

Sustainable intermediate transport in West African secondary cities

Le transport intermédiaire viable dans les villes secondaires, africaines et d'ouest

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ABSTRACT: This research provides a brief review of the scant previous studies of non-motorized modes of sustainable transportation in Sub-Saharan Africa urban areas. Particular attention is given to the need to encourage bicycle transit in West African secondary cities. Although the Institute for Transportation and Development Policy (ITDP) has made considerable progress in developing improved bicycle transportation, much work remains. In their outstanding effort at decentralized cooperation, ITDP has identified key countries for development of the market for quality bicycles, yet some important secondary cities have been thus far, overlooked. This study identifies the potential market for ITDP's quality, yet affordable, "California Bike" in Togo's second largest city, Sokodé, and compares progress made in the neighboring urban area of Tamale, Ghana. A pilot bicycle trailer project in Sokodé will also demonstrate practical application of sustainable and appropriate technology to be introduced in Togo's central region.

RÉSUMÉ: Cette recherche fournit une revue brève des études précédentes scrutées de modes de non-motorisé de transport viable dans Afrique de Sub-Saharan secteurs urbains. L'attention particulière est donnée au besoin d'encourager la traversée de vélo dans les villes secondaires, africaines et d'ouest. Bien que l'Institut pour la Politique de Transport et de Développement (Institute for Transportation and Development Policy, ITDP) a fait des progrès considérables dans le développement transport de vélo amélioré, le beaucoup de travail reste. Dans leur effort remarquable à la coopération décentralisée, ITDP a identifié des pays clés pour le développement du marché pour les vélos de qualité, pourtant quelques villes secondaires importantes ont été ainsi de loin, négligées. Cette étude identifie le marché potentiel pour la qualité de ITDP, pourtant abordable, "le Vélo de Californie" dans Togo deuxième plus grand ville, Sokodé, et compare le progrès fait dans le secteur urbain avoisinant de Tamale, Ghana. Un projet de caravane de vélo de pilote dans Sokodé démontrera aussi l'application pratique.

Introduction

Non-motorized transport (NMT) is central to the issue of sustainable transportation. Among the more arguably important aspects of NMT that are sometimes overlooked are bicycle transportation development and accompanying policy reform. Given the fact that the majority of the world's poor do not have access to motorized transport, it has been well noted that this should not be the only mode considered for development in Africa, the world's poorest region (Leinbach, 2000; Mozer, 2000; World Bank, 2002). Indeed, the last of ten major urban NMT strategy elements that the World Bank reviews in *Cities on the Move* provides some impetus for this study: "development of small-scale credit mechanisms for finance of bicycles in poor countries" (World Bank, 2002, 134). Although the emphasis herein lies not on internal credit mechanisms in particular, the market conditions for bicycle sales and promotion in two very different, yet neighboring countries, Ghana and Togo, are analyzed and compared.

The World Bank has made some studies regarding non-motorized transport in the urban periphery in Sub-Saharan Africa (Starkey et al, 2002), yet scant academic research has focused on the intermediate technology of bicycles and bike trailers. World

Bank researchers note that a wide variety of factors influence differences in rural transportation: "population density, culture, income, topography, climate, or crops and animals" (Starkey et al, 2002, 22). Some of these same factors, particularly demographics and income, influence choices in urban transport. Just as secondary African cities are often economically linked to primary cities, there is close interdependence with peripheral rural areas that supply agricultural goods, thereby ensuring regional food security. Combined with the general weakness of rural transportation systems in Sub-Saharan Africa, it would therefore seem essential to consider peri-urban NMT when discussing urban transit. Indeed, World Bank reports show a clear link between NMT and the reduction of poverty in both rural and urban settings (Starkey et al, 2002; World Bank 2002).

