Chapter 14
Strategic Infrastructure Supporting the Quality of Life in Dhaka

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Abstract This paper explores the role of strategic infrastructure, which includes key physical, environmental and socioeconomic setup of a region that facilitates a good living environment to live a quality life. A wide range of literature shows positive relationships between key infrastructure and quality of life in a region. It has been argued that the presence of adequate service infrastructure with good accessibility by the people provides with a better quality life. Taking Dhaka City Region as an example, the paper highlights that there is a severe infrastructure deficit in the region. Lack of serious initiatives to provide adequate infrastructure, especially in the sectors, such as transport and communication, housing, and utility services add considerably to the costs of development. Especially, due to poor planning and governance, the city fails to achieve the desired level of infrastructure provisions. The study also shows that adequate and quality infrastructure supports required impulses toward better living of the people where they have been planned and provided. Among various infrastructure, social and economic infrastructure are also important along with physical infrastructure. Health and education facilities and services, which are highly inadequate in the region make Dhaka one of the poorly living city regions in the world.

Keywords Strategic · Accessibility · Infrastructure · Governance · Health and education · City regions

14.1 Introduction

Rapid urbanization is a dominant factor in transforming the lifestyle in most of the Asian developing countries. In South Asian countries, especially in Bangladesh, rapid urbanization is manifested in the rapid growth of the urban population. Rapid urban-

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ization merely by the increase of urban population in Bangladesh creates tremendous pressure on the strategic infrastructure that determines the quality of life in urban areas. Dhaka being the largest urban agglomeration and being located centrally in the country attracts huge migrants from all over the country. Most of these migrants are economically poor and therefore cannot afford to get required amenities and utilities to live a quality life. This paper explores from secondary data the kind of strategic infrastructure provided mainly by the public sector available to support the quality of life of the people in the Greater Dhaka Region (GDR).

Quality of life in Dhaka City (like that of any other city) is one of the important factors in its sustainability. A better quality urban structure, such as high income, low unemployment, high investment, and for that matter, high living standards depends largely on the necessary infrastructure, which runs smooth functioning of the City. For citizens to be more dynamic and vibrant in an economic and social context, it is essential that an enabling environment exists in the City (ADB 2012). The World Bank's "Cost of Doing Business Report 2012" ranks Bangladesh well behind other South Asian countries on many of the indicators, including strategic infrastructure. Factors for which Bangladesh, and by implication, Dhaka, rank poorly include physical infrastructures, such as transport, provision of electricity, water supply, sanitation, waste management, health, and education services and recreation facilities.

There is a severe infrastructure deficit in Dhaka City Region. Lack of serious initiatives to provide adequate infrastructures, especially in the sectors such as transport and communication, housing and utility services add considerably to the cost of development. Moreover, due to poor planning and governance, the city also fails to secure its future infrastructure provisions. An ADB (2012) study shows that compensation for acquisition of land for road construction becomes very high, up to 40% to the total cost, even if the constructed buildings are illegal. This results in constraints in getting fund for the development of new infrastructure.

Apart from lacking in physical infrastructure, social, and economic infrastructure are also insufficient in the region. Health, education, and recreational facilities and services are highly inadequate, although these are the key components of human development. The paper highlights some of these key issues related to strategic infrastructure development in the Greater Dhaka Region that shapes quality of life.

14.2 Greater Dhaka Region

The Greater Dhaka Region (GDR) has been chosen as the study area. It consists of six administrative districts: Dhaka, Narayanganj, Gazipur, Narsingdi, Manikganj, and Munshiganj (Fig. 14.1). A substantial part of the area is fully urbanized, while some pocket areas are semi-urban and some are still rural.[1] As a geographical unit, the

[1] Dhaka, Gazipur, and Narayanganj are fully urbanized; the other three districts are partially urbanized but are important since these districts provide transport corridors between megacity Dhaka and other important areas of the country.

Fig. 14.1 The study area

area is difficult to define, as there is a number of entities that relate particularly to the region. At the core of the region is Dhaka Metropolitan area (DMA), which includes Dhaka city corporations (North and South) and some adjoining (nonmunicipal) areas, designated as Other Urban Areas, administered by Union Parishad.[2] The area of DMA is 306 km^2.[3] The second connotation is a planning area, called DMDP (Dhaka Metropolitan Development Plan) area. It covers an area of 1530 km^2, which is also known as the RAJUK area.[4] The third connotation is the present study area, known as the Greater Dhaka Region (GDR) or Dhaka Capital Region (DCR), which covers an area of 7,400 km^2 and can be considered to be Dhaka Metropolitan region in a wider sense (Fig. 14.1).[5]

The Greater Dhaka Region contains about 15.78 million urban populations, comprising over 35% of the national urban population. As a region, the level of urbanization in the GDR is the highest (67.28%) in the country. However, the level of

[2]Union Parishads are the lowest administrative units under the rural-local government structure. Like a municipality, the unions have an elected chairman and a certain number of ward councilors. This is rural-local government as opposed to urban-local government.

