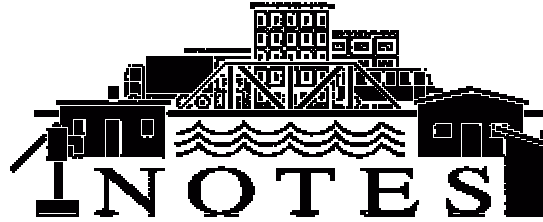


# INFRASTRUCTURE



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## NON-MOTORIZED TRANSPORT: CONFRONTING POVERTY THROUGH AFFORDABLE MOBILITY

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*Non-motorized transport is the primary means of transportation for people in many developing countries and is essential to consider in the design and modernization of transportation systems. This note is the first in a series on topics related to the integration of NMT into Bank infrastructure projects.*

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### ***NON-MOTORIZED TRANSPORT***

Walking is the most familiar form of non-motorized transportation (NMT). Other common form of NMT include bicycles/tricycles; human portorage; handcarts/wheelbarrows; animal drawn carts; and other human powered vehicles. In fact, the definition of NMT includes any form of transportation that provides personal or goods mobility by methods other than the combustion motor.

In medium-sized cities in Japan, Germany and the Netherlands, 40-60 percent of all trips are made by walking and cycling, while in similarly sized cities in India this share is as high as 80 percent (Heierli, 1993). Almost all rural transport in Sub-Saharan Africa is non-motorized and dominated by head- and back-carrying by women and children. In many Asian countries, non-motorized two- and three-wheelers are common sights, employing special adaptations to the vehicle for goods transport, hawking or passenger hire.

Though NMT users are the majority in many places, they are often neglected in the design and modernization of transportation infrastructure. For example, new construction and upgrading often does not provide physical infrastructure (e.g., overpasses or shoulders) for existing NMT users, sometimes resulting in higher NMT-automobile accident rates, longer travel times for NMT users, or even a complete elimination of NMT traffic. The result of this neglect is a transportation system that in many ways favors cars and other motorized traffic to the detriment of poorer segments of the

population; thus consideration of NMT during infrastructure design is an essential element to providing equitable transportation opportunities.

One of the advantages of NMT is that it provides a very flexible solution to accessibility, especially where resources are scarce. This is true not only from the user's perspective; but local level service providers, policy-makers and opinion-leaders are also becoming increasingly aware of the viability of NMT. The following sections discuss issues related to the integration of NMT in the design of developing country infrastructure projects.

### ***WHAT ROLE DOES NMT PLAY IN DEVELOPING COUNTRIES?***

Walking accounts for two thirds of total trips in large African cities such as Kinshasa and Dar es Salaam. In Karachi walking and cycling account for 60 percent of total trips, and for 40 percent of work-related trips. In Madras, one third of the vehicles entering the central business district are bicycles, as are 25 percent of the vehicles passing a cordon-line 10 miles from the center. In Kenya, more than 90 percent of rural trips are on foot, 4 percent by bicycle, 2 percent by paratransit and only 0.5 percent by bus. In most Chinese cities 50-90 percent of vehicular passenger movements are by bicycle, with most of the remainder by bus. NMT has been adapted as a cost-effective solution for such diverse purposes as trash disposal, ambulance services, agriculture produce transport and wholesale delivery.

An example from Colombia illustrates such an innovative use. Productos Ramos S.A., an industrial bakery, was faced with an aging fleet of delivery trucks. Not only did replacement mean a large cash outlay, but the 135 trucks often operated with partial loads and had trouble parking near their destination. An NMT solution seemed impossible due to the large distances between the manufacturing plant and the retail outlets. However, after considering all the options, the bakery introduced a decentralized computerized distribution system-a fleet of 50 trucks hauled products to satellite warehouses, where a fleet of 904 cargo-tricycles picked up the goods for final delivery. As a result of this intermodal integration, distribution costs dropped from 27 to 8 percent of total costs, and employment increased substantially (Heierli, 1993 and Lowe, 1989).

### ***HOW CAN NMT BE USED TO IMPROVE THE MOBILITY OF THOSE MOST IN NEED?***

Two aspects of NMT-*flexibility and affordability*-illustrate its usefulness when access is limited.

#### **Flexibility**

NMT provides a flexible form of transport where it is needed most-in activities that are essential to the basic quality of life. People living in poverty face a wide variety of everyday problems related to mobility, such as access to employment, social services and activities, educational opportunities, and household chores. NMT is a multi-purpose tool that can be used for the door-to-door transport of persons and goods with improved travel time and route options.

#### **Affordability**

Transport has to be affordable to users. While buses may be affordable at the beginning of the month, fares often become prohibitive with dwindling cash over the following weeks, and people are left with no choice but walking. Affordability of NMT is a function of purchase price in relation to income. Operational costs rarely are a constraint. However, high retail prices frequently suppress the potential demand for NMT, such as bicycles, carts and spare parts.

Data from Malaysia and India suggest that bicycle ownership becomes substantial-40 percent or more of households owning a bicycle-when household income levels reach about 10 times the cost of a bicycle (Barwell and Legget, 1986). Other sources indicate that this relationship might be different in Africa due to lower ownership propensities. Evidence from Nigeria shows that households owning a bicycle had incomes 19 times its cost (Adebisi, 1985).

