AN APPLICATION OF STATED CHOICE TO THE VALUATION OF BUS ATTRIBUTES: A CASE STUDY OF DHAKA, BANGLADESH

BY

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DECLERATION

I hereby declare that the work presented in this thesis was carried out by myself at Loughborough University. This thesis has not been submitted in part or whole anywhere for any other degree.

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UTSG (2014)

Mamun, M. A. A. (2014) The valuation of bus attributes to determine users preference in respect to service quality, in Dhaka, Bangladesh.

UTSG (2009)

Mamun, M. A. A., Ryley, T. J. & Bristow, A. L. (2009) The importance of public transport attributes in mode choice behaviour in Dhaka.

Conference on Sustainable Transport for Developing Countries: Concerns, Issues and Options at Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

Mamun, M. A. A., Bristow, A. L. & Ryley, T. J. (2008) Exploring influences on the demand for public transport in Dhaka.

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LIST OF ABBREVIATIONS

AC	Air Conditioning
ADB	Asian Development Bank
AUSD	Australian Dollar
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BNA	Boarding and Alighting
BRTA	Bangladesh Road Transport Authority
BRT	Bus Rapid Transit
BRTC	Bangladesh Road transport Corporation
BSF	Bus Stop Facilities
BUET	Bangladesh University of Engineering and Technology
BVR	Behaviour
CCTV	Close Circuit Television
CLN	Cleanliness
CNG	Compressed Natural Gas
CWD	Crowding inside Bus
DCC	Dhaka City Corporation
DCM	Discrete Choice Model
DFID	Department for International Development
DHUTS	Dhaka Urban Transport Study
DIT	Dhaka Improvement Trust
DITS	Dhaka Integrated Transport Study
DMAIUDP	Dhaka Metropolitan Area Integrated Urban Development Plan
DMP	Dhaka Metropolitan Police
DMRTC	Dhaka Metropolitan Regional Transport Committee
DQ	Driving Quality
DTCB	Dhaka Transport Coordination Board
DUTP	Dhaka Urban transport Project
DWASA	Dhaka Water and Sewage Authority
FGD	Focus Group Discussion
GBP	Great Britain Pound
GDP	Gross Domestic Product
GEV	Generalised Extreme Value
GHG	Green House Gas
GIS	Geographical Information System

HDM	Highway Development and Management
HIG	High Income Group
HWY	Headway
IEA	International Energy Agency
IIA	Independence from Irrelevant Alternative
IID	Independently Identically Distributed
IVTT	In-vehicle Travel Time
IVT	In-vehicle Time
JICA	Japan International Cooperation Agency
LFB	Low Floor Bus
LGED	Local Government Engineering Department
LIG	Low Income Group
LTB	London Transport Bus
LUL	London Underground
MIG	Middle Income Group
MNL	Multinomial Logit
MOC	Ministry of Communication
PND	Picking up and Dropping off
MRT	Mass Rapid Transit
MVO	Motor Vehicle Ordinance
MXL	Mixed Logit
NMT	Non-motorised Transport
NTS	National Travel Survey
NHTS	National Household Transport Survey
O-D	Origin-Destination
OECD	Organisation of Economic Cooperation and Development
PPP	Public Private Partnership
PRS	Priority Seats for Women
RAJUK	Rajdhani Unnayan Kartipaksha (Capital Development Authority)
RHD	Roads and Highways Department
RP	Revealed Preference
RPL	Random parameter Logit
RTPI	Real Time Passenger Information
SC	Stated Choice
SDG	Steer Davies Gleave
SOE	State Owned Enterprise

SP	Stated Preference
STP	Strategic Transport Plan
TC	Travel Cost
TDM	Travel Demand Management
TT	Travel Time
UK	United Kingdom
UN	United Nations
USA	United States of America
VMT	Vehicle Miles Travelled
WB	World Bank
WT	Wait Time
WWI	World War I

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ABSTRACT

Bus is the main mode of urban transport in most cities in developing countries. Despite a high mode share, bus service quality is often poor and para-transit services are regarded as a problem in urban transport systems rather than a solution. Using Dhaka as a case study, this thesis investigates bus service quality through identification and valuation of thirteen important attributes using discrete choice models. The attributes examined are travel time, travel cost, waiting time, headway, priority seats for women, crowding inside the bus, boarding and alighting, picking up and dropping off passengers, bus stop facilities, driving quality, driver and crew behaviour, cleanliness inside the bus, and air conditioning.

Five focus groups were conducted to identify key qualitative bus attributes and their levels in order to design choice experiments for valuation. A survey of 431 respondents in Dhaka was then undertaken. Two choice experiments were designed and implemented within the survey, each with seven attributes (set A and set B) with travel cost as the common attribute. Multinomial Logit (MNL) models and Mixed Logit (MXL) models were developed using the Dhaka choice data. Twelve of the thirteen attributes were statistically significant at the 99% level. The values of in-vehicle time (IVT), waiting time and headway were BDT 34.80, 47.40 and 64.20 per hour respectively for low income groups in the segmented model. Waiting time has a premium valuation, 1.36 times higher than IVT, which endorses existing evidence. The highest valuation is for the dummy variable ‘seating all the way’ which is BDT 42.20 for high income females. The next largest was ‘bus stops properly, picks and drops passengers nicely’, followed by ‘wide door and mild steps for boarding and alighting’, ‘smooth and safe journey’, ‘bus stop with shed, but no seating arrangements’, and ‘air conditioning’. The lowest value was BDT 4.61 for ‘deck and seats are clean and tidy’, for the low income group. The WTP for the qualitative attributes is high, but given the poor level of the existing service and low fare levels this seems reasonable.

Income has a significant impact on travel cost, as well as gender on priority seats for women and crowding inside the bus. However, household car ownership does not have a significant impact on any of the bus attributes examined. The high income group has 75% higher WTP for A set attributes and 79% higher WTP for B set attributes than low income group. Females have 76% higher WTP for 'standing comfortably all the way', but 38% higher WTP for 'seating all the way' compared to the male. However, females have a WTP of BDT 0.44 for 'per percent of priority seats for women' in contrast with males who have a WTP of BDT -0.11.

There is significant taste heterogeneity for both quantitative and qualitative attributes. The qualitative attributes for picking up and dropping off passengers, boarding and alighting facilities and driving facilities have higher valuation and this attributes came from the existing 'within the market competition' structure in a highly fragmented bus market. Therefore, it is recommended to introduce 'competition for the market' and incentives for bus industry consolidation.

Chapter 1 Introduction

1.1 Introduction

This chapter places the research in context and identifies the research problem, aims and objectives. Section 1.2 discusses urban transport issues. Section 1.3 explains the characteristics of urban public transport in cities within developing countries. The transport system in Dhaka and its impact on the economy are discussed in Section 1.4, followed by bus service quality in Dhaka in Section 1.5. Section 1.6 ties this together to identify the research problem that leads to the formulation of an aim and four objectives of the research in Section 1.7. Finally, Section 1.8 explains the structure of the thesis.

1.2 Urban transport issues

Around half of the world's population, 3.3, billion lived in towns and cities in 2008 and it is predicted that this figure will be 4.9 billion in 2030 (Gwilliam, 2013). Most of the growth will be experienced by developing cities. This growth in urban population, coupled with economic growth, will put pressure on limited transport infrastructure resulting in serious traffic congestion, environmental pollution and poor quality of urban life.

An improvement in the efficiency of urban mobility can enhance economic growth using the advantage of conglomeration (Button, 1993), but economic growth is coupled with transport demand and needs to be decoupled (FHA, 2012). As the rise in demand for transport exceeds supply, congestion is common in urban centres, contributing to delays, uncertainties and other transport related externalities negatively affecting urban life (Morris et al, 2005). In 2007, transport (including shipping and aviation) was responsible for 6.13 gigatones of CO_2 emissions globally, 23% of all energy-related CO_2 emissions (IEA, 2007) impacting highly on sustainability.

The Brundtland Commission (1987) defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Sustainability has three interdependent and mutually reinforcing pillars - economic development, social development and environmental protection (United Nations, 2002). Transport plays an important role in sustainability through contributing to each of the three pillars by promoting economic growth and development, social inclusion and equity through basic access and finally affecting the environment through consuming finite resources and producing externalities (Newman and Kenworthy, 1999).

The way that people travel has an impact on sustainability as different transport modes have different carbon footprints. Walking has the lowest footprint followed by cycling, public transport and private car, which has the highest. A transport system based on public transport and well supported by walking and cycling can help in achieving sustainability objectives in the transport sector. Accordingly, three visions for future transport in the UK have been developed by Tight et al (2011). The visions are “current European best practice”, “a car-free public transport oriented future” and “a localised energy efficient future based on walking and cycling”. They argue that a 12% share of public transport in 2006 can be raised to 35% in 2030 according to “vision two” by making public transport of a higher quality than in the present day, so that it fulfils many of the transport needs previously fulfilled by the car.

Improving the quality of public transport can respond to the needs of users more positively which needs careful investigation. Accessibility and availability of public transport are directly related to the quality of service, but affordability plays an important role. A greater coverage means that the service is more accessible to the user. Murray et al (2003) argues that a 400m distance from a bus stop is good from an accessibility point of view. However, White (2009) suggests a typical upper limit of about 500m, as 95% of the urban population is within this distance of the nearest bus stop. It is not only the distance but also other aspects such as weather, safety, topography and vehicular-pedestrian conflict affect accessibility (Rietveld, 2000).

The availability of public transport is related to the level of public transport supply, often measured in vehicle-km directly related to the quality of service. The higher the supply of public transport, the higher the availability of service and so is the quality of service. Efficient route possibilities enable a better matching of supply with demand, and hence either a better level of service without extra resources being required, or savings without substantial losses of traffic and revenue and better crew and vehicle utilisation (White, 2009). Where transport demand has a distinct peak and off-peak variations, transport supply can be controlled by service headways. However, reasonable headways have to be maintained, even in off-peak hours, so that the service quality does not fall below an acceptable threshold level that has mode switching potential, and so can adversely affect the patronage.

The affordability of public transport is an issue in developing countries. Carruthers et al (2005) show a wide variation in affordability from a minimum 2% to maximum of 33% in Latin American cities. The reason for this variation, as reported by the study, is the difference of level of subsidy given to public transport in different cities. Lipman (2006) suggests that transport cost can be considered unaffordable if it exceeds 20% of household income as low income households spend proportionately much more of their income on transport. Using an American city's dataset, Litman (2014) shows that the lowest income quintile spends the highest portion of their income on transport which reduces for higher income quintiles.

1.3 Public transport in cities of developing countries

Generally public transport supply (vehicle-km) is lower than demand. As a result, load factor (passengers per seat) is higher and crowding inside the bus is common in developing cities (Gwillam, 2013). Also the trip rate is lower and trips are shorter in length in developing cities than in developed cities (Carruthers et al, 2005). In spite of high demand and a high modal share of public transport, the public transport service is not well organised in the cities of developing countries. In the absence of a long-term policy and planning framework, a reactive approach for the solution of urban transport problem prevails in developing cities (STP, 2005). A lack of institutional, planning, management and regulatory capacities, coupled with resource constraints, make the urban transport condition even worse. The urban public transport system in developing countries has special characteristics due to a lack of institutional capacity, low wage rates and low value of time, high mode share of bus and high mode share of walking and non-motorised transport.

Small and Verhoef (2007) summarise the characteristics of urban transport market in developing cities as:

- A lack of managerial capacity of regulator and a poor oversight, which means the regulated monopoly or regulated private firms behave quite differently, generally more chaotically than intended;
- Low wage rates for driver and transport crew, difficulties in mobilising funds encourages very small transport companies and even individual operators;
- High modal share of public transit;
- Low value of time of the passengers traded with the bus operating cost leads to lower than optimal frequency, but free entry equilibrium is likely to result in higher

frequency which is even more harmful in developing cities that contributes to congestion; and

- Over supply of bus has created the problems of congestion, air pollution and traffic accidents in developing cities.

