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# Economic Valuation of Poor Road Infrastructure Lagos: A Focus on Urban Households

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**Abstract** - The inefficiency and lack of urban transport services and infrastructure is a major impediment to economic growth and urban productivity in cities of developing countries like Nigeria. This study is aimed at assessing the impact of poor road infrastructure on urban households using environmental valuation techniques. The study is based on a survey research carried out with the distribution of structured questionnaires to 1040 households in eight metropolitan local government areas (namely; Alimosho, Apapa, Eti-osa, Ikeja, Kosofe, Mushin, Shomolu and Surulere) in Lagos State to elicit information on current condition of infrastructure in the area, household consequential cost due to poor road condition, willingness to pay for improved road condition preferred service option for road infrastructure. Analysis was carried out using descriptive statistical tools. Results from the study shows that urban roads in Lagos are in a deplorable condition and households suffer a lot of consequential damages arising from it. The results also show that households are willing to pay for improved road conditions. The paper recommends that the government should formulate a good infrastructure policy that will enhance the sustainability of infrastructure over time and should also encourage public participation in urban infrastructure provision and maintenance.

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## 1. INTRODUCTION

A major and integral part of sustainable development is efficient provision of environmentally sound infrastructure such as road and transportation, water supply and sanitation, power and telecommunications. Urban transport infrastructure in developing country mega-cities such as Cairo, Lagos, Mexico-city and Bangkok, is so deficient that traffic-jam related economic losses of several hundreds of million US dollars is not uncommon, not counting pollution related damages. (Panayotou1998). With population growth, urbanization, and income growth, the demand on infrastructure is growing and the gap between demand and supply is ever widening.

The inefficiency and lack of urban transport services and infrastructure is a major impediment to economic growth and urban productivity in cities of developing countries. Increased motorization, public operating transport

services, inadequate road maintenance, insufficient bikeways and walkways poor traffic management and lack of enforcement of road rules are contributory factors to congestion, road accidents and air pollution. In many cities, traffic congestion leads to lost in work and leisure time, increased fuel consumption and emission, and high accident rates. The cost of road accidents in developing countries two-thirds of which occur in urban areas, is as high 1-2 percent of GDP, taking into account high fatality and injury rates and property damage (WHO 1989) cited in (Bartone, Bernestein, Leitmann and Eigen 1995, Odeck & Brathen 2000). In Nigeria urban centers, the state of infrastructure is poor. Similarly in the city of Lagos most part of the road network are filled with pot holes leading to traffic congestion, delay in travel time, damage to vehicles and accidents (Otegbulu 2010, Lagos State central Office of Statistics 2006). Congestion undermines the major advantage of accessibility which motor transport affords. Harvey and Jowsey (2004) suggested six main ways of tackling the problem of congestion resulting from poor road condition and inadequate road capacity. These are;

- Do nothing
- Invest in the construction of more roads
- Improve physical controls to improve traffic laws.
- Restrict parking
- Use the price system to allocate existing road space.
- Use the existing road system more efficiently through a better distribution of the roads of travel as to free the car and public transport or even cycling.

The impact of the poor road condition on Lagos households is enormous as most roads lack adequate drainage which escalates the flooding and damage to roads.

Roads like any other environmental good and service cannot be fully priced in the market place due to consumer and producer surpluses hence the resort to economic/environmental valuation.

The basic strategy of environmental valuation is the co-modification of the service that the environment provides. It serves to assess individual and group priorities and trade-off in the case of unpaid scarce commodities. It has been used to rank the seriousness of environmental problems in order to provide guidance to relevant agencies as they decide on how to focus

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their efforts. In its simplest forms economic valuation is the process of identifying the relevant changes in consumer demand and product supply arising from a change in environmental quality, or the change in the provision of environmental resources. (Garrod and Willis (2002), Liptons, Wellman, Thieffer and Weiter (1995), Mihra 1998, Darmatne and Strand 1999).

The Environmental Valuation Technique to be applied in this study is Contingent Valuation Model (CVM). It entails asking people for either their maximum willingness to pay (WTP) for an improvement in environmental quality, or their minimum willingness to accept compensation (WTAC) to forego such an improvement. It is also described as **stated preference method**. The method is interested in estimating how much an individual or society's well being will change (Hanley and Splash 1999). Willingness to pay is a measure of individuals' or a society's preference for a particular good or service; the higher the preference, the more the willingness to pay. Contingent valuation model is based on a hypothetical market situation which elicits the prices of those goods and services which cannot be priced in the market place. It is known as contingent valuation model because the results are dependent or contingent upon the hypothetical market devised. (Thomas, 1996; Field and Field, 2002).

