The Problems in Public Bus Transportation System: Assessment by Passengers and Transport Authority in Dhaka

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Declaration

With the exception of references used, for which due acknowledgement has been made, I, Moumita Sen, do hereby declare that this dissertation is an end product of my own research under the supervision of Stig Halvard Jørgensen, Professor, Department of Geography, Norwegian University of Science and Technology, Trondheim, Norway.

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Moumita Sen

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Stig Halvard Jørgensen (Professor)

Dedication

To the Man, whose endless love and support made me who I am today and, who always believed in me, Mr. Sakti Kumer Sen, world's greatest Baba (my father), I dedicate this work.

Acknowledgement

Abstract

The study aimed to investigate existing problems in bus system in Dhaka City from passengers' perspective and also from transport authorities' point of view. The objectives were chosen because bus service is the principal mode in providing public transport facilities in Dhaka City. Bus industry is too unplanned and characterized by several problems, so that passengers found it as the most unattractive mode of transport option and are not very willing to ride on it.

To obtain these aims, a short questionnaire survey with 100 respondents (bus passengers), semi-structured interviews with three key informants from Dhaka Transport Coordination Board (DTCA); personal observations and photographs had been used. The triangulation approach was adopted to incorporate both the quantitative and qualitative data.

The study reveals that long travel time; safety issue and less frequent buses are in order three most important problems which make the bus service a less attractive option. It also found that the importance of these attributes can vary according to age, sex, educational status and location. The other factors associated with bus services like low quality of bus stops, substandard pathways toward the bus stops, no declared time schedules for passengers, inside unfriendly environment of the bus are contributing in declining service quality. Moreover, misbehavior of driver and conductor with female passengers are very common. Female passengers do not want to use public bus to avoid unpleasant situations. The transport authority does not have sufficient manpower and political support to monitor and control these conditions in the public bus system in the city.

Recommendations to improve the service quality of public bus service is demanding, but some proposals in order to help the bus service in the long run, will be, reduction of traffic congestion by electronic road pricing, reducing private car use; enforcement of rules and regulations to reduce accidents rates, prioritize pedestrian facilities, creating provisions for walking and bicycling. These strategies cannot change the situation in the short run but it can be an improvement of public transport and release the excess pressure and quality service problem of public buses. Transportation is an essential welfare aspect for urban population since it provides access to work, facilitates personal life and helps in spinning social networks.

Key words: Public bus system, problems, user behavior, service quality, survey, Dhaka

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Chapter 1: Introduction

1.1 Background

Transportation is an important land use in planning an urban area. A huge amount of land is used for transportation purpose and relevant services. Large amount of financial resource and land space are associated with this, so the utilization should provide a positive outcome in return. Without an efficient transportation system, a city or state cannot function properly. Transportation is an essential welfare aspect for urban population since it gives access to economic activity, facilitates family life and helps in spinning social networks (Wane, 2001).

Dhaka, the capital of Bangladesh is one of the least motorized mega cities in the world (Hoque et al., 2012). Dhaka is a major attraction; people are approaching towards Dhaka from various parts of Bangladesh in search of better life, education, work etc. Rural–urban migration contributes to this high population growth for Dhaka. To serve this huge population, utility services were established and expanded at different times, but not at the same tempo as population growth and demand (Alam & Rabbani, 2007, p. 82).

According to Gordon (2012), physical geography of a country plays a large role in its transportation system. Transport system consists of both motorized and non motorized vehicles (Mahmud & Hoque, 2008). In travel mode choice studies, the attractiveness of motorized travel modes is typically specified as a function of travel time and cost (Rodriguez & Joo, 2004). The Strategic Transport Plan (STP) (2005) stated that the modal share of trips on public transport in Dhaka is about 44%. Traffic congestion, poor traffic management, unreachable community transport for most of the people, high accident rates and increasing air pollution problems are common characteristics of Dhaka City's transportation system (Hasnine, 2011). Rapid growth in urban population is inducing the increase in private cars; lack of connection between transportation and land use plan and mixed traffic flow with non-motorized vehicles conflicting with motorized vehicles; lack of traffic law enforcement etc increasing enormous mobility problems in transport sector (Khan & Chowdhury, 2014).

In addition, Dhaka is facing a number of environmental problems. The disparity and the unequal development and management of the utility services, and improper management of the natural resources and natural hazards have degraded the overall environment of the city. Most of the environmental problems are human induced, resulting either from a lack of acquiescence with national policies, rules and regulations, or from resource constraints to implementing different measures (Alam & Rabbani, 2007, p. 82).

Bus services are considered as the leading mode of public transport of the city. But, public bus transport is regarded as low status and poor service. The reasons behind this condition are fragmented ownership of buses, too many operator company, poor bus condition, lack of maintenance, increase in private operators, poor accessibility to bus stoppages, lack of paasengers' information and safety makes the bus service as the most unappealing option for city dwellers (Khan & Chowdhury, 2014).

Moreover, there are no fixed schedule of arrival and departure, which create a lot of confusion among the passengers. These confusions sometimes result in rough arguments between the passengers and the bus supervisors or the operators (Hasan et al., 2010). High traffic conflicts are created due to mismanagement on the road by buses. Bus drivers stop the bus at middle of the road on passengers'' demand. This also causes problems for other the road users and increased pedestrian accidents (Mannan, 1999).

Among the road accidents data, percent of male victims is 85%. 30% victims are from the ages of 20 to 39 years. Bus and truck accidents consist of 5% of the deaths caused by city road accidents (Mannan, 1999).

Sexual harassment in public transport has become another awful experience which females have to deal with almost every day in cities including Dhaka (The Daily Star, 2015, August). Transport expert Professor Shamsul Hoque said that the solution lay in an organized mass transport system not in introducing more women-only buses or in reserving more seats for women (Khan & Chakma, 2015).

Even though, there are no government authorities to take control or keep an eye over the whole scenario. The private sectors are creating a monopoly, taking control over the public transport and dictatorial raise in bus fair (Hasan, et al., 2010).

Researchers have tested empirically the relationships between revealed travel behavior and neighborhood characteristics. Different travel behaviors, such as frequency of trip and distance and travel time, have been studied for a variety of neighborhood types, land-use patterns, street networks and streetscape design features (Rodriguez & Joo, 2004).

In transport planning, pedestrian needs are the most neglected one. Pedestrian facilities and infrastructure for non-motorized modes are insufficient (Mannan, 1999). Poor infrastructure forces people to abandon walking and cycling and use motorized transports instead. In Surabaya, a city that is only 15 km from north to south, over 60% of trips are less than 3 km, but they are mostly made by motor vehicles such as motorcycle mopeds or by para-transit modes (Hook, 2003, as cited in Leather, et al., 2011).

Public awareness is very much necessary to ensure road safety. Proper traffic education should be ensured for drivers and other related staffs. The police should be stricter regarding the enforcement of rule and regulations (Mannan, 1999).

This study aims to investigate the passengers' perspectives about the existing problems in bus system of Dhaka city and also how transport authority assesses the situations. The study also tries to show how demographic characteristics affect the passengers' preferences. The study will provide the necessary feedbacks that could influence transport planners, policy makers and politicians in long run.

1.2 Objectives of the study

There are two objectives of this research.

- To investigate the existing problems in public bus system in Dhaka City from the passengers' perspective considering work trips

- To find out how transport authorities in Dhaka City assess the situation of bus system as a part of the transport system in the city

1.3 Research questions

To fulfill the two objectives the research questions are as below:

- To investigate the existing problems in public bus services from the passengers' perspective

  ✓ What are the main problems in public transport sector?

  ✓ What are the most important factors affecting the service quality?

  ✓ Do the demographic characteristics influence passengers' preferences?

- To find out how transport authorities assess the situation of bus service as a part of the transport system in the city

  ✓ What are the reasons that make bus service is an unattractive option?

  ✓ To what extent, is the authority responsible for this situation?

1.4 Organization of the chapter

This study has been structured into seven chapters. The first chapter proceeds with a general introduction which is meant to serve as the groundwork to build the entire thesis. Readers are then introduced to the objectives, as well as research questions for which answers are sought for in the following chapters. Chapter two presents the theoretical framework on which this study positions itself. Chapter three is composed with detail methodology employed in this research. Sub-themes such as data sources, research tools used, reliability and limitation issues, as well as how the data is analyzed and presented are thoroughly discussed. In chapter four, readers are introduced with the study area. Chapter five and Chapter six contain analysis of data, results and findings from research field. Chapter seven draws the major findings, discussion about the findings, conclusions and recommendations.

Chapter 2: Theoretical Framework

The theoretical framework consists of some concepts and understandings that can hold or support the research methodology. Some concepts of transportation theory have been discussed in this chapter, which helped to develop the objectives of the study.

2.1 Urban transportation

Since the 1970s the interdependencies between population structure, urban form and travel developed as a research field in spatial sciences and transport sciences (Scheiner & Holz-Rau, 2007, p. 487). There is a close relationship between urban transport and urban structure and land use. When most people can be doing their essential daily tasks through walking, this implies the city structure is compact. This also means citizens live close to their work places (Pacione, 2001, p. 248). Demand for transport in cities, is determined largely by the spatial arrangements of different land uses, like residential areas, commercial zones, recreational spaces, working places etc. During 19th century, the development of rail ways and trams was triggered in separating home and workplaces. It also encouraged functional specialization of land use. After the World War II, in USA, widespread car ownership led to personal mobility and massive expansion of built up areas (Pacione, 2001, p. 248). The relationship between urban form and transportation is described in the table below:

Table: 2.1: Relationship between transportation and urban form

Period	Transport technology	Urban form
Pre industrial	Pedestrian, draught animal	Compact
Early industrial	Electric tram, street car, public transport	High density suburbanization, satellite form, especially in developed countries
Industrial	Motor bus, public transport, early cars	Lower density suburbanization, industrial
Post industrial	Towards universal car ownership	Low density suburbanization, widespread functional decentralization

Source: (Herbert & Thomas, 1997)

Income differences largely determine vehicle ownership. In developing countries, the rate of increase in the road infrastructure is slower rate than vehicle ownership (Gwilliam, 2010, p. 197). In third world cities rapid urban expansion driven by immigration leads to many new arrivals in cities. They are being forced to live at distant areas from work places. The real meaning of mobility or the true goal of transport is access (Tolley & Turton, 2014). But, the land space devoted to circulation was below average in proportion with rapid population growth (Gwilliam, 2010, p. 197). Hundreds of millions of people in the region do not have access to basic social and economic services only due to poor access to transport infrastructure and services (Jain, 2013, p.1). In South Asia, new urban areas are mostly dominated by informal residential and business premises and developments, which are developed without any planning. Even in South Asian mega-cities, where many economic activities are located in informal settlements, urban planners still rely on traditional master-planning approaches, which serve the minority, upper class residents (Tiwari, 1999).

In many developing countries of Africa, Asia, and the Middle East, the market for urban passenger transport has experienced major change towards private motorization due to a variety of economic, political, and societal reasons. With rapidly rising populations and the in parallel growing transport demand, urban areas in Asian countries, namely India, Sri Lanka, Bangladesh, Nepal, Afghanistan, Iran, Maldives and Bhutan today face an exceptional transport and mobility challenge (Jain, 2013). Public transport is inefficient, overcrowded. Still it is largely seen as a transport mode for the poor (Jain, 2013, p. 1). This tremendous rise and increasing shift in motorized mode of transport in megacities of the developing countries is contributing to increased levels of air pollutants, attributed to vehicular sources (Jain & Khare, 2008; Kumar et al., 2013, as cited in Jain et al., 2014).

In South Asia, urban transport is characterized by some social and economic challenges, like high rate of accidents, eve teasing, crimes and exclusion of the disabled. And urban transport is also the target of strikes and vandalism (Jain, 2013, p. 2-3).

Macario (2001) suggests that there is no perfect transportation system. Therefore, the second best solution lies in establishing trade-offs between the transport dimension (adequate balance between modes and means of transport), environmental dimension, economic dimension and

social dimension according to the socioeconomic and cultural reality of each specific environment.

In China, there is a major problem in transport sector due to fundamental political and economic transition (Finn & Mulley, 2011). National and local governments of China are giving public transport the priority to solve the transport problems. They thought public transport (PT) can be the best choice in cities (State Council of the People's Republic of China, 2012, as cited in Liu & Ceder, 2015).

Motorization in South Asia is contributing to an increase in transportation energy intensity and consumption of fossil fuels. The impacts of oil-based transport energy on the natural environment like energy and mineral extraction and use, water quality effects, decreased agricultural land, air pollution, noise, pollution, traffic accidents are significant. During 1980–1990, automobile use in Asian cities grew by 67 per cent whereas, in USA and Europe, the amount is 12 to 29 per cent (Jain, 2013). 72 per cent of emissions in Delhi are due to motorized vehicles (Central Roads Research Institute, 2002). In Dhaka, the concentration of oxides of nitrogen , oxides of sulphur , carbon monoxide and suspended particulate matter are 500, 1200, 7500 and 2500 μgm/m3 respectively which far exceed the acceptable limits set by WHO. The car is the principal contributor of sulphur, nitrogen and carbon monoxide emissions in the city (Hoque et al., 2005). According to the Department of Environment and the Bangladesh Road Transport Authority, more than 90 per cent of the vehicles in Dhaka are faulty and emit smoke far exceeding the prescribed limit. The Bangladesh Atomic Committee reports that automobiles in Dhaka emit 100 kg lead, 3.5 tones suspended particulate matter, 1.5 tones sulphur dioxide, 14 tones hydrocarbon and 60 tones carbon monoxide yearly (Ferdous, 1997, as cited in Dhaka Air, n. d.).

Competitive consumer oriented market

Market definitions have focused on either the product or on the buyers. Products may be closely related in the sense that they are regarded as substitutes by consumers (Needham, 1969, as cited in Day et al., 1979). On the other hand, buyers are individuals who in the past have purchased given class of products (Sissors, 1966, as cited in Day et al., 1979). In order to be successful it is necessary to realize that good reputation is based upon quality and attractive product/services and putting customers in the first place. The primary goal is satisfying stakeholders' expectation,

instead of profit maximizing. Stakeholders are known as the individuals or groups interested in company's activities, such as employees, managers, customers, suppliers, government etc. For public transport stakeholder represent, Government, transport authority, staffs, bus owners and bus passengers. The constantly changing environment requires flexibility for which it is necessary to have strong marketing function in order to achieve modern, marketing oriented organization (Filipović et al., 2000).

Political options are needed, which result from the interaction between the local, regional and national levels of intervention. The strategic level, where the political objectives of the system are defined as an answer to the stakeholders' interests (e.g. accessibility levels, quality standards, environmental protection, etc.), the tactical level, where the previous objectives are translated into operational specifications (e.g. modal mix, service design and specifications, network design, fare regimes, etc.) and the operational level, where transport happens and the contact with the customer effectively takes place. It is thus a function of the strategic level to assure a definition of objectives that provides an adequate answer to the stakeholders' interests (Macario, 2001).

2.1.1 Types of urban transportation

Urban transportation consists of a family of modes, which range from walking and bicycling to urban freeways, metro and regional rail systems. According to Vuchic (2002, p. 4), the basic classification of these modes, based on the type of their operation and use, is into three categories:

Private transportation: This category consists of personal vehicles owned and operated by owners for personal use. Such as: bicycle, private car.

Para-transit (for-hire transportation): This category is operated by sometimes owners or operators, but can be hired by individuals and groups for trips. Such as: taxi, auto rickshaw.

Public transportation: This is a system of operating mode on fixed routes with fixed schedules and prefixed fare for general people. Such as: bus, light rail transit, metro, regional rail are the most popular public transport (Vuchic, 2002, p. 4).

In many South Asian cities due to the lack of public transport and the inability of the masses to own private vehicles, informal transport provides an local solution to mobility needs. Such transport modes include mini bus, chartered bus, taxi, non-motorize transport (NMT), motorcycles, pick up vans, etc. (Jain, 2013). Auto rickshaws can be found in many countries such as Bangladesh, Cambodia, India, Laos, the Philippines, Sri Lanka, and Thailand, as well as in Guatemala, Ethiopia, Sudan and Egypt, which are less noisy, less polluting and more comfortable (Jain, 2013).

2.1.2 Types of trips

Journeys made by individuals and groups are important in travel pattern in urban areas. Deciding on the nature of particular journey can involve several considerations. Trip purpose and mode of travel are the main basis of differentiating journeys. People move from one place to another by using combined means (Tolley & Turton, 2014, p. 14). "Journey to Work" trip has received the most attention from urban transportation researchers. Due to its temporal peaking, work trips put greatest strain on the urban transportation system (Hanson, 1980).

In studies of urban activity patterns (Chapin, 1974, as cited in Tolley & Turton, 2014) work has been identified as a non-discretionary activity. The work trip has been differentiated from other types of intra-urban travel by the lack of choice associated with the timing of the trip and the destination visited.

There are three types of trips based on their purpose: Extrinsic trips, intrinsic trips and transport generated trips (Schaeffer & Sclar, 1975, as cited in Tolley & Turton, 2014). .

Extrinsic trips are those made to fulfill definite objective, such as journey from home to workplace. Work trip is a highly repetitious and therefore highly predictable trip (Hanson, 1980). Walking, cycling and car trips carried out for recreational or leisure activities where no real purpose can be identified are described as intrinsic. The third category comprises transport generated trips, such as car journey to filling station and repair garages, bus or train to depots during off peak period (Tolley & Turton, 2014, p. 15).

Recently the researchers explicitly recognized the journey to work as part of a multiple purpose trip or addressed the question of trip structure. For example, one person can shop while coming back home. It is likely that this distinction between obligatory or non-discretionary travel and

discretionary travel is artificial and that a more fruitful approach would be to view "work" as a dominant trip purpose (in terms of time spent) to which other subordinate "discretionary" activities may be linked in the course of a single journey (Westelius, 1973, as cited in Hanson, 1980).

2.1.3 Urban transport problem

According to Liu and Ceder (2015), the combination of urbanization and motorization has been placing an ever-increasing amount of pressure on the current transportation infrastructure. Therefore, it is consequential in such widespread problems as traffic congestion, traffic fatalities and injuries, traffic pollution and increased energy consumption. In many countries of South Asia, urban growth has been encouraged by the expansion of transport infrastructure, such as a railway station, highway or bus terminal. The presence of mixed land use, high population and employment density along transport nodes and corridors evidenced a close relationship between transport and land use (Jain, 2013).

Providing mobility for people is the key function of an urban transport within the city. But mobility is interrupted by congestion. Traffic congestion is one of the major problems in transportation sector. Urban transport problems of the developing countries differ from the industrialized countries (Gwilliam, 2010). Thw worst traffic congestion occur at morning rush hour, when everyone is heading to workplaces (Quarmby, 1967).The main reason behind congestion is increasing number and usage of vehicles, concentration of travel flow at certain time during the day, typical double peak distribution of daily trips being the journey to and from the work. Even though, different parts of city experience congestion at different times, but in case of large mega cities, they face it the central parts (Pacione, 2001, p. 251). The traditional solution for traffic congestion has been to build more and wider roads. Road building is not a feasible long-term solution for small countries (Goh, 2002, p. 29). According to Dutzik and Pregulman (2003), expansion of more roads increases the level of congestion. Recent trends in Washington State suggest that expanded highway capacity is associated with increases in per-capita vehicle miles traveled, which contributes to increased congestion. According to Goh (2002, p. 30) there are various anti congestion policies like vehicle taxes, fuel taxes, parking

charges, area licensing scheme (ALS), electronic road pricing scheme (ERPS), off-peak car scheme and vehicle quota system (VQS). Reducing private car is an effective solution for traffic congestion. A variety of policy interventions have been introduced to reduce car travel. Structural interventions include road pricing, which provides financial incentives for car-use reduction, road closures, which disrupt reutilized driving patterns and bus priority lanes, which seek to make public transport more efficient. It has been suggested that road pricing offers the most effective means of reducing car congestion. Psychological interventions are designed to change perceptions, beliefs and attitudes and, thereby, motivate voluntarily change in transportation choices (Fujii et al., 2001; Gärling & Schuitema, 2007; Saleh, 2007; Green & Stone, 2004, as cited in Graham-Rowe et al., 2011, p. 402). According to Gärling and Schuitema (2007), this is called Travel demand management (TDM).