To ease these problems, strengthening the regulatory capacity and consolidating the bus industry is a high priority, in order to ensure high quality public transport service in developing cities.

1.4 Transport system in Dhaka and its impact on economy

Dhaka, the capital of Bangladesh, contributed 35% to the national GDP in 2009 and so has a key role in national economic development. The inadequacies and inefficiencies of the transport system are regarded as major impediments to the socioeconomic development of Bangladesh (Andaleeb et al, 2007). Dhaka has a more favourable modal split of 34% public transport (bus), 34% rickshaw and 14% walking than many cities in developed countries (STP, 2005). However, the bus system is inefficient and the quality of service is far below expectations of the general public. Walking facilities and the walking environment are scarce with inadequate pavements and street lighting (Andaleeb et al, 2007). Unlike cities in developed countries, non-motorised rickshaw has a high share of 34% in Dhaka and a low 8% share of private car.

Dhaka, a rapidly growing city, is facing several problems due to inadequate transport supply, insufficient road infrastructure, poor traffic management and weak regulation of urban transport system (STP, 2005). As a result, the transport system in Dhaka suffers high levels of traffic congestion affecting business and the economy of Bangladesh (Bhuyian, 2007). The annual economic loss caused by traffic congestion in Dhaka has been estimated at BDT 117.60 billion (GBP 1.04 billion) in 2005 prices by Alam, (2008) and BDT 190.00 billion (GBP 1.79 billion) in 2010 prices by Mamun et al (2010). The economic loss due to traffic congestion is predicted to continue if an efficient transport system is not provided. Estimates are based on the vehicle operating cost, cost of wasted time, medical cost due to traffic-related pollutions and road accident cost. The major component is the cost of the wasted time. As a result, high levels of traffic congestion and environmental pollution have become a serious concern to the policy makers, transport professionals and the general public as a whole.

For an improvement to the worsening traffic congestion in Dhaka, a long-term action plan and investment in transport sector is required. Bearing this objective in mind, a Strategic Transport Plan (STP) for Dhaka has been prepared with introduction of mass rapid transport (MRT) in selected corridors, improvement of public transport system, better walking facilities and managed NMT (Non-motorised Transport) for the improvement of overall transport efficiency through augmenting transport supply in Dhaka. As a result, issues relating to the improvement of public transport, especially bus service, are a key area of research.

1.5 Bus service quality in Dhaka

Service quality is one of the most important determinants of bus preference, which has a direct and powerful influence on patronage (Balcombe et al, 2004). As a result, bus service operators have to pay attention to service quality in order to maintain market share and increase profitability in a deregulated and privatised market. Bus service quality is related to the regulatory arrangements, the quantity of service supplied, operational arrangement, and the characteristics of infrastructure and vehicle fleet. So, to develop an understanding of bus attributes in Dhaka these issues need to be discussed.

The Dhaka Regional Transportation Committee (DRTC) carries out public transport regulatory functions for the Dhaka metropolitan area. The responsibilities of the DRTC include route planning, deciding the maximum number of buses per route, issuing route permits, and monitoring the service quality. The DRTC issues route permits to individual buses for three years rather than to the fleet of an operator. The process of defining bus routes and issuing route permits has not been studied. The absence of institutional capacity to handle this issue affects service quality. Apart from issuing and renewing route permits, regulatory enforcement is very limited for monitoring and compliance of service quality.

Bus fares are reviewed periodically in a negotiating process with operators, and are officially gazetted by the government for fixed route urban and intercity bus services. The review is not generally based on a systematic or regular evaluation of operating costs, as the structure of regulation means that the government is not equipped with detailed information about bus operations. At present, the maximum bus fare between stops less than a kilometre apart is BDT 5.00 and then BDT 1.60 per additional kilometre, as fixed by government. Though the bus fare is regulated, in the absence of regulatory oversight the public transport market is practically deregulated and there exists a fierce competition amongst operators.

The road network hierarchy in Dhaka is poorly defined with arterial roads serving both long haul motorised and short haul non-motorised modes, including rickshaw and pedestrians that share carriageways. Sharing carriageways by motorised and non-motorised modes with varying operating speeds is an underlying cause of operational disorder and traffic congestion in Dhaka (STP, 2005). With a 34% modal share, bus is the main motorised public transport mode in Dhaka. There is no mass transit system in Dhaka but a wide mixture of road based public transport and para-transit modes, which offer a range of choices to travellers.

In Dhaka, the three types of buses of human haulers, minibuses and large buses are in operation. Human haulers, a type of para-transit mode, evolved to serve poorly connected neighbourhoods where a large bus service is not technically possible due to physical constraints such as poor road geometry. To fill the transport gap created by the replacement of 55,000 two-stroke auto rickshaws by 11,000 CNG (compressed natural gas) powered auto rickshaws in 2004, human haulers got an advantage. The bus classification is based on vehicle size and capacity. Human haulers can carry 9-15 passengers, minibuses no more than 32 passengers, and a large bus has a seat capacity of over 32 passengers. The large bus fleet in Dhaka includes single deck, double deck and recently introduced articulated buses. Though there is a wide difference in capacity of these three types of buses, they are so classified because they follow defined routes allocated to them. The total number of permits issued up to 2007 was 6,339, of which 4,807 were for buses and minibuses and 1,592 for the smaller human haulers (Bhuyian, 2007). STP (2005) estimates 1,600 buses operate on different routes without valid route permits. Therefore, there are a large number of buses in a relatively small road length of 170 km. Intercity buses also serve travellers within the city to augment public transport supply, but the city transport operators have complained about it (DevCon, 2009).

The route length indicates the area covered by bus service and is an important proxy for quality of service. With a longer route length, a wider area comes under bus operation with improved bus accessibility. For a bus service, quality is a function of quantity supplied. It means that a greater supply of vehicle-km over a given route network implies, in general, a more frequent service and lower waiting time (Polat, 2012). Bus service delivery on a specific route can be measured in a number of ways such as total vehicle-km or hours, frequency, headway / service interval, wait time and schedule delay. The only available data for the bus supply in Dhaka is in the form of the number of routes, the road length under bus operation and frequency of service.

In Dhaka, only 170 km of the road network serves 141 bus routes, of which 103 are bus / minibus routes and 38 are human hauler routes (Bhuyan, 2007). In the peak hours, there are significant variations of headway from less than 5 minutes on high frequency routes, between 5 to 10 minutes on medium frequency routes and more than 20 minutes on less frequency routes (Fjellstrom, 2004). More frequent routes are generally minibus and human hauler routes and such small vehicles at very high frequencies provide advantages in waiting time savings for passengers, but are inefficient in the use of road space. The benefit of waiting time savings can be offset by a longer journey time due to congestion. Fjellstrom (2004) reports that in 2004 bus operating speed in peak hours was about 10 km per hour and the off-peak speed is 30% higher, and the situation has not improved.

Both public and private operators provide bus services in Dhaka. The Bangladesh Road Transport Corporation (BRTC) is the largest public sector operator. Depending on the working arrangements of driver and other staff, bus operations in Dhaka are divided into two distinct categories. Firstly, drivers and crew either own the bus individually or rent it on a daily or monthly basis and operate at their own revenue risk. They require enough passengers per day to repay the bus rental fee, cover fuel and basic maintenance costs, and to make a profit. This structure of incentives has many negative consequences such as reckless driving, blocking the buses behind, overloading at departure points, picking up and dropping off passengers while moving and extended waits at terminal points to fill up. This category applies to the majority of the bus fleet: some large buses, most minibuses, and all human haulers.

The second category of operators runs the service professionally. In this arrangement drivers, crew and other staff work on a more secure employment basis and are paid, not according to how many passengers they carry, but according to the number of hours they work. In addition to drivers and conductors, these bus operators employ administrative and managerial staff, maintenance staff, ticket booth operators, and marketing and sales staff. These operators are distinguished by the fact that they maintain ticket booths in order to collect fare payments. This allows drivers to concentrate on driving, rather than continually seeking to chase additional passengers. It gives a better service experience than the first category.

Given the disadvantages of a one bus one operator system, the consolidation of bus operations is being encouraged through policy interventions. Policy interventions are also being introduced to replace small buses with higher capacity and cleaner fuel buses. In response to this, all individual operators on a particular route form a company for obtaining route permits and continue the individual operation by paying the company for maintaining permits. As a result, on many routes the *“one company in one route system”* has been established without further improvement of the operation standard. In general terms, de facto route franchise has taken place without any competitive bidding or any contractual obligation of the franchisee with the regulators on service provision and maintaining a minimum quality of service.

To minimise the acquisition cost of the bus fleet, buses are locally manufactured on an imported chassis which undermines standards for safety and comfort. Most buses are locally manufactured which adversely affects the service quality such as difficulties in boarding and alighting. It draws attention to the investigation of attributes related to the characteristics of vehicle fleet. At the same time, supporting infrastructures such as bus stop facilities are rare in Dhaka.

1.6 Development of the research problem

In cities within developing countries, motorisation is at a low level and the mode share of bus is mostly para-transit type and walking is high (Cervero and Golub, 2007). This is not the result of a planned sustainable transport policy action but rather due to the poor economic conditions. Bus markets are highly fragmented and fierce on-street competition for passengers is the prevailing market structure popularly known as ‘competition within the market’. This results in a low quality of service with poor safety and security for passengers. Flat price regulation and the absence of differential pricing linked to quality of service also act as barriers to the introduction of quality bus services. With economic development, car mode share is predicted to grow and an improvement of bus quality is an option to contain the growth in car use through appropriate measures.

The quality of urban bus services and their operation in the cities of developing countries is therefore an issue that needs improvement under a suitable competitive regime. According to Gwilliam et al (2000), competition in the market gives suppliers a greater degree of freedom to respond to consumer demand, and gives the consumer the most direct instrument – their willingness-to-pay (WTP) – to what is supplied. However, market competition is not always responsive to several important types of market failure. For example, because of information asymmetry and the difficulties of “shopping around”, the process of competition may result in a combination of fare and quality of bus service supplied which is not the preference of most consumers. Therefore, the challenge is to understand the mode choice behaviour in developing cities.

Though “competition within the market” often results in poor driver behaviour and an inferior quality of service, it may be possible to deliver the desired benefits. This could be by introducing services with varying quality at different prices on the same route. Some flexibility towards the introduction of new categories of services at higher prices may be a means of reconciling the maintenance of a basic low fare with the provision of adequate total capacity, and a sufficiently varied range of price / quality combinations to meet demand in a city. For the introduction of a new superior bus mode on the same route with a higher quality, the fares to be set need an adequate knowledge of users’ willingness-to-pay (WTP) for a better quality service. If it can be known with sufficient accuracy, a good cross subsidised system can be designed for the basic service for the general public and a premium service for better-off users.

Therefore, there is an inadequate knowledge of urban public transport mode choice behaviour in cities within developing countries such as Dhaka, Bangladesh and the users’ willingness-to-pay (WTP) for an improvement to bus attributes.

1.7 Aim and objectives of the research

As a public transport mode bus is more sustainable than private car, but it is inferior with inherent limitations including lack of privacy, temporal and spatial inflexibility. Moreover, the quality of the bus service is not satisfactory in the cities within developing countries. As a result, there is a huge demand for the improvement of bus service quality. Therefore, encouraging bus patronage growth through improvement of service quality can help achieving goals of overall economic, social and environmental sustainability.