This study is therefore aimed at assessing the impact of poor road infrastructure on urban households using environmental valuation techniques.

This will be achieved through the following objectives;

- ✚ To examine the condition of road infrastructure in the study area
- ✚ To determine the impact of poor road infrastructure on travel time of households in the study area
- ✚ To ascertain the extent of averting expenditure/ameliorating cost incurred by households due to the current state of road infrastructure in the study area
- ✚ To find out households preferences in terms of service options for road improvement in the study area
- ✚ To determine households' willingness (WTP) for improved road and their preferred payment vehicle (mode of payment)

## II. ECONOMIC IMPACT

Poor road conditions and transportation system hinder movement of goods and people in the urban areas. Lack of adequate infrastructure could also be a disincentive to both local and foreign investors in our urban areas. Constraints to productivity at the city level, such as infrastructure deficiencies presented below reduced the productivity of firms and households and this affected the aggregate productivity of the economy (World Bank, 1992).

Cities have played a key role in the evolution of the global economy. Cities are generators of enormous

wealth and act as the powerhouse of the national economy. There is a clear link between the performances of urban areas and the performance of the economy as a whole (Oatley, 1998; 3-20). The strength of the nation's economy, the contact point of international economics, the health of our democracy and the vitality of the humanistic endeavours all are dependent on whether the city works (Ciceros cited in Lawless, 1996; 28).

Transportation plays a major role in economic development both urban and national. It also has a broader role in shaping development and the environment. The interface between transportation investment and economic development has broad ramifications that goes beyond the basic purpose of moving goods and people. Transportation facilities are located in a specific place, they provide services to businesses (and households) within a specific geographic area, and their use is directly related to moving goods and people between two points. It is essential in the operation of a market economy (Eberts, undated). It should be noted that road infrastructure is fundamental to urban transportation, as it provides access to land and determines whether it is ripe for development or not. It is a determinant of where people can live or not live and constitutes a catalyst to urban development.

According to Eberts (undated), four factors are important in examining the relationship between transportation and economic development. These comprise relevant types of transportation investment, data necessary to analyze the economic effect of the investment, appropriate methodology to analyze the economic effect and the proper dissemination of the result and evaluation of professionals as to the economic effect of transportation investment.

The dispersed spatial distribution of residential, employment, shopping and leisure facilities in the modern city, frequently predicts walking as a means of getting from one place to another. This and the fact that peoples' time is a scarce resource on which they often but not always wish to economize with respect to travelling, means that some sort of efficient mechanized transport system is required to transport people to their destination in urban areas. (ESRC, 1996).

## III. NEIGHBOURHOOD ROAD DESIGN

Better transportation services that reduce commuting costs and time can allow households the opportunity to devote more time to income-earning activities. They also can be essential to maintaining an acceptable quality of life as well (Fox, 1995).

Transportation infrastructure is an important element of neighbourhood design. It is a major determinant of neighbourhood form. Within the context of sustainable neighbourhood design, transportation infrastructure should be designed to encourage the use of more sustainable modes of transportation, including,

walking, cycling and public transit (Engel-Yen, Kenedy, Saiz and Pressnail 2005). Research by Handy (1993) found that residents in traditional neighbourhoods make more non-work trips by walking and cycling within the neighbourhood than those in auto-oriented neighbourhoods.

Designing pedestrian, cyclist, and transit friendly neighbourhood will encourage intra-neighbourhood travel by non-auto mode. (Engel-Yen et.al, 2005). This will require providing for pedestrian and cyclist paths in neighbourhood road design. This in addition to the provision of streetlights will enhance security and visibility at night.

Road space requirement increases with vehicle size and speed. Faster vehicles need more safe distance that is, the traffic zone between them and other objects. A person typically requires 0.929 square metres feet while standing, and 1.858 square metres while walking. A bicycle requires about 50 square metres when ridden at 16 kph. An automobile occupies 13.93 – 26.91 square metres when parked, 139.35 square metres when travelling at a moderate speed of (30-mph, assuming 50 vehicles per lane-mile), and more than 464.51 metres when travelling at high speed. A bus requires about 2 - 3 times as much parking and road space as an automobile.