[3]Dhaka Metropolitan area is a jurisdiction of Dhaka Metropolitan Police. The area is truly urban, surrounded by four rivers, Buriganga on the south side, Turag on the north and west sides, and Balu-Sitalakhya on the east side.

[4]DMDP area includes DCC (north and south), DMA, other city corporations such as Narayanganj and Gazipur, Savar Municipality, and a large number of unions.

[5]GDR area was the study area for Dhaka Transport Plan (STP) and CCED study undertaken by ADB in 2009. The area also legally defined the jurisdiction of recently established Dhaka Transport Coordination Authority (DTCA).

urbanization varies substantially among the six districts of GDR. Dhaka District, which contains the largest urban agglomeration, has an urban population of over 10 million, with a level of urbanization of nearly 90%. The next largest concentration of urban population is in Gazipur, which is 2.2 million; followed by Narayanganj, which contains 1.9 million. In terms of the growth of the urban population, Gazipur accounted for 9% per annum, the highest in the region in 2011. Narayanganj and Munshiganj, respectively, recorded 4.8% and 4%—still above the national urban rate of growth. GDR, as an urbanized region, is growing at 4.1% rate—way above the national urban population growth. It is important to note that the Dhaka central area population is growing slowly (3.3%). The reason for this, perhaps, is that land prices and congestion discourage receiving more population in the central area of the City.

There are reasons for selecting GDR as a study area. First, the economic landscape of the area is undergoing rapid changes in recent years. Second, the concentration of industries is taking place along the major road network of the region, which gives the region the status of a very special economic zone in the country. Third, historically GDR was a capital region,[6] which means that the region was a seat of administration and various nonagricultural economic activities. Thus, the landscape of the whole area as a special economic zone is a justifiable concept.

14.3 Strategic Infrastructures in GDR

14.3.1 Transport Infrastructure

Dhaka is well connected by air, water, rail, and road networks to cities within the country and surrounding countries. However, the capacity of the modes of transport, particularly for passengers, is still low. The transport infrastructure of GDR is characterized generally by poor network planning, inadequate road capacity, poor road maintenance, and poor traffic management, undisciplined traffic management, overcrowding, slow movement, congestion, and frequent accidents (Islam 2005). Slow-moving cycle rickshaws, along with fast-moving motorized vehicles mix freely in the city streets, which are often chaotic and this creates congestion for unusually long periods (on average an hour for a short trip of about two kilometers). Apart from rickshaws, there are rickshaw vans and pushcarts and a few horse carts (in older Dhaka only), which ply regularly for business in the City. However, there are buses, CNG run three-wheeler "baby taxies", minibuses, and private cars to accommodate the limited road spaces in the City.

Road spaces within the Dhaka Metropolitan Area (DMA) will not be more than an estimated 15% of the city space.[7] Islam (2005) estimates that the total length of

[6] Dhaka was the capital of Bengal during the Mughal period since 1608. Besides Bikrampur (present Munshiganj), Sonargaon (present Narayanganj), and Savar (present Dhaka District) it had the status of capital at various point of time in history.

[7] Estimated by the study team, Detailed Area Plan reports of DMDP, Dhaka 2010.

the road network in DMA is approximately 3000 km, roughly one-quarter of these roads are of the primary type (main roads), with a width of more than 20 m. Although some of the new roads are wider, most of the roads in the City are narrow, ranging from 3 to 15 m.

The road transport system in Dhaka is operated by formal (public and private transport) and informal transportation systems. The most obvious negative conditions concerning the transport sector include poor transport management, using the same routes by both motorized and nonmotorized traffic and lack of provisions for parking facilities in the City. The problem further intensifies by the poor management and coordination among responsible organizations. This situation severely constraints smooth functioning of traffic and costs very high for sustainable economic development and the quality of life.