In response to the research problem, the overall aim of this research is to examine willingness-to-pay (WTP) for bus service attributes in Dhaka and how this varies by socio-economic characteristics to deepen understanding of bus travel behaviour in Dhaka. Socio-economic characteristics include income, gender and household car ownership. To achieve the overall aim of the research four specific objectives have been determined:

1. To examine key issues of bus operation in Dhaka and to identify important quality attributes;
2. To obtain monetary values for selected bus attributes;
3. To examine the influence of socioeconomic variables on the valuation of those attributes; and
4. To examine the individual taste heterogeneity in the valuation of those attributes.

1.8 Structure of the thesis

Chapter 2 discusses the transport system in Dhaka and its operation. Chapter 3 reviews literature covering qualitative attribute valuation and their role in improving bus quality in cities within developing countries. Chapter 4 develops the research method and includes a discussion of qualitative research techniques, with an emphasis on the focus group discussion which is used to explore important bus attributes that influence bus quality in Dhaka. This Chapter also discusses the issues related to experimental design for discrete choice modelling to estimate users' willingness-to-pay (WTP) for bus attributes. The theory behind discrete choice modelling, and the techniques available for choice modelling and experimental design, are discussed in this Chapter to find the most suitable way to design experiments and to carry out modelling.

Chapter 5 presents the result of focus groups conducted to broaden understanding of quality attributes in Dhaka, to achieve the objective of identifying the attributes that influence bus service quality in Dhaka and help explain bus mode choice behaviour. A pilot survey was carried out to achieve an overall efficiency of the data collection process and to test the questionnaire. Chapter 6 gives an account of attributes and levels and design of experiment for discrete choice modelling. Chapter 7 discusses the pilot study, implementation of survey testing the experimental design, and adjustments to the questionnaire and experiments for the main survey. Chapter 8 is the analysis of the main survey data that presents mode choice behaviour and examines the details of public transport trips, including the importance and satisfaction rating for the attributes evaluated. Chapter 9 presents the results of the discrete choice models developed and presents the willingness-to-pay values with explanation. Chapter 10 discusses the findings which are presented in the order of the research objectives. It also draws necessary conclusions from the research, including the limitations of the present study and any further research that could be carried out in this area.

Chapter 2 Overview of public transport system in Dhaka

2.1 Introduction

This chapter provides an overview of public transport in Dhaka. Section 2.2 briefly examines the history of Dhaka. Section 2.3 discusses urban transport infrastructure in Dhaka including the road network and parking facilities, bus route network and bus stop and terminal facilities. Section 2.4 discusses the way people travel in Dhaka including modal split and changing modal shares. The composition of the vehicle fleet is discussed in Section 2.5. Section 2.6 discusses the characteristics of public transport modes. Section 2.7 gives an account of the bus operation system and Section 2.8 discusses the issues related to bus network integration and extension. The institutional arrangements that regulate the bus system in Dhaka are discussed in Section 2.9 followed by the bus market structure in Section 2.10. Conclusions are drawn in Section 2.11.

2.2 Transformation of Dhaka

Dhaka, the capital city of Bangladesh, is one of the oldest cities in the region and emerging as a capital city of Bengal in 1610 during the Mughal era. The city was thriving with a rich cultural heritage and was a centre of trade and commerce in the pre-colonial era, attracting foreign traders from across the globe. The Dutch, Portuguese, Armenian and English were some of the many nationalities who came to Dhaka for trade and business giving a rich testimony of the past prosperity of Dhaka. However, after the takeover of India by the East-India Company, Kolkata (Calcutta) was developed as the capital of British-India in 1765 and Dhaka's glory started to fade slowly. After the end of colonial period Dhaka became a provincial capital of then East-Pakistan and emerged as national capital of Bangladesh in 1971 after independence from Pakistan.

Administrative jurisdiction of different authorities in Dhaka varies and so does the area under their jurisdictions. DMA (Dhaka Metropolitan Area) is the area under the jurisdiction of the metropolitan police and DCC (Dhaka City Corporation) area is the central urban part of the city under the City Corporation, the largest local government body in Bangladesh. Similarly Rajuk (Capital Development Authority) area is under the jurisdiction of Capital Improvement Authority responsible for development and planning control of the Dhaka. The Strategic Transport Plan (STP) area is under the planning jurisdiction of Dhaka Transport Coordination Authority (DTCA), responsible for transport planning and the development and operation of mass transit system in Dhaka. Therefore, Dhaka means any of the area under the respective jurisdictions.

There is a wide variation of the area under their respective jurisdiction. However, the area under the Strategic Transport Plan (STP) study and Dhaka Urban Transport Study (DHUTS) is presented here. The DHUTS (2010) study area is 1,530 sq-km same as the jurisdiction of DMP (Dhaka Metropolitan Police) known as the metropolitan area. The STP (2005) study area is 7,786 sq-km including the DMP area and adjacent areas under six districts around Dhaka which is known as the greater Dhaka area, as shown in Table 2.4. The current population of the DMP area is 15.4 million and Greater Dhaka area is about 18 million.

The growth of urbanisation around Dhaka is very high and population growth (4.2% per annum) is more than three times higher than the national population growth (1.3% per annum) and is predicted to continue in the future (Mamun et al, 2010). To meet future transport demand, five mass transit corridors were identified in the STP (2005) and would be developed in different time lines. Of these mass transit options a BRT along the study corridor and a Metro Rail projects along another corridor are already under implementation and expected to be completed by 2017 and 2020 respectively. At present, bus is the dominant mode in Dhaka with walking and rickshaw having high mode share and the share of private car is very low.

There is an urgent need for improvement to the efficiency of the transport system, particularly through the modernisation of bus system in Dhaka, as the inefficiency is causing a loss of BDT 190.0 Billion (GBP 1.79 Billion) every year in 2010 prices (Mamun et al, 2010). Figure 2.1 shows the bus network and proposed mass transit corridors in Dhaka. The yellow buffer shown in Figure 2.1 is the study corridor.

The study corridor is one of the five major transport corridors in Dhaka and is the longest running between the Uttara residential area in the north and Sadarghat inland water transport port in the south. This corridor connects the newly developed residential areas of Uttara, Banani and Gulshan in the north, the Tejgaon industrial area, the Ramna and Motijheel commercial area (central business district) in the central area and the old part of the city in the south. Shahjalal international airport and the airport railway station are within the corridor. The busiest section of the study corridor is around Shahjalal international airport. According to Bhuiyan (2007), 34 city routes and 58 intercity routes pass this section and morning hourly peak bus flow towards the city is 533 (117 large bus, 407 minibus and 9 human hauler) and bus passenger flow is 24,020 per hour, as shown in Table 2.1. This corridor is broadly representative and importantly has all types of available passenger transport running on it. Moreover, the high traffic volume and plan for BRT implementation combine to make this the most attractive study corridor for this research.

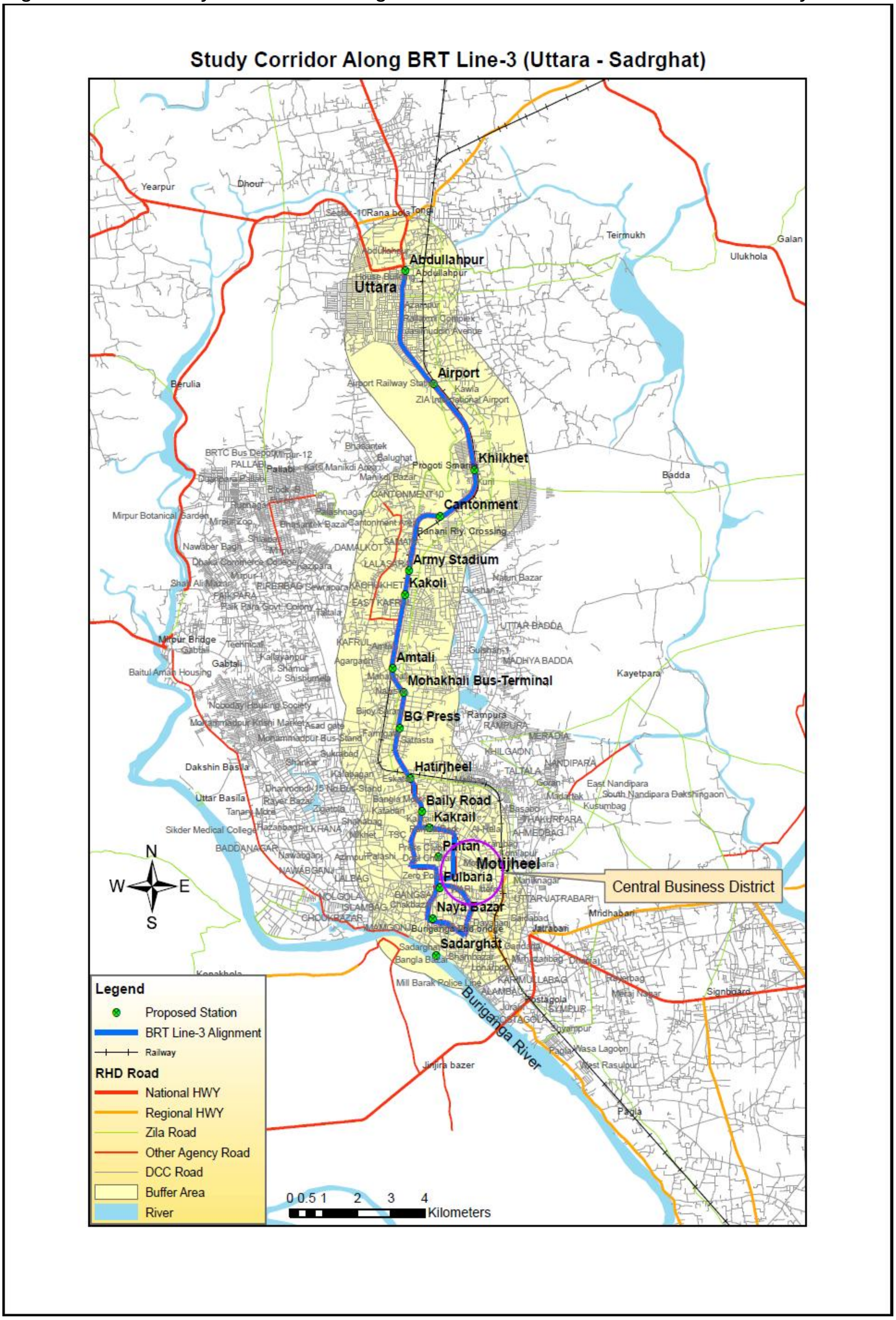
Table 2.1 Bus and passenger flow at four locations along the study corridor

Location	Direction	Peak flow time	Large bus	Minibus	Human hauler	No. of pax	No. of routes	
							City	Intercity
Airport	From	11 am	159	316	7	23,080	34	58
	To	9 am	117	407	9	24,020	34	58
Mohakhali	From	10 am	120	190	116	15,535	27	26
	To	5 pm	122	229	138	17,225	27	26
Satrasta (BG press)	From	9 am	46	151	27	9,165	18	17
	To	10 am	55	184	0	11,070	18	17
Kakrail	From	11 am	88	163	51	12,375	14	11
	To	9 am	98	162	62	12,985	14	11

Source: Adapted from Bhuiyan (2007)
Note: All the locations are shown in the map

From Table 2.1 it can be seen that the study corridor is very busy and the busiest section is around the airport. The peak bus flow at that section is more than 500 buses per hour per direction and hourly bus passenger flow is 2350 passenger per hour per direction. Overall average hourly bus passenger flow per direction is 15,691 in peak hours varying between 9,165 and 24,020. The morning peak flow is higher than the evening except at Mohakhali. However, the morning peak hour varies between 9 am and 11 am in different places along the corridor.