Walking and cycling facilities such as sidewalks and paths often constitute 10-20% of roadway right of way, although this space is often shared with utilities (telephone poles, signposts, electric poles etc), and side walk exist in part to support automobile travel. [www.vtpi.org/landuse.polf.2007](http://www.vtpi.org/landuse.polf.2007)).

#### IV. DEMAND PREFERENCES AND USER CHARGES

The first problem with project selection pertains to how projects and problems interact. There is a lack of attention to strategic success (Whether a project's objectives are consistent with needs and priorities in society and has long term benefit which could reasonably be expected to be produced). If projects are developed in response to societal problem it will lead to generation of public trust (Bruzeluis, Flyvbjerg, Rottengatter 2009, Premius, Flyvbjerg and Wee 2008) infrastructure policy decision involve four set of actors. The first are policy makers, who created the basic environment in which decisions are made and in many cases establish policies to determine overall spending, what type agencies deliver services and so forth. Second, infrastructure manages determine policy within service delivery organizations and make major decisions in areas such as technology. Third, operational staff are responsible for undertaking a daily provision of services. Finally users are the major client for infrastructure service. Each set of actors is an integral component of good decisions and must be confronted with appropriate incentive in order to make the correct decisions (Fox 1995, Cotton and Franceys 1993).

The poor performance and mismanagement characterizing most publicly-owned and operated utilities gave the impetus for considering private sector participation. Unsustainable levels of budget deficits and external debts, and the need to maintain fiscal discipline to control inflation and spur economic growth has convinced governments to seek private sector resources (Panayotou 1998). Involvement of road users and other stakeholders in the road network planning has been found in some countries to provide the key to effective and efficient and financing measures particularly since governments are usually reluctant to increase taxes and user charges. There is therefore a need to consider involving urban road users on how to manage the road. If members of the community are to be made stakeholders they may be willing to pay more for roads, but only if the money is seen to be judiciously utilized which is not the case in the present situation. According to Adewunmi (undated) involvement of stakeholders in urban road network can create a surrogate market discipline which will encourage road administration to use resources efficiently.

#### V. METHODOLOGY

The research approach employed in this study is the basic survey design. It is designed to answer questions about road infrastructure condition including; amelioration costs and willingness to pay for improved road infrastructure in different local government areas of Lagos metropolis (8). The study goes further to find out the amount respondents are willing to pay for improved road conditions. The contingent valuation surveys usually value goods which respondents have experience on. Secondly, contingent valuation uses hypothetical market which must be believed and understood by respondents. Structured questionnaires were distributed to 1040 households in the study area and 774 were returned in useful state. The local government areas are; Alimosho, Apapa, Eti-osa, Ikeja, Kosofe, Mushin, Shomolu and Surulere. The questionnaires were framed in such a manner that the grey areas are made explicit to respondents so that they could give valid responses. The questions were based on the likert scale format. Analysis was carried out with the use of descriptive statistical tools such as mean frequency tables and relative impact index (RII). The respondents are of varied income levels and most of them have lived in the area for more than 5years.

## VI. DATA PRESENTATION AND ANALYSIS

Table 1 : Ranking of types of road problem

	Ranking Problems of Road															
	Alimosho		Apapa		Eti-Osa		Ikeja		Kosofe		Shomolu		Mushin		Surulere	
	RII	Rk	RII	Rk	RII	Rk	RII	Rk	RII	Rk	RII	Rk	RII	Rk	RII	Rk
Are not wide enough	0.83	8	0.87	1	0.84	2	0.86	1	0.87	2	0.94	3	0.88	2	0.8	2
Lack pedestral walk	0.83	7	0.72	6	0.77	6	0.81	3	0.8	6	0.93	5	0.84	4	0.8	4
Full of pot holes	0.94	1	0.87	2	0.83	4	0.77	4	0.83	3	0.98	1	0.85	3	0.8	5
Not paved	0.86	5	0.63	8	0.71	8	0.72	8	0.78	7	0.93	6	0.77	8	0.7	8
Lack safety	0.84	6	0.76	5	0.71	7	0.72	7	0.72	8	0.91	7	0.80	7	0.7	7
Poor traffic management	0.86	4	0.68	7	0.81	5	0.75	6	0.80	5	0.94	4	0.83	5	0.7	6
Poor drainage	0.91	2	1.33	4	0.83	3	0.77	5	0.82	4	0.98	2	0.83	6	0.8	3
Lack street light	0.89	3	1.33	3	0.84	1	0.82	2	0.88	1	0.91	8	0.89	1	0.9	1

Source : Field survey 2010.