In Dhaka, transport development has been seriously neglected in the past and the budget has always been inadequate for development. On top of this, technical manpower was not adequately developed to face the challenges of growing demands created mainly by the City's increasing population. In the policy arena of city transport system, neither the participation of the private sector was encouraged, nor were the public agencies strengthened with trained and technical manpower.

Only recently, some initiatives have been taken to improve the transport systems of Dhaka. The most significant achievement to date is the preparation of a Strategic Transport Plan (STP) for the City Region (Louis Berger Group Inc. and Bangladesh Consultants Ltd. 2005). The STP has proposed a number of short, medium, and long-term measures to cope with the transport problem of Dhaka City. Some of the proposals have already been considered, such as the construction of new links between the existing networks, an elevated expressway, and a metro rail system. The ultimate target is to offer a multimodal, efficient, and integrated transport system in the city, which comprises a metro rail, an expressway, several circular roads, reducing traffic congestions and construction of a few dual carriageway roads to link important places in and around the City Region (Government of Bangladesh 2011).

14.3.2 Water Supply

The history of the water supply in Dhaka dates back more than 130 years. Modern pipe supply began in 1878, with the establishment of a treatment plant at Chandi Ghat on the bank of the River Buriganga in August 1874 (Akhtar 2009). It should be noted here that Dhaka was declared a municipality in 1864. The supply of pure water was the responsibility of Dhaka Municipality until Dhaka Water Supply and Sewerage Authority (DWASA, an autonomous body) was created in 1963, with responsibility for supplying water in Dhaka, Narayanganj, Demra, Tongi, Gazipur, and Savar. However, the authority could not manage all these areas and concentrated only on Dhaka City (360 km^2) (Sheesh 2010).

Dhaka WASA has a threshold population of 12.5 million to supply water. The water came from an underground aquifer (87%) and surface water (with treatment

13%) up to 2012. DWASA will be able to produce 2431 million liters every day, against a demand for 2560 million liters. However, a recently established treatment plant at Saidabad enhanced an additional production capacity of 220 million liters per day. This will reduce dependency on underground water from 87 to 78%. This thus reveals that only 22% of the demand for water can be met from treated surface water from DWASA's three water plants (DWASA 2012). However, demand is increasing due to population growth and the growth of industries and additional demands may be met by underground sources.

The present water supply infrastructure shows that the underground water is raised to the surface through deep tube wells. There are 490 such deep tube wells in operation. The overall length of water pipes in the City (DMA) is about 2600 km, providing water through more than 260,000 connections (Sheesh 2010). Of these, 92.7% of water goes for household use and the rest (6.54%) go to commercial and industrial uses. DWASA, however, supplies water to the low-income community almost free of charge, which is currently 0.68% of the total supply. It should be mentioned here that about one-third of the City population fall into the low-income category, receiving less than 1% of the water supply.

Average water consumption in the City is 130 L per person per day, of which 92% or 120 L is used such as for toilet flushing (22%), cleaning (7%), washing (2.2%), and bathing (41%). About 8% of water is used for cooking and drinking (DWASA 2013). The tariff for the domestic (household) water supply is heavily subsidized by the government and this encourages the misuse and overuse of precious water resources. On the other hand, the present tariff structure is flat for all categories of people. The authorities are thinking of introducing a progressive billing system to reduce the subsidy to those in the higher income bracket and heavy water users. Thus, increased revenue could be used for expanding the water supply service, improving quality, and making an investment in DWASA's other development plans. However, the main barrier in introducing such a progressive system of billing is that many user households are connected to one meter (account), especially in apartments, hostels, and communal worker accommodation, where segregation of consumption per household is difficult.

Access to drinking water coverage to GDR is shown in Table 14.1. It reveals that 98% of households had access to safe drinking water in the region. However, the proportion of households with access by various sources of water varies by district. It has already been indicated that the Dhaka district has provided 66.4% households with tap water. About 32% households who live in the slums use tube wells. The proportion of tube well users is high among other districts in the region. At least 5% of the households use water from sources other than taps and tube wells. Map A shows the spatial pattern of water supply in the region.

