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Transport Infrastructure and Poverty Reduction

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This paper summarizes some of the key policy issues and recommendations presented and discussed by resource speakers and participants at the 2005 ADBI Workshop on Transport Infrastructure and Poverty Reduction. The author wishes to thank Anna Cassandra Melendez-Nakamura for her inputs and research assistance.

Introduction

Investment in transport infrastructure has remained a priority area of attention in developing countries. Conceptually, it may not be difficult to acknowledge that transport infrastructure can contribute to poverty reduction, but there is a shared concern about the limited knowledge base linking infrastructure to poverty reduction. Recently, a number of empirical studies have been undertaken and the results confirm that transport infrastructure does contribute to economic growth. However, the studies also reveal that while improved transport infrastructure may be a necessary condition for poverty reduction, it is by no means a sufficient one. There are instances where transport investments have failed to provide benefits for the poor, despite aggregate gains in productivity and income. At its worst, transport infrastructure appears to have exacerbated existing inequities as well as given rise to a number of negative externalities. The findings of recent research clearly indicate that there is considerable room for making transport infrastructure more pro-poor. This policy brief summarizes the main issues surrounding this concern and provides a range of policy, regulatory, and institutional measures that could help strengthen the impact of transport infrastructure on poverty reduction.

Transport Infrastructure and Poverty Reduction: Macro-Level Impacts

Transport infrastructure investment has long been assumed to contribute indirectly to poverty reduction, channeled through economic growth. Recent empirical studies provide considerable evidence to substantiate the claim that transport infrastructure's impact at the macro level is critical to ensuring sustained growth in output, employment, and income that is a prerequisite for achieving long-term poverty reduction. Kwon's (2005a) study on the poverty impact of roads in Indonesia finds that road investments improved the performance of provincial economic growth in poverty reduction, such that every one percent growth in provincial GDP led to a decline in poverty incidence by 0.33 percent in good-road provinces and 0.09 percent in bad-road provinces. This implies that the accumulation of road capital has a nonlinear contribution to poverty alleviation. As road capital is accumulated, the link between economic growth and poverty reduction becomes stronger. Likewise, a study on roads and poverty in the People's Republic of China (PRC) reveals that road development contributed significantly to growth and poverty reduction in the PRC (Kwon, 2005b).

Apart from its indirect contributions to poverty reduction, there is also increasing evidence to show that transport infrastructure can have a direct contribution to poverty reduction, independent of the growth channel. For instance, the same study by Kwon (2005a) reveals that road capital had its own explanatory power for poverty incidence, which was *not channeled through economic growth*. Provincial roads directly improved the wages and employment of the poor in Indonesia, such that a one percent increase in road investment led to a 0.3 percent drop in poverty incidence over five years. Meanwhile, Warr's (2005) study on road and rural poverty in Lao PDR shows that all-weather roads had a positive and highly significant impact on poverty: all-weather road access lowered poverty incidence by around six percent, and about 13 percent of the decline in rural poverty incidence between 1997–98 and 2002–03 can be attributed to improved road access alone.

Transport Infrastructure and Poverty Reduction: Micro-Level Impacts

The extent to which transport infrastructure can directly contribute to poverty reduction seems to depend on its impact on income and non-income dimensions of poverty at the micro-level.

In terms of income poverty, transport infrastructure opens up opportunities for the poor to raise the productivity of their limited resources. In rural areas, where most of the poor reside and where agriculture remains the main source of income, transport infrastructure lowers the costs of inputs and facilitates access to credit, extension services, and most importantly, output markets with better prices. It also facilitates the commercialization of farm and non-farm activities and often leads to agricultural diversification from low-value food grains to more perishable, high-value agricultural products.

An ADB study in 2005 provides empirical evidence to support these theoretical linkages. Based on field research in India, Thailand, and the PRC, the study finds that rural transport improvements decreased costs to the poor for personal travel and goods transport. Rural transport improvements are also revealed to have generated farm income, promoted non-farm activities, and increased the range of opportunities for wage employment as well as the wage rates of labor in rural areas.