Among the more successful decentralized, cooperative projects focused on bicycle transport is the recent work conducted by the Institute for Transportation and Development Policy (ITDP). ITDP has been active in Africa for over twenty years, with particular success in Ghana (Gauthier, 2005; Gauthier and Hook, 2005). Gauthier and Hook (2005) present compelling evidence that the market for durable, yet affordable, quality bikes in Africa is primed for de-

velopment. Based on bicycle marketing studies by ITDP, there may be similar success in developing and marketing bicycle trailers in selected countries, thereby expanding transit mode shares in secondary cities where bicycle use for the movement of agricultural goods is significant. In countries where the transport of agricultural goods is critical to national economic prosperity and food security, the need for alternative mode development becomes even more acute. Given the fact that approximately 42 percent of Togo's gross domestic product comes from agriculture (Bureau of African Affairs, 2005), the country provides an appropriate case study for improving intermediate transport.

Bicycle mode shares and transit oriented development

Before discussing the details of bicycle transport development in Africa, it may be of assistance to note changes occurring in other world regions. Data analyzed by the World Watch Institute (2001) show that bicycle production increased from about 10 million units in 1950 to 100 million units in 2000, whereas automobile production increased from about 8 million units to only 40 million units during the same time period. Although Holland has lead the world in per capita bike sales with almost 90 bicycles sold per 1000 people, China has the greatest total bicycle ridership and production in the world (Gauthier and Hook, 2005). While only 20 bikes per 1000 people are sold in China (op. cit.), approximately 52 percent of the estimated 100 million bikes produced worldwide in 2000 were manufactured in China (World Watch Institute, 2001). In terms of urban NMT, Chinese cities have the greatest percentage of cyclists per total transportation mode shares. It has been estimated that Tianjin has among the highest bicycle mode share of any city in the world, with an estimated 77 percent. Close behind Tianjin is the city of Shenyang with a 65 percent bicycle mode share (International Bicycle Fund, 2005). However, bicycle ridership has begun to rapidly decline in some Chinese cities as China moves toward free enterprise. In some cities, bicycles are no longer aloud on major roadways that are increasingly dominated by vehicles. The cycling mode share in Shanghai for example, has declined from an estimated 70 percent in 1990 to only 17 percent in 2003 (Summerville, 2005).

The decrease in ridership within China has signaled a shift in production trends. As the Chinese buy fewer bikes, bicycle exports from China are expected to continue to increase. In fact, the European Union recently endorsed an anti-dumping duty of 48.5 percent on all Chinese built bicycles (begun in July, 2005) (European Union Council, 2005). The rippling effect of depressed demand in China also led the Economist magazine to report that streamlined production in China has led to a significant de-

crease in the cost of low-end mountain bikes in Ghana where the price dropped from \$67 in 2001 to \$25 in 2003 (author unknown, 2003).

Despite some decline in ridership in primary cities such as Shanghai, growing world wide bicycle production and sales noted above give proof to the viability of bike transport. In cities where safe bicycle transportation is encouraged, and where bicycle sales are high, it comes as no surprise that a significant percentage of the mode share is in bicycles. The city of Groningen in the Netherlands, for example, has a bicycle mode share of about 50 percent, which is just ahead of Beijing at 48 percent (International Bicycle Fund, 2005). In addition to strong markets for bikes, Holland has some of the most well developed bicycle transportation master planning and supporting transit oriented development (TOD) in the world.

Certainly the prevailing transportation ethics of a community, its level of economic development, and local cultural characteristics will influence the popularity of cycling and trailer use. Even though these cultural characteristics, as well as socioeconomic conditions vary dramatically from Europe, to North America, to Africa, there is one commonality: regardless of dependency on the singly occupied vehicle (SOV), many people are reevaluating their transportation choices, seeking alternatives that may be counter to the expanding status quo. The European Commission (2003) estimates that the total kilometers traveled in the European Union by SOV will increase by 40 percent between 1995 and 2030. American SOV use has far outpaced bicycle transportation with less than one percent of the mode share occupied by cyclists (American Public Transportation Administration, 2002; US Census Bureau, 2000). Nevertheless, in some American secondary cities where traffic conditions allow, bicycles are being used as a viable alternative mode of transport.