If compared with typical South Asian situation, Bangladesh's performance in providing safe drinking water and water for other uses for the country as a whole is little behind other South Asian countries. However, if considered water supply in GDR, its performance is better than South Asian countries. Water supply in Urban areas of Bangladesh shows 85% coverage, while GDR accounted for 97.8% coverage in the supply of water. India and Pakistan, respectively, covered 97% and 96% of

Table 14.1 Household sources of drinking water in greater Dhaka region

District	Proportion of households (%)		
	Tap	Tube well	Others
Dhaka	66.4	31.9	1.7
Gazipur	36.6	60.9	2.5
Manikganj	3.1	94.2	2.6
Munshiganj	2.9	93.8	3.4
Narayanganj	18.1	78.9	3.1
Narsingdi	3.2	94.4	2.5
GDR	42.2	55.6	2.2

Source BBS (2012)

their urban areas as a whole. Sri Lanka and Bhutan covers, respectively, 99% and 100%.

14.3.3 Sanitation

Bangladesh has made remarkable progress in providing better sanitary services. Access to sanitary toilets increased from 12.5% in 1991 to 63.5% in 2011 (BBS 2004, 2012). In urban areas, the situation coverage was found to be better. More than 80% of households in urban areas have access to improved sanitation, which is much higher than 58% in rural areas (BBS 2012). Dhaka megacity region (DMR) accounted for about 95% coverage. Sanitation conditions in GDR are better than the national urban scenario. About 86% of households in GDR have access to sanitary toilets. The sanitary conditions are worst in the slums and squatter areas of GDR. More than one-third of the population living in poor settlements and some poor households also enjoy sanitary toilets, meaning that conditions in Dhaka District are better than in the other districts of GDR. More than 93% of households have access to sanitary toilets in Dhaka, followed by 81.8% in Munshiganj, 81.5% in Gazipur districts (Table 14.2).

14.3.4 Access to Electricity

Electricity is possibly the most important factor contributing to a better living environment, quality of life and economic development. Among all the utility services, access to electricity is relatively good, but there is also an acute shortage of electricity supply and most areas experience frequent blackouts. The electricity coverage and supply for GDR is better than for the other areas in the country. In Bangladesh, little more than one-half of households (52.4%) have access to electricity, which is only

Table 14.2 Proportion of households having access to sanitation in GDR by districts in 2011

District	Proportion of households (%)			
	Sanitary (water-sealed)	Other sanitary	Non-sanitary	None
Dhaka	51.9	41.6	6.1	0.4
Gazipur	29.4	52.1	16.5	2.0
Manikganj	18.9	53.7	25.4	2.0
Munshiganj	23.7	58.1	16.6	1.7
Narayanganj	23.9	54.2	20.2	1.7
Narsingdi	20.2	40.9	30.4	8.5
GDR	**38.3**	**46.5**	**13.5**	**1.7**
Bangladesh	**24.8**	**38.7**	**28.7**	**7.7**

Source BBS (2012)

Table 14.3 Household electricity coverage in GDR by districts in 2011

Zila	Electricity coverage (% of households)
Dhaka	97.0
Gazipur	84.0
Manikganj	52.7
Munshiganj	90.1
Narayanganj	95.3
Narsingdi	72.8
GDR	**89.4**
Bangladesh	**52.4**

Source BBS (2012)

47% in rural areas and more than 85% in urban areas. In GDR about 90% of households have access to electricity (Table 14.3). In the central part of GDR, especially in Dhaka district, the proportion is about 97% (BBS 2012).

Due to rapid population and industrial growth, demands for electricity are increasing every year. At present, in the DESCO area, there are 0.59 million authorized consumers. In 2001, the number of consumers was only 0.11 million. However, the DESCO failed to supply the demanded quantity of electricity due to inadequate production. As a result, people face power shortages and power failures every day. People face load shading and frequent outages of electricity every day, but for longer in the summer, when the average power outages in Dhaka are four to five hours per day (BRAC 2012). On the other hand, the management of electricity supply is poor and as a result, government loses about 10% of revenue from this sector due to "system" losses, mainly through illegal connection (DESCO website 2013).

The poor and middle-income people face serious problems due to inadequate electricity supply. Most of the commercial, industrial consumers, and the upper-middle and upper-class residential consumers arrange backup sources of power in

the form of acquisition and widespread use of IPS, generators, charger fans and lights. A study conducted by IGS (BRAC) shows that the use of backup facilities have become quite commonplace, though the extent of the use of backup options varies according to the abilities of households to pay (Choudhury 2012).

14.3.5 Telecommunication

Tele communication is an advanced way of enhancing the value of services. It increases the number of consumers by reducing physical mobility. It also plays a dominant role in economic growth and quality of life (Sridhar and Sridhar 2008). Recently, if compared with other traditional infrastructure, telecommunications is more pronounced due to its significant impact on generating economic growth. Information and Communications Technologies (ICT) infrastructure improves the efficiency of communication, marketing, reducing transaction costs, and times and thus increases the firms' output in various economic sectors (Roller and Waverman 2001). Increasing investment in ICT infrastructure and its derived services provide significant benefits to the economy. ICT is now considered as one of the key drivers of the economic competitiveness of cities.