The distinction between the purchase of new and second-hand bicycles is an important, but often overlooked, qualification. A survey in Kenya shows that 65 percent of bicycles are bought second-hand because of low incomes and lack of credit (Kaira, 1985). However, this does not imply that quality is necessarily subordinate to price. Surveys in Mozambique show that the average citizen is unwilling to invest in a poor quality, locally manufactured product, but unable to afford an imported new bicycle (Overton, 1992). A study of conditions in Malawi indicates that with bicycles costing about 45 percent of annual household income, an average household simply cannot afford a bicycle without access to credit for which the poor are rarely eligible (Nyasulu et al., 1991).

### ***WHY IS AWARENESS OF NMT SO IMPORTANT TO THE DESIGN OF BANK PROJECTS?***

In The central business districts of many developing Cities, congestion is a growing concern, affecting the health of inhabitants and economic activity. For example, in Bangkok, an estimated \$1. 4 million worth of fuel is wasted every day by vehicles idling in traffic. Added to these economic cost, are losses of revenue caused by the hampered ability of businesses to deliver goods and services and increased employee commuting times. A study by the Engineering Office of the Bangkok Metropolitan Administration states that, had the person-hours lost from the average 44 working days spent in traffic each year been put to productive use, the gross national product would have grown by another 10 percent (Bangkok Post, August 15, 1990).

The concept of "environmentally sustainable development" implies that mobility solutions must encompass new targets, such as reducing energy consumption and improving public health and safety. These requirements reflect on transport and traffic policy, especially in urban areas, and are increasingly included in the design of Bank projects.

### ***WHAT CAN THE BANK DO?***

Successful integration of NMT in environmentally sustainable transport strategies, aimed at the creation of well-balanced transport systems, depends on the following variables: availability and relative price of NMT and spare parts; infrastructure; road safety; and image of NMT.

Table I gives an overview of possible policy measures and instruments that can have a positive impact on these variables. [These measures will be discussed in further detail in upcoming *Infrastructure Notes*, seminars and *Urban Transport Lunches*.]

Six broad categories are identified:

*Economic Policy.* This includes an analysis of import and tariff regulations to determine whether these are detrimental to NMT use. Another important aspect is the availability of credit, especially to women.

*Traffic Engineering and Management Measures.* The development and distribution of a national NMT design manual can provide assistance to local planners. Design standards for NMT infrastructure must be developed and integrated with design standards for motorized traffic. Training courses can be an effective tool to sensitize policy makers, traffic planners and engineers to the viability of transportation systems that include all transport modes.

*Regulation and Enforcement.* NMT users and pedestrians are especially vulnerable in a motorized environment. Traffic regulations have to reflect their needs.

*Environmental Policies.* Government decision to place more emphasis on creating a sustainable environment will address the potential role of NMT.

*Integrated Land Use, Housing and Transport Planning.* Sprawling cities make the use of NMT more difficult. The close proximity of work unit and housing was one of the aspects that led to dominance of bicycles in China.

*Other Measures.* Use of NMT can be influenced positively through targeted distribution of bicycles, for example to extension agents and NGO representatives.

The Bank can assist borrowers in identifying the proper instruments to remove disincentives for NMT use as well as in defining the appropriate level of application (national, regional, local). Borrowers should define country-specific target scenarios that include short-, medium- and long-term goals as well as performance indicators. Short-term goals might include improving availability and prices of bicycles and spare parts through the removal of import restrictions and lowering of tariffs and taxes. Medium-term objectives would be to improve NMT infrastructure in high dividend areas and eliminate safety "black spots", with the long-term goal of fully integrating NMT in national, regional and local transport planning and policy.

The next two *Infrastructure Notes* in this series will present case studies from Africa and Asia. These two regions present interesting opposites: one of the important issues in Asia is how to manage too many NMTs in urban areas whereas in Africa the problem is too few NMTs-creating a "missing link" in the transport chain.

Table 1.

**Table 1: Overview of Impact of NMT Policy Instruments**

INSTRUMENTS	IMPACT			
	Availability & Prices	Infrastructure	Road Safety	Culture & Image
<b>Economic Policy</b>				
Remove Import Restrictions	++	0	0	+
Adjust Taxes	++	0	0	++
Local Assembly/Manufacturing	++	0	0	++
Provision of Credit Schemes	++	0	0	++
<b>Traffic Engineering &amp; Management Measures</b>				
NMT Design Manual	0	++	++	++
NMT Budget Allocation	0	++	++	++
Traffic Management	0	+	++	+
Professional NMT Training	0	+	+	++
<b>Regulation &amp; Enforcement</b>				
Traffic Law & Regulation	0	+	++	+
NMT Registration	0/-	0	0	0
<b>Environmental Policies</b>				
	0	0	0	+ / ++
<b>Integrated Land Use, Housing &amp; Transport Planning</b>				
	0	++	++	++
<b>Other Measures</b>				
Traffic Education	0	0	+	++
Promotional Campaigns	+	0	+	++

Legend: ++ direct impact, + indirect impact, 0 no impact, - negative impact.

**TO LEARN MORE**

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