Figure 2.1 The study corridor showing the catchment area for household survey



2.3 Transport infrastructure in Dhaka

Transport infrastructure includes available road network, parking facility and bus stop and terminal facility. Although bus route network is not directly bus infrastructure this issue is also discussed in this section.

2.3.1 Road network and parking facility in Dhaka

The road network in Dhaka is limited and the hierarchy is poorly defined, with a limited number of arterial roads that serve both motorised vehicles undertaking relatively longer (more than 3 km) trips, and a large number of rickshaws undertaking medium length (1 to 3 km) trips and access / egress services for bus and pedestrians undertaking shorter (less than a km) to medium trips. The traffic problems on main roads are caused by the sharing of the same road lanes by fast moving motorised modes and slow moving non-motorised modes, which creates operational disorder. Moreover, a significant portion of road space is blocked by illegal roadside parking in the absence of adequate parking facilities that adversely affect the capacity of the road network. It has been argued that slow moving modes and pedestrians should be restricted on main roads for efficient operation of traffic at higher speed (STP, 2005).

However, many cities around the world are able to accommodate high volumes of city centre passenger movements by motorised vehicles, non-motorised vehicles and pedestrians sharing the same main road. This requires careful planning to efficiently accommodate all of the modes and trip distances. Many cities not only allow but encourage slow modes in the city centre, either by providing segregated lanes or by slowing down mixed traffic to speeds of 30 km / hr or less.

Bhuiyan (2007) argues that the road network in Dhaka is inadequate and is only about 8% of the total area of the city and only a small portion of the available roads are suitable for bus operation. In the DCC (Dhaka City Corporation) area the total road length is about 1,300 km and the road length in DMDP (Dhaka Metropolitan Development) area is 3,002 km. 70% of this network has a road width of less than 8.75 m where operation of standard bus is very difficult. As a result, the bus network in DCC area was only 170 km in 2007 and it is now 200 km which is inadequate to serve the public transport demand of the city.

2.3.2 Bus route network in Dhaka

Dhaka has three major bus route corridors in the north-south direction, mostly originated at Uttara and Mirpur suburban areas and terminated mostly at city centre of Motijheel / Gulistan, and some routes are extended up to the south-eastern and eastern fringe of the city, as shown in Figure 2.1. The bus operation in Dhaka is confined to 200 km bus road network with 141 routes. The DMRTC (Dhaka metropolitan Regional Transport committee) is responsible for bus route planning and issuing route permits to public transport vehicles in Dhaka. DevCon (2009) identifies that some of the official routes are not in operation, and some routes are in operation without government approval. Due to a lack of institutional capacity of DMRTC, the identification and allocation of routes to the operators are arbitrary without proper demand assessment.

The inner city bus / minibus routes within DCC (Dhaka City Corporation) area are not very long but the STP area includes six adjacent districts. Routes connected to those suburban areas are called suburban routes and are relatively longer. All of the human hauler routes are within the city and the length of those routes are a maximum of 10 km. The distribution of bus / minibus routes according to their length can be seen in Table 2.2 below.

Table 2.2 Distribution of bus routes by length

Route length (km)	Number of routes
10 or less	1
11 to 20	39
21 to 30	31
31 to 40	17
41 to 50	5
51 to 70	7
Greater than 70	3
Total	103

Source: DevCon (2009)

70% of the routes are between 11 km and 30 km in length and the longer routes over 40 km are suburban routes and they are about 15% of total routes. From the route length and the number of buses and their daily trips, bus supply (vehicle-km) in Dhaka can be calculated from Bhuyian (2007). Considering an average of five trips per bus and minibus / day and the seven trips per human haulers, it can be calculated that about 775,000 vehicle-km bus supply in Dhaka of which 120,000 vehicle-km / day is of human haulers and 655,000 vehicle-km / day is of buses and minibuses. Considering the average occupancy of a bus and a minibus is 45 and that of a human hauler is 10 then the total passenger km can be calculated as 29.48 million passenger-km per day of buses and minibuses and 1.2 million passenger-km per day of human haulers (Bhuyian, 2007).

2.3.3 Bus stops and terminal facilities in Dhaka

Bus stops and terminals are critical facilities for bus operations that impact on the quality of the bus journey experience. There are three inter-district bus terminals in Dhaka but the facilities in the inter-district bus terminals are not adequate (Bhuyian, 2007; DevCon, 2009 and STP, 2005). Most bus operators do not have parking facilities for their bus fleet, as a result bus terminals are illegally used by the buses for parking and the parked buses even occupy road lanes adjacent to the bus terminals. Bus stop capacity, location, distance between bus stops, and the design of bus stops to allow accessibility for boarding and alighting of passengers are the important issues.

As bus stops are the passenger collection points they are good places for illegal vendors to sell their goods. The vendors often occupy the bus stop area and sometimes part of the road lanes. All of the buses under company operation maintain ticket booths at the bus stops, but ticketing on-board is allowed for the buses operated under individual ownership. No formal studies have been conducted so far for determining the location and design of bus stops in Dhaka. At most bus stops, facilities such as a shed / shelter to protect from adverse weather condition are very inadequate and virtually non-existent at many stops. As there are no guidelines for bus stop facilities, some companies provide some seating facilities as part of their advertisement purpose not focusing on the needs of passengers.

2.4 The way people travel in Dhaka

In the absence of a formal mechanism for the regular collection of travel data, there is no chronological travel data of Dhaka. However, travel data collected by STP (2005) provides information on the characteristics of household travel patterns in Dhaka for 2005. The average household size is 4.12 which is almost double the average size of households in developed countries, and an average daily trip per household is 8.50. So, average per capita trip rate is 2.06. Of those average household daily trips, 3.71 trips are made by transit, 4.12 trips are made by non-motorised modes and the remaining 0.67 trips are made by private cars. The average daily household trips comprise 2.74 home to work trips, 1.11 home to education trips, 3.90 home to other trips, and 0.75 non-home based trips.

The average trip length in Dhaka is 5.37 km, which is low compared to developed countries and it is interesting that the lower income people travel further (7.49 km) than their wealthier counterparts (6.71 km) (STP, 2005). It is logical that poor people live on the periphery of the city far from their work locations to minimise their house rents. Trip length varies significantly depending on the trip purposes, the average length of home to work trip is 5.81 km, home to education trip is 3.50 km and home to other and non-home based trip lengths are 6.02 km and 6.44 km respectively. Therefore, it is clear that people travel further for work than for education.

As there is not much evidence of the valuation of bus quality attributes in cities within developing countries, the willingness-to-pay (WTP) is compared with that of cities in developed countries, especially the UK. Therefore, the travel data of Dhaka is compared with the UK data. Apart from the household size in Dhaka, the daily travel indicators are lower than those for developed countries as compared with UK travel data.

Table 2.3 shows that there may be a large suppressed travel demand in terms of daily number of trips and also the length of travel. It is expected that both the absolute number of daily per capita trips and the length of these trips will grow with economic growth on top of natural population growth, and by the effect of rural urban migration. The population in Bangladesh is growing at 1.3% with the overall urban population growth rate of 3.6%. The population growth in Dhaka is 4.2% (Mamun et al 2010), the highest amongst urban centres which indicates high rural-urban migration.

The relatively short travel distances and the lower number of per capita trips have a close relation to the low level of car modal share (motorisation) and high dependency on bus travel, non-motorised trips and walking. However, increasing car ownership will encourage the growth of per capita daily trips and average trip length, any of these outcomes will affect adversely to the sustainable urban mobility in Dhaka. Therefore, the improvement of bus service quality is at the centre of policy formulation for the improvement of transport efficiency in Dhaka.

Table 2.3 Comparison of mobility between Dhaka and the UK (2005)

	Dhaka	UK (National)
Average number of trips in year	750	1,040
Average Trip length (km)	5.37	11
Distance travel in a year (km)	4,040	11,425

Source: Strategic Transport Plan, (2005) and National Travel Survey, (2005)

There is no official data regarding the growth in per capita daily trips or trip length, so it is difficult to show the pattern of change in modal share over time. However, the growth in travel demand and the modal split can be shown from available data from different studies. The area covered by the studies varies as does the population. Therefore, it is difficult to compare the data directly across the studies. The mode choice data in Dhaka from four different studies between 1994 and 2010 has been reviewed. They are DITS (1994), Hoque and Alam (2002), STP (2005) and DHUTS (2010). The study area for DITS (1994), Hoque and Alam (2002) and DHUTS (2010) are the same. These studies can be compared to discuss the change in mode choice trends between 1994 and 2010.

STP (2005) and DHUTS (2010) defined trips on the basis of the completion of an activity irrespective of the trip lengths. However, DITS (1994) and Hoque and Alam (2002) counted access and egress link of a public transport trip by rickshaw or walking as a separate trip. The non-motorised trips are mainly rickshaw trips and the same definition has been used for them across the studies. Therefore, both short and long trips as well as non-motorised trips are included in the travel demand data. Microbuses are included in the private bus category in DITS (1994) and DHUTS (2010), but these trips are included in the bus category in the other two studies as presented in Table 2.4. STP (2005) study covers a wider area known as greater Dhaka also known as the STP area. Mode share of STP (2005) is also presented in Table 2.4 but not compared with the other studies due to different study area, and the column of the Table 2.4 is shaded.

Table 2.4 Growth in travel demand and modal split between 1994 and 2010

		Name of the study			
Mode	Description	DITS 1994	Hoque and Alam 2002	DHUTS 2010	STP 2005
Area	(sq.km)	1,530	1,530	1,530	7,786
Walking	Bicycle and walk	5,151,783 (60.13%)	9,000,000 (62.05%)	4,061,132 (19.79%)	3,740,625 (14.00%)
Rickshaw	Rickshaw / van	1,480,441 (17.28%)	1,927,000 (13.29%)	7,853,352 (38.26%)	9,084,375 (34.00%)
Private car	Private car and taxicab	264,408 (3.09%)	576,000 (3.97%)	1,050,058 (5.12%)	2,137,500 (8.00%)
Private bus	Staff / school bus, microbus	138,331 (1.61%)	-	359,629 (1.75%)	-
Auto rickshaw	Motor cycle, and CNG	88,671 (1.03%)	845,000 (5.83%)	1,357,147 (6.61%)	1,475,335 (5.50%)
Truck	All goods vehicle	-	-	7,085 (0.03%)	-
Railway	Bangladesh railway	2,752 (0.03%)	-	10,092 (0.05%)	-
Bus	Bus & human hauler	364,990 (4.26%)	1,482,000 (10.22%)	5,801,629 (28.27%)	9,057,656 (34.00%)
Waterway	Boat and launches	177,442 (2.07%)	-	25,188 (0.12%)	-
Other trips		898,532 (10.49%)	675,000 (4.65%)	-	1,223,259 (4.60%)
Total daily trips		8,567,350 (100%)	14,505,000 (100%)	20,525,311 (100%)	26,718,750 (100%)

Source: Compiled from DITS (1994), Hoque and Alam (2002), STP (2005) and DHUTS (2010).

Table 2.4 shows that over 15 years, travel demand grew 2.4 times. Transport in Dhaka is dominated by rickshaw, bus and walking. There was a phenomenal growth in bus demand followed by rickshaw and private car between 1994 and 2010. However, there was a decline in walking trip over the same period of time. The growth rate of car modal share (166%) in Dhaka is lower than the overall growth of travel demand (240%). The growth rate of rickshaw was 221% which is more than the car growth rate.