Table 2 : Difficulties arising from poor road condition

	What difficulties have you encountered as a result of bad road?					
	Damage to car	Delay in movement	Robbery	Air pollution	Car accident	Total
Alimosho	67	28	1	0	0	96
	69.8	29.2	1.0	0.0	0.0	100%
Apapa	30	20	0	0	0	50
	60.0	40.0	0.0	0.0	0.0	100
Eti-osa	50	43	2	1	1	97
	51.5	44.3	2.1	1.1	1.1	100%
Ikeja	44	31	3	4	2	84
	52.4	36.9	3.6	4.8	2.4	100%
Kosofe	34	42	3	1	3	83
	41.0	50.6	3.6	1.2	3.6	100%
Shomolu	90	10	0	0	0	100
	90.0	10.0	0.0	0.0	0.0	100%
Mushin	25	39	10	9	15	98
	25.5	39.8	10.2	9.2	15.3	100%
Surulere	19	40	12	14	13	98
	19.4	40.8	12.2	14.3	13.3	100%

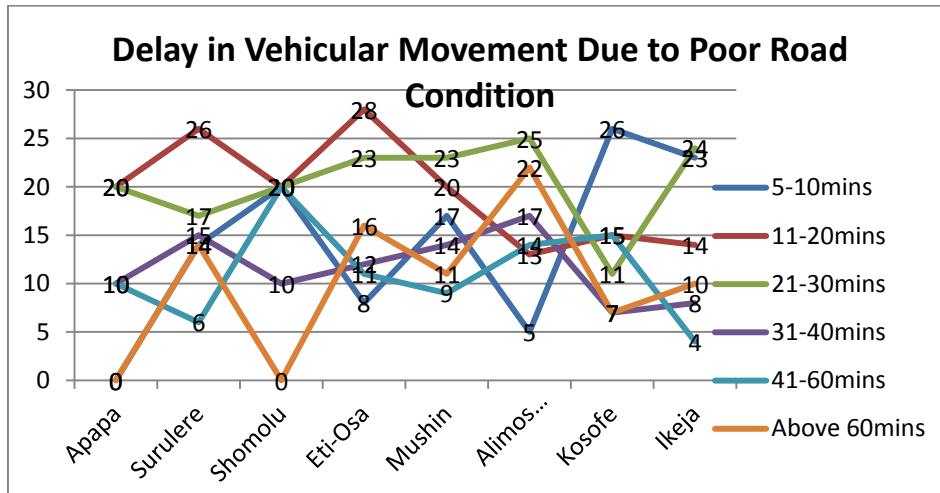
Source: Field survey 2010.

Based on data from table 1 & 2 a lot of problems emanate from poor road condition. The nature of road problems varies from local government to local government. In Apapa and Ikeja local government, the greatest problem is narrow roads. In Alimosho and Shomolu, the major problem is potholes. In Eti-Osa, Kosofe and Mushin it is lack of street light. The problem of street light in the study area creates insecurity at night. Potholes had been causing accidents and damage to cars, delay in traffic movement and robbery at hold-ups. This problem can also influence WTP. The loss in man hours and air pollution arising from poor

road condition is enormous and this calls for increased budget allocation for road maintenance and rehabilitation