Public transport is concentrated in morning and evening rush hours. In comparing to demand, the capacity is invariably insufficient to provide comfortable travel condition and delays at these times. In Tokyo, metro rail use pusher to ensure the passengers are forced into trains to allow the automatic doors to close. On the other hand, the operator face a financial problem of maintaining sufficient vehicles, plant and labor necessary to peak hour which his underused rest of the time (Pacione, 2001, 252).

Transport is a major source of air pollution with exhaust gases, environmental impact include noise pollution, visual intrusion, destruction of natural habitat, segregation of communities. The fast-growth of private vehicles is seen as a most intractable source of carbon emissions. In Delhi, study shows that among 73 percent of total motorized transport, 31 percent of vehicular trips are carried by private cars and responsible for 90 per cent of emissions (Jain, 2013).

Accidents are unfortunate negative external effects of an urban transport system. In urban and suburban area road traffic accidents are very common (Pacione, 2001, p. 253). Developing countries face high occurrence of transport-related injuries, both from accidents (the safety problem) and from criminal behavior (the security problem). Nearly 1 million people per year are killed in road accidents, of which about 85% are in the developing countries in urban areas (Gwilliam, 2010, p. 199).

In Asia, Bangladesh has the worst fatality rate with 85.6 fatalities per 10,000 vehicles, even though with relatively low motorization. It is followed by Nepal (24.3), India (20.3) and Sri Lanka (15.5) (Jain, 2013).

The majority of urban accidents in industrialized countries occur at junctions; whilst in developing countries are reported to occur at mid-link. Unrestricted access to main roads and ineffective development control increases the risk of a collision (Gwilliam, 2010, p. 207).

Public transport passengers are generally more vulnerable to physical attack than private car users. The pedestrians are even more at risk to suffer violent attack than the public transport passenger. This may occur after dark as part of a robbery or, in the case of women, sexual assault, often by transport staffs and male co-passengers (Gwilliam, 2010, p. 207).

Transport planning and decision-making are not gender sensitive, resulting in policies and investments inappropriate to the differentiated needs of women and children. In South Asian cities where eve teasing and pushing women in crowded public buses are common. In Dhaka, during the 1980s five per cent of the seats on buses were reserved for women, which were subsequently withdrawn (Jain, 2013). According to a government decision taken in 2008, all the city buses are supposed to have nine designated seats for women, children and people with any type of disabilities while minibuses are supposed to have six such seats (Hossain, 2015).

An evaluation of Bangladesh Road Transport Corporation buses in Dhaka revealed that women's dignity and security are at risk travelling on crowded buses as they face the dangers of physical touching and gross misbehavior (Lennat & Thynell, 2004, as cited in Jain, 2013). To avoid such conditions of travel, women either have to walk long distances or pay high fares in hiring rickshaws. This constrains women's access to work, education and necessary social services (Jain, 2013, p. 26).

2.2 Public transport

Public transport generally refers to the service provided by public or private agencies. The general public can use this service by paying a prescribed fare. In urban areas, typical public transportation systems are bus, trolleybus, light rail transit (LRT), metro, regional rail operating on prescribed lines/routes on established and announced schedule (Vuchic, 2002, p. 4).

In the urban areas of most developed countries, public transport is provided by public or private operators. The operator and transport authority make medium- to long-term agreements for a defined set of services, enforced legal protection against interlopers, and are usually subsidized to cover any losses due to the social and environmental dimensions of the services (Finn & Mulley, 2011, p. 90).

In many third world cities, urban rail system, public buses play a dominant in the public transport sector. With the expansion of cities, a deficit between the supply and demand of public transport will often occur. Increasing travel demand causes enormous pressure on the existing transport supply. According to Liu and Ceder (2015), the rapid urban sprawl makes it more difficult, time-consuming and frustrating for citizens to travel between their residences and work/recreational places. Traffic blockage is caused mainly by low-occupancy personal vehicles (Jain, 2013, p. 16).

Especially in low-income countries, public transport is largely seen as the transport mode for the poorer sections of the community. This group of people cannot afford to own personal transport. In South Asian countries, public transport is a major area of public policy which impacts urban growth and its sustainability. Urban public transport is mainly comprised of buses, while rail-based public transport exists primarily at the intercity level. Some cities like Mumbai have introduced urban rail network, and few cities have recently embarked upon Bus Rapid Transit (BRT), Metro, Light rail and other forms of multimodal public transport systems. Public transport systems are usually complemented by taxies, autos and Non-Motorized Transports (NMT) (Jain, 2013).

In order to make bus transit more reliable and faster, the Delhi Government has proposed BRT as a part of Integrated Mass Rapid Transit System (IMRTS). The pilot BRT corridor in Delhi stretches from Dr. Ambedkar Nagar to Moolchand, and is under trial run since 20 April 2008. The pilot project saw some resentment among private vehicle users due to the priority given to buses at traffic signals, leading to longer stoppage time for non-bus users (Jain et al., 2014).

During the last decades there has been unprecedented urbanization and enhanced mobility demand in South Asian countries amidst policies of economic liberalization and privatization

(Jain, 2013). Land use factors such as urban sprawl and low-density residential areas have also contributed to the appeal of the private cars (Kennedy et al., 2005; Luk, 2003, as cited in Redman, et al., 2013, p. 119). In South Asian countries such as, India, Nepal and Sri Lanka, private vehicles are growing 2 to 3 times the population growth rates (Jain, 2013). Private cars are considered as a relatively convenient means of mobility. Car holders are generally upper class people who can live far from their work and use cars to go to work. But poor people like garment industry works, construction labor try to live at nearest possible place from their work.

2.2.1 Bus

Buses represent the most widely used transit technology. Bus service is easy to introduce or modify: basic service requires only purchase of vehicles, garage and maintenance facilities, and organization of service. Stops along the lines can be simple. Large cities with rail transit also operate extensive bus networks, usually on lines with lower passenger volumes (Vuchic, 2002).

A recent study conducted by Dhaka Transport Coordination Authority (DTCA), found that as per the records of the Bangladesh Road Transport Authority (BRTA), the number of bus routes in Dhaka is 160. Bus routes are highly concentrated in high capacity arteries. The average bus supply in a motorway link is 2,384 buses per day/direction, which means that there are 2.5 buses at every minute. In main streets, there are 2.15 bus/min and in local streets 0.67 bus/min on an average (DTCA, 2014, Ch. 2).

Therefore, buses are considered as the most economical transit mode for lightly traveled lines. This flexibility of bus routes is an advantage for any necessary changes. The disadvantage for major bus lines are they lack permanence, efficiency in carrying heavy passenger volumes, and image of permanent, physically fixed routes desired by passengers. Compared to para-transit and rail transit modes, bus transit is very labor-efficient and has no economy of scale: on heavily traveled lines for every additional 40-120 passenger, one bus and one driver must be added to service (Vuchic, 2002).

In Accra and Tbilisi, the transport authority or government acquired vehicles for the public sector bus operators that had all but ceased to have the operational capacity. The vehicles were

initially second-hand buses that had limited benefit and many of these vehicles soon ended up out of service. This allowed them to re-establish large-bus operations (Finn, 2008, as cited in Finn & Mulley, 2011, p. 95).

In Sri Lanka, in 2005, the 11 regional state public owned and operated bus companies were reformed into a single national entity, SLTB (Sri Lanka Transport Board). There are also approximately 19,000 private bus operators in addition (Finn & Mulley, 2011, p. 95).

In Dhaka (Senegal), the transport authority used government-negotiated loans to establish a special purpose company to acquire vehicles and lease them to private sector operators who agreed to be regulated and to operate under contract (IBIS 2008) in return (Finn & Mulley, 2011, p. 95).

Numbers of factor determine operational effectiveness of urban bus fleets. The intensity of operation, high loadings, congested road and environmental factors such as rainfall, dust temperature, road damage all increase operational and maintenance costs. Moreover, Labor costs are low, but fuel costs are a high proportion of total cost. Sometimes, it takes months or year in obtaining essential spares and equipment, which should be ready within a week or day (Pacione, 2001).

In third world cities, shortage of public transportation is minimized by para-transits. These transports provide door to door mobility and services. Women take their majority of the users of para-transit. These also connect inaccessible and congested neighborhoods (Jain, 2013)

2.3 User behavior, travel pattern and modal shift

In Germany, attitudes are mainly discussed under the premises lifestyles or mobility styles, which are based on the increasing extent of freedom of action of mobile individuals. This approach argued for travel demand to be explained in cultural terms of subjective attitudes, aims and preferences rather than in terms of demography and social structures (Scheiner & Kasper 2005, as cited in Scheiner & Holz-Rau, 2007, p. 488).

Travel is now increasingly interpreted as related to residential mobility. It is assumed that spatial differences in travel demand were not so related to differences in urban form but to subjective location attitudes of some selective immigration of certain population groups (the self-selection

hypothesis, Handy et al., 2005; Scheiner, 2005; Schwanen & Mokhtarian, 2005; Scheiner, 2006b, as cited in Scheiner & Holz-Rau, 2007, p. 488).

Reducing private transport use and increasing the usage of public transport are two critical but challenging tasks for dealing with the problem of urban transport. Customer loyalty is seen as a prime determinant of a system's long term performance and is considered a major source of competitive advantage. So understanding the loyalty of public transit passengers is important. (Lam et al., 2004, as cited in Lai & Chen, 2011, p. 318). Service quality, consumer satisfaction, and value are frequently viewed as key building blocks of customer loyalty (Chen, 2008, as cited in Lai & Chen, 2011, p. 319). These factors can determine the customer's intention to choose a particular mode.

International literature provides much research on user 'perceived quality' (Dell'Olio et al., 2010, as cited in Dell'Olio et al., 2011, p. 217) of a public transport service or system. Traditional research on perceived quality provides the operating companies with knowledge on the impact their decisions have on their customers (Dell'Olio et al., 2011, p. 217).

Desired quality and perceived quality

The concept of 'desired quality' must be differentiated from that of 'perceived quality'. The concept of 'desired quality' defines "what they want to obtain to be fully satisfied with the service offered" (Dell'Olio et al., 2011, p. 218). It reflects the maximum level of utility. It can vary with user category. Perceived quality refers to "what the users have experienced and perceived on public transport" (Dell'Olio et al., 2011, p. 218). For example quality of bus stops, protection from weather (rain, sun), rate of unpleasant episodes, timetables, electronic screens, behavior of driver and conductor of bus are considered for public bus.

Desired quality provides valuable information for planning personalized marketing policies directed at different user categories to improve the quality of service and attract more people to public transport and move towards more sustainable mobility (Dell'Olio et al., 2011). Perceived value pertains to a ''consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given'' (Zeithaml, 1988, as cited in Lai & Chen, 2011, p. 319).

Consumer satisfaction

Satisfaction is considered as the main driver of consumer loyalty and behavior (Olsen, 2007, as cited in Lai & Chen, 2011). It is closed associated with perceived service quality and value (Chen, 2008; Jen & Hu, 2003; Petrick, 2004, as cited in Lai & Chen, 2011). Satisfaction is an overall affective response to a perceived discrepancy between prior expectations and perceived performance after consumption (Oliver, 1980 & Oliver, 1999, as cited in Lai & Chen, 2011, p. 319). Past studies have proved that customer satisfaction significantly change customer loyalty and behavior intentions in various industries including public transport services (Lai & Chen, 2011).

Involvement

Involvement is defined as "the level of interest or importance that an object has for an individual, or the centrality of an object to an individual's ego structure" (Zaichkowsky, 1994, as cited in Lai & Chen, 2011, p. 318). Involvement is intended to cover an individual's subjective sense of the concern, care, importance, personal relevance, and significance attached to an attitude, a person's motivational state of mind with regard to an object or activity, or the mobilization of behavioral resources for the achievement of relevant goals (Thomsen, Borgida, & Lavine, 1995; Zaichkowsky, 1985; B. Mittal & Lee, 1989; Poiesz & de Bont, 1995 as cited in Olsen, 2007). Involvement refers to a person's feelings about the relevance or importance of an object based on their inherent needs, values, and interests (Zaichkowsky, 1985). Since an individual can be involved with advertisements, products, or purchasing decisions, the concept of involvement with these different objects leads to various responses. Involvement which can be used across various research studies might include three categories: personal which refers to the inherent interests that motivate an individual's feelings toward the object, physical, which refers to the characteristics of the object and situational which refers to factors that temporarily increase or decrease interest in the object (Lai & Chen, 2011, p. 320).

Attributes

Quality of service may be defined by a wide range of attributes which can be influenced by planning authorities and transport operators (Paulley et al., 2006). Respondents or passengers

evaluate some attributes according to their preferences. Depending on these attributes they choose a particular mode.

Travel time is considered an important indicator of public transport and one of the important reasons for mode choice (Beirão & Cabral, 2007). Previous studies of 26 BRT project worldwide showed that, frequency is an often targeted quality attribute. 75% of BRT programs offering full day non-stop services increases ridership. Impressively, with daily ridership of over 40,000, the Los Angeles Metro Rapid bus service achieved increases of approximately 30%. In Vancouver 8000 new riders were added, among 20% of whom previously used automobiles, and 5% of whom were making new trips (Levinson et al., 2003, as cited in Redman et al., 2013, p. 122).

Another important aspect is comfort. Having a comfortable journey is very important for all the respondents. Comfort means soft clean seats, a pleasant temperature, preferably having air-conditioning and not many people on the vehicle. This aspect is evaluated differently across different groups (Beirão & Cabral, 2007). In developing countries, comfort meant by public transport passenger is clean pleasant seat, not too much people in bus and absence of unpleasant situations etc.

Fare is considered as an important determinant. A variety of PT pricing mechanisms attempt to combine price attributes with convenience, customer loyalty and service provider co-operation. These include integrated tariff systems, seasonal passes, and transferrable passes and automated ticketing (Redman et al., 2013, p. 123). Webb et al. (2006) found that the introduction of a Senior Sunday and a Sunday Saver offer rapidly received a positive customer reaction and increase ridership. In a study on public transport showed that free PT services offered in a medium-sized transit service in Austin, Texas, USA that the free fares encouraged a 75% increase of ridership. However, the free fares attracted a considerable amount of 'disruptive' riders, that is, riders that annoyed the regular PT users (Perone & Volinski, 2003, as cited in Redman et al., 2013, p. 123). Public transport is acknowledged as cheaper than car even by car users, but it does not appear as a key factor for changing to public transport, when considered in isolation from other factors which restrict that choice (Beirão & Cabral, 2007).

Speed is also critical in affecting customer satisfaction with the perceived quality of PT services. A rail service improvement reduced commuting time by 15 min each way between central New York stations. 24.5% of ridership was increased by over one year (Pucher et al., 2005, as

cited in Redman et al., 2013, p. 123). The new lanes increased the average PT speeds from 11 km/h to 22 km/h and 700,000 additional bus passengers was increased a day on a daily ridership (Redman et al., 2013. P. 123). The implementation of priority bus lanes in Seoul, Korea also aimed at improving the speed of PT in a city with high congestion due to private vehicle use (Pucher et al., 2005, as cited in Redman et al., 2013, p. 123).

Improved accessibility encouraged increased ridership, but but relatively few of the reviewed studies addressed effects on access. A study examined ridership changes in Melbourne, Australia, where accessibility was improved by extending PT routes to the outer, lower-income suburbs and by providing weekend and evening PT services (Loader & Stanley, 2009, as cited in Redman et al., 2013, p. 123). A previous study found that a common determiner of accessibility in PT is the density and locations of PT nodes (bus stops) along routes. In their attempt to model the optimal number of PT nodes along a hypothetical three mile bus route, the authors found that the optimal number and locations of PT stops is chiefly affected not by route length, but by users' valuation of time, speed of accessing the node, and demand (Chien & Qin, 2004, as cited in Redman et al., 2013, p. 123).

A project in Norwich, England provided new, covered bus shelters with 15 seated spaces at the rail station and throughout the region's bus routes. An on-street survey subsequently found that 98% of respondents were at least satisfied with the quality of the new facilities (Redman et al., 2013, p. 124).

Convenience is defined here as level of simplicity of using the PT service. While it relates closely to other PT quality attributes already discussed. Introducing integrated ticketing systems is considered a key strategy aimed at improving convenience of PT services (Redman et al., 2013, p. 124).

Safety and security are two most important attributes in order increase service quality of public bus. Accidents are unfortunate occurrence of an urban transport system (Pacione, 2001). According to Gwilliam (2010, p. 207), Public transport passengers are generally more vulnerable to physical attack than private car users. In the case of women, sexual assault, often by transport staff and male co-passengers are very common.

2.3.1 Service quality

The measurement of service quality remains a challenging and important research area with practical implications for service providers (Hensher et al., 2003, as cited in Beirao & Cabral, 2007, p. 479). Considering public transport, both operators and authorities need to understand how consumers evaluate the quality of the service. However, consumer evaluation of quality is an abstract and elusive concept to measure (Parasuraman et al., 1985, as cited in Beirao & Cabral, 2007), complicating the development of valid and accurate constructs of service quality. It deals with abstract and intangible attributes, such as safety and comfort, which are not easily measured. PT suppliers systematically overestimate the quality of service provided compared to customer evaluations (Rietveld, 2005, as cited in Redman et al., 2013, p. 121).

A focus group discussion was conducted in Porto to discuss bus and car travel. Study found that the respondents, whether they were users or non-users, evaluate each mode and viewed them differently based on different criteria (Guiver, 2007, as cited in Beirao & Cabral, 2007, p. 480).

In a previous study showed elements of performance can be different in different geographical and socio economic condition. Some elements of performance are service frequency, operating speed, reliability, safety, line capacity, productive capacity, productivity, and utilization (Vuchic, 1981).

In another study on measuring the service quality of Indonesian para-transit systems nine factors with 54 attributes were used. The nine factors are as follows: availability, accessibility, reliability, information, customer service, comfort, safety, fare, and environmental impact (Joewono & Kubota, 2007, as cited in Lai & Chen, 2011, p. 319).
A study on bus service in Taipei, Taiwan, proposed a scale of bus service quality with 20 items under four dimensions – interactions with passengers refers to respect and care for passengers, tangible service equipment refers to level of comfort of the facilities, convenience of service refers to accessibility and provided information, and operating management support refers to bus schedules, service periods, number of staff (Hu & Jen 2006, as cited in Lai & Chen, 2011, p. 319).

Andaleeb et al. (2007) worked on bus system of Dhaka city and found five most important indicator of bus service are comfort, need to change buses, behavior of the staff, government supervision, waiting facilities.

In another study on bus service of Dhaka city, Rahman and Nahrin (2012) found five most important indicators are availability of bus and less time (traveling and waiting), confirmed seat, interior environment, and staffs behavior.

For an efficient public transport system, terminals & stops, vehicles, and transport points are also very important in improving service quality (Tyrinopoulos & Antonious, 2008, as cited in Lai & Chen, 2011, p. 319).

In addition, many studies have concluded that service quality positively affects perceived value (Cronin et al., 2000; Zeithaml, 1988, as cited in Lai & Chen, 2011, p. 319). Satisfaction is an overall affective response to a perceived discrepancy between prior expectations and perceived performance after consumption (Oliver, 1980, 1999, as cited in Lai & Chen, 2011, p. 319). No declared schedule, risk of arriving too late, delay of next bus, uncertain waiting period, unpleasant event for female passengers etc can lower the satisfaction level of passengers of public bus.