In terms of non-income poverty, transport infrastructure can likewise generate direct impacts by lowering the cost of services needed by the poor, and by serving as a good complement to interventions that seek to improve access to health, education, and other social services. Transport investments may also play an important role in mitigating risks faced by poor households.

The same study finds that rural transport investments increased the availability and accessibility of education and health care services in rural areas, resulting in greater participation in these programs by the poor. Rural roads also facilitated the delivery of emergency relief to the poor in case of natural disasters.

For all of these reasons, across Asia and the Pacific, the rural poor often give very high priority to improvements in transport (Rayner, 2005), and both the poor and non-poor alike see positive impacts and welcome investments in transport infrastructure (Cook, 2005).

Who Captures the Benefits of Transport Infrastructure Investments?

Despite evidence confirming that transport infrastructure can contribute to poverty reduction, experience would tell us that this relationship is by no means automatic. In many instances, transport investments have failed to provide benefits for the poor and the vulnerable, despite aggregate gains in productivity and income.

In countries where the distribution of income and opportunities is skewed, in general it is the non-poor who benefit more from investments. Because they are better endowed, the non-poor, particularly the larger landowners and the vehicle owners/operators, tend to disproportionately capture cost savings as a result of better transport infrastructure. Improvements in agricultural productivity and the shift to commercial production have tended to benefit the larger and wealthier farmers who could intensify land use and benefit immediately from improved market access. On the other hand, smallholders often require further assistance in coordinating the bulk purchase of inputs and the collective marketing of outputs. In most cases, this could lead to a worsening of income distribution in the short and medium term (Setboonsarng, 2005). Without further assistance, these and other benefits such as rising land values are typically captured by the local elite. In addition, despite better access to social services due to improved connectivity, the poor's access to such services remains disproportionately low compared to the non-poor (ADB, 2005).

Improved roads lower the operational costs of vehicles and bring immediate benefits to the owners and operators of vehicles; however, these savings are rarely passed on to the poor since the poor do not own or operate vehicles but are typically users of transport services provided by others (Rayner, 2005). In many countries, to make transport services more affordable to the poor, either subsidies are provided or fares are controlled, but the poor rarely capture the benefits of these interventions.

All of these outcomes can be expected to aggravate existing patterns of inequity. Cook (2005), for instance, reports that although at best, the benefit incidence of transport infrastructure has been neutral, increasing access for the poor and non-poor alike with no significant difference between the poor and the non-poor in terms of impacts on education, health, safety, security and social interaction, for some of the poorest of the poor, transport improvements may produce negative effects on welfare.

The hard-core poor in Asia are generally the landless and unskilled workers. Without land or skills, the poor spend most of their productive time on fulfilling their subsistence needs. While investment in transport infrastructure can bring eventual benefits to this group of people who have limited resource endowments, the challenge seems to rest on tailor-suiting transport investments to make them more responsive to the prevailing conditions faced by the poor.

Why Hasn't Transport Infrastructure Done More to Reduce Poverty?

Despite transport infrastructures' potential to make a substantial contribution to poverty reduction, it has become increasingly evident that in many cases it has failed to do so. The magnitude and direction of the impact seems to depend on a number of critical factors:

1. **Choice of transport infrastructure**. For decades, the choice of infrastructure investment was largely driven by considerations of efficiency, with a focus on promoting output growth at the aggregate level. Poverty reduction was not a major criterion for infrastructure projects until recently, and as a result, the very real trade-offs between efficiency and equity and the possible cost of externalities were typically not factored in.

   The results of Kwon's (2005b) study on the impact of roads in China can illustrate how the choice of infrastructure would be different depending on whether the objective is to maximize growth or to reduce poverty. The study reveals that each additional kilometer of high-class roads generates higher return to GDP than do low-class roads, but it is low-class roads that raise far more rural poor above the poverty line per Yuan invested. From a poverty reduction standpoint therefore, it would be more strategic to invest in low-class roads, but from an efficiency and economic growth standpoint, one would come to the opposite conclusion.