It is interesting that walking maintained almost the same modal share between 1994 (60.13%) and 2002 (62.02%), but fell dramatically between 1994 and 2010. Both bus and rickshaw share grew rapidly between 2002 and 2010 but walking share fell dramatically between the same periods of time. A walking (60.13%) city in 1994 turned to a city dominated by rickshaw (38.26%) and bus (28.27%) in 2010 when walking share was only 19.79% which needs careful explanation. The growth in car modal share (7.78%) over the same period of time is just over the national GDP growth of 6%.

The high level of congestion, high upfront cost of car purchase and difficulties in maintaining a chauffeur discourage car ownership as identified in the focus groups in Chapter 5. Moreover, abundance of rickshaw at door steps in Dhaka acts as a close substitution of private car offering privacy and door-to-door service that again might discourage car purchase.

Moreover, with economic growth people are making longer trips that could not be made by walking but are suitable for rickshaw, though rickshaw is more expensive than bus in Dhaka. As a result, the rickshaw modal share grew at the cost of walking share which is logical. However, the bus modal share grew at a similar pace as rickshaw between 2002 and 2010. Rickshaws operate within local areas, where no bus service available because of road geometric constraints. Moreover, many of the flexibilities offered by a private car such as availability, privacy and door-to-door service are offered by rickshaw.

The population growth in Dhaka was very high till the end of the last century due to high rate of migration and the growth became stable after 2000. Therefore, population growth and travel demand growth are compared between 2002 and 2010. The average growth of travel demand in Dhaka between 2002 and 2010 was 4.43% per annum as calculated from Table 2.4, which is slightly higher than the population growth rate of 4.20% per annum. Therefore, the travel demand growth in Dhaka is mainly due to the population growth. More females are joining in the work force since late 1990s, which might have contributed to the growth in per capita daily trip rates as reflected in the growth in travel demand.

2.4.1 Public transport modal share

The highest modal shares of bus and rickshaw (34% each) in Dhaka in 2005 indicate that the majority of people are dependent on bus and on rickshaw and they have a distinctive place in the transport market in Dhaka (STP, 2005). However, the bus modal share is saturated within the city area and shows around a 5% fall and the share of rickshaw grew about the same 5% between 2005 and 2010. As can be seen from Table 2.4, a deterioration in bus quality may be one of the many possible causes. It is not immediately possible to introduce a Mass Rapid Transit system (MRT) in Dhaka. The MRT is also not an alternative to bus in all corridors or routes, so the demand for improved bus service is predicted to grow in future. The operation of buses within the city is in disorder and the service to the general public is very poor as pointed out by STP (2005). Buses struggle for road space with other vehicles and usually come off second best and an immediate suggestion by the STP team is to introduce a series of bus priority and bus-only lane schemes on the main arterials into the city. What this means is that some lanes will be dedicated to buses and use by other vehicles will be restricted, and some intersections will have lanes given over to bus transit with priority green times at signals. However, traffic control by automatic signalling system does not work in most parts of the city. This gradual program of introducing bus lanes needs to be coordinated with the traffic management improvements. Such improvements to the bus system will help reduce congestion for buses and the services will move more efficiently thereby increasing operators’ profits.

The number of major routes exceeds the minimum required passenger flow (5,000 passengers per hour per direction) for some sort of mass transit system (Fjellstrom, 2004) and STP (2005) suggests a progressive program of introducing BRT operations with limited stop services on those routes within Dhaka and extending on demand to the surrounding satellite cities in the short term. According to the study, these routes constitute some 210 km, covering most of the city and can provide a high quality rapid service on long haul routes. The study also suggests that the regular bus routes can be re-organised to provide more localised, frequent stop services parallel with the BRT system, within the neighbourhood.

In the long term new metro lines need to be constructed and some of the BRT lines may be superseded by these Metro lines subject to a detailed feasibility study. The whole system (Bus, BRT and Metro) needs to be more integrated with common ticketing and easy efficient interchange stations.

2.5 Composition of vehicle fleet

A large number of alternative modes of transport offer a rich mix of choices for travellers of Dhaka and a unique challenge for transportation planners. It is expected that there is a significant variation in cost and quality of service offered by these modes. The vehicle registration data from the BRTA (Bangladesh Road Transport Authority) shows the growth of different categories of passenger transport vehicles over the last five years. Not all of the vehicles registered in Dhaka necessarily operate in Dhaka. However, Table 2.5 shows the total number of registered vehicles in Dhaka from 2009 to 2013.

According to the BRTA vehicle registration figures up to December 2013, there are more motorcycles (303,930) than private cars (215,411) in Dhaka, but general observation as well as traffic counts undertaken by the STP (2005) study shows that cars far outnumber motorcycles in the city. One of the explanations for this discrepancy may be that motorcycles are registered in Dhaka but tend to be used predominantly in areas around the periphery and outskirts of the city, or in nearby towns. The case is also true for the bus and the passenger cars, as all of the vehicles registered in Dhaka do not necessarily mean that they operate in Dhaka. However, the use of motorcycles are increasing recently as it has flexibility of manoeuvre during the congested road network, defying traffic rules as they can take advantage of poor enforcement.

Table 2.5 Number of registered passenger vehicles in Dhaka (2009 - 2013)

Vehicle type	Up to 2009	Up to 2010	Up to 2011	Up to 2012	Up to 2013
CNG	7,612	7,664	7,776	7,887	7,947
Large bus	15,552	16,783	18,284	19,502	20,473
Human hauler	2,475	2,718	3,287	3,432	3,547
Microbus	40,503	46,202	49,742	52,385	54,612
Minibus	9,341	9,490	9,626	9,729	9,812
Motor cycle	179,383	210,081	244,789	277,599	303,930
Private car	16,1649	182,524	195,645	205,073	215,411
Taxicab	36,011	36,011	36,063	36,106	36,110

Source: BRTA (2014). Note: Private car includes jeep

2.6 Public transport modes in Dhaka

There are a range of public transport modes in Dhaka. Starting with CNG auto-rickshaws, human haulers (informal microbuses), minibuses, microbuses, double deck buses, articulated buses, taxis and rickshaws are the common public transport modes in Dhaka. An overview of public transport modes is given to aid understanding of the public transport market in Dhaka.

(a) Auto-rickshaws (CNG)

An auto-rickshaw is a three wheel vehicle fuelled by CNG (compressed natural gas) also popularly known as a "CNG". Fare levels and operation of auto-rickshaw is regulated by the government (BRTA) through gazettes and permits, but it is not adjusted regularly as raising fares is not a popular political decision. Though auto-rickshaws are meant to operate under a regulated fare and meter system and bound to serve any destination within the city, it is common practice to negotiate the fare before starting a journey. It is a general complaint from users that drivers often decline to serve destinations where there is a lower chance to win a return passenger, in order to optimise their revenue. Generally, the drivers of the auto-rickshaws are not the owner of the vehicle and they pay a fixed amount as rent to the owner, which is reportedly very high and there is no regulatory mechanism to control this hiring rate (DevCon, 2009). The total transfer of revenue risk to the driver with high upfront payment for the shift, and operation and maintenance cost, is the key bottleneck for the sound operation of CNG service. This revenue maximising attitude of the drivers is the main driving force behind the undisciplined operation of this service. Safety and security in auto-rickshaw are also important issues, especially at night for female passengers.

(b) Rickshaws

Rickshaws in Bangladesh have a long history, and they are an important component of Dhaka's transport system. DCC (Dhaka City Corporation) regulates the number of rickshaws by issuing permits to them. Rickshaws are pulled by human being which is a laborious job. At present more than 600,000 rickshaws are operating in Dhaka against only 85,000 permits issued by DCC and almost all of them are human powered. Due to poor design and controlling features of battery powered rickshaws, they are not allowed to operate in Dhaka on safety grounds. However, the number of battery powered rickshaws is growing defying ban and creating a safety hazard as reported in the Dhaka Tribune (2013).

There are no guidelines for rickshaw fare. Fares for rickshaws are negotiated for each trip and vary widely according to location, time of the day, load and user, but are generally around BDT 15 per kilometre and BDT 10 as minimum fare (flag fall fare). Another common rickshaw fare yardstick is BDT 2 per minute.

Like any vehicles, rickshaws contribute to congestion if concentrated in large numbers in a limited space, as there are virtually no regulatory mechanisms for controlling rickshaws. Rickshaws offer many advantages for the economy and transport system that include a door-to-door personalised service, almost zero pollution, and little noise. It is a source of employment for the surplus agricultural labour force from rural Bangladesh as well as seasonally unemployed labour. It can be mentioned that pulling a rickshaw is a very hard physical work and suitable for young people. Rickshaws are more efficient users of scarce road space than cars at lower speeds, although less efficient than buses. So it can be argued that rickshaws as a mode of urban transport should not be treated as a problem, but a weakness in regulating and integrating them with other modes of transport may be an issue. The advantages of rickshaws can be maximised with effective regulation and modernisation of rickshaw designs. Effective regulation could include restriction of the numbers of rickshaws at a neighbourhood level, and should include road and public transport station designs which take into account their needs.

(c) Taxis

The taxi service, popularly known as taxicab, was introduced in Dhaka in 1998 after a government policy of company taxi operation to provide a better transport service. An incentive mechanism allowed companies duty-free car imports for taxi operation. Permit numbers were initially limited to 10,000, considering the issue of traffic congestion. This number was raised to 12,000 in 2004. Like auto-rickshaw the fare of taxi is regulated by the government but similarly taxi drivers negotiate fares and rarely run on meters. Out of those 12,000 taxi permits, fewer than 3,000 taxis were in operation that shows the dismal performance of this service. The reason for this poor performance of this service was reported by DrvCon (2009) as:

- Substandard vehicles
- Shortage of skilled drivers
- Little or no experience of running taxi companies
- Low engine capacity 800cc to 1500cc

The premature retiring of the taxi fleet resulted in huge financial losses for the entrepreneurs, financial institutions and small investors.

(d) Bus

Buses are the dominant mode of public transport in Dhaka, varying in size and capacity. There are different types of buses in Dhaka including large buses, minibuses, double deck buses and recently introduced articulated buses. There are also small public transport vehicles categorised as “human haulers”. They are classed as buses as they follow defined routes. The total number of permits issued up to 2007 was 6,339, of which 4,807 were for buses and minibuses and 1,592 for the smaller human haulers (Bhuyan, 2007). STP (2005) estimated that 1,600 buses operate on different routes without valid route permits. Therefore, a large number of buses operate on a relatively small road length of 200 km and intercity buses also serve travellers within the city augmenting public transport supply.

(i) Large buses

There has been a significant change in recent bus fleets in Dhaka with the increase in the number of large buses. Bhuyian (2007) defined large buses as buses ten metres or more in length, and this class including double deck buses and recently introduced articulated buses on one of the routes. The large bus sector has shown considerable dynamism in Dhaka in recent years, despite generally poor operating conditions caused by increasing congestion.

Figure 2.2 Large bus, double deck bus and articulated bus in Dhaka

(ii) Minibuses

Minibuses are defined as buses with 15 to 32 seats capacity, excluding the driver. Most minibuses are around 8 m in length, with locally manufactured bodies on Isuzu, Hino or Tata chassis and engines (Fjellstrom, 2004)). As the body and the seating arrangements of buses are locally constructed, the basic dimensions and safety standards are often compromised to maximise passenger capacity with inadequate space in seats, inadequate legroom, low roof height, small doors and high steps. Naturally the violations of such standards adversely affect the comfort and quality of journey, and are a key issue for improving the quality of service that needs immediate attention. According to STP (2005), minibuses are the largest constituent of bus fleet and around 5,000 minibuses are in operation in Dhaka, of which around 2,000 are operating without permits or in contravention of allocated routes.