In American primary and secondary cities where TOD has integrated infrastructural development to support bicyclists and pedestrians (e.g., Portland, Oregon and Boulder, Colorado), some of the better developed bicycle pathway systems in the world are emerging. Frustrated by traffic congestion, degrading air quality, and the lack of government initiatives to reduce carbon dioxide emissions, local community planners and commuters are turning to the bicycle and, or mass transit. Cyclists are increasingly prevalent in the Front Range communities of Colorado where TOD includes cycling, whereas Wasatch Front communities in Utah have many recreational cyclists, but far less development to support bicycle commuting. If a revival of bike use is to occur that ensures safe movement, community planning involving "walkable" and "cycleable," or "new urbanist" design elements must be integral to TOD. We cannot assume that where motorized transportation infrastructure has been developed, non-motorized tran-

sit will follow. In fact, some “autocentric” planning undermines the safety and encouragement of non-motorized transportation. The lack of cyclist and pedestrian safety is endemic not only to more economically developed countries, but developing countries in Africa face similar challenges of modernization. For further reading on best practices for pedestrian and bicycle planning, see Litman, Demopolous, Eddy, Fritzel, Laidlaw and Maddox (2000) with the Victoria Transportation Policy Institute in British Columbia (www.vtpi.org). Velo Mondiale is another key decentralized cooperative organization that provides valuable information on bicycle master planning (www.velo.info). While countries like China and the Netherlands have significant percentages of their population moving by bicycle, how do Sub-Saharan African countries compare?

Bicycle promotion in Africa

While attitudes toward bicycling in African cities vary from country to country, many view bikes as an antiquated form of transport, and far prefer motorized vehicles; yet the reality is that bicycles are a sustainable form of transport, particularly for those of low income (Howe, 1997; Mozer, 2000; ITDP, 2005). Researchers have found that bicycle users in Accra and Ouagadougou preferred motorized two-wheeled vehicles (mopeds, scooters, or motorcycles) to bikes. Nevertheless, some found bicycles more appealing than buses due to low cost, speed, reliability, and more flexible routing (World Bank, 2002). In an effort to improve non-motorized transportation, non-government donor agencies and individuals have generously donated used bicycles from the U.S. and Europe to Africa. Although well meaning, donations are problematic in that used bikes are often of low quality, and are therefore prone to mechanical failure. When these foreign bicycles are introduced without proper marketing, there are few services developed for repairs and parts made available to African cyclists. Gauthier and Hook bluntly state the problem: “it was ‘a race to the bottom’ in terms of the quality [of bicycles], and this undermined cycling as a legitimate form of transport” (2005, 9).

Having experienced the drawbacks to relying on used bikes, ITDP staff then decided to take a new approach to the bicycle commuting problem. ITDP technical team members worked with bicycle manufacturers, Trek and Sram to develop the California Bike. The California Bike, a six-speed, low end mountain bike is being produced by Giant Inc. (ironically, in Shanghai) and made available to consumers in Senegal, Ghana, Tanzania and South Africa at an average price of \$100 (Gauthier and Hook, 2005). Once ITDP identified bike dealers and formed the California Bike Coalition (CBC), the bikes were sold at a rate many would not have anticipated.

In spite of low average per capita incomes in most African countries, consumers in Ghana, Kenya and Tanzania are buying bikes at unprecedented rates. Indeed, bicycle sales in Ghana in 2002 were estimated at almost 29 per thousand people, higher than bicycle consumption in China (Gauthier and Hook, 2005). Kenya had the second highest bike sales per 1000 people in Africa in 2002 (16.4 bikes/1000 population). It is important to note that sales in Kenya increased from 9.5 bikes/1000 people in 2001 following a reduction in bicycle import tariffs. As a result, the CBC has identified a bicycle marketing strategy targeting those countries with low import duties such as Ghana and Kenya (op. cit.).

While devising a strategy for the Coalition, ITDP also considered annual growth rates in gross domestic product (GDP), as well as the level of existing bike use and sales in selected African countries. The CBC strategy to target countries with low tariffs seems logical; however, the reliance on GDP growth rates as an indicator of success for the development of the California Bike market may be constraining. Kenya provides a strong example with an annual growth in GDP from 2000-2004 of less than 1 percent, yet as previously noted, bicycle sales almost doubled from 2001 to 2002. Indeed, the use of per capita GDP estimates and fluctuating growth rates as indicators of actual prosperity is flawed. GDP figures mask differences in wealth within countries, and do not account for the informal sector. Even the casual observer in Sub-Saharan Africa can attest to the significance of the informal sector of these economies where much commerce goes undocumented and untaxed.