Figure 1: Delay in vehicular movement due to poor road condition

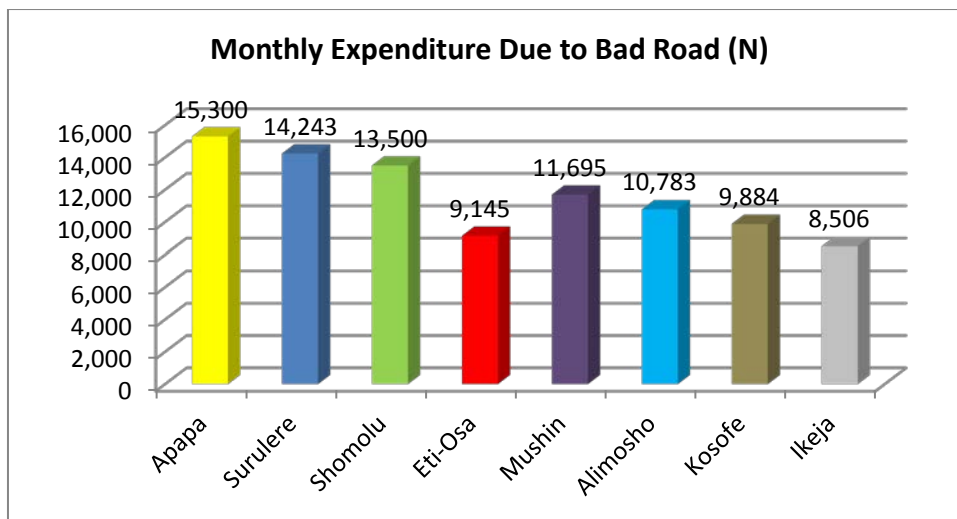


Source : Field survey 2010.

Data from figure 1 shows that households in the study area suffer delay in travel time due to bad road. Most of them are delayed for periods of between 20 minutes to 60 minutes. This could cause engine overheating and also expose commuters to being attacked

by hoodlums and street vertices, it will also increase energy cost in addition to air pollution. The implication of this is that productive hours are wasted in traffic, more fuel is consumed and vehicle engines are stressed

Figure 2



Source: Field survey 2010.

Data from figure 2 above shows cost incurred by car owning households due to damages to their car arising from plying bad roads. Residents of Apapa local government incur the highest cost of ₦15,300.00 per month while Ikeja local government area have the least mean cost of ₦8,506. The residents are also serious that the conditions of roads in their area be improved and are willing to pay of ₦13,750. The implication of this is that the residents have displayed a sense of commitment for infrastructural sustainability in the study area. The mean expenditure for a particular area is dependent on the condition of road and type of cars used. The level averting cost can influence demand preference and WTP.

Table 3 : Mean WTP for improved road conditions

	Mean	Rank
Apapa	₦13,750	1
Surulere	₦13,594	2
Shomolu	₦13,437	3
Alimoso	₦11,151	4
Mushin	₦9,660	5
Eti-osa	₦9,695	6
Kosofe	₦8,020	7
Ikeja	₦7,979	8

Source: Field survey 2009.

From Table 3 above, Apapa has the highest mean WTP of ₦13,750.00 followed by Shomolu's ₦13,594.2. The least is Ikeja with mean WTP of ₦7,979.20 for improved road condition. The high WTP is an indication that households in the study area want less damage to their car, and less delay in their travel time.

Table 4 : Preferred mode of payment for improved road condition

	How would you want to pay?								
	Payment at once	Monthly	Yearly	Included in income tax	Included in tenement rate	Included in rent	Toll fee	Others	Total
Alimosho	22	21	23	10	5	1	9	0	93
	24.2	23.1	25.3	11.0	5.5	1.1	9.9	0.0	100%
Apapa	20	10	0	30	0	0	0	0	60
	33.3	16.7	0.0	50.0	0.0	0.0	0.0	0.0	100%
Eti-osa	18	15	8	29	4	6	10	0	90
	20.0	16.7	8.9	32.2	4.4	6.7	11.1	0.0	100%
Ikeja	14	16	5	9	14	5	14	0	77
	18.2	20.8	6.5	11.7	18.2	6.5	18.2	0.0	100%
Kosofe	20	17	7	7	12	5	5	1	74
	27.0	23.0	9.5	9.5	16.2	6.8	6.8	1.4	100%
Shomolu	50	0	10	0	0	0	20	0	80
	62.5	0.0	12.5	0.0	0.0	0.0	25.0	0.0	100%
Mushin	15	14	10	8	13	4	8	4	76
	19.7	18.4	13.2	10.5	17.1	5.3	10.5	5.3	100%
Surulere	10	7	7	10	10	0	6	10	60
	16.7	11.7	11.7	10.2	10.2	0.0	10.0	16.7	100%

Data from table 4 shows the preferred manner of payment by various households. 50% of households in Apapa local government prefer to pay through income tax. 24.2% of households in Alimosho local government prefer to pay through lump sum payment. In Eti – Osa local government area, majority (32.4%) prefer payment

through income tax. The bottom line is that residents have expressed their desire for sustainable urban infrastructure through their WTP and expressed payment vehicle for improved road infrastructure.