Figure 2.3 Minibus in Dhaka

(iii) Human haulers (small buses)

Human haulers are small buses seating nine to fifteen; mostly a form of converted pickup truck with makeshift body and two benches added parallel to each sides of the vehicle for passengers to sit in a crammed condition. The roof height is extremely low and the door is at the back of the vehicle, a moderate jump is needed to get in and out of the vehicle using an extended step outside the vehicle which is quite risky. Human haulers follow a specific route and there are no designated stops en route as they are a seating only service and shuttle between two destinations. They drop passengers en route as requested and pick up passengers en route but charge the full fare for the entire length of the route. The fleet includes some low cost Indian Tata vehicles with low capacity engines. Most are diesel, though there are some petrol engines and now a small number have converted to CNG. A total of about 1,600 route permits had been awarded to human haulers to operate on 38 routes.

Figure 2.4 Human hauler in Dhaka

Human haulers use high sulphur diesel and are poorly maintained which causes huge environmental pollution. The space inside the vehicle is poor in relation to the number of designated seats. Though human haulers are a seated service, the comfort level is very low due to congested seating arrangements. A driver and a conductor run the service. The conductor stands on the extended steps outside the vehicle at the back holding the body of the vehicle and assists the driver and collects fares. There is no defined service headway rather they maintain an order of operation and start when all seats are full. It is a very high frequency service but inefficient due to low capacity, the vehicle contributes to congestion.

(iv) Microbuses

Microbuses have a capacity of 8-16 passengers and do not follow specific routes as defined by the DMRTC (Dhaka Metropolitan Regional Transport Committee). Microbuses include both new and reconditioned vehicles, mostly imported from Japan. Some companies use microbuses to bring employees to and from work, a service usually offered at no charge to the employees. They are also used to transport students from home to education for which the students pay a monthly fee. Sometimes microbuses are used on a day rental basis.

2.7 Bus operation in Dhaka

Apart from fare regulation and route permits the bus market in Dhaka is by and large deregulated (STP, 2005). Permits are issued for individual buses allowing operation along a route for three years for new large buses by Dhaka Metropolitan Regional Transport Committee (DMRTC). Route permits for human haulers, small buses and old buses are issued for one year to discourage their operation and to encourage entry of new large buses.

In the absence of a mass transit system, the bus is the only mass public transport mode that provides important transport services along 103 bus / minibus and 38 human hauler routes in Dhaka. The bus market is deregulated along those 141 defined routes where both public and private operators provide transport service on a competitive basis though fare is regulated for all types of public passenger transport. In theory the transport fare is regulated by government gazette, but in practice the fare is deregulated to a large extent in absence of proper enforcement and adequate oversight.

It is the requirement of the Act (MVO, 1983) to review public transport fares periodically but the government does not review and adjust fares on a regular basis. As a result it is common that operators adjust fares in line with their operating costs and the fare is deregulated on the ground.

2.7.1 Structure of bus industry in Dhaka

Bus operation in Dhaka is highly fragmented with "one bus one operator" being the most prevalent market structure, mainly responsible for chaotic bus operation including poor standards of service quality, safety and security for passengers. According to the regulatory cycle proposed by Gwilliam (2008), bus market consolidation should take place naturally by market forces and is a continuous cycle. However, fare regulation without proper account for operating cost, regulation of routes without scientific consideration and the prevailing local political environment discourage formal investment in the industry and act as a barrier to natural consolidation. As a result, most studies (e.g DITS,1994; STP, 2005) recommend the restructuring bus industry from a large number of small operators into a smaller number of large operators in order to achieve improved quality of service, increased productivity, and effective regulation. It is unchanged in the dual sense that (a) little has occurred in terms of consolidation and (b) little has changed regarding the importance of consolidation.

Some progress towards consolidation of bus industry has been made by DMRTC (Dhaka Metropolitan Regional Transport Committee), who now issue permits for bus and minibus from 2004 following policy measures, summarised by DevCon (2009) as:

- No new permits for minibuses and human haulers; only the existing permits can be renewed;
- Larges buses capacity of 50 or more run by CNG (Compressed Natural Gas) will be encouraged to apply for permits; and
- Buses that operate under a company structure and having their own parking at the origin and destination should be given preference in issuing permits.

Human haulers operation remains under the most fragmented structures on the routes that have inadequate road geometric constraints and are difficult to serve by large buses with higher frequency. The market is now saturated in some of the human hauler routes, so efficiency gains through high frequency is offset by delays en route due to congestion. However, the human hauler services are justified as there is a market niche where large bus or minibus operation is neither profitable nor practically feasible in less accessible areas, so the regulating human haulers may limit the access to transport service to some less served areas.

These measures had little effect in a real sense. Encouraging large buses to operate within a company structure needs support from insurance and financial institutions, and a decent capacity of operators with fair chance of return of their investment. The third regulatory decision of having own parking facilities at both ends of the routes is not economically efficient and practically feasible for an individual operator given the scarcity of land in Dhaka. However, this facility can be developed under the Public Private Partnership (PPP) framework allowing bus operators to use parking on payment.

The present structure of bus industry that has evolved after the regulatory measures introduced since 2004 and can be summarised as:

- Type 1: Company owns bus with own bus depot for maintenance and parking of their bus fleet;
- Type 2: Company hires bus on monthly basis on top of their own buses and has bus depot for parking and maintenance;
- Type 3: Bus owned by individuals operate under a company structure to meet the requirement of permit and pays fees to the company for arranging permits; and
- Type 4: Companies of each route under Type 3 operation formed a Route committee that provides schedule to the individual operators in their committee and charges fees for this service.

As a result of the decision by the DMRTC, 86 routes out of 103 routes are under company operation but the remaining 17 routes are still under individual operators and 77% of bus fleets are under so called company operation, 40% of the bus fleet is fuelled by CNG and 28% of the fleet is older than 6 years (DevCon, 2009). It apparently shows a good level of consolidation, but in reality individual operators on the route formed companies to meet the requirement of getting the route permit, and the operating arrangement remained individual as before.

According to DevCon (2009), after 2004 there was apparently a significant consolidation of bus industry in Dhaka with 75 bus companies. Of these 75 companies, 90% of them have a fleet size of between 11 and 50, and only 2.7% company having fleet size less than 10 buses and another 2.7% companies having fleet size more than 100 buses. The only Type 1 operator is the public owned BRTC (Bangladesh Road Transport Corporation) that existed before the regulatory measure introduced in 2004. Type 2 consolidation as a result of the regulatory measure have some positive impact but the Type 3 and Type 4 consolidation have no positive impact on the bus operation in Dhaka apart from higher cost of the individual operators in the form of commission to the bus company or the route committee.

Gradually fleets are being upgraded with newer vehicles as a result of this regulatory intervention. STP (2005) recommends continuing these policies and actions that encourage industry consolidation and fleet renewal as a second best option. However, from several years of experience DevCon (2009) argues that forced consolidation through forming the operators' cooperatives by DMRTC is failing to meet the overall objectives of the consolidation, as the individual operation continues by paying the cooperatives for schedule and runs the business as usual.

There are 10 private bus operators with fleets of 30 or more buses, predominantly in the large-bus sector but including some large minibus operators. Aside from these larger operators, buses are under individual rather than collective ownership, although some individuals own several buses. Microbuses (human hauler) are generally held under individual rather than collective ownership. The overall level of fragmentation of the industry remains high.

2.7.2 Regulation of bus fares in Dhaka

The bus fare, as with the fare of all public transport modes, is regulated by the Ministry of Communication through government gazette notification. As reported by STP (2005) there is a difference between the regulated fare and the actual fare collected by the bus operators due to the weakness of the enforcement. They also reported that fierce competition for passengers among different operators, and given the high operating cost and inherent inefficiency of the bus industry in Dhaka, the government regulated fare is at the lower end for short distance trips. STP (2005) collected information about the variation of bus fare across operators and found that bus fares vary among operators, but that competitive forces ensure that the variation is not large.

Though per km basis regulated fare is flat and different only depending on the capacity of the bus (large bus and minibus), but there is no official price differential for the better quality of service. Large buses offer better quality of service compared to minibuses as they are spacious, having more headroom, legroom and larger seats compared to minibuses. Operation standard of large buses is also better than minibuses. Therefore, the higher fare for large buses compared to minibuses is logical. However, STP (2005) reported that there were air conditioned premium services and a seating only express service that charged higher fares than the regulated fare. So, there is a de facto price differentiation depending on the quality of service in an informal way. However, the air conditioned premium services stopped operation after 2007. It is not the case that there is no demand for premium services, but there may be other reason behind the closure of air conditioned service. There are no reports on the reasons for closure of the premium service.

2.7.3 Current fare level

The current regulated fare for large bus is BDT 1.60 / km with a minimum fare of BDT 7.00 and the same for minibus is BDT 1.50 / km with a minimum fare of BDT 5.00 effective from 19/09/2011 enforced by the government gazette published on 19/09/2011. There is demand for regular fare adjustment from the bus operators, but the government does not consider this on a regular basis even to adjust inflation. According to STP (2005), despite inflation, rising fuel costs and deteriorating operating conditions, bus fares have not increased substantially since 2000 and in some cases appear to have actually fallen. This has been identified as the regulatory barrier for improvement of the bus service in Dhaka. Operators attribute this decline in fares to competitive forces, and cite the low fares as a major obstacle to financial sustainability of operations.

Partly as a result of the current ‘fare war’ between bus operators, Sino Dipon and Green Express, both of the formal operators on the Uttara to Motijheel route under the research corridor, were operating at a loss in 2005 as reported by STP (2005). Green Express was optimistic, however, that operations would be profitable with the addition of new buses to their fleet, that would allow a more frequent peak period service. As the fleet expanded, Green Express was also planning to introduce fare variations including return tickets and daily, weekly and monthly passes (STP, 2005). Price of the service is directly related to the quality of service and there is a stand-off between price and quality of service in bus market of Dhaka. Operators blame low fare as a barrier for improved service and the users argue that low fare is for low service. However, this vicious circle needs to be broken through regulatory initiatives for long term sustainability of bus industry.

2.7.4 Fare setting criteria and procedures

According to MVO (1983), it is a legal requirement that fares are reviewed periodically in a negotiation process with operators, and officially gazetted by the government for fixed route public transport services. In reality, however, a de facto deregulation of urban bus fares has occurred, with the official fare applying only to intercity travel reported by all the available transport studies in Dhaka (STP, 2005, Bhuyian, 2007 and DevCon, 2009). The government review of fares generally is not based on a systematic or regular evaluation based on operating costs, as government is generally not equipped with detailed information about bus operating costs.

Generally, the bus owners association and transport workers association pursue government for fare adjustments to offset increasing operating costs and inflation. There is no explicit and transparent fare setting criteria for studying and monitoring cost of bus operation both for urban and interurban bus service. There is always a difference of opinion on the bus operating cost between the government and the operators, and it is thought that operators do not always disclose their real cost as it is a business secret. However, with a process of negotiations between the operator and the government per km fare for bus service is fixed and gazetted by the government. However, operators always state dissatisfaction over the rate gazetted by the government.

From observations and discussions with stakeholders within the bus industry, STP (2005) suggests that there is no urgent requirement for changes to the existing bus fare policy, but there is a demand for a regular review and adjustment of bus fare in line with changes to the operating cost and inflation. The study also observed that since 2001, intense competition on the major travel corridors has led to a drop in bus fares and, as a result, operators are charging less than the official fares. This is especially true for longer trips. However, such low fares are only sustainable due to the poor quality and condition of the vehicles and the service provided. The low fares also have the adverse effect of precluding and / or discouraging investments in better vehicles and improved service.