Though the correlation between GDP growth rate and per capita GDP is weak, bicycle ownership appears to be closely correlated with per capita income (Hook, 1995; Gauthier and Hook, 2005). However, bicycle sales and ownership do not necessarily equate with bicycle use. Hook (1995) showed that the relationship between per capita income and bicycle commuting, or the total number of work trips by bike, is not statistically significant. Table 1 shows relationships between GDP and the prevalence of bicycle ownership and sales for selected countries, yet no definite conclusions can be drawn for actual bicycle use. Clearly, there is positive correlation between Ghana’s GDP and the number of bikes per thousand people (Table 1). One would expect to see low bicycle ownership and sales in Togo given the country’s low GDP/capita. Unfortunately no data on bicycle ownership or sales are currently available for Togo. Regarding Togo’s low GDP growth rate, it should be noted that Togolese face considerable constraints given political unrest and economic decline since the early 1990s.

Table 1. Economic Indicators and Bicycle Prevalence, 2005 Estimates

	Population (million)	GDP/ capita (PPP\$)	GDP growth (% increase)	# of bikes/ 1000 people*	# of bikes sold*
Ghana	20.9	2500	4.3	28.7	588,048
Kenya	33.8	1200	5.0	16.4	517,302
Senegal	11.1	1800	6.1	2.0	20,253
Togo	5.7	1600	2.8	N.A.	N.A.
Uganda	26.9	1700	9.0	2.4	60,675

GDP = Gross Domestic Product

N.A. = Not Available

PPP = Purchasing Power Parity

Sources: Bureau of African Affairs, US Dept. of State, 2005;

*Gauthier and Hook, 2005.

Economic factors alone do not explain the lack of cycling in Africa, where most trips are made on foot, yet the bicycle is underutilized (Howe, 1997; Mozer, 2000; World Bank, 2002). Although extensive pedestrian movement and some bicycle use are widespread in most West African cities, little attention is given to safe movement. Indeed some villages and cores of secondary cities are divided by major roadway corridors, e.g., Togo's Route Nationale runs through the center of towns where pedestrians and cyclists are at risk. Drawing again from World Bank policy outlined in *Cities on the Move*, emphasis must be placed on infrastructural development for "safe movement" of non-motorized transport (World Bank, 2002, 134). Although some African city governments are embracing TOD with safe bike route development, the issue is generally neglected.

Demographic- and gender-based barriers

Closely related to economic growth factors and market conditions are demographic differences between urban, peri-urban and rural areas that are essential to take into consideration when evaluating bicycle transport systems. Most secondary cities in Africa are tightly bound to surrounding rural settlements and marketing activity, hence the need to discuss subsistence, or smallholder farming communities and their dependence on bicycles and, possibly, bike trailers. Smallholder farmers in Sub-Saharan Africa experience unique challenges in the only world region where per capita food production has declined over the past fifteen years. As farmland holdings are subdivided into smaller plots to accommodate new family members or land sales, and fallow periods decline in closer proximity to village settlements, household members and laborers are forced to travel greater distances between the village and farm, then village to urban market. Transport of goods between the farm and village is most often made on single-track by foot, or occasionally by bi-

cycle (when affordable and available). Smallholders with farms of four or more acres that are more diversified in terms of their production, compared to farms of one to two acres, are often more financially successful (Dorsey, 1999), and may therefore be more likely to have the financial flexibility to purchase a bicycle and, though less likely, an accompanying trailer.

A similar demographic pattern related to economies of scale occurs among urban households. Commuters living in African primary cities often have better access to public transit, typically diesel buses, than those in secondary cities. While ITDP estimates that less than 2% of commuting trips in major African cities are made by bicycle, it is possible that the figure for secondary cities is as high as 45 percent (Gauthier and Hook, 2005). ITDP members also note that many of the bikes sold in major cities are actually used in secondary cities and, or villages (op. cit.). Based on the previous discussion of tariffs on imported bicycles, it would also be expected that bikes bought in major cities where there are low to no tariffs may be taken into adjoining countries with higher tariffs, e.g., from Ghana to Togo.