   Another study by the ADB (2002a) reveals that, perhaps due to issues of affordability, the poor still inhabit a walking world, with very limited opportunities to use roads. From a poverty reduction standpoint, providing a network of tracks, paths, and culverts could prove to be a more effective strategy than building roads.

2. **Policy and regulation on transport services.** As Rayner (2005) emphasizes, the main benefit of transport infrastructure investment is expressed in terms of savings in operating costs, savings which are more often than not enjoyed by vehicle owners and operators. As users of transport services, the benefits have to be passed on to the poor in the form of lower fares or freight rates.

   As a general rule, the most effective way of ensuring benefits to the poor is to ensure effective competition in the supply of transport services. Unfortunately, in many developing countries, it is very common to find market entry or transport fare regulation. Market entry regulation reduces competition and lowers the incentive for operators to

operate efficiently, improve the quality of services, and reduce fares. At the same time, although fare regulation is ostensibly aimed at helping the poor, in reality it tends to be regressive. The regulated fares are usually set based on operating costs at the national or provincial level, which do not reflect conditions on a specific route. As such, fares will not reflect reductions in operating costs on a specific route and the operator ends up retaining the benefit of lower operating costs (Rayner, 2005).

3. **Lack of effective maintenance system.** Studies of transport infrastructure in developing countries have consistently revealed chronic underinvestment in maintenance, particularly in the case of roads[1]. Lack of maintenance reduces the benefit steam of infrastructure for three reasons: first, it deprives the community of a long-term source of income and employment opportunities of local labor; second, it undermines the ability of the poor to sustain any improvements in access and opportunities which the roads may have brought about in the beginning; and third, it leads to huge efficiency losses and raises numerous expenditure issues.

   Although maintenance should be a major concern in developing countries, this issue has proven to be very difficult to address, if serious attention is given to the issue at all. Part of the problem is political: typically, politicians, donors and governments tend to prefer large, flagship construction projects that attract a lot of attention. By its very nature, maintenance is an on-going process, but politicians and donors prefer activities with a clear-cut beginning and end. This attitude tends to distort the decision making process of governments (McCawley, 2005). Another part of the problem is budgetary: given limited funding resources and persistent problems in multi-year budget allocation, the governments of developing countries are often pressed to allocate among competing priorities. In the course of prioritization, it is very common for maintenance to be given a low priority, mainly because funding for it cannot be guaranteed in the long-term (Puri, 2005).

4. **Existing social structure and concentration of assets**. Typically, improvements in physical access are not enough to guarantee poverty reduction impact because the poor often lack assets, or they may face a number of constraints, such as access to credit or land, which prevent them from taking advantage of new opportunities (Cook, 2005, Duncan, 2005, Hettige, 2005). In the very worst case, the poor could be completely excluded from access to infrastructure because they belong to a particular socio-economic group that is discriminated against. This is aggravated by the fact that in most developing countries, mechanisms for the poor to voice their needs or preferences are often weak, if they exist at all. Often the decision on the kinds of infrastructure and the choice of where they should be built is influenced by the local elite; the poor have very little power to influence decision-making, even at the local level.

5. **Premature displacement of the informal transport sector.** In rural areas, informal transport services using non-conventional vehicles/vessels such as modified agricultural equipments, motorized tri-cycles, or even non-motorized vehicles, to carry passengers and/or freight are commonly utilized by the poor. In many cases, these informal transport services are the only affordable services to the poor. Once rural roads are improved, there is a tendency in most countries to issue policies in favor of high-quality standard vehicles and discourage the use of such vehicles on public roads. While safety concerns are valid, the rush to eliminate them pre-maturely may lead to significant negative consequence for the poor, both the poor service provider and the user alike.

[1] Maintenance in other sectors, such as airlines and shipping, is comparatively better; this could be due to pricing factors, as well as greater opportunities for cost recovery.