2.7.5 Fare collection system

Fares are collected outside the bus at ticket counters at bus stops for the major bus and minibus operators under company operation. As a result, there are about one to twelve counters at each bus stop depending on the number of major operators on the route. Large buses and minibuses under individual ownership have conductors to collect fares on board. Human haulers also have conductors who collect fares on board, and they do not have counters for selling tickets. The rationale for the ticket counters is not to speed up boarding on the buses, but to enable the larger bus operators to reduce revenue leakages by avoiding cash transactions on buses by the conductors.

Given the low cost of labour, operators can afford to maintain ticket booths at the bus stops for selling tickets without a significant increase in their operating cost. Moreover, in the absence of published timetables the ticket sellers in the booths can provide information to passengers about the timing of the next service coming to the respective stop. According to DevCon (2009), one operator with a fleet of around 100 buses employs around 400 ticket counter workers at 80 ticket booths along four urban routes. Figure 2.5 shows the ticket counters and passenger shed at the bus stop that represents a typical bus stop.

Smaller buses, especially human haulers, have one driver and one conductor to collect fares from passengers. The conductors also assist the drivers to drop passengers on the way as it is quite common that human haulers drop passengers *en route* as per their demand. Minibuses and large buses which operate under individual ownership have a driver, a conductor who collects fares, and a helper to assist the drivers. Buses and minibuses run by companies with ticket counters at the stops have a helper but no conductor. Some large buses, such as the newer Volvo double-decker BRTC buses and the premium services, operate without conductors or helpers. In developed countries, the wage of driver is a major component of operating cost, but given the low wage rates employing drivers, conductors and helpers is still a commercially viable option in Dhaka.

Figure 2.5 Bus stop shows ticket counters and inadequate facilities

To provide more flexibility to the passengers, the government owned bus operator BRTC (Bangladesh Road Transport Corporation) and other major private operators have introduced advance daily, weekly and monthly tickets between any origin and destination they operate, and are also in the process of introducing a smart card ticketing system on an experimental basis. With a smaller fleet size, small operators cannot take advantage of this system as there are a number of operators in the same route, and passengers have less motivation to buy monthly or weekly advance tickets from a particular operator.

At the bus stops passengers can get information from the counter master (who sells ticket) about their next service arriving to that bus stop, and can buy a ticket for the service that is arriving next. They prefer to buy tickets just before boarding the bus that arrives first if there is more than one operator between an origin and destination to minimise their waiting time. A limited number of large operators, or one operator one route system, can take the advantage of daily, weekly or monthly advance ticketing system or even a more flexible ticketing system.

2.8 Bus network integration and extension

The bus system in Dhaka has evolved in response to passenger demand not as a result of careful route planning exercise. The service is provided by individual operators and concentrated between profitable origins and destinations. The issue of expansion and integration of the bus routes is generally absent in formulating plans and policy for bus route planning and operation. However, the presence of more flexible and abundant rickshaw as an access and egress mode has helped to overcome the weaknesses of integration of service with higher user cost. Rickshaws are far more expensive than buses and provide feeder services for the bus network. However, the expansion of bus network even with smaller vehicles can benefit the passenger through improved accessibility and lowering travel cost.

Bus operation is limited to about 200 km primary roads along nine corridors and, depending on the passenger flow; five of the corridors qualify for the operation of any form (bus or rail based) of mass rapid transit system. Two corridors are already under development of BRT and elevated metro rail system. The extension of bus service to the secondary roads can be examined as an integrated system to improve accessibility and to improve the bus patronage that will act as feeder service for faster bus services such as BRT or Metro in the main corridors. The plan for development of public transport in Dhaka focused on mass transit system on major corridors, but the plan for improvement of existing bus service got less priority. This may not yield optimum benefit to the general public in the city. As a result, the assessment of the existing network and possible extension of bus services in the secondary roads can be examined for better service quality through more supply and improved access and efficiency.

2.9 Institutional arrangements for bus operation and regulation

The traffic and transport system is regulated by the MVO 1983 (Motor Vehicle Ordinance, 1983) which is the primary law on motor vehicle operation in Bangladesh. In the framework of the Act the Ministry of Communication has overall responsibility for the regulation of road transport system in Bangladesh. The fare of public passenger transport is regulated by the Ministry. BRTA (Bangladesh Road Transport Authority) under the Ministry of Communication is responsible for vehicle registration, driver licensing, fitness testing and formulating traffic rules and regulations. Within the DMA (Dhaka Metropolitan Area) traffic division of DMP (Dhaka Metropolitan Police) under the Ministry of Home Affairs enforces the traffic rules and prosecutes the offences related to motor vehicle. DCC (Dhaka City Corporation) a local government institution under the ministry of Local Government and Cooperatives build and maintain necessary infrastructure for the road traffic and transport within their jurisdiction. Outside the DCC area RHD (Roads and Highways Department) builds and maintains the main road network and LGED (Local Government

Engineering Department) does the same for the secondary road network.

For the better operation and management of the transport system in Dhaka, DTCB (Dhaka Transport Coordination Board) Act 2001 empowers the board to plan public transport services in Dhaka. The Act also allows the board to design, construct, maintain and operate Mass Transit system in Dhaka. Like DMRTC, this Board has members from different government bodies for better coordination but the board itself has shortage of transport professionals to perform the transport planning function.

For the regulation of public transport services in Dhaka, DMRTC (Dhaka Metropolitan Regional Transport Committee) issue route permits for any types of public transport vehicle under MVO 1983. This committee is also responsible for the route planning of public transport vehicle. DMRTC constitutes the committee with the Police Commissioner of Dhaka as the chairman of the committee. Apart from the official members from different government bodies there are representatives from Bangladesh Road Transport Association, Bangladesh Bus Truck Owners Association, Dhaka District Transport Workers Union and Dhaka CNG Owners Association. These organisations are the key stakeholders outside government and do not have any voting right in the decision-making process of the committee. Examining the profiles of the committee members, DevCon (2009) evaluates that DMRTC lacks professional knowledge and experience to make technical decisions for public transport route planning with appropriate number of public transport vehicle in each planned route. They suggest the reconstitution of the DMRTC with enhanced role of DTCB in the DMRTC.

2.10 Bus market competition in Dhaka

The existing form of bus market competition in Dhaka and the problems associated with the competition arrangement are discussed to understand the root causes for some of the bus attributes, and the valuation of these attributes is the main interest of this research. The competition 'within' market is the prevailing scenario in Dhaka and characteristics of this market structure are discussed in this section.

Competition in general is a positive force that leads to better services and lower costs through efficiency and productivity improvements. However, the 'wrong' form of competition can lead to bus operators 'fighting' for passengers on the street and can have destructive consequences for the bus sector. In Dhaka, the revenue risks are fully transferred to the bus owner and drivers and they try to maximise their revenue from the number of passengers they can carry. This competition 'within the market' creates incentives in the form of lower bus fares, thereby improving affordability by passengers, but it has many negative consequences.

STP (2005) summarises the characteristics of bus operation in Dhaka as poor driver conduct that includes speeding to overtake buses which has safety implications. Stopping in the traffic stream to block buses behind from passing contributes to congestion. Lingering in terminals or at major stops along the route until buses are full and to increase the gap with the bus in front are poor driver behaviour to maximise revenue. Picking up and dropping off passengers while moving without complete stopping is risky and unsafe for passengers, and allowing boarding and alighting at random locations along the route is poor quality of service. These tactics result in longer and unpredictable journey time, overcrowded buses, compromised safety standards and passenger inconvenience. Competition within market is the underlying cause for these problems in Dhaka.

Figure 2.6 Picking up and dropping off passenger on moving

However, it can be argued that the bus drivers, crews and operators who act in this manner are not necessarily inherently undisciplined, incompetent or uncaring, but rather because this is the way the current bus sector organisation and structure of incentives encourages them to act. As a result, the valuation of attributes emanated from this market structure is important to convince the policy makers for initiating policy change. It is not possible to change the behaviour only through enforcement but it can be addressed by changing the incentive mechanism so that competition accomplishes a positive rather than a destructive force. Evidence shows that attempts to force bus drivers to disregard the structure of incentives and instead act in a more responsible manner would require high levels of enforcement and is less likely to succeed. A more productive approach, as supported by international experience, shows that changing the structure of incentives so that it is in the interests of drivers to act more responsibly is the only viable solution to this problem.

Competition among modern bus operators complying with environmental, employment and safety requirements, and dilapidated minibuses and human haulers which do not meet these standards on the flat per km regulated fare, lacks an incentives mechanism for improved quality bus service. Moreover, quality standards are not explicitly introduced in the absence of a proper understanding of the bus quality attributes and user preferences for these attributes. STP (2005) recommends that the regulatory authority take action to enforce minimum environmental, safety and employment conditions for all owners, operators and drivers, especially upon the owners and drivers of dilapidated minibuses and human haulers.

2.11 Conclusions

The road network in Dhaka is inadequate and the length of road under bus route operation is very low, at only about 200 km. There are a number of public transport options in Dhaka, both motorised and non-motorised. Bus and rickshaw (including walking) are the dominant modes of transport and the level of motorisation is very low with a car modal share of only 8%. There is a variation of bus service quality depending on the operator and vehicle fleet, but fares are regulated by the government.

The regulatory arrangement is inadequate and enforcement is very limited, that needs improvement. Although fares are regulated, on-street competition largely determines the fare in the absence of regular adjustment of fares in line with the change in operating cost and inflation. The bus market is highly fragmented and consolidation of the bus market is needed to improve the quality of service and better monitoring.

Fierce on-street competition with regulated flat prices acts as a barrier to improved quality of service and attraction of investment in the sector. A definition of bus quality standards and introducing a differential price based on the quality of service can help reduce the on-street fierce competition and also the quality of service. Introducing ‘competition for the market’ through an appropriate form of contracts with predefined quality of service can help improve the quality of service. Fare levels are low and many of the company operated services are incurring losses which is against the improvement of quality of service and also the investment in this sector.

Attracting adequate investment in the bus industry is a serious challenge in Dhaka. Competition is at the centre of the provision of good quality service and the attraction of financial investment in the bus sector. The issue that can encourage healthy competition and a fair chance of returning investment can attract professional operators supported by financial institutions that will act positively to improve bus quality in Dhaka:

For an introduction of differential fares related to the quality of service in the same route or corridor, it is important to know user preferences for bus attributes. Even for the introduction of 'competition for the market', a service quality standard should be defined for the prequalification of operators. As a result, issues related to the quality of service needs further examination to deepen understanding about bus attributes and their relative impacts on the bus quality of service through attribute valuations and formulation of policy recommendations for the transport system in Dhaka. Evidence of existing bus quality issues is discussed in the next Chapter.

Chapter 3 A review of values of public transport attributes

3.1 Introduction

This Chapter is a review of urban public transport attribute valuation focusing on qualitative attributes in both developed and developing countries. Section 3.2 discusses the urban bus market and regulatory framework to explore related quality issues. Section 3.3 reviews bus quality issues related to the cost and time of a journey. Section 3.4 classifies and defines bus attributes. Evidence on rail rolling stock and rail station attributes, and bus and bus stop attributes, and their values are presented in Sections 3.5 and Section 3.6 respectively. Section 3.7 discusses the variation in the values identified in the review. Section 3.8 sheds some light on issues related to individual and group attribute valuation including the package effect. Finally, Section 3.9 summarises key findings and identifies research gaps.

3.2 Urban bus market and regulatory framework

In urban bus operation quantity, quality and price are closely related and are mutually reinforcing under a sound oversight mechanism that ensures the proper functioning of the bus market to deliver efficient services (Gwilliam, 2008). Different regulatory arrangements can help to develop different market structures that finally affect the quality and price of the service. The urban bus market varies from ‘regulated’ to ‘free market private ownership’ across the globe. In Britain, after the public transport market was deregulated by the Public Transport Act 1985, very little quantity or price regulation remains apart from the effective control over some prices for rail passengers and London-area services by central government and the mayor of London respectively (White, 2009).