Perhaps one of the more challenging demographic issues influencing the use of bicycles is that of gender. Women in many Sub-Saharan communities often carry the majority of goods (farm products, tools, fuel wood, etc.) between the village and larger urban markets (Leinbach, 2000; Mozer, 2000). Development of policy and support for bicycles and bike trailers offers a critically needed alternative to the burden of moving loads by foot, yet few African women ride bikes. Due to cultural differences in western Burkina Faso, women's bicycles do not sell as well as in other regions (Sifa, 2001). One aspect of culture and gender effecting bicycle use is dress. The traditional wrap of cloth, a "pagne" or sarong, worn by women in much of Africa is not conducive to bicycle riding. An effort to break down the norm of gender division in cycling was pursued during the "Tour des Femmes" in Senegal and the "HIV/AIDS Education Bike Ride" in Ghana. Both bike tours, initiated in 2002, were bold attempts by local men and mostly women, US Peace Corps volunteers, and various non-government organizations to raise awareness about girl's education and health issues. The tours lasted from four days to three weeks and inspired many Africa women to try cycling even where traditionally only men cycle (ITDP, 2005).

Bicycles and trailers in Ghana and Togo

So as not to put the cart before the bike, it should be noted that Togo has little to no investment or policy support for bicycle transport, nor has ITDP attempted to introduce the California Bike (CA Bike) in Togo. Discouraged by high tariffs in Togo, ITDP staff members are working to establish a bicy-

cle manufacturing facility in Senegal. Since Togo is a member of the West African Economic and Monetary Union, or Union économique et monétaire ouest-africaine (UEMOA), bicycles manufactured in Senegal could then be imported in Togo without exceedingly high tariffs. ITDP representatives have been working with an independent bike dealer in the secondary city of Tamale (Ghana's third largest city) to distribute the CA Bike in Ghana. Tamale has a population of about 270,000 people, and is centrally located in a region where bicycle use is expected to be high. If the CA Bike were to be introduced in a secondary city in Togo, the most closely comparable city would be Sokodé, Togo's second largest city with a population of roughly 75,000. Although Tamale is larger than Sokodé, both cities are characterized by large, sprawling residential areas with relatively weak infrastructural development. Connections to surrounding rural villages are strong, and intensified agricultural production is prevalent in both peri-urban areas.

Given the obvious need to have quality, affordable bikes, with readily available replacement parts and repairs, before bicycle trailers can be used, the first stage of the trailer project discussed below will be to survey the market for quality bikes. Cooperation with the Togo Ministries of Transportation and Agriculture will be requisite to the long term promotion of intermediate transport policy, but more immediately important will be cooperation with localized groups such as "Jeunesse et Sports," or Youth and Sports advocates, as well as local retailers who may wish to sell the CA Bike. Such decentralized cooperation is now viewed as essential to the success of transportation projects. Indeed, the development of bicycle trailer projects in Africa has been largely the result of cooperation between organizations such as ITDP, the Swedish International Development Agency (SIDA) and others.

Bicycle trailers are being used in many world regions to broaden the mode share for transit. Trailer use may be most pragmatically applied in secondary urban areas and the urban periphery where access to transportation is more constrained than in capital cities such as Accra or Lomé. The development of prototype bicycle trailers has a history of mixed success in Ghana, but the extent to which trailers are being used in Togo is unclear. Development of trailers as bicycle powered "ambulances" has been undertaken to assist in urgent medical care where vehicle access is limited. Bike ambulances produced in Ghana are now being used in Uganda with considerable success (Gauthier 2005).

One of the few critiques of bicycle trailer projects comes from Ghanaian researcher, M. Salifu (1994). In the Transport Rehabilitation pilot project in Northern Ghana, supported by the World Bank, the bicycle and trailer combination was often unaffordable. Salifu concludes that although the trailer

was a reasonable technology, it was inappropriate given the failures of the pilot project. Several key findings are worthy of note: the trailers lacked the structural integrity to haul heavy loads, the trailers were cost prohibitive, and as noted above, generally, women do not use bikes (Salifu, 1994). Furthermore, the trailers did not perform well on village footpaths (Starkey et al, 2001). As a result, the Togo pilot project discussed below will target two different trailers. First, an affordable, locally produced, two-wheel trailer will be designed for urban areas, and at a later date, a single-wheel trailer designed for use on single-track footpaths will be developed in hopes that diversified smallholders will be able to afford a light-weight, simply constructed vehicle.