Based on above studies done on service quality of bus service, eight attributes has been chosen in this study. These are, frequency, travel time, safety, accessibility, availability, security, comfort and economy.

2.3.2 Travel behavior

Lifestyles always include behavioral aspects like leisure behaviour, consuming behaviour, social networks, etc. The realization of lifestyles specifically relates individuals to their spatial environment, specific needs and preferences which are reflected by residential location choice (Scheiner & Holz-Rau, 2007, p. 490). People move from one place to another. They choose the most convenient means. For every trip the traveler weighs the expected benefits to be gained at the destination against the costs of getting there one of which is time, a scarce and finite resource

for most people (Tolley & Turton, 2014). Studies revealed that there are complex interdependencies between various causes of travel behavior. In this context individual personal circumstances can be distinguished from external conditions. In particular, personal circumstances are usually described by socio-demographic variables on the individual level. External conditions are often studied with respect to urban form and transport system (Scheiner & Holz-Rau, 2007, p. 489).

Evaluation of possible measures is difficult because very little is known quantitatively about what influences people's choices of travel mode for the journey to work (Quarmby, 1967, p. 273-274).

Residential location choice can change or influence passengers' travel behaviors (Choocharukul et al., 2008). In case of daily urban trips like work trips, passengers' mode choice is dependent on socioeconomic characteristics (Limtanakool et al., 2006). Transport patterns and choice also vary with person characteristics such as age, gender and monthly income (Stradling et al., 2007, as cited in Yaakub & Napiah, 2011). Previous studies found that women consistently have shorter work trips than men. The reasons are lower income, restricted accessibility, bound to give more family time (Gordon et al., 1989).

Previous studies were done in order to explain modal choice, or levels of usage of different modes of travel. Different studies carried out in the United States. A study was carried out, which relates the use of public transport throughout a city to such characteristics as size, density and age of the city, and to population characteristics such as income, car ownership, and so on. North American transportation consultants developed models of mode choice. The aim is predict public transport and private car use for all trips made between any pair of the zones into which the urban area is divided. Factors such as relative travel times and costs for pairs of zones are often taken into account. Then, some researchers have developed models to explain and predict individual choice of mode, taking account of individual travel and household characteristics (Quarmby, 1967, p. 275).

The problems of traffic cannot be viewed in terms of travel infrastructure and vehicle movements alone. Commuting, the human behavior involved in travel to and from work (and for that matter, other travel) is important both in delineating the nature of the problems, and for understanding how people's choices and amendments of time, mode, distance and direction contribute to traffic patterns (Punpuing & Ross, 2001). In Netherland, from1962 to 1972, number of trips per person and travel time per years has hardly changed, but total distance rose from 7156 to 11487km. People like to go further by using the speed and saved time (Tolley & Turton, 2014). This means people are moving very frequently with short travel time but a further distance. These became possible for increased speed of vehicles.

The need for mobility is a consequence of the spatial separation of different types of land uses in the city. The increased separation of urban land uses improved transportation facilities and resulting enable people to travel further in a given amount of time than they could previously (Pacione, 2001).

There are many people that use both public transport and private cars. So, in order to reduce car use it is necessary to understand the underlying patterns of travel behavior. In general, the car is the most attractive mode of transport. Convenience, speed, comfort and individual freedom are well-known arguments (Anable, 2005; Hagman, 2003;Jensen, 1999, as cited in Beirao & Cabral, 2007). The very perception of vulnerability influences the travel patterns. People try to avoid vulnerable modes such as cycling or vulnerable times of travel (Gwilliam, 2010, p. 200).

Understanding travel behavior and the reasons for choosing one mode of transport over another is an essential issue. People make choice between different transport modes, depending on their characteristics. The choice of one specific transport mode can vary over time and with the type of journey. Low wage workers may prefer to live (have their dwelling and houses) near the factory/company where they work, so that they do not have spend money transport. Srinivasan (2002) in calculating pedestrian environment factors for Boston, found that pedestrian attributes of the route between home and work, rather than the attributes of the endpoints themselves, appear to matter most in the decision to walk for work trips. In a study on 12 neighborhoods in the Puget Sound area of Washing- ton, suggested that, given the appropriate land-use conditions and pedestrian facilities, suburban areas can support pedestrian travel and have a significant influence on mode choice (Moudon et al., 1997, as cited in Srinivasan, 2002, p. 2005).

In US based studies showed that planners in Montgomery County, Maryland found that pedestrian friendliness is based on building setbacks and the availability of sidewalks, paths, and bus shelters to traffic zones in the region. On the other hand, planners in Portland, Oregon developed factor scores measuring the pedestrian environment based on sidewalk continuity, ease of street crossings, street characteristics, and topography (Rodriguez & Joo, 2004).

Behavioral intentions, as an affirmed likelihood to engage in a certain behavior, are important indicators of customers' future behaviors. According to the Theory of Planned Behavior (TPB), behavioral intentions trigger future behaviors (Ajzen and Fishbein, 1980, as cited in Lai & Chen, 2011). Service quality is perceived as an important determinant of users' travel demand (Prioni and Hensher, 2000, as cited in Beirao & Cabral, 2007, p. 479).

Favorable behavioral intentions lead to customer loyalty, which is defined as ''a deeply held commitment to repurchase a preferred product or service in the future'' (Oliver, 1997, as cited in Lai & Chen, 2011, p. 319). Behavioral intentions can be considered as indication whether a customer will continue to utilize a company's services or switch to a different provider (Zeithaml et al., 1996, as cited in Lai & Chen, 2011, p. 319). Public transport needs to adjust the service to the attributes required by consumers in order to become more attractive and influence a modal shift (STIMULUS, 1999, as cited in Beirao & Cabral, 2007, p. 479).

Travel behavior might be an effect of selective location decisions of individuals or households, who decide in favor of a certain location type that meets their needs and their behavior. Urban form also affects travel behavior. If person relocates to a new place, he tries to adjust his travel behavior according to the spatial structures at the new place of residence (Handy et al. 2005; Scheiner 2005, as cited in Scheiner & Holz-Rau, 2007, p. 492).

Chapter 3: Methodology

3.1 Introduction

Research is the process of trying to gain a better understanding of the relationships between humans, space, place and environment. It is a continuous enquiry and discovery (Kitchin & Tate, 2000). Research can be defined as 'knowledge production, seeking answers to questions through inquiry' and thus it proceeds along a methodology (Mikkelsen, 2005, p. 135). According to Kitchin & Tate (2000, p. 6), it is sort of 'a coherent set of rules and procedures which can be used to investigate a phenomenon or situation'. Every research has some goals and objectives. The objectives determine the choice of methodology. By including all the scientific procedures, a researcher adopts a certain methodology to generate, analyze, interpret and present collected data.

The baseline of methodology of a research work is created by the theoretical framework. Theory, methodology and practice are tightly and intimately bound (Kitchin & Tate, 2000). In the words of Warf (2006, p. 486), methodology is 'a meso-level theoretical construct that allows researchers to translate their philosophical and theoretical assumptions into data'. This chapter involves discussions on the research methodological approach used in this study. This chapter is consisting of sources of primary and secondary data, quantitative and qualitative approach, data collection techniques, reliability and validity of the data and limitation of study and position of researcher.

3.2 Qualitative and quantitative

The research is a mixed approach with a combination of qualitative methodologies and quantitative methodologies, with emphasis on the latter. Quantitative methods have been defined by mathematical argumentations, techniques and representations in understanding geographical

forms and relations. Statistical methods are employed in generating and testing hypotheses using empirical data and pure mathematical modeling is employed when deriving formal models from a set of initial conceptual assumptions (Gregory et al., 2011). Qualitative methodology is important for human geography. Qualitative method is mostly adopted, when a researcher wants to see a big picture of real life like patterns of society, their living standard, trends, daily life, how thing works or sometimes doesn't (Smith, 2001). The feelings, understanding and knowledge of human being can be explored through qualitative methodologies. Interviews, discussion, participants observations are major tools in qualitative approach. Researchers used these techniques to explore the complexities of everyday life (Dwyer & Limb, 2001). Real world does not seem same to everyone. Qualitative method is considered as reading the world, which is a collection of competing social constructions, representations and performances (Smith, 2001).

3.3 Primary data collection techniques

According to Kitchin and Tate (2000, p. 40) quantitative data, 'are well structured and consists of numbers or empirical facts', that can easily be 'quantified' and analyzed using numeric (statistical) techniques. On the other hand, Qualitative data are 'generally unstructured and consists of words, pictures and sounds'.

A major weakness associated with the qualitative methods is the 'inability to make universal conclusions and to produce consistent results' (Rudestam & Newton, 1992, p. 67). With the involvement of researcher himself can make the data biased. But the researcher bias is not limited only to the qualitative methods but to the so-called 'value-free' quantitative methods as well. Quantitative methods have been identified with positivism. According to Auguste Comte (1798-1857), social world could and should be studied based on direct observations from which universal and invariant laws of human behavior can be predicted (as cited in Ormston et. al., 2014).

The primary data includes both quantitative and qualitative data. The full dataset was collected in the period from June to August in the year of 2015.

3.3.1 Quantitative data

Questionnaire survey

Questionnaire survey is one of the important tools to collect quantitative data. In this research, questionnaire survey had been conducted for 100 respondents in designated study area. The study area was Dhaka City. The survey had been conducted in two selected neighborhoods, Mirpur and Kalabagan. The reason behind this selection has been discussed in the study area chapter. The bus users were the primary respondents of the study. The questionnaire was prepared before approaching field. According to (Kitchin & Tate, 2000), to design a questionnaire survey, researcher should consider several number of factors. The researcher should select the question in order to know what he wants to know from respondents. In case of quantitative data, questionnaire should be more structured and close ended. Before selecting the questions researcher should take in to consideration of some variables, means what she wants at end of the survey or while analyzing the data. Variables could be experimental or independent, dependent, controlled and uncontrolled (Kitchin & Tate, 2000). Regarding the answer categories, there are nine basic types of question, like quantity, category, multiple choice, scaling, semantic differential scaling, ranking, complex grid, contingency and open ended (Kitchin & Tate, 2000). The questionnaire is prepared using open and close ended questions. Close ended questions includes multiple choice and ranking.

The questionnaire was designed in three parts. It started with an introductory part, where researcher asked about demographic information, and then the main part of the transport evaluation study, which consists of work place, distance, travel time, office hour, problems faced in bus etc. In this part, eight attributes were given to respondents to rank them three most important ones. After reviewing previous studies and considering transport system of Dhaka city, eight attributes were finalized. Attributes were frequency, travel time, safety, accessibility, availability, security, comfort and economy. The last part was closing part where researcher thanked all the respondents for participating (see Appendix 1). The questionnaire was short, so that it could be held at any place and any time. The survey took place only for four to five minutes for each respondent. Most of the questionnaire survey was administrated by the researcher herself. She conducted the most of them face to face, but some of the survey were conducted over the phone and email, to be specific, the questionnaire were sent via email and

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respondents filled up and sent back to her. The number of questionnaire was done over the phone and email is hardy 20 to 25 percent.

Sampling

After structuring the questionnaire the next step was to do the sampling. According to (Kitchin & Tate, 2000), all possible people who display the characteristics researcher is interested in is termed out as population. Normally a researcher has a time limitation. And it would be impractical to survey them all. We clearly needed a subset of that population. The subset is called sample. There are different sampling methods. Quota sampling was performed to select the primary respondents in two selected neighborhoods. It was done so, because there were two areas, and the researcher had to stratify respondents evenly from these two areas. According to Kitchin and Tate (2000), sample size is selected subjects with predefined quota control. After that, in a particular area, researcher performed judgmental or purposive sampling. According to Crang and Cook (2007), purposive sampling means, according to the researcher, who is the most relevant for the research. On the other hand, judgmental sampling means sampling elements are selected based on the interviewer's experience in order to produce required data. But the people who are fallen in this category cannot be reached easily. So, the researcher approached the respondents, who are easily accessible. At last, convenience sampling was performed. According to Crang and Cook (2007) convenience sampling means, whoever researcher can find in his way. The passengers using any buses were taken into consideration and were not distinguished according to the bus company or any other factor. It would be tough to find out a fixed bus company's passengers, because passenger does not use same type of bus every day. The refusal rate was high, so the researcher had to make some replacement to fill the 100 quota.

Table 3.1: Distribution of respondents (Bus passengers)

Age group	Neighborhood			
	Mirpur		Kalabagan	
	Male	Female	Male	Female
18-28	9	8	14	0
29-38	11	8	11	14
39-50	8	2	2	9
51-59	0	2	1	1
Total	28	20	28	24

The researcher repeated the purposive or judgmental sampling, to select the key informants. Because, to get actual information, the most experienced people in transportation field is required.

Pilot study

Pilot study is necessary to identify any difficulties or weaknesses in the questions that might be encountered in a larger study. At first researcher should self-evaluate the effectiveness of the strategy in terms of response rate, answer given, ease of analysis etc. (Kitchin & Tate, 2000). In this study, researcher started the questionnaire survey with her known people and friends to check out how they answer the question and evaluate the attributes. Then she started the actual survey with the relevant respondents.

Trial and error: approaching respondents

Every research work had to go with some adjustments. Sometimes things do not go as planned. The major adjustments arise while conducting the questionnaire survey. The main problem was where to administrate the questionnaire at. It could be on bus stops or home within selected neighborhoods. Before approaching field, it was decided to administrate the questionnaire at bus stops. But in practical situation, people are on a rush at bus stops. It was obvious that they are not ready to waste their time for some voluntary survey. Then the researcher tried to get access to people's' home. Mostly they did not allow someone unknown in their home. They had their reasons that had to be respected. Then researcher took an attempt to conduct the survey on the street of Mirpur and Kalabagan area. The researcher got 40to 50 percent of the total respondents there. Then she tried to conduct over the phone and email of known person who live in selected neighborhoods. She got 20 to 25 percent respondents. Then she tried the last option in going peoples offices, it came up as a good idea. People are very calm and quite in their offices, so they tend to answer the entire questionnaire in a gentle manner. Researcher got about 20 to 25 percent respondents. Conducting the survey on street and offices, self selection was done for choosing the respondents. If they are fitted under required criteria, then researcher started the questionnaire with the person.

Response rate

While approaching to respondents, some of them were agreed to answer and some refused. In the designated study area, researcher had to move to another person. These non respondents were replaced by a new one. The researcher asked on an average 3 persons and one of them were ready to answer. The response rate of respondents is hence about 33%. As, some people were not ready to answer so that it cannot be said what his or her answer would be. It could be very positive towards the bus system and could be negative. If those persons would have participated, the end result would probably have a possibility to be different. So this kind of biasness of data does exist. But it is impossible and unreasonable to survey the total population of the study area. The time limitation and recourses was one of the reasons that a researcher cannot survey the whole population of her study area.

3.3.2 Qualitative data

Semi- structured interview

Semi structured interviews had been conducted with key personnel's of transport authority in Dhaka. According to Valentine (2001), semi-structured interviews are very formal one. Researcher should prepare a broad idea about the questions to be asked. The researcher managed to get three person form Dhaka Transport Coordination Authority (DTCA). These three persons include one Project Director, CASE Project (also a traffic engineer) and two Transport Modelers. The researcher went into their offices during the office hour and held the interview there (see Appendix 2). There was a fully prepared open ended questionnaire. The same questionnaire was asked to theses persons. The questionnaire consists of their perception about the bus system, problems, government initiative, institutional capacity and political support and interruptions, corruptions etc. The interview took place only for fifteen minutes with each person. They all tried to answer irrespective of their personal and political view. They conduct the conversation as an employee. They also talked about their limitations that sometimes they cannot do what is actually required due to political influence. Political instability is another reason behind these problems of Dhaka city.

Observation

In the first draft of survey design, observation was not in the plan. Because of some unexpected occurrence, researcher had to make some changes. The researcher stands on one of the junctions of Mirpur road and observes the passengers behavior while riding on a bus, counter reactions of bus conductor, picking up and dropping down of passengers etc. The researcher also took some picture from the designated study area to find out some real scenarios of bus services in Dhaka. The researcher is also a bus users and a resident of Mirpur area, it makes her an insider of the study. According to Rabe (2003), insider can provide major insights of the community. But sometimes, insider status can be hindrance when trying to understand subject's point of view. The researcher tried not include her perception and be indifferent while observing and analyzing, even though some biasness can come in the study which cannot be avoided.

Triangulation

This study is a mix method in combination with quantitative and qualitative approach. To conduct this, different survey methods had been used to collect data. Questionnaire survey with passengers, semi-structured interview with authority had been conducted to investigate different perspectives. Using multiple methods and different sources can make the researcher to better understand the correct position of the research problem. The process of drawing different sources or perspective is known as triangulation (Valentine, 2001). The idea of triangulation is very much associated with measurement practices in social and behavioral research. Triangulation is broadly defined by Denzin (1970, p. 291) as "the combination of methodologies in the study of the same phenomenon." According to Webb et al. (1966), triangulation shares the conception that qualitative and quantitative methods should be viewed as complementary rather than as rival camps. Organizational researchers can improve the accuracy of their judgments by collecting different kinds of data bearing on the same phenomenon.

According to Webb et al. (1966), "Once a proposition has been confirmed by two or more independent measurement processes, the uncertainty of its interpretation is greatly reduced."

Denzin (1970) distinguished four forms of triangulation: Data triangulation, Investigator triangulation, Theoretical triangulation, Methodological triangulation. In this study, methodological triangulation has been used, which refers to the use of more than one method for gathering data. On the other hand, it can be referred as within-method and between-method.

"Within-method" triangulation essentially involves cross-checking for internal consistency or reliability while "between-method" triangulation tests the degree of external validity. For quantitative methods such as survey research, this can take the form of multiple scales or indices focused on the same construct. For qualitative methods such as participant observation, this can be reflected in "multiple comparison groups" (Glaser & Strauss, 1965, as cited in Jick, 1979).

The effectiveness of triangulation rests on the premise that the weaknesses in each single method will be compensated by the counter-balancing strengths of another. That is, it is assumed that multiple and independent measures do not share the same weaknesses or potential for bias (Rohner, 1977, as cited in Jick, 1979)

3.4 Sources of secondary data

The main source of secondary data is book, journals, newspapers, and internet. Some relevant data like map of Dhaka city, number of authorized routes of public bus, types of services etc. had been collected from the reports produced by Dhaka Transport Coordination Authority (DTCA). Strategic Transport Plans for Dhaka City and registration records for vehicles had been collected form DTCA and BRTA's official websites. Besides this, some previous studies have also been collected from DTCA offices.

3.5 Reliability, validity and limitations

The aim of every scientific work is producing a knowledge which is valid and reliable. According to Rudestam & Newton (1992) reliability refers the ability of a measure to produce consistent results. On the other hand, Validity indicates a measure what it purports to measure. Validity 'concerns the soundness, legitimacy and relevance of a research theory and its

investigation' while reliability may refer to 'the repeatability or consistency of a finding' (Kitchin & Tate, 2000, p. 34). These two themes of validity and reliability are of much relevance to qualitative-based studies as they are for quantitative-based studies (Silverman, 1993; Kitchin & Tate, 2000). Reliability concerns the extent to which an experiment, test or any measuring procedure yields the same results or repeated trials. Reliability is a part of validity in the sense that high reliability is a requirement for high validity (Carmines & Zeller, 1979).

According to Rudestam & Newton (1992, p.74), limitations may refer 'to restrictions in the study over which you have no control'. During the survey period, researcher might face some obstacles that she could not overcome and it somehow influences the data. Transportation survey is always very time consuming and hectic. The survey had been conducted during summer and the temperature was above 35 degree in Dhaka. It was quite impossible to stand on a road with such high temperature. Because of this unfriendly weather, people were very annoyed and they did not want to waste time on a road in such a hot weather. Every research work has to go through some shortcomings that need to be adjusted. Then researcher moved to a new person. Short time period and in sufficient man power are big constraints. The whole survey had been administrated by researcher.