Although the communication sector is relatively new in the country communication infrastructure is improving fast. At present, the total telecommunication transmission cable network is about 14800 km, connecting 59 districts out of 64 (BTRC 2013). There are more than 36 million internet users throughout the country (BTRC 2013) and a large proportion are from the GDR area. Urban areas, especially Dhaka, are enjoying this service the most. In Bangladesh, the number of mobile phone subscribers is about 110 million (BTRC 2013) and this number is increasing very rapidly. On the other hand, internet services are also expanding. In the ICT sector, Dhaka shows progressive growth. Within a decade, Dhaka has created its position globally as a productive and quality outsourcing city. According to some of the US-based leading companies and online agencies, Dhaka ranks third among the cities of the world where online jobs are outsourced from the West (BASIS website 2011). Dhaka wins in this competitive sector due primarily to its cheap labor and good communication command in English.

14.3.6 Health and Education

Healthcare facilities in Bangladesh are poor both in rural and urban areas. However, it is better in urban areas than its rural counterparts. Table 14.4 shows a variety of sources of treatment facilities available in the country. The use of the sources depends on the affordability of the patients.

It can be observed in the table that more than one-third of the patients receive treatment from medicine shops without prescriptions from qualified doctors, even in

Table 14.4 Sources of healthcare facilities in urban and rural areas, 2010

Facilities	Urban (%)	Rural (%)	National (%)
Government health worker	1.70	2.57	2.41
Government doctor (institution)	12.53	8.52	9.28
Government doctor (private)	19.57	13.11	14.34
Private doctor	22.0	25.04	24.46
NGO doctor	0.13	0.22	0.20
NGO health workers	0.64	0.31	0.37
Pharmacy/dispensary/shop	36.05	41.20	40.21
Homeopathic doctor	3.26	3.49	3.44
Traditional healers	0.97	1.44	1.36
Family and self-treatment	1.52	1.48	1.49
Others	1.63	2.62	2.43
Total	100.00	100.00	100.00

Source BBS (2010)

urban areas, where doctors and hospitals are available within very close proximity. It seems that going to a qualified doctor is beyond people's economic ability—a good number of patients even go to traditional healers. It can also be observed that there is a little variation between rural and urban areas. A larger proportion of urban patients (14.23%) avail themselves of government facilities than rural patients (11%).

Healthcare facilities have been increased under private sector development in Bangladesh. Most of these facilities are located in urban areas and Dhaka is the largest hub of such healthcare facilities under private sector. Patients from all over the country come to Dhaka for treatment and most of them go to private hospitals. Government facilities are limited and treatment is slow, thus the preference is for people to go to the private sector, though it is expensive. The poor cannot usually go to private sector hospitals and clinics. Their choices are reflected in the table above.

It is difficult to assess healthcare facilities in the GDR. LGED (2005) has found 114 hospitals and clinics in the Dhaka Metropolitan area. Most of these were developed under the private (formal) sector. All six district headquarters in GDR have at least one general public hospital, 250 beds each. Dhaka City has quite a good number of general and specialized hospitals in the public sector. However, the health infrastructure, whether in the public sector or private, has little accessibility for poor people.

14.4 Environmental Infrastructure and Threats of Climate Change

The physical infrastructure in GDR may face a serious challenge in the future due to the possible impact of climate change and natural disasters. The geological settings, geomorphological conditions, and easy river connectivity are some of the important controls for Dhaka and its growth. The older part of Dhaka is a wide natural levee and relatively at a higher elevation than the surrounding low lying areas in the east, west, and south. Over the past 40 years, the principles of geomorphological controls on urbanization of Dhaka have largely been undermined by the development process. Dhaka's fast-growing population and concentration of services and industries translate to higher consumption of natural resources such as wetlands, canals, and rivers. The City has already been facing pressures from natural disaster migrants in the city. About 20% of all migrants took shelter in the City due to natural disasters (Ishtiaque 2013). Most of these migrants were housed in informal settlements of the city and pressurizes on the available limited infrastructure.