Table 5 : Preferred service option for Roads

	What kind of road do you prefer?					
	Road with side walk	Road with cyclist path	Road with drainage	Road with street light	Just motorable road	Total
Alimosho	43	5	31	8	6	93
	46.2	5.4	33.3	8.6	6.5	100%
Apapa	20	10	20	0	10	60
	33.3	16.7	33.3	0.0	16.7	100%
Eti-osa	25	3	26	26	18	98
	25.5	3.1	26.5	26.5	18.4	100%
Ikeja	43	1	15	17	11	87
	49.4	1.1	17.2	19.5	12.6	100%
Kosofe	36	3	14	24	8	85
	42.4	3.5	16.5	28.2	9.4	100%

Shomolu	60	0	20	10	10	100
	60.0	0.0	20.0	10.0	10.0	100%
Mushin	15	8	29	39	7	98
	15.3	8.2	29.6	39.8	7.1	100%
Surulere	17	6	18	50	7	98
	17.3	6.1	18.4	51.0	7.1	100%

Source : Field survey 2009.

Data from table 5 shows the different service options for road in the study area. This include road with side walk, cyclist path, drainage, traffic light and just motorable. The preferred road type for Ikeja, Kosofe, Shomolu and Alimosho is road with side walk. This option will increase safety in the study area. Households in Mushin local government prefer road with street light probably because of the high crime rate in the area. The peculiar situation in an area will influence their preferred service option for road infrastructure

## VII. SUMMARY OF FINDINGS

- Road Infrastructure provisions in the study area are grossly inadequate and households suffer consequential costs and damage to property
- In addition to inadequacy, the conditions of available ones are quite deplorable in most of the local government areas under study. Most households experience traffic congestion, car damage and robbery at hold ups due to deplorable road and traffic conditions.
- In consideration of the importance of road infrastructure to households in the study area, majority of them are already incurring heavy expenditure due to its poor condition and in consequence are willing to pay for improved service in all the infrastructure under study within the study area. The level of willingness to pay however varied from one local government area to another.

## VIII. RECOMMENDATIONS

- There should be a radical change in infrastructure provision policy in the country as the current top-bottom approach does not achieve the desired result and fails to meet public expectations. The bottom-top or demand driven approach should be embraced as this will make residents and urban households more committed to its funding where cost recovery is of essence.
- Government can promote public private partnership through introduction of subsidy in infrastructure. For example, if the WTP of the people cannot sustain private investment in infrastructure, governments can provide subsidy by being responsible for part of the Capital Cost, while the extent of cost that can be sustained by households WTP is provided by the private investor. This will help when high standard of infrastructure is of essence. Subsidy can also hold when government has a limited budget and urban

households want a higher specification or standard of infrastructure. Households will then be asked to pay the difference between the expected standard and the budgeted sum. This situation is most relevant in areas of water, sanitation and road projects. Inadequate infrastructure can have multiple effects on health, and thereby on individual labour and productivity as well as quality of life.

- Proper pricing is a veritable tool for efficient and sustainable infrastructure provision. It is necessary for financing of service delivery, rationing of consumption to an economically efficient level, and also to provide an indicator for demand. Providers should ensure that prices should be able to recover cost for all infrastructure services except those with significant positive externalities and for very few services, to ensure that poor households have access. Payment of fee must be associated or linked to service delivery and any significant fee increase must result from service enhancement or improvement.

Imposing user fees to recover cost may be politically difficult in the short run as urban households are used to receiving under priced services. In spite of this difficulty, pricing is central to improved service delivery system. On the contrary, failure to properly price services could be politically dangerous because inadequate services will lead to dissatisfied urban residents and poor business, resulting in poor economic growth.

- Infrastructure reforms cannot be achieved in the absence of an efficient regulatory system. Governments all over the world are transforming their infrastructure sector to better meet the needs of consumers and regulatory reform is an essential part of this process. A good regulatory system must serve the interest of consumers. In this respect, the need to separate operation of facilities and regulation of service quality is very central. The regulatory authorities must be able to regulate the reliability and output of infrastructure providers.

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