6. **Lack of complementary investments and pro-poor policies or interventions in other sectors.** Transport infrastructure's contribution to a reduction in non-income dimensions of poverty will depend on the level of investments and the pro-poor nature of policies governing other services that are crucial for empowering the poor. This includes investing in sectors such as health, education, natural resource management, and agriculture. Only when sufficient investments are made in these sectors to provide these basic services for the poor, will transport infrastructure investment bring about significant poverty reduction.

7. **Lack of awareness on the gender dimensions of transport**. Empowering women is another dimension of poverty reduction that requires more attention. Women, particularly poor women, are often put at risk by the lack or poor quality of transport services (Cook, 2005). Despite improvements in transport modes, women are still likely to suffer from transport deprivation: this problem is most prevalent in gender segregated societies, where women are often unable to travel or trade unless there are sections and facilities in buses, trains, boats or waiting rooms that are for women only. While transport investments could provide improved connectivity benefits to women, if not well guarded, they can produce unintended detrimental impacts and give rise to a host of negative gender outcomes. Transport improvements have been implicated in the trafficking of girls and women, especially in localities near major highways and cross-border corridors (Lateef, 2005).

8. **Road safety**. The poverty implications of road safety have gained increasing attention in recent years. Investment in transport infrastructure in developing countries is generally not accompanied by investment in improved road safety standards. As a result, the increased volume of traffic often severely affects the security and safety of the population. Melhuish (2005) points out that road accidents alone can have significant socioeconomic impacts on poverty. Citing the results of a study in Bangladesh and India, he pointed out that that the poor suffered disproportionately from a road crash: they bore the biggest losses in income, and the unexpected medical or funeral costs accounted for a larger proportion of household income compared to non-poor households, forcing many to go deeper into debt. Overall, 7 out of 10 households suffered a decrease in total household income, and many households had to decrease food consumption as incomes declined. Even some households that were not poor before the crash found themselves poor afterwards.

9. **Unintended negative externalities**. There are negative externalities associated with improvements in transport infrastructure: increased mobility is linked to the spread of diseases such as HIV/AIDS; vehicle emissions along with dust generated by un-paved roads could cause health problems, alteration of water ways brought about by road construction could lead to detrimental consequences on natural resource systems, the emergence of motorized transport could displace labor, as in the case of porters who used to manually transport goods, and out-migration from rural communities could lead to other social problems. Such negative externalities are likely to exact a bigger toll on the poor rather than the non-poor.

Improving Transport Infrastructure's Direct Impact on Poverty

In developing countries, extending transport infrastructure to provide universal access will continue to be a priority, but at the same time, there is clearly a pressing need to make poverty reduction an integral part of transport infrastructure policy. Meanwhile, many other factors influence the impact of transport infrastructure on poverty reduction, most of which are exogenous to infrastructure interventions, e.g., macroeconomic conditions such as governance, conflict, and physical factors such as population, density, resource endowments, climate and terrain. These factors likewise give rise to bottlenecks that prevent transport infrastructure from benefiting the poor, and must also be sufficiently incorporated in the design and management of transport infrastructure projects. Some of the more critical interventions in this regard include the following:

Poverty analysis

To be effective in addressing poverty, there is a need to put asserted effort to explicitly identifying the poor or disadvantaged groups that will be affected by transport infrastructure projects; carrying out poverty analysis; and incorporating the results of such an analysis into project design. Components spelling out explicit activities should be incorporated to ensure that poverty issues are addressed throughout the project cycle.

Choice of investment and poverty targeting

Equity considerations require some form of targeting and prioritization of transport investments that have the greatest impact on poverty. For instance, among the different types of transport infrastructure, targeting investments to road infrastructure could make the most sense since it has been highlighted in the past as an important determinant of poverty reduction. Besides addressing the question of what to invest in, there is also the equally important question of where to invest. Given that poverty incidence tends to be higher in rural areas, targeting rural areas that lack access to basic transport infrastructure and services can be expected to have the biggest impact on poverty reduction.