14.5 Infrastructure and the Quality of Life

The paper looks at selected urban key infrastructure and services available in GDR (and in the country) to support the quality of life in Dhaka.[8] The urban population depends largely on the provision of some key infrastructure and basic services. It can be observed in the analysis above that strategic infrastructure, such as transport, water supply, sanitation, power, telecommunication, health, and education are not adequate for supporting the quality life and economy of GDR. Whatever infrastructure has been developed supports the rich in most cases (such as health, education, water, and sanitation). The poor have accessibility problems due to the cost of using facilities being much higher than their affordability.

Secondly, the most crucial condition can be observed in the cases of the transport and power sectors. Both of these sectors suffer from serious problems. The transport sector suffers from poor management and is in disarray as a result and the power sector suffers from supply shortages. It is necessary to develop the major strategic sectors for enhancing the quality of life in the City because:

- Better transport networks make accessibility easier, which reduces travel time and cost.
- Improved telecommunication services increase efficiency in communication, transaction, trade, and business.

[8]Infrastructure data were explored with a limited scope. This is a huge area of research to collate all the information. We have selected some important information to assess how it is related to the quality of life in GDR.

- Reduced utility costs and the availability of utility services increase the possibility of investments being made.
- Job satisfaction, quality of life, and social security increase efficiency as well as the productivity of workers.

References

ADB. (2012). *TA 7641-BAN: Strengthening regional planning and governance*, Unpublished project report. Asian Development Bank and Government of Bangladesh.

Akhtar, S. (2009). On the selection of Dhaka as the capital of Eastern Bengal and Assam 1905–1911. In S. U. Ahmed (Ed.), *Dhaka past, present and future*. Dhaka: Asiatic Society of Bangladesh.

BASIS website. (2011). Dhaka ranks third in global freelance outsourcing work. Dhaka: Bangladesh Association of Software & Information Services. Last browsed 26 March 2019. Available at https://basis.org.bd/media/whats_new_detail/10.

BBS (2004).*Population census-2001 national report (Provisional)*. Dhaka: Bangladesh Bureau of Statistics.

BBS (2010). *Report of the household income and expenditure survey 2010*. Dhaka: Bangladesh Bureau of Statistics.

BBS. (2012). *Population and housing census 2011*. Dhaka: Bangladesh Bureau of Statistics.

BRAC. (2012). *State of cities: Urban governance in Dhaka*. Dhaka: Institute of Governance Studies, BRAC University.

BTRC. (2013). *Mobile phone subscribers in Bangladesh*. Information collected from the official website of BTRC. Last browsed: 14 October 2013. Available at http://www.btrc.gov.bd.

Choudhury, L. A. (2012). Quality of urban life: Service realities. In Z. R. Hossain (ed.), *Bangladesh urban dynamics*. Dhaka: Power and Participation Research Centre (PPRC).

DESCO website. (2013). *Information collected from the official website of DESCO*. Last browsed: 14 October 2013. Available at http://www.desco.org.bd.

DWASA. (2012). *Dhaka WASA newsletter*. Issue no. 05 (July to December 2012). Dhaka: Public Information Department, DWASA.

DWASA. (2013). *Progressive water tariff potentials and challenges*. Unpublished office document presented in a workshop (March 30).

GOB. (2011). *The sixth five year plan 2011–2015*. Dhaka: Planning Commission, Ministry of Planning, Government of Bangladesh.

Ishtiaque, A. (2013). *Natural disasters and migration to Dhaka city*. Unpublished Masters Thesis, Submitted to the Department of Geography University of Dhaka.

Islam, N. (2005). *Dhaka now: Contemporary urban development*. Dhaka: Bangladesh Geographical Society.

LGED. (2005). *Paurashava statistics*. Dhaka: Local Government Engineering Department.

Louis Berger Group Inc. and Bangladesh Consultants Ltd. (2005). *Strategic transport plan for Dhaka*. Dhaka: Ministry of Communications, Government of the Peoples Republic of Bangladesh.

Roller, L. H., & Waverman, L. (2001). Telecommunications infrastructure and economic development: A simultaneous approach. *American Economic Review, 91*(4), 909–923.

Sheesh, K. M. (2010). Water supply in Dhaka in Bangladesh period. In M.A. Islam et al. (Eds.), *Environment of capital Dhaka*. Dhaka: Asiatic Society of Bangladesh.

Sridhar, K. S. & Sridhar, V. (2008). Telecommunications infrastructure and economic growth: Evidence from developing countries. *Applied Econometrics and International Development, 7*(2). Available at SSRN http://ssrn.com/abstract=1250082.