The other problem was with the attributes given in questionnaire. The entire respondent was not very well educated. The researcher tried to explain it in their native language, Bengali. But still it was very difficult for researcher to make them understood what does this mean, especially in the middle of the road. So it was a drawback of the questionnaire that is found out while conducting the survey. Questionnaire should be designed while keeping in mind with whom the survey will be conducted.

The passengers were selected for the survey irrespective of any particular bus company. Within a short period, picking up passengers for a bus company was impossible and most importantly the bus users do not use the same bus company every day. It would be tough to fulfill 100 questionnaires.

Dhaka City can be very chaotic, especially for a female researcher. Access to every place can be limited in times, and some people were found to be of discouraging behavior. The survey was in June to August, at that time Ramadan was started, so offices were closed for several days. She had to wait until the offices to open. She could not manage to some officials at the end. And also

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due to time limitations and lack of connections, she could not approach the personas from each sector like owner of bus company, driver, conductor or equipment supplier.

3.6 Reflexivity, positioning and the personality

Researchers' personality and individualistic attitudes affect the field work. There are no neutral or unbiased observers (Haraway, 1988, as cited in Moser, 2008). The ways people treat and talk with researchers vary. It was based upon their individualities more than their positionalities (Moser, 2008). Positionality is a strategy that has been employed to contextualize research observations and interpretations (Cloke et al. 2000, as cited in Moser, 2008). Positionalities refer where we belong and who I am. For example, the researcher is female, resident of the study area and also a bus user (Moser, 2008). The advantage of being an insider is that the researcher can understand what they want to say. Disadvantage is she might influence their answer.

> Kikumura (1998, p. 140-141, as cited in cited in Rabe, 2003, p 149) says*, "On one hand, advocates for outsider perspective generally argue that access to authentic knowledge is more obtainable because of the objectivity and scientific detachment with which one can approach one's investigation as a nonmember of the group. On the other hand, proponent of insider perspectives claim that group membership provides special insight into matters based on one's knowledge of the language and one's intuitive sensivity and empathy and understandings of the culture and its people."*

The knowledge produced by researcher is necessarily affected if they carry their unique individual biographies (Moser, 2008). We belong to various social categories that position us differently within power structures. It can help researchers to move away from traditional views of impartiality and claims to neutrality in fieldwork (Moser, 2008). We must recognize and take account of our own position, as well as that of our research participant, and write this into our research practice (McDowell, 1992, as cited in Moser, 2008).

According to Karnieli-Miller (2009), Power relations are affected by the content of the inquiry, and equally by the institutional context in which the study is carried out and by researcher and participants' personal motivations. While interviewing the official staffs of transport authority, the researcher and personnel shares a partnership as they possess a kind of same kind of interests.

They both are working in related field. The power structure is different here in comparison with the bus passengers. Dowling (2000) suggests the identification and efficient negotiation of power relations. Perhaps the use of the checklist in the interviews helped to create the necessary rapport that enabled the best possible responses to be obtained in spite of the unequal power relations.

The researcher is perceived as the one with power who speaks for the people without power (Rabe, 2003). In this study the researcher speak ups for improving the bus system on behalf of a huge number of bus users. In this case the researcher is more powerful than the rest. The respondents' role is done after sharing the opinion. After collecting the data, researcher will undergo the methodology and analysis and then publish it in front of the society or academic body. It is the researcher who can control the end result.

Reflexivity is a technique developed that is, self-critical sympathetic introspection and the self conscious analytical scrutiny of the self as researcher (England, 1994, as cited in Moser, 2008). Researcher's own reflection should come out in her research. What a researcher thinks from her perspectives and from her social position. In this research the researcher added her personal observations as an insider in analytical part. According to Karnieli-Miller (2009), the researcher's task is to collect the informants' stories and use skills, experience, and ethical commitment in a way that best serves the research goals. These data will undergo a process of shared elaboration whereby they might and should be processed and interpreted by the researcher without significant active participant input. It is the researchers' critical adherence to methodological thoroughness and transparency that endows the research process with credibility.

3.7 Techniques applied for data analysis

The field data was analyzed both quantitatively and qualitatively. In case of quantitative data, all data were inputted in to the Statistical Package for the Social Scientist (SPSS) 21.0 software Analyses was done according to age, sex, area and educational status. Chi square test was also applied by using SPSS to test the association of data. Microsoft Office Excel 2007 software was used to present the data in tabular format and also create charts. For the qualitative data, the information generated from the semi-structured interviews, photographs and my own observations was presented by quotations and transcriptions.

Chapter 4: Study Area

4.1 Introduction

Dhaka is the capital city of Bangladesh with a huge population of 17 million (Hoque et al., 2012). It is the 20th megacity and the most densely populated metropolitan of the world (Hasnat & Hoque, 2016). Within an area of 1,528 km², almost 13 million people live. The density is 45,000 people per km² (Asian Development Bank, 2011). Dhaka is the center of concentration of all political activity, cultural occasions and economic life of Bangladesh. The city experiences rapid growth of scattered and unplanned development. Almost 73% area is developed without any planning (Hasnat & Hoque, 2016). The rapid urbanization process, high vehicular population growth has created significant transport problems in the metropolitan Dhaka (Hoque et al., 2012).

Like people from many other developing countries, local citizens of Dhaka city in Bangladesh also enjoy the convenience of automobile transportation (Khan & Chowdhury, 2014). According to Mahmud et al. (2012), Dhaka city's traffic system is considered to be one of the most chaotic ones in the world. Flawed traffic signaling systems, narrow road spaces, no separate lanes for public transport, overtaking tendency of drivers and inadequate manpower to monitor these violations create pro-longed traffic congestions. The residents are compelled to undergo physical stress and suffer financial losses in terms of man-hours lost in the streets on working days. People are worried to get out of their houses, because the journey from home to work place takes away the vital hours that he could devote to his work (Mahmud et al., 2012).

Haphazard and unplanned land use pattern of Dhaka city has trimmed down the opportunity to construct new roadway infrastructure or to introduce modern systems for the improvement of the overall transportation system (Hasnat & Hoque, 2016).
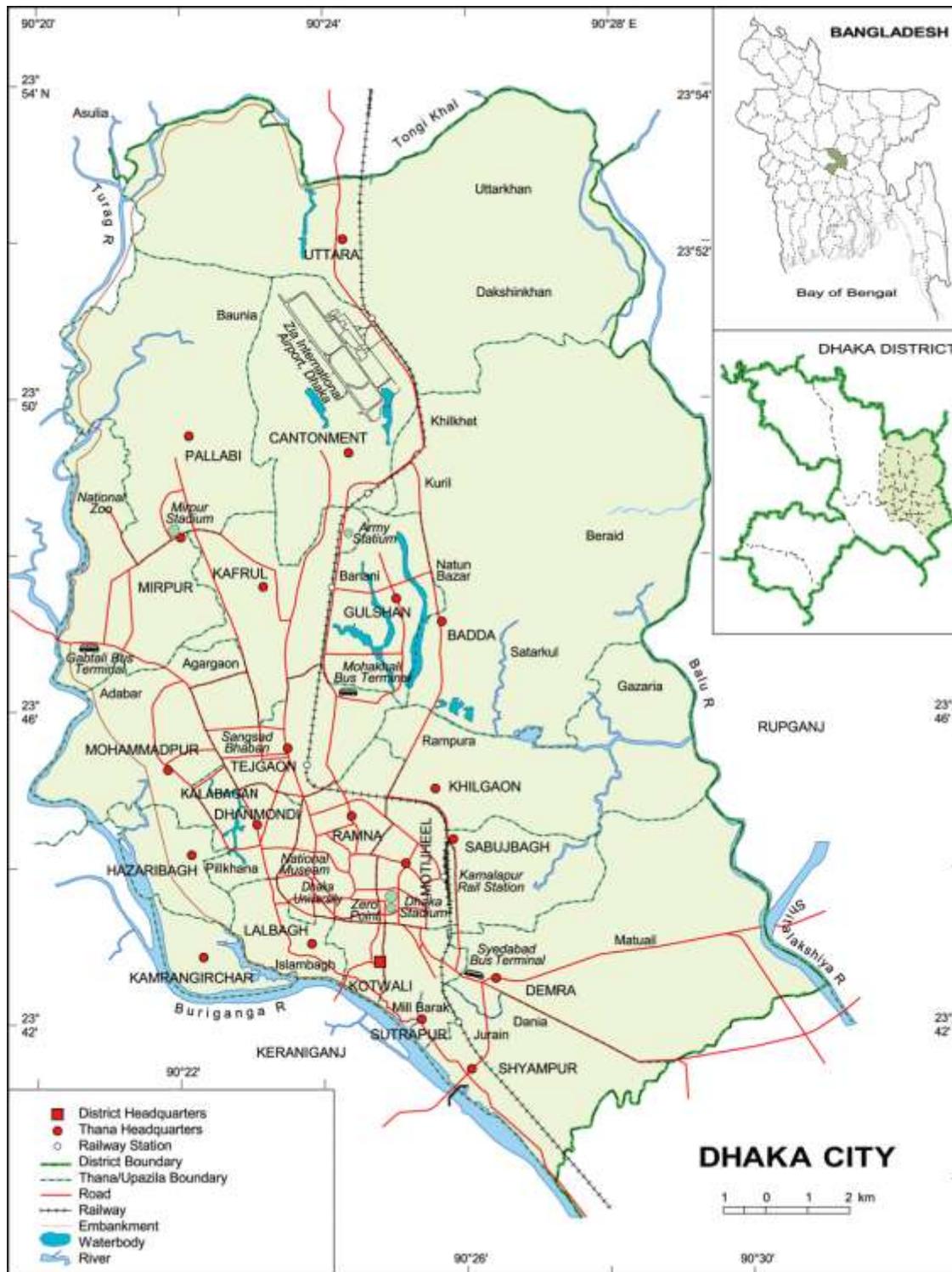
Map 4.1 Map of Dhaka City,
Source: Dhaka Bus Network and Regulatory Reform Implementation Study and Design Work (Unpublished report) of DTCA, 2014.

In addition, limited resources are invested for creating new infrastructure and increasing vehicles to meet rising transport demand. As a result, huge number vehicles inadequate and improper traffic management schemes are producing severe transport problems in the urban areas of Bangladesh (Karim, 1997).

To make a city functioning, urban transport is needed that can meet the basic mobility needs for all urban dwellers. And also can ensure physical safety, absence of congestion and adverse environmental effects (Hoque et al., 2012).

4.2 Transportation system

In Dhaka city, transportation system is road based. In general, it is said that a city should have 25% roads of its total area. But in Dhaka Metropolitan City, 9% space is occupied by roads and streets of its total space while that of other mega cities cover approximately 25%. The pavement area is only 6% of total area (Mahmud & Haque, 2008). The basic problem of the city's transport system is that the existing road network (see figure 4.2) is unable of holding the ever-increasing number of motor vehicles (Mahmud et al., 2012).

The transport system in Dhaka can be divided into motorized and non-motorized (Hoque et al., 2012). The main mode of vehicular transportation in downtown Dhaka is still non-motorized rickshaws. The approximate number of rickshaw in Dhaka is more than 45000, but only 70000 of them are officially registered (DTCA, 2014, Ch. 2). In 1998 the data showed that Rickshaws took up 38% of road space, while serving 54% of passengers in Dhaka. The private cars on the other hand, took up 34% of road space while serving 9% of the population (DUTP, 1998, as cited in Mahmud et al., 2012). In Bangladesh, motorized traffic is growing rapidly; around 300 new motorized vehicles are coming to road per year. Motor vehicles are encouraging by creating new roads. On the other hand, non-motorized transport is a significant mode, but no effective bi-cycle lanes and safe walkways, footpath are creating for pedestrian. Existing ones are occupied by vendors and ticket booths (DTCA, 2014, Ch. 2).
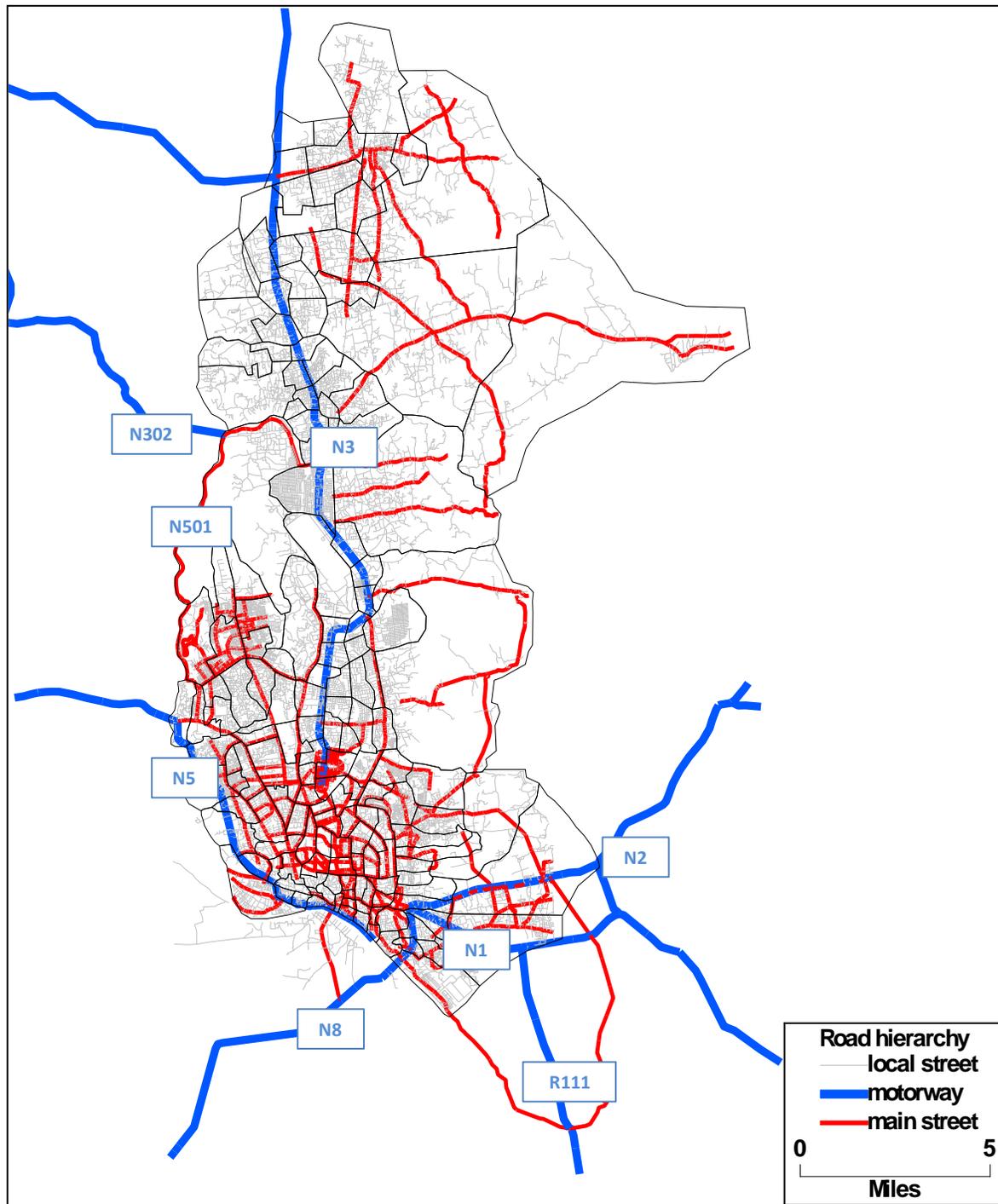
Map 4.2: Road Network of Dhaka City

Source: Dhaka Bus Network and Regulatory Reform Implementation Study and Design Work (Unpublished report) of DTCA, 2014.

The city's transport environment and system are unique among cities of comparable size in the world. As being a road based transport system need to share road space with non-motorized transport. Buses and minibuses are the cheapest mode as mass transit. These can often be characterized by poor service conditions, long waiting, delays, overcrowding etc. Another major problem is the long walking distance to bus stoppages from the residence or work place. This situation has resulted in worsening in accessibility, loss of time, safety, comfort and operational efficiency, increased costs, air pollution and psychological strain. Transport problems also threaten serious risk to the economic feasibility of the city and the environment sustainability (Hoque et al., 2012).

According to the BRTA vehicle registration record, 2016, the number of vehicles from the year 2010 to 2016 is given below in the table 4.1

Table 4.1: Number of vehicles in Dhaka City

Year	Up to 2010	2011	2012	2013	2014	2015	2016	Total
Bus	16783	1501	1218	971	1364	2221	507	24565
Private Passenger Car	163004	11423	8187	9231	12972	18422	3406	226645
Auto Rickshaw	7664	112	111	60	56	428	4	8435
Taxicab	36011	52	43	4	302	54	0	36466

Source: (BRTA, 2016)

The latest BRT study estimated that on a normal day 21 million trips are taking place in Dhaka metropolitan area (Advanced Logistics Group, 2011). Regardless of the rapid growth of motorized transport in Dhaka, non-motorized transport still remains the leading mode for the city dwellers who are mostly middle and low income groups. More than 40% of the city trips are served by walking and rickshaw (DHUTS, 2010, as cited in Mahmud et al., 2012).

4.3 Zoning

According to the public transport model zoning (168 zones), 4.5% of those are intra-zone, with the origin and destination inside the same zone. One third of the total trip production by bus is concentrated in Mirpur, Pallabi, Kafrul, Kalabagan, Dhanmondi and Mohammadpur. The Ramna zone itself is the highest trip producer, generating and attracting 12% of the total trips, followed by Mojitheel, with 9% of the total production (DTCA, 2014, Ch. 2).

4.4 Two neighborhoods

Dhaka is now divided into North City Corporation and South City Corporation. In this study, Mirpur and Kalabagan are picked from two different city corporation areas (see Map 4.1). In accordance with the limitations of time and manpower, the research was narrowed down into two specific residential zones. These two areas are selected because these areas are along side of the Mirpur road. Mirpur road is one of the major arterials of Dhaka City. Mirpur area is the starting point of the road and Kalabagan is kind of the middle part on the road. Mirpur road acts as a most important transport corridor which links between different parts of the country to the capital. It Mixed land use pattern on both sides of Mirpur road generates a huge pedestrian flow (Anowar et al., 2008).

Location and Size

Mirpur is under North City Corporation. It is situated in the north-east part of Dhaka city. The area is bounded by Shah ali and Pallabi thanas on the north, Sher-e-bangla nagar and Darus salam thanas on the south, Pallabi and kafrul thanas on the east, Shah Ali and Darus Salam thanas on the west (See Figure 4.1). The total area of Mirpur is 4.71 km². Mirpur has a population of 500373. Among this total 269051 are male and females are 231322 (Bangladesh Bureau of Statistics, 2012).

Kalabagan is under South City Corporation. It is bounded by Sher-e-bangla nagar and Tejgaon thanas on the north, New market thana on the south, Ramna thana on the east and Dhanmondi thana on the west. It occupies an area of 1.26 km². The population of Kalabagan is 118660, which consists of 67762 male and 50898 female (Bangladesh Bureau of Statistics, 2012)

Mirpur is an area of middle and lower middle income people. Kalabagan is the residents of upper middle income people. In order to find out two significantly different scenarios of public bus users, these two areas had been selected. Prskawetz et al., (2004) have observed that demographic characteristics have an important effect to the overall transportation demand. In order to provide efficient, affordable and sustainable transport, community participation, efficient urban management, cost recovery, involvement of the private sector can be key tools for (Kazi, 2003).

Chapter 5: Bus system: Assessment by Passengers

5.1 Introduction

In this chapter, the present condition of public bus system based on passengers' perspective while using for work trip had been analyzed. The first objective of this study is to find out the main problems of the public bus system in Dhaka City from the office going users' point of view. Kalabagan and Mirpur had been chosen to conduct the survey. In this chapter all the analysis and discussion had been done thoroughly based on the field survey.