Where bicycle use is high, and/or markets offer promise, it would follow that the use and sales of bicycle trailers might also accelerate. Hence, the objectives of the pilot project are two-fold: to identify urban and urban periphery transport challenges related to the movement of goods between villages, farms and urban centers; and to develop a sustainable bicycle trailer construction program for improved rural to urban transport. Through administration of a brief survey of urban household members, smallholders, and cyclists in the Sokodé urban and peri-urban area of Central Togo, the study will attempt to identify the following:

- the means by which household members travel to work (for testing of correlation with other variables);
- average distances and travel times for travel to work;
- average cost of travel to work;
- if travel is made by bike, cost of bicycle;
- availability of bicycle repairs, parts and accessories, including trailers in the region;
- average income of bicycle owners;
- average farm holding size; and attitudes toward purchasing a bicycle and/or trailer.

After survey results are analyzed, all data will be shared with ITDP and other interested organizations so that recommendations might be made regarding the market for the CA Bike or other low cost bicycles. It is hypothesized that diversified smallholder farmers with more than 3 hectares under production could benefit from affordable bikes and trailers. As prototype two-wheel and single-wheel bicycle trailers are developed, tested and introduced in Central Togo, attention can be shifted to larger scale production and marketing of trailers in Togo, or perhaps Senegal where CA Bikes are produced. By surveying women and developing a trailer that may be converted to a hand cart, the Bicycle Trailer Pilot Project (BTPP) in Togo will take issues of gender into consideration in the testing and introduction of this appropriate technology program. The BTPP will attempt to form a partnership between researchers, smallholders, the Togo Ministries of Ag-

riculture and Transportation, ITDP, and the US Peace Corps. Survey results and observations from the field will be presented at the annual Cooperation for the Development and Amelioration of Urban (and Peri-urban) Transport (CODATU) conference in Lyon, France (July 5-7, 2006).

Conclusions

Urban transportation planning is often focused on mass transit and roadway improvements that inadvertently perpetuate dependence on the singly occupied vehicle. As transit oriented development becomes more widespread, alternative modes of walking and bicycling may be revitalized despite trends in primary cities such as Shanghai where bicycle ridership has begun to decline. Direct cooperation between organizations such as the Institute for Transportation and Development (ITDP) and cycling advocates in secondary cities, such as Tamale in north central Ghana and Sokodé in central Togo, are critical to providing reliable intermediate transport to those who cannot afford private vehicles. While some transportation specialists and many elite in Sub-Saharan Africa anxiously embrace motorized vehicles, some are realizing the value of less polluting, more dependable, efficient, quality bicycles for commuting to work, school, the market place or other destinations.

Development of the market for quality bicycles such as the California Bike, may be key to promoting non-motorized transport in Africa. Currently, those countries with growing GDP per capita are being targeted for bicycle sales, yet countries plagued by political unrest and faltering economies may miss these marketing opportunities. In fact, countries such as Togo may be in greatest need of bicycles and trailers to perpetuate food security in the urban periphery. As less expensive, but adequate quality bicycles from Chinese manufacturers saturate the market outside of China, countries with low import tariffs will capitalize on intermediate transport. Ghana's recent per capita bicycle sales that exceed those of China indicate that the African market should not be ignored as it has been for decades. However, given that actual bicycle ridership is not necessarily correlated with bike sales, bicycle use in countries such as Togo could also expand rapidly. If bicycle manufacturing within the West African Monetary and Economic Union can be achieved, perhaps marketing of quality, affordable bike trailers will follow. Transportation survey data from West African urban and peri-urban areas, as well as the development of trailer prototypes will undoubtedly assist us in meeting the demand for improved movement of both agricultural goods and commuters.

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