Transport services policy

Improving transport infrastructure's impact on poverty does not only entail physical access but affordability as well. This requires ensuring that the poor benefit from savings in operating costs, and that the resulting change in transport services is affordable to the poor. Here the primary policy instrument is to ensure effective competition in transport services, allowing operators to set their own fares and new operators to enter the market so that efficiency is encouraged. As Rayner (2005) states: "The lower the level of fare and entry regulation, the higher the chance of infrastructure investment contributing to poverty reduction."

There has been some debate regarding how far the competitive environment can be used to positively influence the distribution of benefits. At the crux of this debate lies the possible trade off between allowing competition in the transport sector and the potential need for regulation to protect the interest of consumers. The ADB study (2005) reveals that low-cost, publicly provided services that fail to meet minimum standards of comfort, safety and reliability are not highly valued by the poor. In this regard, Rayner (2005) argues that quality regulation is necessary at all times, to ensure safety standards.

However, quality standards that are too rigorous could also displace non-motorized or informal transport services, which are also very important for the poor, particularly those in the rural areas. Maintaining the informal transport sector can also contribute to direct poverty reduction because it offers income-generating possibilities for the poor. Governments may therefore need to practice a more tolerant attitude towards these kinds of service providers, without unduly exposing users to safety risks.

Addressing maintenance issues

Quite obviously, there is a need to discover new approaches that will guarantee a more appropriate level of investment and better implementation of road maintenance. Since project activities are more visible and easier for donors to finance, one possible way of overcoming political and financial constraints could be to re-package or neatly bundle maintenance activities into a project. In other words there might be a need to "projectify" maintenance; bundles of activities pertaining to maintenance could be packaged into a project equipped with all the conventional elements of public projects i.e. project documentation to provide data on the problem area, the course of action required, as well as the rates of expected return. As a project, maintenance activities could become viable to politicians and donors (McCawley, 2005).

However, the most feasible and sustainable solution seems to lie in shifting the responsibility of maintenance away from the government and donors towards greater cost recovery, through mechanisms such as Road Funds, or towards broader participation of beneficiaries at the local level. At present, there is very little involvement of beneficiaries who are often very willing to participate in maintenance efforts, even to the extent of contributing to the cost of maintenance either in cash or in kind. While some might argue that local contributions could not possibly be sufficient to cover the necessary expenditures, experience tells us that only very small amounts are required initially to meet maintenance requirements. However, the costs tend to rise rapidly as deterioration progresses, exceeding local capacities and budgets (ADB, 2002b). Nevertheless, maintenance schemes with participation of the private sector in the local communities should be further encouraged.

Promoting participatory project design and management

Beyond addressing maintenance issues, adopting a participatory process and giving beneficiaries a voice in decision-making should become standard practice in the overall design and management of transport projects. Instituting some forms of local participatory process is arguably the best way to ascertain the transport needs of the poor and specific social groups, such as women, as well as determine the kind of safeguards required by those who might suffer negative effects.

Providing complementary services

All of the measures that have been proposed thus far fall within the ambit of transport sector policy, but it has been demonstrated that transport infrastructure's impact on poverty is greatest in the presence of complementary services, which are provided by other sectors. Improvement in physical access should be integrated with other interventions such as schools, health clinics, agricultural support programs, and ICT services. This highlights the importance of cross-sector investment planning.

Minimizing the trade-offs

Despite the best and most well-meaning efforts to make transport investments more pro-poor, the trade-off between maximizing growth and minimizing poverty reduction or the trade-off between providing access/affordability and maximizing quality will continue to remain challenging realities. Experience from PRC suggests that where income distribution is skewed, the choice of investing in rural or low-grade road to benefit the poor may be a more appropriate choice.

On the trade-off between access/affordability and quality, it seems that there should be an effort to define a set of minimum standards and regulations that can adequately address the needs of the poor. There should be a proper balance between the trade offs between access/affordability and quality, although the combination and the balance of the trade offs will tend to differ depending on prevailing conditions.

Financing of Transport Infrastructure

Faced with persistent fiscal crises and slow growth prospects, the past decade has seen a dramatic increase in the liberalization of transport policies in developing countries, occasioning a bigger role for private operators and investors in transport infrastructure.