Public transportation systems should be perceived as it funtions within a competitive consumer-oriented market. New systems development must be designed to provide service which is attractive, safe, secure and competitive within a growing and changing consumer market to be successful (Golob et al., 1972).

Dhaka is the most densely populated city in Bangladesh. All public facilities and Government offices are concentrated here. The rate of in-migration of people to Dhaka is very high. New arrival rate is 5 lakh per year. With each new wave come greater problems (Khan, 2009). Like all other sectors, transportation service is also facing problems in accommodating this huge population and necessities. To run a city system, an efficient transport system is needed with offering mobility as the first priority. According to Punpuing and Ross (2001), people's socio-economic condition and behavior is very important to identify the nature of transport problems.

People who are the mostly use this public transport services are the main sufferer of this situation. According to Filipović et al. (2000), passengers or service consumers should be in the first place in order to be successful. Passengers who used bus for work trips are included in this research. The researchers or intellectuals or expertise are not directly going through transports problems, they might have their perception about it by reading books, newspapers or other related studies. Only based on researchers' perspective, drawing a conclusion would be partial or one sided. On the other hand, it is also true that bus passengers cannot be allowed to take the decision regarding bus system, as they are not expert on this particular subject. By conducting the survey, what they actually face while using bus for going to workplaces and coming back

home, is included in this study. Then the officials of transport authorities had been interviewed to comment on this situation of bus service, which had been discussed in next chapter. Based on two perspectives, researcher tried to get an overview.

Travelling is a derived demand. People travel for going somewhere to do some purposes. Only travel to work is considered is this study. According to Hanson (1980), work trip is considered most important one and puts greatest strain on the urban transportation system. As already mentioned in theory chapter, socioeconomic characteristics of passengers are the most important factors affecting mode choice for short-distance trips or trips conducted within daily urban systems (Limtanakool et al., 2006).

According to the respondent, they use the public bus because they are not offered any transport facilities from their offices to go to workplace and getting back home almost every day. Transport patterns and choice also vary with person characteristics such as age, gender and monthly income (Stradling et al., 2007, as cited in Yaakub & Napiah, 2011). They spend much time and energy on the way to workplaces or coming back home. Every morning heading to office, it is kind of a battle to get into a bus or hire CNG (compressed natural gas) auto-rickshaw with a substantially huge fare. From September, 2015, the government hiked the minimum fare of CNG auto-rickshaw to 40 BDT from 25 BDT. Which is very high in comparing public bus, fare rate is 1.60 BDT per kilometer (The Daily Star, 2015, November). According to Jain (2013), in developing countries, public transport is still considered as options for middle and lower economic group of people. In South Asian countries para-transits are very common but expensive to use every day. This implies only public bus is left option for middle and lower income people. Even though, people are not happily using the public bus. There are many reasons which make people unwilling to use it, which had been thoroughly discussed in next segment.

5.2 Problems in the public bus system

According to the data, almost 63% respondents' office time is in between 9am to 10am. Most of the respondents leave home for office at least 1 to 1.5 hour before the office time, but it varies

depending on their distance between homes to offices. Among the respondents, 61.5% respondents from Kalabagan and 83.3% respondents from Mirpur use bus everyday to go to workplace.

5.2.1 Bus stops

There was a question to respondents about the distance between nearest bus stop and home. 70% respondents said that their nearest bus stops within 1 kilometer (Km). 24% people said bus stops is within 1.1 to 2 km. Countries like Bangladesh, it is fair enough to have a bus stop within 1km. People who have bus stop far than 1 km; they usually use a rickshaw or tempo to get to bus stops. Then get into a bus.

Figure: 5.1: Bus stop and ticket counters in Mirpur and Kalabagan area
Source: Field Survey, 2015

From figure 5.1, we can see the condition of bus stop and ticket booths for public buses. These all are occupying the footpaths. There are no timetables or electronic screens on bus stops for passengers. Bus always does not stop at designated bus stops. Sometimes bus stops in front of the ticket counters. According to Dell'Olio, et al., 2011, if what the users have experienced in public transport system does not match with what they have expected, then it will affect their satisfaction level. They will not very willing to use this mode again and again.

Figure 5.2: Busiest node is considered as bus stop (Mirpur, section-10)
Source: Field Survey, 2015

Figure 5.2 shows that number of buses is gathered in a place. This is an important node on Mirpur road. There is no systematic way to stop and pick up passengers. The driver stops their buses at any angle even in middle of the road. People get in bus from this kind of nodes. Formal sheltered bus stops are not actually considered as a place for waiting for a bus. When a bus stops for traffic signal, people try to get in. Scheiner & Holz-Rau (2007) discussed about user behavior depends on cultural practice. Not only, Mirpur and Kalabagan, other areas in Dhaka are suffering from serious traffic congestion and environmental quality problems. From the perspective of bus service, we suppose one reason for traffic congestion is that the bus stops frequently on the congested arterial streets and creates its own high-occupancy vehicle lane or eliminates one traffic lane (Uchimura et. al., 2002).

If bus stops are within 1km, people can walk, but in Dhaka city, pedestrian's facilities are the most neglected one. There are footpaths but not well maintained. Most of them are encroached by informal business or hawkers or even a foot-over bridge.

Figure: 5.3: Condition of Footpath in Mirpur and Kalabagan
Source: Field Survey, 2015

From figure 5.3, we can see the substandard conditions of footpaths. The road with low level of traffic separations discourages people to walk. Especially women cannot use this kind of footpaths. Eve teasers are plying on this footpaths or node of an access road. Women feel uncomfortable for using these roads. From my observation, I found that the foot-over-bridges are encroached by billboards, drug addicts and beggars. These are very unsafe for men and women both. So, it is not only the public bus service that discourages people to use it, other circumstances around it works as well. To avoid walking or any unpleasant situation people prefer not to use bus. Some people try to get into bus wherever it is accessible. They consider nodes as bus stops and wait there to get into a bus. This practice is very normal in whole Dhaka City. Table 5.1 shows that 71.2% respondent and 68.8% respondent have their bus stops within 1 km respectively in Kalabagan and Mirpur. 25% and 22.9% respondents have the bus stops within 1.1 to 2 km in Kalabagan and Mirpur respectively. Only 2.1% respondents in Mirpur and none of them in Kalabagan have bus stops far than 3 km.

Table 5.1: The respondents' distance from home to bus stop

Distance / Area	Number of respondents (%)				Total
	<1km	1.1to2 km	2.1 to 3 km	>3km	
Kalabagan	71.2%	25%	3.8%	0%	100%(52)
Mirpur	68.8%	22.9%	6.3%	2.1%	100%(48)
Total	70%	24%	5%	1%	100

Source: Field survey, 2015; Missing Data=0

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.438[a]	3	.697
Likelihood Ratio	1.823	3	.610
N of Valid Cases	100		
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .48.			

The sample size is 100. Few cells are below 5. From the chi square test, we can see that the association is non-significant. The P value is 0.697, which is greater than 0.05. If could manage a large sample size, the result would have been different.

5.2.2 Distance between home and workplace

Dhaka is a compact city. The distance from home to workplace is not too far but travel time is way too long. A large portion of people is working within 5 to 10 kilometers (Km) from their home. This distance is easily covered by bus within half an hour. Among the respondents from Kalabagan, 42.3 % people work within 5 km, 53.8% people work within 5.1 to 10 km and only 3.8% people work 10.1 to 15km. Among the respondents from Mirpur, 29.2% people work within 5 km, 39.6 people work within 5.1 to 10 km and only 31% people work 10.1 to 15km.

Table 5.2: Distance from home to workplace

Distance / Area	Number of respondents (%)			Total
	<5km	5.1 to 10km	10.1 to 15km	
Kalabagan	42.3%	53.8%	3.8%	100%(52)
Mirpur	29.2%	39.6%	31.3%	100%(48)
Total	36%	47%	17%	100%

Source: Field survey, 2015, Missing Data: 0

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.304[a]	2	.001
Likelihood Ratio	14.619	2	.001
N of Valid Cases	100		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.16.			

Chi square test shows that there is close and significant association between place of neighborhood and distance from their workplace. The P value is 0.001, which is lower than 0.05. This implies that respondents travelling for work place depend of the neighborhood they live. Mirpur area is more distant from central business district than Kalabagan.

5.2.3 Distance and travel time

Table 5.3 shows that, 36 respondent travels within 5 km to go to workplace, among these respondent, 91.7% people taking less than one hour to cover this distance by bus. On the other hand, 47 respondents said that they travel between 5.1 km to 10 km to go to workplace. Among these respondents, 83% respondents take 1.1 to 2 hours by bus. The next category is the respondents who travel to go to workplace in between 10.1 to 15 km, only 17 passengers fall in this category. Among these respondents, 88% respondents take 1.1 to 2 hours and 11.8% respondents take 2.1 to 3 hours by bus to cover this distance.

Table 5.3: Travel time to work versus distance to work

Time / Distance	Number of respondents (%)			Total
	<1hr	1.1 to 2 hr	2.1 to 3hr	
<5km	91.7%	5.6%	2.7%	100%(36)
5.1 to 10km	17%	83%	0%	100%(47)
10.1 to 15km	0%	88.2%	11.8%	100%(17)
>15km	0%	0%	0%	100%(0)
Total	41%	56%	3%	100

Source: Field survey, 2015, Missing Data: 0

Figure 5.4, shows that to cover the distance less than 5 km is taking almost one hour by bus. Without traffic congestion, it should not take more than 15 minutes. To cover 5 to 10 km, it is taking 1.1hr to 2 hr by bus. But in normal condition it should not take more than 30 to 45 minutes. That means the travel time is longer than it should be.
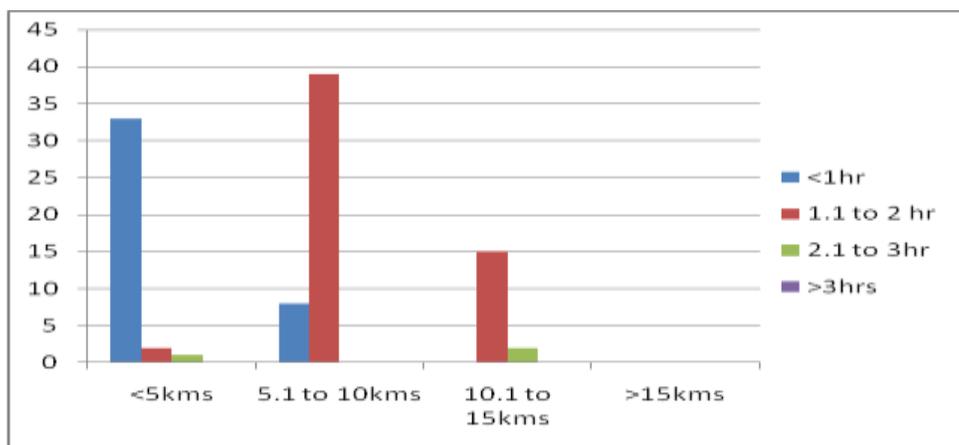
Figure 5.4: Distance versus travel time;
Source: Field survey, 2015

Table 5.4 shows that, travel time to work against travel time getting back home. From a previous table 5.3 we have already seen the scenarios of travel time of respondents. Now we will compare between this two. Total 41 respondents travel less than one hour to reach workplace by bus. Among these people, only 41.5% can return home using same travel time, 58.5% respondents take 1.1 to 2 hours. 56 respondents take 1.1 to 2 hours to go to work place by bus, among these, 48.2% respondents take the same travel time to reach home but 50% people take 2.1 to 3 hours and 1.8% takes more than 3hours. Only 3 respondents travel 2.1 to 3 hours to go work, and return home using more than 3 hours. They are all covering the same distance but travel time increases in evening times.

Table 5.4: Travel time to work and home

Time towards home / Time towards workplace	Number of respondents (%)				Total
	<1hr	1.1 to 2 hr	2.1 to 3hr	>3hr	
<1hr	41.5%	58.5%	0%	0%	100%(41)
1.1 to 2 hr	0%	48.2%	50%	1.8%	100%(56)
2.1 to 3hr	0%	0%	33.3%	66.7%	100%(3)
>3hrs	0%	0%	0%	0%	100%(0)
Total	17%	51%	29%	3%	100

Source: Field survey, 2015, Missing Data: 0

There are several reasons behind this longer travel time, like no separate lane for public bus, mixed traffic plying on same road (see figure 5.5), driver stops the on every block or wherever people waves or asked for even at the middle of the road, driver waits until the bus is full. Bus operators have own bus schedule or authorized bus stops to passengers. But no one here to monitor, so bus driver does not care to maintain these schedule or bus stops.

Figure 5.5: Long Travel Time (Mirpur Road)
Source: Field Survey, 2015

It is very difficult to find out the actual problems where the whole system is problematic. How people want the bus service is needed to find out. From my observation, when a passenger sitting in a bus, he does not want that driver stops the bus very frequently. But when the same person waits for bus on the road, he definitely would get angry if driver does not stop for him. Surprisingly, if traffic police does not allow the bus to stop at every place, passengers would not take it very easily. But still they are complaining about traffic congestion and long travel time. South Asian cultural practice is contributing in transport problems. As I already mentioned people's attitudes are very important to identify the nature of transport problems (Punpuing & Ross, 2001).

5.3 Prioritizing the attributes

According to Beirao and Cabral (2007), how consumers evaluate the quality of the service is very important. Reviewing previous studies and considering transport system of Dhaka City, eight attributes had been chosen, which are frequency, travel time, safety, accessibility, availability, security, comfort and economy. Among the eight attributes, respondents are asked to rank three the most important attributes. As mentioned in theory chapter, socio-demographic variables social structures can influence traveler preferences and behavior (Scheiner & Holz-Rau, 2007). So the analysis of importance of attributes had been done according to age group, sex and residential location and educational status. After calculating all the ranking, travel time has been found as the highest ranked attribute (see figure 5.6). In this study, work trips are only considered so, office going people normally be worried about arriving office at time. The importance of travel time is a reminder that travel is a derived demand, not something that commuters do for the pleasure of the drive (Hall et al., 2001).
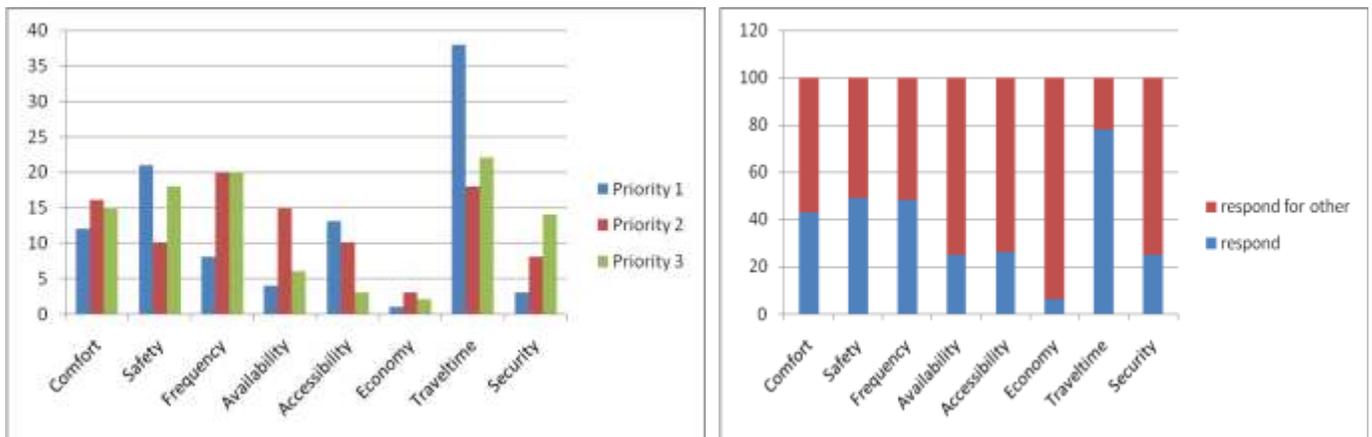
Figure 5.6: Prioritize the attributes
Source: Field Survey, 2015 (all respondents rank only three in order out of eight attributes)

55

Figure 5.6 shows prioritizing three attributes in order and in total highest ranked one. Travel time is the highest ranked, 78% respondent gave rank. Second highest is safety, 49% respondent gave rank. The third highest is frequency, 48% respondents gave rank. Then 43% respondent rank to comfort, 26% respondents ranked accessibility, 25% respondents gave rank availability and security and last only 6% respondents gave rank to economy.

Travel time

Most of the respondents agreed that longer travel time is reported as the main problem. If someone does not sure at what time he will reach at office, one cannot decide which transport he would choose or at what time he should get out from home. Among 100 respondents, 78 respondents gave ranking to travel time. Beirão & Cabral (2007) already said in their study that travel time is the most important indicator.

Figure 5.7: Travel time
Source: Field Survey, 2015

Figure 5.6 shows that, 48.72% of those respondents gave the first priority, 23.1% gave second priority and 28.21% gave third priority to travel time.

Table 5.5 shows prioritizing travel time according to the particular neighborhood. Among total respondents, 43 respondents from Mirpur and 35 respondents from Kalabagan gave priority to

travel time. I previously said in study area chapter that Kalabagan is nearer to city center than Mipur. Mirpur is fallen at a side of Dhaka city and a complete residential zone. So people living in Mipur, need to travel more than people living in Kalabagan to reach workplace or city center.

Table 5.5: Prioritizing travel time according to area

Priority / Area	Number of Reponses (%)			Total
	1	2	3	
Kalabagan	42.9%	25.7%	31.4%	100%(35)
Mirpur	53.5%	20.9%	25.6%	100%(43)
Total	48.7%	23.1%	28.2%	100%(78)

Source: Field Survey, 2015, Missing Data: 0

From the chi square test, it is seen that the P value is 0.646 which is greater than 0.05. The association doesn't show any significance. It is because the small sample size. In general, people living in Mirpur area travel longer distance than Kalabagan.

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.873[a]	2	.646
Likelihood Ratio	.875	2	.646
N of Valid Cases	78		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.08.			

The table 5.6 showing the priority varies according to gender. Male respondents are more concerned about travel time. Among 78 respondents who gave priority to travel time, 37% is female and 63% is male.

Table 5.6: Prioritizing travel time according to sex

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Female	44.8%	44.8%	10.3%	100.0%(29)
Male	51.0%	10.2%	38.8%	100.0%(49)
Total	48.7%	23.1%	28.2%	100.0%(78)

Source: Field survey, 2015, Missing Data: 0

The proportion of bus users is dominant by male, that is why a large percentage showing for male respondents. Male people use the buses so they should be more concerned about spending too much time on road..Gordon et al. (1989) found that women consistently have shorter work trips than men. The reasons are lower income, restricted accessibility, bound to give more family time. In Dhaka city, outside environment is not comfortable for women. Nowadays, women are using public transport but the percentage is very low. Female passengers most of the time hire CNG (compressed natural gas) auto rickshaw and non motorized rickshaw to avoid this waiting time and uncertainty of accessing a bus. Another important reason for not using public bus is insecurity for female passenger which had been discussed latter in this chapter

The chi square test shows the association is significant. The p value is 0.001 which is lower than 0.05.

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.828[a]	2	.001
Likelihood Ratio	15.325	2	.000
N of Valid Cases	78		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.69.			

Safety

Safety is a very important issue. Almost everyone is concern about it. Safety is the second highest ranked attribute. According to Gwilliam (2010), the rate of traffic accidents is very high in developing countries. 49 respondents think that it should be taken into consideration. Among these respondents, 42.9% people gave it to first priority and 20.4% people gave it second priority and 36.7% gave third priority. Safety issue is irrespective of gender, because accidents rates are very high in developing countries. Sometimes it depends on age group. Because young people do not care about their safety and older one do.

