NMT).

stipulating labor-intensive work methods *where feasible*. In practice the latter stipulation has more commonly been used to disqualify, rather than approve, their use.

The continued belief in new road construction as an effective and sustainable mechanism of socio-economic change defies the much more qualified lessons of experience. More than a decade ago the cruel paradox of rural transport in Africa was succinctly identified. While being under-equipped with its existing rural road system it was simultaneously over-burdened by the maintenance of what it had [Riverson et. al. 1991]. Nothing much has changed and building more new roads, especially rural roads, is tantamount to throwing petrol on a fire to extinguish the blaze. The creation of effective local maintenance systems remains the overwhelming priority.

In the foregoing context, Tanzania's advocacy of community mobilization smacks of desperation. Despite considerable experimentation with this mechanism, over the past decade there is absolutely no evidence that it is likely to be any more sustainable than the efforts of Local Government Authorities.

The strategies are universally silent on the issue of the adequacy, or inadequacy, of rural transport services and whether measures are needed to increase their efficiency and, crucially, availability. Rural Africa is known to experience severe, fundamental problems in the provision of services due to a series of interlocking structural constraints [Ellis 1998, Ellis and Hine 1998]. These cannot just be assumed away. Road works in and of themselves will do little other than in the rare situations where they allow services to be restored that were discontinued due to the deteriorated state of roads.

With the sole mention of NMT in Tanzania there is nothing on the issue of the low levels of personal mobility that characterize most of rural Africa and what might be done to tackle this issue [Barwell 1996]. Even the possession of a humble bicycle or animal cart remain symbols of wealth not poverty [Dennis and Howe 1993].

ANNEX II: Transport-Relevant Sections of Agenda 21

7.53. (b) Adopt urban-transport programs favoring high-occupancy public transport in communities, as appropriate;

7.53. (c) Encourage non-motorized modes of transport by providing safe cycle-ways and foot-ways in urban and suburban centers in countries, as appropriate.

Agenda 21 also outlined ways in which transport sector and other infrastructure projects could maximize their job-creation potential;

7.70. (e) Promote the use of labor-intensive construction and maintenance technologies which generate employment in the construction sector for the underemployed labor force found in most large cities.

Agenda 21 also recognized the need for land use regulation as a means for reducing transportation demand. Chapters 7 and 9 recommend that local governments:

7.53. (a) Integrate land-use and transportation planning to encourage development patterns that reduce transport demand [number of trips and trip distance];

9.12. (e) Develop or enhance, as appropriate, mechanisms to integrate the transport planning strategies and urban and regional settlement planning strategies, with a view to reducing additional needs for transport.

Agenda 21 also explicitly recognized the ‘polluter pays principle’, and specifically identified its relevance to transport. Specifically, Chapter 9 suggests that governments:

9.12. (d) ... promote economic mechanisms, including pricing, which, *inter alia*, seek to discourage large, fuel-consuming and polluting vehicles, and encourage the development and use of alternative fuels;

The Habitat II conference in Istanbul further articulated the transportation-specific goals of the signatory governments. Not only does Par. 43.bb. call for “**Eliminating as soon as possible the use of lead in gasoline,**” but it outlines a number of other transport-specific measures to be adopted as well:

147....Integrated transport and land-use policy and planning can reduce the ill effects of current transport systems. People living in poverty, women, children, youth, older persons, and people with disabilities are particularly disadvantaged by the lack of accessible, affordable, safe, and efficient public transport systems.

149...Transport-system priorities should be given to reducing unnecessary travel through appropriate land-use and communication policies, developing transport policies that emphasize mobility alternatives other than the automobile, developing alternative fuels

and alternative fuel vehicles, improving the environmental performance of existing modes, and adopting appropriate pricing and other policies and regulations.

150. Non-motorized transport is a major mode of mobility, particularly for low-income, vulnerable and disadvantaged groups. One structural measure to counteract the socio-economic marginalization of these groups is to foster their mobility by promoting affordable, efficient and energy-saving modes of transport.

Actions:

151. In order to achieve sustainable transport in human settlements, Governments at the appropriate levels, in partnership with the private sector, the community sector, and other relevant stakeholders should:

(a) Support an integrated transport policy approach which explores the full array of technical and management options and pays due attention to the needs of all population groups, especially those whose mobility is constrained because of disability, age, poverty or any other reason;

(b) Coordinate land use and transport planning in order to encourage spatial settlement patterns that facilitate access to basic needs such as workplaces, schools, health care, places of worship, goods and services and leisure, thereby reducing the need to travel;

(c) Encourage the use of optimal modal composition of transport including walking, cycling, and private and public means of transportation, through appropriate pricing, spatial settlements policies and regulatory measures;

(d) Promote and implement disincentive measures that discourage the increasing growth of private motorized traffic and reduce congestion which is damaging environmentally, economically, socially and to human health and safety, through pricing, traffic regulation, parking, and land-use planning, traffic calming methods, and by providing or encouraging effective alternative transport methods, particularly to the most congested areas;

(e). Provide or promote an effective, affordable, physically accessible and environmentally sound public transport and communication system giving priority to collective means of transport, with adequate carrying capacity and frequency that supports basic needs and the main traffic flows;

(f) Promote, regulate, and enforce quiet, use-efficient and low-polluting technologies, including fuel-efficient engine and emissions controls and fuel with a low level of polluting emissions and impact on the atmosphere and other alternative forms of energy;

(g) Encourage and promote public access electronic information services.

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