For the both the government and the private sector, this should have meant a change in their fundamental roles in transport infrastructure provision, and to a certain extent, it has, as evidenced by the different modes of public and private sector partnerships. However, the movement of private finance into infrastructure has been slow, accounting for only 30 percent of total infrastructure investment, with much of this figure concentrated in a small number of countries (Pernia 2003, in Weiss, 2003).

Private finance has likewise been problematic. The private sector has no effective mechanism to deal with issues such as right of way and resettlement. In most cases, the private sector is interested in investing in transport projects only when they can also benefit from land and property development along the new transport route. Therefore, private sector investments have been more extensive and successful in large urban cities or peri-urban populated areas. The track record of success has been in projects such as mass transit systems and tollroads.

Experience points to the fact that government is likely to continue to play a key role in transport infrastructure while new and innovative modes of financing will have to be tested.

Poverty Reduction Through Trade Promotion: The Importance of Cross-Border Transport Infrastructure

Thus far, we have looked at the issues surrounding transport infrastructure and poverty reduction at the domestic level. However, given increasing globalization, liberalization, and changing patterns in trade, providing regional public goods such as cross-border infrastructure has become more critical in bringing benefits that may not materialize through domestic provision alone. Transport projects constitute one logical area for regional cooperation, considering the impact that infrastructure improvements could have on reducing trade costs and facilitating trade between participating countries (Fujimura, 2004).

The case for investing in cross-border transport infrastructure is most compelling for small countries like Cambodia, Laos, and Myanmar, or countries in Central Asia that are moving from a transition to a market economy. Since they are land-locked and far from markets, these countries have common elements that are motivating them to cooperate (Wescott, 2005).

However, the success of cross-border transport projects will depend on the extent to which they are able to meet three overriding challenges, as identified by Wescott (2005):

First, since several countries are involved in the endeavor, these countries have to agree on a common framework. Transactions such as these take longer and cost more. It is important that governments be aware of this upfront, to avoid frustration.

Second, in many cases, it has also been difficult to get countries on board because there is a lack of convincing evidence on the potential benefits of cross-border infrastructure investment. In a framework of benefit-cost analysis, costs have been easier to estimate since this only requires taking account of material investment cost and financing cost but collecting information on benefits to different countries under various stages of development is far more complicated. Empirical studies approximating the benefits from cross-border transport infrastructure will be necessary to encourage participating countries to increase the amount of cross border infrastructure investment.

Finally, at present, cross-border transport projects are underfunded. The financing requirements are far more than ADB and other development agencies can meet and

governments have a difficult time gathering enough resources to support regional projects. Multilateral donors also lack suitable financing and supplements for funding regional projects. The main instruments that multilateral financial institutions such as ADB have are loans that require sovereign guarantees of member counties. The whole process of financing regional projects requires a coordinated allocation of responsibility among the countries as well as participating donor agencies. Coordination will be essential, particularly when there is a need to combine three or four different loans for different nations entailing different sovereign agreements for each loan. In theory grant funds would be appropriate for investments because grant funds will not require sovereign guarantees from involved governments. However, there is a limited amount of grant funds to cover current financing needs.

Areas for Future Research

Despite recent studies on the subject, the knowledge base linking infrastructure to poverty reduction remains limited. This entails bridging the remaining knowledge gap on the impacts of sector policy change, impacts of changes in service provision, impacts of transport modes other than roads, impacts on the urban poor, and the importance of rural-urban linkages. There is a need to have a better understanding of the notion of poverty reduction, the distribution of benefits between the poor and non-poor, and measures to include the poor in decision making process. The research needs also extend to issues related to privatization and regulation of transport infrastructure, innovative road maintenance scheme, and the indirect effects of larger infrastructure investments on poverty.

Finally, efforts to promote cross-border transport projects will have to be supported with empirical studies which approximate the benefits to encourage participating countries to increase the amount of cross boarder infrastructure investment.

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