Table 5.7 shows that, 26 respondents from the age group 29-38, 17 respondents from age group 18-28 gave priority to safety. The dominant bus users are these middle aged groups of people. Safety concern is not only traffic collision, but also depends on the attitude toward the traffic rules and regulations. A large number of accidents are occurred during a passenger is approaching towards a running bus in the middle of a road.

Table 5.7: Prioritizing safety according to age group

Priority / Age	Number of Reponses (%)			Total
	1	2	3	
18-28	41.2%	17.6%	41.2%	100%(17)
29-38	46.2%	15.4%	38.5%	100%(26)
39-50	50.0%	50.0%	0.0%	100%(4)
51-59	0%	50.0%	50.0%	100%(2)
Total	42.9%	20.4%	36.7%	100%(49)

Source: Field survey, 2015, Missing Data: 0

From the table 5.8, it is seen that people from Kalabagan are more concerned about safety than Mirpur. Sometimes economic condition influences people to think about their value of life. Kalabagan is upper middle income neighborhood and Mipur is middle and lower income neighborhood. Out of 100 respondents, 49 respondents ranked safety. Among 49 respondents, 28 respondents are from Kalabagan and 21 respondents are from Mirpur. Among the respondents from Kalabagan, 35.7% respondents gave first priority, 17.9% gave second priority and 46.4% gave third priority to safety. Among the respondents from Mirpur, 52.4% respondents gave first priority, 23.8% gave second priority and 23.8% gave third priority to safety.

Table 5.8: Prioritizing safety according to area

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Kalabagan	35.7%	17.9%	46.4%	100%(28)
Mirpur	52.4%	23.8%	23.8%	100%(21)
Total	42.9%	20.4%	36.7%	100%(49)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.657[a]	2	.265
Likelihood Ratio	2.727	2	.256
N of Valid Cases	49		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.29.			

The chi square test shows that P value is greater than 0.05. The association is not significant. If the dataset would larger then we could find a closer association.

Safety issue doesn't depend on gender. Anyone can be injured by road accidents. But table 5.9 shows 20 female and 29 male are concerned about safety.

Table 5.9: Prioritizing safety according to sex

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Female	30.0%	20.0%	50.0%	100%(20)
Male	51.7%	20.7%	27.6%	100%(29)
Total	42.9%	20.4%	36.7%	100%(49)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.925[a]	2	.232
Likelihood Ratio	2.948	2	.229
N of Valid Cases	49		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.08.			

The chi square test shows that P value is 0.232, which is more than 0.05. The association is not significant. It proves that safety is always important indicator of public service irrespective of gender. Every human being's life is valuable.

Frequency

Frequency is another attribute to determine the bus service condition. Frequency is the thirds highest ranked attribute. Levinson et al. (2003, as cited in Redman, et al., 2013) showed in their study that increasing the frequency of public transport can increase the ridership. After arriving in a bus stop, it is totally uncertain when the bus will come in Dhaka city. The bus drivers do not follow any fixed schedule. There are no declared timetables for passengers. If bus companies have, it is like one bus at every 10 minutes. Still drivers can't maintain this because of huge traffic congestion.

The table 5.10 shows prioritizing frequency according to the neighborhood. 25 people from Mirpur and 23 people from Kalabagan gave the priority to frequency. But among respondent

from Mipur, only 8% respondent gave the first priority and among respondent from Kalabagan 26.1 gave first priority and 47.8% gave second priority. It implies that frequency is more important to the respondents from Kalabagn than other attributes. If there are no other attributes it might be increased. It is because, in Mirpur area, getting a bus is easy as this is almost the first stoppage on Mirpur road. Kalabagan is middle point of Mirpur road, so bus became full until it came Kalabagan.

Table 5.10: Prioritizing frequency according to area

Priority Area	Number of Reponses (%)			Total
	1	2	3	
Kalabagan	26.1%	47.8%	26.1%	100%(23)
Mirpur	8.0%	36.0%	56.0%	100%(25)
Total	16.7%	41.7%	41.7%	100%(48)

Source: Field survey, 2015, Missing Data: 0

Chi square test shows that few cases are less than 5, but we take this value. The p value is 0.07, which is closer to 0.05. We can assume that there is little association, which could achieve significance with an enlarged sample size.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.326[a]	2	.070
Likelihood Ratio	5.501	2	.064
N of Valid Cases	48		
a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 3.83.			

Table 5.11 shows prioritizing frequency according to gender. 18 female and 30 male passengers gave priority to frequency. Among female respondents, 33.3% but only 6.7% among male respondents gave first priority. This implies male respondents think it is important but not as first priority to change it. Because male people can get involve in pushing other passenger to get in a bus, but women cannot get involve this unwanted situation.

Table 5.11: Prioritizing frequency according to sex

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Female	33.3%	11.1%	55.6%	100%(18)
Male	6.7%	60.0%	33.3%	100%(30)
Total	16.7%	41.7%	41.7%	100%(48)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.587[a]	2	.002
Likelihood Ratio	13.784	2	.001
N of Valid Cases	48		
a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.00.			

Chi square test shows that P value is lower than 0.05. The association is significant. It implies that male is female passengers are more concerned about frequency than male passengers.

Comfort

Comfort is kind of a luxury issue in developing countries. The main purpose of public transport is not served properly how people can even think about extra service. Still everyone seeks for a comfortable journey.

Figure 5.8: Inside environment of a bus,
Source: Field Survey, 2015

Figure 5.8 shows the inside environment of a bus full of passengers. Bus is crowded with people, no space to move. Passengers are standing by blocking pathway of bus.

Table 5.12 shows prioritizing comfort according to age group. It can be easily seen that middle age people are very concerned about comfort. But elder people should have been more concerned about it. The one reason can be the aged people do not travel by bus frequently, so the percentage is low. 43% users respond for comfort. From the age group 18-28, 34.7% and from age group 29-38, 28.6% people gave first priority to comfort.

Table 5.12: Prioritizing comfort according to age

Priority / Age group	Number of Reponses (%)			Total
	1	2	3	
18-28	34.7%	21.7%	43.47%	100%(23)
29-38	28.6%	50.0%	21.4%	100%(14)
39-59	0%	66.67%	33.33%	100%(6)
Total	27.9%	37.2%	34.9%	100%(43)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.784[a]	8	.361
Likelihood Ratio	10.531	8	.230
N of Valid Cases	43		
a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .28.			

73.3% cells are lower than 5, so chi square test is invalid.

Table 5.13 shows that 18 female and 25 male respond for comfort. In a general condition we always think women are supposed to be more concerned about comfort and space. In this survey, surprisingly male passengers are mostly seeking comfortable journey. Among male respondent 32% and among female 22.2% respondent gave first priority to comfort.

Table 5.13: Prioritizing comfort according to sex

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Female	22.2%	33.3%	44.4%	100%(18)
Male	32.0%	40.0%	28.0%	100%(25)
Total	27.9%	37.2%	34.9%	100%(43)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.295[a]	2	.523
Likelihood Ratio	1.292	2	.524
N of Valid Cases	43		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.02.			

Chi square test shows that P value is greater than 0.05. The association is not significant. That means as we expect women is supposed to be more concerned about comfort. Women can be with child while travelling, so they need a comfortable seat. The sample size is not very large and may be other factors works here.

Accessibility

Accessibility is an important determinant of level of service of a bus system. According to Chien and Qin (2004), increasing accessibility to public bus can increasing ridership.

Figure 5.9: Buses are available but not accessible on Peak periods on Mirpur road
Source: Field Survey, 2015

If buses are easily accessible, people will use public bus rather than using private cars. In Mirpur, people always get access to the bus, because it is the one of the earliest stoppages on Mirpur road. But when the bus comes to Kalabagan, it is almost full so that residents of Kalabagan do not get access in to the bus. From table 5.14 shows what actually expected. 26 respondents respond for accessibility, among them 19 are from Kalabagan and only 7 are from Mirpur. 47.4% among the respondents from Kalabagan gave the first priority.

Table 5.14: Prioritizing accessibility according to area

Priority / Area	Number of Reponses (%)			Total
	1	2	3	
Kalabagan	47.4%	36.8%	15.8%	100%(19)
Mirpur	57.1%	42.9%	0.0%	100%(7)
Total	50.0%	38.5%	11.5%	100%(26)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.251[a]	2	.535
Likelihood Ratio	2.024	2	.363
N of Valid Cases	26		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is .81.			

Chi square test is invalid because 66.7% cells are less than 5.

From the table 5.15, we can see that 26 respondents responded for accessibility. Among them, 61% female and 38% male. Among female respondent 62.5% gave the first priority and 30% among the male respondents gave first priority. There is no systematic queue for getting into a bus. Whoever can get a place first he can seat there. Females are mostly suffered to get into a bus in competing with male. Because in normal condition, female are harassed and misbehaved by male passengers, if they got into the fighting to get over a place into bus, it would be worsening. It puts a lot of mental pressure as well.

Table 5.15: Prioritizing accessibility according to sex

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Female	62.5%	37.5%	0.0%	100.0% (16)
Male	30.0%	40.0%	30.0%	100.0% (10)
Total	50.0%	38.5%	11.5%	100.0% (26)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.110[a]	2	.047
Likelihood Ratio	7.141	2	.028
N of Valid Cases	26		
a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 1.15.			

From the chi square test, we can see the association is significant. P value is lower than 0.05. That implies females are more concerned about accessibility than male passengers. If they cannot get a bus in time, it will hamper their valuable time for work and personal life. Everyone cannot afford private vehicle or CNG (compressed natural gas) auto rickshaw.

From table 5.16 we can see that among 17 respondent who have done their graduation and 9 respondents who have done post graduation gave priority to accessibility. 58.8% from graduate and 33.3% from post graduate gave accessibility as the first priority. We do want to think that education matters when it comes to etiquettes and behavior. They try to avoid unwanted situation and any kind of harassment. Normal office going person cannot get involved in a physical fight just over a seat in a bus.

Table 5.16: Prioritizing accessibility according to education level

Priority / Education	Number of Reponses (%)			Total
	1	2	3	
Graduate	58.8%	23.5%	17.6%	100%(17)
Post Graduate	33.3%	66.7%	0.0%	100%(9)
Total	50.0%	38.5%	11.5%	100%(26)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.200[a]	2	.074
Likelihood Ratio	6.036	2	.049
N of Valid Cases	26		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 1.04.			

From the chi square test, the p value is 0.074. It is closer to 0.05. We can just get an assumption that the educated people are more reserved and less aggressive to enter a bus. So they do not want to involve any kind of awkward scene to get into bus. This association seems distinct and could have been significant based on a larger sample size.

Availability

Availability is an important indicator. From the table 5.17, we can see that 25 respondents out of 100 gave priority to availability. Among them, 9 respondents are from Kalabagan and 16 respondents are from Mirpur. Mirpur is more convenient for getting a bus. That is why; most of the respondents of Mipur gave availability as third priority but, a large portion of respondent from Kalabagan responded for first priority. 33.3% people from Kalabagan and only 6.3% people form Mirpur gave first priority to availability. Mirpur is near to bus depot. Different types of buses pass through this node. Buses are always available there.

Table 5.17: Prioritizing availability according to area

Priority / Area	Number of Reponses (%)			Total
	1	2	3	
Kalabagan	33.3%	55.6%	11.1%	100%(9)
Mirpur	6.3%	62.5%	31.3%	100%(16)
Total	16.0%	60.0%	24.0%	100%(25)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.660[a]	2	.160
Likelihood Ratio	3.670	2	.160
N of Valid Cases	25		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 1.44.			

Here most of the cases are less than 5, so the chi square value in invalid. Another reason is people did not get what actually meant by accessibility and availability.

Security

According to Gwilliam (2010) Public transport passengers are generally more vulnerable to physical attack than private car users. Women are more vulnerable. The sexual harassment, snatching bags and unpleasant condition in bus, misbehavior by passenger and staff are very common. From the respondents who gave priority to security, 60% are female.

From the table 5.18, we can see that female respondent gave higher priority to security than male. It is actually obvious in our country. Female suffered the most, for example eve teasing,

misbehave by driver and male passengers, unpleasant touching, snatching and sexual harassment etc. In dark weather snatching, hijacking is very common for male or female both. In a very chaotic environment in bus passengers also experience pick pocketing, stealing phone etc. Among 25 respondents, 15 respondents are female. Among female respondents, 6.7% gave the first priority, 33.3% gave the second priority. Security is an issue but comparing to other attributes, it got less weightage.

Table 5.18: Prioritizing security according to sex

Priority / Sex	Number of Reponses (%)			Total
	1	2	3	
Female	6.7%	33.3%	60.0%	100%(15)
Male	20.0%	30.0%	50.0%	100%(10)
Total	12.0%	32.0%	56.0%	100%(25)

Source: Field survey, 2015, Missing Data: 0

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.017[a]	2	.601
Likelihood Ratio	.997	2	.607
N of Valid Cases	25		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 1.20.			

Most of the cases are less than 5, so the chi square test is invalid.

Sometimes level of security problem varies in different areas. Some areas are more insecure or chaotic so that snatching or pick pocketing is higher than other areas. Table 5.19 shows prioritizing security by neighborhood. 14 respondent from Kalabagan and 11 respondents from Mirpur responded for security. Among respondents from Kalabagan, only 7.1% gave first priority and 35.7% gave the second priority. Among respondents from Mirpur only 18.2% gave

the first priority and 27.3% gave the second priority. People from Kalabagan are more concerned about their security. Economic condition may have influence about passenger's perception about their value of life. Kalabagan is an upper middle income area. Mirpur is middle and lower middle income area. In general, concern about security should have been higher, but whole country is somehow reluctant about citizens' security.

Table 5.19: Prioritizing security according to area

Priority / Area	Number of Reponses (%)			Total
	1	2	3	
Kalabagan	7.1%	35.7%	57.1%	100%(14)
Mirpur	18.2%	27.3%	54.5%	100%(11)
Total	12.0%	32.0%	56.0%	100%(25)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.770[a]	2	.680
Likelihood Ratio	.771	2	.680
N of Valid Cases	25		
a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 1.32.			

From chi square test, most of the cells are less than 5, so chi square is invalid.

Economy

In comparison to other modes of transport like auto rickshaw and taxi cab, public bus is very cheap. Though Bangladesh is very poor country, people don't think that bus fare is too high. According to Scheiner & Holz-Rau (2007), sometimes external factors or conditions affect travelers' behavior or set the preferences. The response rate for giving priority to economy is

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very low, because other attributes are found very important comparing to fare. The fare is fixed but sometimes people want to make a settlement with conductor and pay less and a little portion goes directly to driver or conductor. Sometimes people engage with a quarrel with the conductor and beat him for the fare. Passenger's attitudes are influenced by cultural practice.

In comparing with other metropolitan cites' bus system, bus fare should be reasonable. Educated people may have the knowledge of bus system of all over the world and so they can compare whether Bangladesh bus service is charging high or not. I showed a cross tabulation in table 5.20, where we can see the most educated people gave response for economy and other people just do not care about it. Out of hundred, only 6 people responded with priority to economy. From post graduation category only 2 respondents gave priority to economy.

Table 5.20: Prioritizing economy according to education level

Priority Education	Number of Reponses (%)			Total
	1	2	3	
Graduation	0.0%	75.0%	25.0%	100%(4)
Post Graduation	50.0%	0.0%	50.0%	100%(2)
Total	16.7%	50.0%	33.3%	100%(6)

Source: Field survey, 2015, Missing Data: 0

Chi square test			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.750[a]	2	.153
Likelihood Ratio	4.866	2	.088
N of Valid Cases	6		
a. 6 cells (100.0%) have expected count less than 5. The minimum expected count is .33.			

All of the cases are below 5, so chi square test is invalid. The table shows very small numbers for giving priority to this attribute.

From above discussion, it is very clear that importance of attributes depends on passengers' age, gender, and residential location. Among eight attributes, travel time, safety and frequency are most important indicators in bus services. The problem lies not only in infrastructure and also human attitude towards the service. Traffic management has been notably unsuccessful in many developing country cities. This is partly inherent due to the wider mix of traffic (Gwilliam, 2010). In developing countries, urban transport policy and programs is a major challenge (Jain, 2013). Transport policy is not gender sensitive. It is a challenge for developing countries in order to allocate separate lane for public transport, non-motorize transport, bicycle lane and informal roads and also safeguard dignity and security of women, children and elderly people (Jain, 2013). In addition there is absence of adequate planning and implementation skills (Gwilliam, 2010).

Chapter 6: Bus System: Assessment by Transport Authority

6.1 Introduction

The second objective of the study is to find out how transport authorities assess the situation of public bus system. In this chapter, I am going to analyze how the transport authorities assess present condition of public bus services. I have interviewed three official personnel (see Appendix 2). I have chosen officials from Dhaka Transport Coordination Authority (DTCA), because this organization plays a dominant role in transport sector. DTCA is a regional level transport authority and works for Dhaka City. It is also a key coordinating body with other transport related authorities such as Bangladesh Road Transport Authority (BRTA), Dhaka Metropolitan Regional Transportation Committee (DMRTC). I have also used previous transport related study; strategic transport plans etc as secondary sources and also include my personal observations.

The main objective of the transport system authorities, both at national and regional level, should be providing as much efficient and effective service to users in spite of maximizing the profit (Chu et al. 1992; Karlaftis 2004, as cited in Hawas et al., 2012). The objective should be targeted during the first few years of operation until the systems are mature enough and are well reputed to attract traditionally private car users (Hawas et al., 2012). Interaction between different acting agents of the system within and across different levels of planning and control like authorities, bus companies, suppliers of equipments, bus passengers to make a transport system efficient and ensuring perfect urban mobility. Stakeholders' interests should be in first place in designing strategic objectives for transportation solutions (Macario, 2001). As Jain (2013) said that, transportation system in South Asia is not designed considering gender, age or other characteristics of users.

6.2 Bus industry of Dhaka city

According to the Project Director, CASE Project, DTCA, the main problem of bus services is that too many operators and too many routes. The unpublished report of DTCA (2014) is also stating that current bus industry of Dhaka can be termed as unplanned and overburdened. Extreme disintegration of ownership pattern in private sector prevents professional management, control, co-ordination, policy making and capital accumulation for investment in the sector.

Private Operators

According to (Bhuiyan, 2007), the buses of Dhaka City are being operated under 4 types of company structures by ownership and type of operations, which are as follows:

Type 1: Usually a limited company, owns the buses, has its own depots and maintains the buses.

Type 2: Some vehicles are owned by the company and some are rented. Bus rental is paid through a fixed amount per trip or month.

Type 3: The buses belong to individual owners but operate under a company banner. Company charges management fees.

Type 4: The Company only provides the schedule to individual operators, who drive the buses, collect the fares and pay all the costs. The Company charges fees for providing the schedule.

These four company structures are translated into two different systems of bus operation (DTCA, 2014, Ch. 2):

Company-Based Buses (types 1 and 2): In this system the company operates the buses as pre determined frequencies and time tables. The buses board and alight passengers at designated stops and do not wait for passengers there to fill up the bus.

Non-company-based Buses (types 3 and 4): These buses also have some pre fixed timetables but they do not care to maintain. These buses wait for the passengers until the bus is full. These

buses block the carriageway at different stops or nodes and sometimes even at the starting point, especially during off-peak hours (DTCA, 2014, Ch. 2).

Both company and non company bus passengers are included in the survey. It is difficult for passenger to distinguish between company and non company buses and also difficult for them to stick with only one bus type. My personal observation as an insider is that these are all theoretically true, but none of these regulations are practiced on the road while plying.

Public Operators

Bangladesh Road Transport Corporation (BRTC) is a public company providing. From 1993, the market share of BRTC started to decrease and 5% remained. The market share of BRTC has continued to decrease further, due to increasing number of private operators and also declining number of bus of BRTC. Therefore, city bus services in Dhaka are mainly provided by private operators (either companies or individual operators) (DTCA, 2014, Ch. 2).

Fare

According to Strategic Transport Plan (STP) (2005), fares are reviewed periodically by the Government in a process of negotiation with the operators. They are officially established by the Government for fixed route public transport. The Government review of fares is not based on a systematic or regular evaluation of operating costs, because Government is not supplied with detailed information about bus operations.

Project Director, CASE Project, DTCA said, *"The route permits and fares are fixed by BRTA. But they do not have the capacity to monitor whether the prefixed fare is charging from passengers or not. So bus owners run their buses and charged extra fare sometimes, which is totally illegal. The minimum fare is 7 BDT (US$0.09) and per kilometer 1.6 BDT (US$ 0.02). In general the driver and conductor are recruited by BRTA. But, in recent years it is more common that the bus owners recruit the driver and conductor by own."*

From my observation, if the drivers and conductors recruited by the company, then the company set up a target income per day for the drivers. If they can't reach the target, they are bound to fill

the gap by giving up from their pocket. So the driver and conductors always are being concerned about their target. They wait long for more passengers until the bus is full. If conductors found that the passenger is new on this route or female, they try to charge extra fare. If they charge extra fare to regular passenger or male, the passenger would have definitely engaged in an argument and sometimes ended up with a fight. But if the bus fare is raised by Government, there no official protest by passengers occurred.

Transport sector is a huge expenditure of Government budget. In the year of 2011-2012, 6.9% of total budget was for transport (International Institute for Sustainable Development, 2012). In the year of 2015-2016, the transport budget increased to 23.8% (MediaBangladesh.net, 2015). Government subsidizes the fuel, which is a huge cost of transport operators and bus owners. The average annual consumption of petrol is 152 million liters, most of which is used for transportation. The amount of subsidy is expected to be BDT1.39 billion (US$16.9 million) during the year 2011–12 (International Institute for Sustainable Development, 2012).

6.3 Institutional Framework

According to STP (2005), Government regulatory arrangements have undergone changes to strengthen the control system of transport sector. These changes include a more prominent role of the Dhaka Transport Coordination Authority in bus sector regulation, a more active policy-making role of the Regional Transportation Committee(RTC), and the declining influence of the bus and minibus operators' association. Current responsibilities for urban transport in Dhaka are spread among a number of government institutions, with notable problems in terms of both performance and coordination (DTCA, 2014). Figure 6.1 shows the arrangement of different transport authorities.
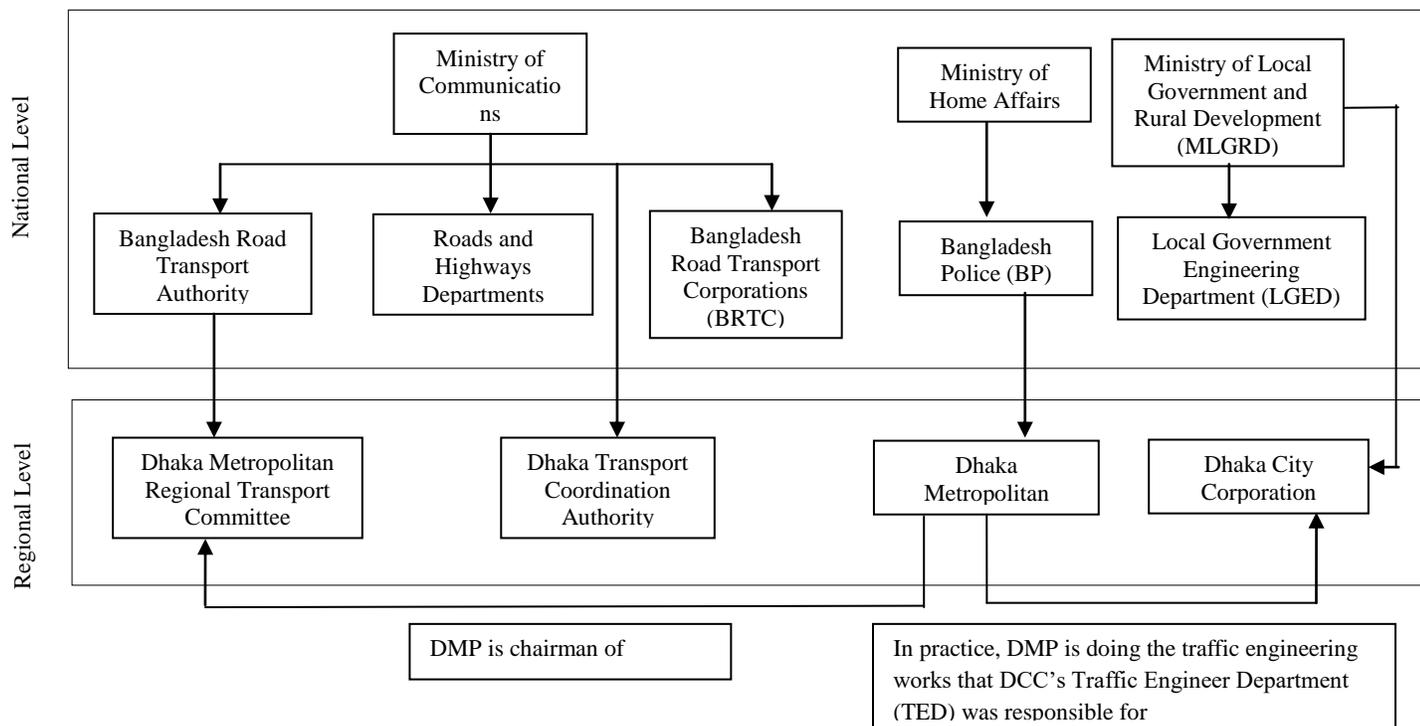
Figure 6.1: Involved authorities in transport sector
Source: ALG(Transportation, Infrastructure and Logistics)

Ministry of Communications (MOC)

The MOC is responsible for providing clear policy leadership. Policy initiatives seem to be initiated by the RTC and DTCA as well as the Ministry of Communications, Police, and even BRTC (STP, 2005). In practice, transport issues at national level such as international aid, financial budget are handled by MOC, regional and local level matters such as transport project consultancy, route permit, licenses, monitoring are administrated by DTCA, RTC and BRTA.

Role of Bangladesh Road Transport Authority (BRTA):

According to the report of (DTCA, 2014), in 1983, under section 2A of Motor Vehicle Ordinance (MVO), the Bangladesh Road Transport Authority (BRTA) was established, and later amended on 20/12/1987. BRTA started functioning in January 1988 as a regulatory body to

control, manage and ensure discipline in the road transport sector and road safety related issues in Bangladesh (DTCA, 2014, Ch. 2).

Role of Dhaka Metropolitan Regional Transport Committee (DMRTC):

According to the report (DTCA, 2014, Ch. 2), the Motor Vehicle Ordinance (MVO), section 54 empowers BRTA to constitute Regional Transport Committees (RTC) to exercise powers conferred by MVO. RTC for Dhaka is known as Dhaka Metropolitan Regional Transport Committee (DMRTC).

BRTA constituted DMRTC with Police Commissioner of Dhaka Metropolitan Police (DMP) as the Chairman. It also included 15 official members from DMP, BRTA, BRTC, MOC, Dhaka City Corporation (DCC), Dhaka Chamber of Commerce and Industries (DCCI). Four representative members (General Secretaries) from Bangladesh Sarak Paribahan Samity, Bangladesh Bus Truck Owners Association, Bangladesh Sarak Paribahan Workers Union (eg. driver, conductor, ticket booth staff etc.) and Dhaka District CNG (compressed natural gas) Owners Association respectively (DTCA, 2014, Ch. 2).

The committee is in charge for planning the bus routes, fixation and spacing of stoppages, frequency of operation, fixation of fares and distribution of buses on each route in Dhaka. But DMRTC does not keep the necessary information regarding the actual demand of passengers and sufficient professionals to assess and develop a demand-based bus route network for Dhaka city. As a result, the nature of the committee has been primarily of judicial nature (ibid).

Role of Dhaka Transport Coordination Authority (DTCA):

DTCA is responsible for coordinating transport policy, infrastructure and strategic planning. Therefore, it is the responsibility of DTCA to formulate strategic plan for the traffic & transport sectors of Dhaka and advice and co-ordinate and monitor with the concerned agencies for implementation of the plan. It also works for creating a safe and integrated transport system for Dhaka. DTCA is also responsible for the planning of transport infrastructure in Dhaka City, such as road system, bus stops, pedestrian facilities and Coordinating with transport authorities such as BRTA, DMRTC (DTCA, 2014, Ch. 2)

According to Project Director, CASE Project, DTCA, transport related institutions have a lacking necessary expertise and resources for public transport planning.

Dhaka Metropolitan Police (DMP)

DMP serve the dual functions of criminal and traffic enforcement. DMP exercises a strong influence over public transport policy through their chairmanship of the RTC and influence over BRTA, as well as their on-street traffic enforcement activities (STP, 2005).

Apart from this official organization, there is another influencing body, which is Bus Operators' Association. The highly fragmented nature of the bus industry is due to bus operatos' influence on bus sector. They try to control and influence the issues related to bus system, such as: route permit allocations, fare, schedules. Around 2003-04, some bus operators are trying to operate outside its influence (STP, 2005). This is because bus associations try to control the bus owner. But some owners do not want any interference in their business.

Driver and staffs arrangement

Most of buses are operated by private operators; just a small amount of share is held by BRTC. In case of public operators, they employ drivers and conductors officially. On the other hand, private operators employ in different ways. Sometimes, drivers and crew themselves are owner of the bus or rent the bus on a daily or monthly basis, or work for a bus owner on an incentive basis. They operate the vehicle either at their own revenue risk. They require enough passengers to make a profit in addition, covering the cost of fuel, rent, maintenance (STP, 2005). When driver rent a bus for certain period, the driver tries to earn as much as he can. For this reason, he stops without a bus stop, pick up passengers from anywhere, charge extra fare and wait until the bus is full. He has to pay the owner a certain amount, whether earn a single penny or not.

Those drivers that are directly employed by bus owners are under similar pressure to carry sufficient passengers in order to meet operational expenses as well as salary incentives. No employment guarantees is provided and the driver and crew handle all fare payments on the bus (STP, 2005). These drivers and conductors sometime try to income extra which is out of the count of the owner and goes direct to their pocket. The owner, driver and conductors do not care

about the service quality at all, because the demand is so high people are bound to ride the buses to get to work or home. As I already mentioned in chapter 5, the alternative options are way too much pricy.

Drivers, crew and other staff working for the professional operators typically work on a more secure employment basis and are paid not according to how many passengers they carry, but according to the number of trips made. The professional bus operators also typically employ administrative and managerial staff, maintenance staff, ticket booth operators, and marketing and sales staff (STP, 2005).

6.4 Limitations of the authority

These Government institutions for transport sector in Dhaka have notable problems in terms of both performance and coordination. Transport authorities lack the necessary expertise or resources for public transport planning (DTCA, 2014, Ch. 2). Incapability to enforce the policy is because of institutional weakness or political unwillingness or may lack of coordination between the different organizing bodies.

Project Director, CASE Project, DTCA said, *"BRTA, DTCA and DCC all the organization run by their own manuals. They do not have any coordination. If they coordinate with each other, they fear might have loosened their power. This is one of the root causes why they do not have capacity."*

Different governing bodies work independently without any consultation with each other. They all have separate plans which sometimes conflict with each others.

He also added, *"Bus service is a business. If there so many operators, they got involved unhealthy competition within themselves. Five or six operators run their buses on same route. These are not monitored on regular basis. Political support is necessary, but to present a proposal of reducing bus routes or operators, we need to study, survey. To do this, we do not have any institutional capacity. We do not have expertise."*

According to Jain (2013), in developing countries, private buses operate tend to choose the profit making routes. This is also same for Dhaka. The bus operators try to run the buses on that route,

where profit can be easily made, not that one where is necessary. For example, on Mirpur road, there are so many buses but other areas like Bashabo or Rampura, bus is insufficient is there. According to DTCA (2014), there are generally considerable discrepancies between official route permits and routes actually operated on the ground.

Project Director also added, *"Sometimes bus operator take the route permit but do not buy bus and sale the permit with high price to someone else. There is no check and balance. There are 152 routes but not enough buses in comparing with route permits"*

The person who illegally buys the permit, he then buys an old model bus and run it anyhow without regular maintenance. They always concerned about profit maximizing not improving the services. They do not spend the money for maintenance like repairing glass, seats and clean the inside area of the bus.

At first as a researcher I thought the problem was embedded in policy. But unfortunately polices perfectly stated to run a bus industry. The main problem is associated with implementation or enforcement. The enforcement body is supposed to monitor all kinds of violation. They do not have the sufficient man power and those who are supposed to monitor mostly corrupted. Another reason for having substandard service is lack of political willingness to stop the violation. The rules and regulations are all stated in the official policy not in practical field. This is part of political-economic culture and power system in Dhaka.

In the year 1999-2005, the World Bank funded project to reform bus operation in Dhaka failed. The main reasons behind this failure was recognized as absence of coordination between the transport authorities, key ruling political party leaders dominate bus owners–varied ownership competition in market, too many bus operators, poor regulation and lack of enforcement, uncontrolled corruption (Akbar & Campos, 2009).

Government is engaged with international support for strengthening transport authority. An article on AFD's (Agence Française de Développement) website named "AFD supports an efficient urban transport management for Dhaka"(2015) said that, "*on April 22nd 2015, AFD signed a convention with the Government of Bangladesh to provide a grant of €2.85 million, with delegation by AFD, European Union under the Asian Investment Facility (AIF), will be used to*

strengthen the capacity of DTCA. Workshops and trainings will be offered in domains such as traffic management, parking management so as to scale-up the operational team of DTCA so that the organization (DTCA) can have a greater control on movements of the city. Funds will be dedicated to find innovative ways to better track and understand commuters' movements, restructure the city bus network." Accordingly, this convention proves that transport authorities have institutional lacking and insufficient and inefficient expertise and no control over whole transport system of Dhaka City.

According to Macario (2001), if there is more than on organizations in a system, they can differ to a large extent both at the planning and control stages. For the design of a management model it is essential to identify the main interaction points and also components of the system.

6.5 Public bus: an unattractive option

According to Lai and Chen (2011), customer satisfaction significantly changes customer loyalty and behavior intentions in various industries including public transport system. If passengers do get what they deserve form a service, they might not be interested in that service in future.

I discussed with two transport modelers of DTCA about the problems which make public bus is the last option for passengers. They said that the operators and crew of the public buses do not maintain any systematic behavior. Bus drivers and conductors do whatever they like while plying on road. To monitor and correct this kind of behavior the authority does not have manpower. Everyone is very reluctant about this. One of the transport modelers said this kind of attitude problem is very common in the whole Indian subcontinent. Operators and passengers both do not like to obey the rules and regulations. Jain (2013) discussed in "Sustainable urban mobility in southern Asia" about the reluctant attitudes of transport providers and users towards traffic rules.

From personal observation, I felt the same that we are in a culture of lack of loyalty and adjustments to rules and regulations. Road user does not care about maintaining traffic rules if no one is there to stop. They always look for an escape gate.

One of the female transport modelers added, *"I am also a bus user. I know how the bus driver and conductors behave. They do not follow any schedule, stop without an authorize stoppage, pick passenger without offering seats, even though if it is a mandatory seating service. They do not have time limitation of halting on a particular stop. Nobody knows how long bus will be stopped. Sometimes conductors pick up passenger without completely stopping the bus."*

From my personal observation, commuting between home and office is an everyday battle in Dhaka city. First, the concern is getting into a bus, then getting a seat and then getting out of a bus is another battle. In the morning, buses are overloaded, after crossing the entire crowd, when one can reach at the door, driver starts. Passengers have to shout to stop the bus. The driver stops the bus at middle of the road. This is the most common scenario in Dhaka but residents of Dhaka take this situation as very normal. According to Jain (2013), driving behavior is usually characterized by frequent flouting of traffic rules and regulations, aggressive, high speed driving and overtaking, freedom of parking on roads and excessive horn blowing. This not only leads to frequent accidents, but also quarrels and crimes on roads.

She also added, *"Women are mainly sufferer from this kind of services. Women with children and shopping bags cannot get into a running bus. They prefer rickshaw and CNG (compressed natural gas) auto rickshaw instead of bus. Authority does not monitor. Sometimes they do, but not a regular basis."*

Bus driver sometimes do not want to take female passengers. They pay the same fare as male passenger does. There are some restricted seats for female but most of the time these seats are grabbed by male passengers. The male passengers do not have the minimal courtesy to leave the seat for a female one, even nor for elder one. Of the conductor protests, the male passengers burn out on him.

The regular female passengers of a bus, need to wear a harsh look and maintain a sharp tongue from finding a bus to getting a comfortable seat free from all kinds of unpleasant situations (Khan & Chakma, 2015).

One of the transport modeler added, *"Another reason of stopping anywhere is driver and conductors are paid way too little. They try to earn by this kind of illegal ways. They wait until bus is full; they halt without stoppages to pick as much passengers as they can. The extra money they earn goes directly to drivers' and conductors' pocket."*

From my personal experience I saw that if driver and conductor do not stop wherever the passenger asked for, the passenger beat them. They are bound to stop at every block. In addition, passengers sometimes do not want to give the actual fare. To fulfill their daily target, they stop without stoppage and take passengers.

We share a culture where we do not have mutual respect for others. Drivers and conductors are socially lower class, people of middle and upper middle income think that they can control or beat the people who are economically lower class. The problem lies on both sides to some extent. It is a vicious circle. If I add being an insider, the passengers, for whom the service is, they are not at all caring and respectful about the service and the involved people with the service.

Chapter 7: Major Findings, Discussion and Conclusion

This chapter summarizes major findings of this research and discusses them in detail and then draws some recommendations. Again, the study aims to investigate the existing problems in public bus services in Dhaka City from the passengers' perspective and to find out how transport authorities in Dhaka City assess the situation of bus service as a part of transport system in the city. The recommendations are given for purpose of helping the policy makers, planners and involved officials in their future initiatives for improvements of transport sectors and for further academic works.

7.1 Major findings

- Travel time, Safety and Frequency are three most important indicators of bus service according to regular bus users for work trip, filling in a questionnaire survey.

- Importance of indicators depends on age group, sex, location and educational status.

- Longer travel time is main problem of Dhaka City, which indulges other transport problems

- Factors outside the bus service make bus transport an unattractive option.

- Transport authorities are helpless with not having institutional support and political willingness.

- Pedestrian facilities are the most neglected among road user or mobility group.

- Service providers' and consumers' reluctant attitudes towards the rules and regulations makes the situations worsen. It is impossible to monitor each and every road user if they are not self concerned about using the road. On the other hand, enforcement authority is undermined by corruption and bribing.

7.2 Final discussion and conclusion

In this research, by using quantitative and qualitative method I tried to find out the problems in public bus services in Dhaka City. For this purpose, two neighborhoods, Mirpur and Kalabagan had been chosen to conduct the questionnaire survey. The survey had been conducted mostly on the roads of these neighborhoods. A small number of surveys had been done in some offices. It was getting really tough to approach unknown people on the road. The semi structured interviews had been conducted in DTCA's offices. In the qualitative part, some secondary sources had also been used. With reference to the methodology, both primary and secondary sources of producing data were used. To create a more comprehensive research design, triangulation approach was adopted even though utmost weight was given to quantitative part.

Questionnaire survey with primary informants, who are 100 bus passengers of different bus companies, was used as quantitative data. SPSS software had been used to analyze the quantitative data. The research tools used in generating the qualitative data were: semi-structured interview with three key informants, one of them were project director, CASE Project of DTCA, two transport modelers of DTCA, personal observation and some photographs. Secondary sources of data were obtained from reports produced by DTCA, recent articles, books and journals in the libraries and on the internet, census data and newspapers.

Based on my research objectives I can summarize my findings written as below:

7.2.1 Problems in public bus system

First objective was to identify the problems of bus service in Dhaka City from passenger's perspectives while traveling to work. The study found out that bus users are not very willing to ride on a bus. They use bus, because they are unable to afford other transport modes. Jain (2013) already mentioned this kind of situation in South Asia. Bus is the only option as public transport in Dhaka City. There exists some human-hauler, tempo, but these are used for short distances. There are also exists para-transit like CNG (compressed natural gas) auto rickshaw, taxicabs and non motorized rickshaw. These options are very pricy. People use them occasionally or in case of emergency. In this study, I considered only work trips. As I already mentioned work trips put

greatest strain on the urban transportation system (Hanson, 1980). These people do not use CNG (compressed natural gas) auto rickshaw for traveling to work. Because, CNG (compressed natural gas) auto rickshaw is not available everywhere when you need and drivers are always not ready to go where you asked for. It would also not be very reasonable to spend most of their income on transport.

The study also reveals that the accessories related to bus like, bus stops, fixed schedule, behavior of driver and conductors, inside environment of bus are not very convenient. According to Dell'Olio et al. (2011), what passengers want to obtain to be fully satisfied with the service offered should be matched with what the users have experienced and perceived on public transport. Bus stops are not very far from most of the people's home. The path towards the bus stops is not very comfortable or safe to walk. They need to hire a rickshaw to go over a stop. Sometimes buses do not stop at designated stops. If bus is not full, bus driver waits for passengers, it may cause someone is getting late for work. They pick up and drop off a passenger in a running bus. The drivers may perform reckless driving and may collide with other buses. Passengers also said that travel time from home to work is not same as when get back home. They also had to wait a longer to get a bus in the evening.

For female passengers, the situation is even worse. They face all the other problems like male passengers do. But, being a woman, they also face misbehavior from staffs of bus, male co-passengers, even sexual harassment. These harassments come in various forms like inappropriate touching, penetrating stares, lewd gestures or comments and sex attacks, and most of the victims cannot and sometimes do not protest.

> "Jasmin Papri, a working woman in Dhaka, said public buses have become a golden opportunity for some pervert male passengers."If you are a female passenger then you will face numerous problems and a female passenger means anyone can touch her in an inappropriate way," she added. "Once I had to get engaged in a battle of words with passengers when she protested such behaviour of a fellow male passenger in a public bus. It is not that easy to protest, as all male passengers might go against you, but we should not spare anybody," Papri added" (The Daily Star, 2015, August).

A baseline study on 800 women and girls and 400 men and boys shows 86 percent women face derogatory comments from bus drivers and conductors. The study found that about 13 percent women keep from public transports to avoid sexual harassment (Khan & Chakma, 2015).

The main problem is that the bus industry runs without a system of regulation and controls which are not enforced. To enforce a law, there should be a monitoring team and political support. Dhaka is very densely populated city, to monitor thousands of violations; transport authority needs a strong and sufficient monitoring man power. Political willingness is also necessary so that the authority can perform their work properly.

7.3 Ranking the attributes: affecting the service quality

In a previous study showed elements of performance can be different in different geographical and socio economic condition (Vuchic, 1981). Passengers' travel behaviors are influenced by residential location choice (Choocharukul et al., 2008). The analysis had been done according to different age groups, sex, area and educational status. The questionnaire gave the respondents eight attributes, they were supposed to rank the most three important attributes. Attributes are frequency, travel time, safety, accessibility, availability, security, comfort and economy. The three higher ranked attributes are travel time, safety and frequency which reflects the actual scenario of transport system of Dhaka City. According to Beirao & Cabral (2007), in case of public transport, authorities and operators need to understand how consumers evaluate the quality of the service.

Travel Time

Respondents reported that longer travel time is the worst problem in bus service. Among the respondents, 62.8% male think that travel time is the most important and only 37.2% female considered travel time as important one. According to Gordon et al. (1989), women travel short distance for work trips. On the other hand, 55.1% respondents from Mirpur considered travel time an important indicator and 44.8% respondents from Kalabagan ranked travel time. Residents from Mirpur have to travel more to reach office than Kalabagan. In general, all over the city, traffic congestion is the reason why people are spending too much time on the road. Longer travel time is not an inside problem of bus service; it is associated with the whole

transport system. In Dhaka, the main reason of the occurrence of traffic congestion is the mixed traffic plying on same road without a lane separator. Especially Mirpur road on which the study focused, already loosen its characteristics because of various land use types such as residential, commercial, industrial, recreational and educational are developed on both side of the road. There are very much access roads coming out from Mirpur road to serve the particular land use, which congest the traffic flow.

Safety

The second highest reported attribute is safety. Passengers do not want to travel by bus because the drivers are not that careful about their driving. According to Gwilliam (2010), perception of vulnerability influences the travel patterns. Data showed that 49 respondents ranked safety, among them 53% respondents from 29-38 age groups. The ranking also varies according to socio-economic condition of respondents. The percentage of respondents from Kalabagan is higher than Mirpur in ranking safety. Surprisingly, in ranking safety, percentage of male is higher than female. It is because; the percentage of female passengers is low of the bus transport in Dhaka. Women are not willing to ride on a bus, especially when they are travelling with children. Drivers and conductors are not concerned about picking up and dropping off the passengers. Accidents are occurred during the dropping off or picking up a passenger. Drivers do not completely stop the bus while they picking a passenger. They stop their bus at the middle of the road to gain time or reduce delays. The door of the bus is always open, so that anyone at any situation can get into a bus, which is even riskier.

Frequency

The third highest reported attribute is frequency. Almost 47.9% respondents from Mirpur and 52% from Kalabagn gave priority to frequency. Among the respondents of Kalabagan, 26.1% gave the first priority, but only 8% of respondents from Mirpur gave the first priority. Buses are more frequent in Mirpur than Kalabagan. As already said in study area chapter, Mirpur area is almost the first stoppages of Mirpur road. According to the respondents, buses are not very frequent and they have to wait long for the next bus and they do not know how long they will have to wait. There is no fixed timetable revealed for passengers. Maybe the bus companies have

some target number of trips, but none are declared schedule for public. Because of the traffic congestion, bus drivers cannot maintain the inside timetable fixed by the company or owner. They even cannot make the one trip within designated time period and then it creates the delay for following trips as well and it continues; accordingly brings longer and uncertain waiting time for passengers.

While conducting the survey I felt that people are very reluctant about the survey questions regarding the bus service. They use it but not very concerned about any improvement regardless of their educational state. They went through this kind of survey and after that nothing changes. They made their peace with this kind of problem and they take it for granted. They cannot even think about a better system they can deserve. Now they do not expect for changing for betterment. Moreover, when I told them, that this is an academic research, after that they feel more unenthusiastic to answer my questions and even talk with me.

7.4 How authority assess the situation

My second objective was to find out how the authority or service provider assesses the situation of bus service. The study found out that bus industry is not well organized to serve the people. The bus industry is fragmented and unplanned. There are too many bus companies. The number of buses is not insufficient, the problem lies in management. There exists a system of bus routes in Dhaka City, but buses are not well distributed in each route. Bus companies are concerned about profit maximizing. The bus owners try to run the business anyhow. They care little about passenger and services. The authorities are not well equipped to monitor all these activities. The transport authorities do not have political and institutional support. The bus associations are linked with political leaders. The businessmen are holding the ownership of this bus companies. The political leaders are backed by these businessmen. The enforcement police are also corrupted. People who violated the rule can escape by bribing them. All the agencies of transport system are in a vicious circle. The system need to reorganize from the very beginning. According to Macario (2001), interaction between different working body within and across different levels of planning and control like authorities, bus companies, enforcement agency is important. The most importantly passenger's desires should come first while taking any kind of planning and improvement initiatives for public transport system.

Bangladesh is a poor developing country of South Asia. Population density is so high that it creates tremendous pressure on space and transport services. Authority understands the problems but they are helpless and cannot offer the services to every citizen. Poverty is another reason that authority cannot implement the best possible solution. The authority does not have proper information about any kind of problems sometimes and cannot take a counter measure to solve it. We do not have the culture to complain and getting an immediate result. A few people in Bangladesh can afford education; so most of them are ignorant about public services and improvements.

To make the service convenient and attractive, authorities need to take into consideration of passengers' preferences; passengers should be asked how they want the services. If public transport is efficient, private car use will be reduced. Countries like ours could not afford the road space for car. Only a few percentage of people are car users. Most of the citizens depend on public transport. We do not have any other forms other than bus as public transport. We should introduce metro rail and water transport. Our Government initiated a project of installing metro rail. Hopefully it will reduce the excess demand on bus industry to some extent.

7.5 Recommendations

7.5.1 Initiatives to reduce traffic congestion

As the study reveals that longer travel time and frequency are two most important attributes. Traffic congestion is the reason for having longer travel time and also not having frequent buses, so reducing traffic congestion may help bus services to regain its quality to some extent. There is an urgent need to reduce traffic congestion in Dhaka City. Road expansion and construction of highways are short term solutions. According to Dutzik and Pregulman (2003), road capacity expansion usually leads to increases in vehicle travel. Portland and Vancouver experienced the greatest expansion of highway capacity and vehicle travel in the state in 1990s, which contributes a huge degree of congestion. Again, a 2000 review of 26 years of transportation data determined that one-third of all new road capacity in the Baltimore/Washington, D.C. area has been used up by new travel that would not have occurred without highway expansion (Dutzik & Pregulman, 2003, p. 5). Sometime increasing supply with increasing

demand is not the best strategy. Demand needs to be managed. Transport authorities should think about strategies for long term solutions.

Electronic road pricing (ERP)

An attractive way is electronic road pricing (ERP) system. Established in April 1998, the ERP system is used to electronically monitor and track only vehicles entering a restricted zone. When the congestion level in the restricted zone exceeds a preferred threshold level, the system can impose a demand sensitive congestion toll on every vehicle without requiring them to slow down or stop and ensures a smooth traffic flow (Goh, 2002, p. 32).

According to Odeck & Bråthen (2002, p. 253), tolls can be used as a financial instrument for road construction. In the three largest cities of Oslo, Bergen and Trondheim cordon tolls make the main funding of road investments, and to a certain extent, public transport investment programmes.

Singapore had adopted congestion pricing in 1975, with a flat rate S$3 to enter central business district during morning rush hours. In 2003, London began charging a premium to drive into the city's congested business district, where traffic congestion threatened the city's economic competitiveness and quality of life. Congestion quickly dropped and average traffic speed increased (Agyemang, 2009, p. 96).

Reduce private cars use

As I already mentioned in theory chapter that, policy interventions can be introduced to reduce car travel. These include road pricing, road closures and bus priority lanes, parking regulations. Previous studies found that, road pricing offers the most effective means of reducing car congestion (Fujii et al., 2001; Gärling and Schuitema, 2007; Saleh, 2007; Green & Stone, 2004, as cited in Graham-Rowe et al., 2011, p. 402). The Seoul Metropolitan Government (SMG) introduced a system of parking ceilings, which reduced the existing parking supply requirement from 40% to 20% for any new commercial and office buildings to be built in the central business district (CBD) (Hwang, 2001, as cited in Lee et al., 2006).

Travel Demand Management (TDM) Measures (Steg, 2003, as cited in Gärling & Schuitema, 2007) can be implemented to reduce car use. TDM measures can be categorized into four types.

Table 7.1: Travel demand management measures (TDM)

Physical change measures	Legal policies	Economic policies	Information and education measures
−improving public transport −improving infrastructure for walking and cycling −park & ride schemes −land use planning to encourage shorter travel times −technical changes to make cars more energy-efficient	−prohibiting car traffic in city centers −parking control −decreasing speed limits	−taxation of cars and fuel −road or congestion pricing −kilometer charging −decreasing costs for public transport	−individualized marketing −public information campaigns −giving feedback about consequences of behavior −social modeling

Source: (Steg, 2003, as cited in Gärling & Schuitema, 2007, p. 141)

From table 7.1 describes four types of TDM measures that can be applied to reduce private cars. The most important one is improvement of public transport can reduce the dependency on private cars. Direct policy to discourage private car users like restricted zone, removing parking lots etc can be effective. Increasing road pricing and tolls are also very successful in many cities. Lastly, campaign and public awareness rising is also very important for long term effect.

7.5.2 Initiatives to reduce accidents rates

Accident rates are very high in developing countries. People are very reluctant about traffic rules and regulations. Road user behavior is of paramount importance to road safety. Drinking and driving, speeding, driving against red lights and not wearing seat belts are examples of road user behavior. These careless attitudes increase the risk of traffic accidents (Bjørnskau & Elvik, 1992). The upgrading of road infrastructure has normally been seen as a technique for reducing fatalities and injuries associated with traffic crashes (Noland, 2003, p. 599). Accident frequency is reduced if there separate lanes for traffic with different speed (Milton & Mannering

1998, as cited in Noland, 2003, p. 600). Speed is one the major contributor in road traffic crashes. Passenger safety can be enhanced by speed regulations in developing countries. Police is responsible for monitoring the violation but involvement of civil society is essential to create self awareness to control road traffic crashes, injuries and fatalities in developing countries (Afukaar, 2003). This enforcement could be undermined by corruption and bribing.

7.5.3 Pedestrians' facilities

Pedestrian facilities are the most neglected one in Bangladesh. Especially in big cities people do not want to walk. Walking culture is not very common in Dhaka City. People take rickshaw to cover the short distances or to go to bus stops. It is because the environment for walking is not very friendly. People especially women do not feel comfortable to walk. Government should take initiatives to construct more sidewalks, improve the condition of footpaths, foot over bridges. There exists no provision for elderly or handicap people to move alone. Most of the footpaths are encroached by informal business or ticket boots for buses. In Europe and North America, pedestrians are always facilitated with sidewalk, boulevard, bicycle lanes, zebra crossing. People will definitely walk if you can create the environment. Security is also a main concern for the pedestrians. Walking is good for health. Most of city people face health problems like obesity, cholesterols. Climate is also responsible not having walking culture. Warm and humidity are the characteristics of Dhaka City's weather. It creates uncomfortable walking conditions. In Malaysia, the Tenth Malaysia Plan for the year 2011 to 2015 (Government of Malaysia, Economic Planning Unit of the Prime Minister's Department, 2010, as cited in Leather, et al., 2011, p. 29) focuses on a new approach toward building vibrant and livable cities. The new approach focuses on "public transport as the primary spine, supported by a pedestrian-friendly street network." It also states that city planning shall promote a human-scale development approach—"designing cities to reduce the need to travel and to encourage the presence of people-centric activities within the urban landscape by concentrating a wide range of activities and amenities within walking distances." (Government of Malaysia, Economic Planning Unit of the Prime Minister's Department, 2010, as cited in Leather et al., 2011, p. 29).

Singapore's Land Transport Master Plan is a "people-centered" plan. It specifically states that in terms of pedestrian facilities, providing more covered link ways and pedestrian overhead bridges

and underpasses are main priorities. The target is to have 384 pedestrian overhead bridges with fitted shelters (192 in 2008) by the end of 2010 (Leather et al., 2011).

7.5.4 Encourage bicycling

Bicycling trends is not very common in Dhaka city. Very lower percentages of people use it. They do not use this transport for work purpose; it is still as leisure ride. Bicycling is healthy. Even if cyclists face more accidents this is out weighted by general physical condition improvements. Number of scientific studies assessing the impacts of bicycling on levels of physical activity, obesity rates, cardiovascular health, and morbidity (Anderson et al., 2000; Bassett et al., 2008; Bauman et al., 2008; BMA, 1992; Cavill et al., 2006; Dora & Phillips, 2000; Gordon-Larsen et al., 2009; Hamer and Chida, 2008; Hillman, 1993; Huy et al., 2008; Matthews et al., 2007; Roberts et al., 1996; Shephard, 2008, as cited in Pucher et al., 2010, p. 106). Transport planners should have a look to create or think about creating provision for bicycling. It will reduce the extra pressure on public bus. Striped bike lanes and separate paths are common in North America and Europe. Many European cities also use pavement coloring and other innovations such as "cycle tracks," which function like a bike lane but have greater physical separation from motor vehicles (Pucher et al., 2010). A cross-sectional study at the city level of over 40 US cities found that each additional mile of bike lane per square mile was associated with an increase of approximately one percentage point in the share of workers regularly commuting by bicycle (Dill & Carr, 2003). Bike parking is one of the key aspects of integrating bicycling with public transport bike end ride. Especially secure, sheltered parking to prevent theft and to protect bicycles from inclement weather (AASHTO, 1999; APBP, 2002; Fietsberaad, 2006; Litman, 2009; Netherlands Ministry of Transport, 2009; Pucher, 2008; USDOT, 2007, as cited in Pucher et al., 2010, p. 112). Martens (2007) surveyed the impacts of improved bike parking at both rail stations and bus stops in the Netherlands, in the context of specific pilot projects during the 1990s to improve integration of bicycling with public transport. He found significant increases in both public transport use and bicycling.

7.6 Scope for further research

This study is based on the survey of 100 passengers from two neighborhoods. For any future work one should include other areas to get a more practical view. I only interviewed the transport authorities, but future researcher can include or get an expert opinion from the academicians who concentrate in transportation study.. The study on public bus can focus not only in Dhaka city but also other cities in Bangladesh. In this research, passengers were asked only about existing problems, but in future works, passengers should be more involved in giving solution for improving of service quality. To do this, research questions can be asked to the passengers: What is the possible strategy transport authority should take to improve the service quality? Finally, this study gave much attention on existing problems of public bus service in Dhaka City. The other transport problems like excessive car use, traffic congestion, environmental problems due to motorizations, traffic accidents etc could be prospective research areas.

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Appendix 1: Questionnaire for primary informants

Questionnaire Survey for Bus Users

(The survey is voluntary and completely anonymous. The results of this survey will be used for academic purpose only.)

Respondent No.:   Address:

Put (✓) mark on selected option

Age		Education		Sex	
18-28		Primary		Female	
29-38		Secondary		Male	
39-50		Graduation		Other	
51-59		Post Graduation			

1. What is the distance from your home to bus stop??

    a) Less than 1 km b) 1.1- 2 km   c) 2.1- 3 km d) More than 3 km

2. What is distance from your home to work place?

    a) Less than 5 km b) 5.1- 10km c)10.1- 15 km d) More than 15 km

3. What is your office time in the morning?

    a) Sharp 9am b) 9-10am c) 10-11 am d) other flexible hours

4. How many hours do you usually spend to reach at work??

a) Less than 1 hr b) 1.1-2 hr c) 2.1- 3 hr d) More than 3 hr

5. Is it same travelling hours to get back home? If no, then how many hours?

   a) Less than 1 hr b) 1.1-2 hr c) 2.1- 3 hr d) More than 3 hr

6. At what time you usually get out from your home to reach office on time??

7.   How often do you travel by bus to reach office?

   a)   Everyday b) 4-3 days in a week c) 2-1 days in a week d) Hardly a day in a week

8. What is the main problem you face in travelling by bus?

Prioritize three most important attributes among the list

Attributes	Priority (Three most important in order)
Comfort	
Safety	
Frequency/Regularity	
Availability	
Accessibility	
Economy (Fare)	
Travel time	
Security(unpleasant episode, pick-pocketing, harassment)	

Thank you so much for participating in this survey!

Appendix 2: Semi-structured interview guide for key informants

1. What percentage is shared by private companies??

2. What is the share of Government owned bus??

3. Who recruits the drivers and staffs of the bus?

4. Who are mainly responsible for monitoring and enforcement in regarding maintaining service quality??

5. Why people are not very willing to ride on a public bus??

6. Why percentage of woman passenger is low??

7. How the authorities consider themselves as responsible for the situation??

8. How service prodders and passengers reluctant attitudes make the situation worse?

9. What are the possibilities and limitations for Government to take the full authority??