According to Small and Verhoef (2007), a less drastic form of privatisation (deregulation) is ‘contracting out’, further down the line is ‘franchising’, and ‘regulated monopoly’ and finally ‘privatisation with deregulation’. The privatisation of bus services can be implemented under a framework of gross contracting (where the authority retains revenue) or net contracting (where the operator retains revenues) arrangements where operators run the service in specified routes and maintain the fleets, and are paid by the authority according to the provisions of the contract. Obviously both contracting methods have advantages and disadvantages.

3.2.1 Form of competition in a deregulated bus market

In the absence of a proper market structure and effective regulatory oversight transferring revenue risks to the bus operators will adversely affect the quality of service due to competition for passengers and cream skimming attitudes of the operators. Therefore, the appropriate form of bus market competition is very important in a deregulated bus market. Cervero and Golub (2007) argue that competition within markets encourages poor driver conduct such as risky speeding to overtake buses in front, deliberate stopping in the traffic stream to block buses behind from passing, premeditated delays terminals or at major stops along the route to increase the gap with the bus in front and picking up and dropping off passengers en route to maximise revenue per trip. All of these elements contribute to unpredictable and longer journey times, overcrowded buses, unsafe boarding and alighting and compromised safety on-board. To overcome these problems, STP (2005) suggests introducing “competition for the market” with a minimum quality standard to be achieved before a company may bid for an operating licence.

The gross contracting method sometimes referred to as Scandinavian model is a relatively simple but apparently effective form of competition for the market and has been successful in Scandinavian cites, London, Rome, Auckland and Las Vegas (Small and Verhoef, 2007). However, some studies suggest that net cost contracting, where operators collect and retain the fare revenue, have greater savings. In this arrangement revenue risk is transferred to the operator which has both positives and negatives. As the operator can retain the revenue they have the incentive to attract more users through better service, but as the private operators may be less able to bear this risk, it may result in higher bids and less competition for the contract.

In franchising arrangements more risks and responsibilities are transferred to private firms under less specific guidelines for a defined leasing period varying from two to three years in Scandinavian countries to as long as several decades in South America (Nash, 2005). In regulated monopoly a single firm is allowed to provide services under strictly controlled terms of price and service quality. However, the terms of price and service quality may be relaxed under a framework of allowing ‘free entry’ in the market with the assumption that free entry will bring competition in price and quality of service. When those restrictions are lifted and free entry is allowed, the result is a free market with deregulation. In privatisation with deregulation government oversight is maintained in the areas of safety, financial disclosure, and other matters covered by business market policy (Small and Verhoef, 2007).

3.2.2 Experience of bus market deregulation

The experience of deregulation both in developed and developing countries highlights the advantages and disadvantages of different competition arrangements that took place in different contexts. Starting with developed economy, different competition arrangements emerged in the UK bus market as a result of the 1985 Transport Act. As reported by Small and Verhoef (2007), in London the public bus operator (London Transport) was retained but it was required to tender services through competitive contracts, outside London the bus services were mostly privatised with free market entry, with municipal operators required either to privatise or to operate on a commercial basis.

The British experience with deregulation sheds light on competition arrangements and it is well documented by White (1997). Key findings by White (1997) included growth in real total revenue from users and continued bus supply (bus-km) growth albeit with lower load factors. Overall, passenger trips in the deregulated areas fell by 2.3% between 1994-1995 and 1995-1996; the smallest reduction being that of 0.9% in the English Shires but London bus trips grew at 3.0%. Further findings by White (1997) has shown that overall, between 1985-1986 and 1994-1995, total local bus-kilometres grew by a very similar percentage in all regions (ranging from 27.9% in the English shires to 30.4% in London), with an average of 28.6% in the deregulated areas. The marked differences in ridership trends (expressed as passenger trips) remain, ranging from a fall of 35.6% in the Metropolitan areas to a growth of 1.3% in London.

The main results outside London were also mentioned by Small and Verhoef (2007) including large service increases (Vehicle.km), higher fares, lower patronage and substantial cost savings meaning higher productivity. They also explained that the higher supply (Vehicle-km) is partly due to the switch to smaller buses from large buses and increased coverage area with higher frequency. The higher fares resulted not from the new market structure but from a drastic reduction in government subsidies at the same time as deregulation. However, the patronage decline after deregulation is more difficult to explain and they argue that the fare increase alone does not explain all of the decline but lack of service integration among competitive operators may have diminished service quality which contributed to the decline in bus patronage.

There is an obvious impact of deregulation on the bus market that ultimately shapes the market and the industry structures including service quality depending on the extent and nature of deregulation. The market and industry structures are different in developed and developing economies as the level of financing, institutional capacity and affordability are important issues. In a deregulated market the monopoly power of large operators can grow in the long run leading to higher prices and Cowie (2014) therefore argues for reregulation for better efficiency. Gwilliam (2008) identifies four distinct stages of the public transport market evolving through different competitive regimes defined as: regulated public monopoly, competitive private supply, private sector area monopoly and finally regulated private local monopoly. Similarly for developing economies, they are private regulated monopoly, public/municipal monopoly, fragmented informal supply and informal sector cartel suggesting that market regulation is a dynamic process and context specific.

The lesson is that it is not privatisation or deregulation per se that improves public transport, but rather the introduction of carefully managed competition, in which the role of public sector as a regulator complements that of the private sector as service supplier. So ensuring participation of the private sector in a competitive manner under an effective regulatory framework can help improve the quality of service and efficiency in this sector.

However, deregulation of public transport market can produce huge overcapacity, increased urban congestion and environmental degradation if old and unsuitable vehicles are introduced in the service. A number of aspects of anti-competitive or anti-social on-the-road behaviour have also occurred in completely deregulated markets. These include hanging back for maximum patronage, blocking rival operators, racing to beat rivals or turning back to pick up passengers.

Moreover, it is envisaged that participation by private sector by introducing efficient competition through regulation can ensure improved public transport system. The private sector is highly fragmented and it is difficult for the authorities to enforce disciplined behaviour. According to Gwilliam (2008) vehicle size and operator size tend to be closely correlated and fragmentation of supply has proved difficult to handle and a need for consolidation has emerged.

3.3 Public transport quality of service

A wide range of factors influence public transport quality of service and hence public transport demand. Public transport demand is a complex function of all relevant factors and change in any of these can affect the quality of service, and finally the public transport mode choice decision (Balcombe et al, 2004). Some of the major attributes that influence service quality are: service headway, access and egress distance (time) to / from bus stop, waiting time, reliability, operating speed, comfort, fare, journey time, transport vehicles and other qualitative factors (Polat, 2012).

Travel cost:

Travel cost is the main determinant of transport mode choice and is one of the two variables that stand out from the others as they contribute a major part in the utility; the second variable is journey time. The generalised cost of travel is the sum of fares paid for each leg of a journey and value of time spent for the journey. However, journey time has different components with differing values.

Fares

Fares are the money paid for a journey and may be flat, distance based, zone based or graduated. It is relatively easy to estimate the fare elasticity of public transport demand and there is extensive evidence both in developed and developing countries. Bresson et al (2003) argue that changes in fares have the most direct and powerful impact on bus patronage and the effects of changes in fares can be distinguished in three main terms: short term, medium term and long term. However, the effect of fare on public transport patronage is not similar in all public transport modes in all contexts and all time frames. Balcombe et al (2004) reported bus fare elasticity as -0.4 in the short term, -0.56 in the medium term and -1.0 in the long term.

Polat (2012) argues that fare sensitivity is higher in the case of price increases than for decreases (mainly for commuters), and when the service is poor than it is good, but passengers are approximately twice as sensitive to changes in travel time as they are to changes in fares. Moreover, the response to fare changes increases with the level of fare, so that fare reductions will have a greater impact on demand when fares are high, which suggests that subsidies will be most effective when and where the fares are high. Additionally, fare sensitivity may depend on trip purpose, traveller type, access to private car, gender and level of income. Polat (2012) concludes that travellers who have access to cars are more responsive to fare changes than those who do not, males are expected to be more sensitive to fare changes than females, and travellers with higher incomes are more likely to be sensitive to fare changes as they can afford alternative modes, but they are more likely to absorb the effect of fare increases. Passengers with low income are more likely to be affected by fare increases than passengers with high income as low income group spends proportionately higher part of their income on transport. However, there is no evidence of variation of demand (valuation) depending on age groups (Balcombe, 2004).

Travel time

Travel time is the most important factor that influences the choice of transport mode and influences the use of public transport. Unlike other factors, the time is an absolute constraint because people cannot increase the time spent on travelling indefinitely. On average, individual's daily time budget for travelling is about an hour and this has been stable for a long time. As public transport is multimodal by nature the term 'travel time' includes several components within the public transport frame. The three main components of travel time are access / egress time, waiting time and journey (in-vehicle) time. Interchange time is sometimes added to this list (Wardman, 2004). More generally, these components are grouped in two classes namely out of vehicle time (OVT) and in-vehicle time (IVT). Depending on the quality of time spent on different legs of a public transport journey, each of these components has different values for travellers.

Table 3.1 Quantitative attributes of a multimodal public transport system

Time spent for access to bus/train stop at origin	Time spent for waiting at the bus/train stop	Fare	Time spent in the vehicle	Time spent at interchange	Fare	Time spent in the vehicle	Time spent for access to destination

Source: Adapted from Polat (2012)

From Table 3.1, it can be shown that out of eight components of quantitative attributes in a multimodal public transport system only two are in the form of fares and the remaining six are in the form of time spent in walking, waiting or travelling. Each of the time components has different weight. For example passengers put high weight on time spent at bus stops and at interchanges, but less weight to time spent in vehicles. There is much empirical evidence on the valuation of different components of travel time. Wardman (2004) analysed the effect of time related factors such as walking time, wait time and number of transfers on public transport use. Abrantes and Wardman (2011) updated these values for different components of journey time reported in the respective component of time discussed in following paragraphs.

It is generally found that the passengers' sensitiveness to out of vehicle time (OVT) relative to in-vehicle time (IVT) is between 1.2 and 2.3 times as reported by Polat (2012). Balcombe et al (2004) reported the wait time to be valued at about 1.6 times IVT for buses and 1.2 times IVT for rail in the UK. IVT for rail is more than bus and the waiting environment at rail station may be better than bus stops and reliability of rail is more than buses that might cause this difference. However, evidence from developing countries may suggest different wieghts. For example, Phanikhumar et al (2006) reported that IVT for bus????? is valued at about 2.4 times higher than wait time. High noise levels and high levels of crowding might be responsible for higher valuation of IVT than waiting time. All of the components of travel time are discussed briefly in the following sections.

Walk (accress / egress) time: The use of public transport involves walking to / from home (or office, or shopping centres, schools, etc.) to a bus stop or rail station or transfer between vehicles or modes. It is agreed that walk time is expected to have premium value since it incurs greater effort; there are fewer opportunities for making productive use of time and it may be undertaken in less pleasant environment, followed by wait time and then in-vehicle time (Wardman, 2004). Murray (2001) explained that access to public transport is an important service performance measure as both access ad egress time (distance) determine the availability of public transport.

It is argued that if the access / egress time (distance) exceeds a maximum threshold, passengers are likely to prefer modes other than public transport. Most studies that provide values for different components of travel time, more or less, agree that walk and wait times are more highly valued, sometimes two to four times higher than in-vehicle time (IVT). According Abrantes and Wardman (2011) walking time values for bus passengers vary between 1.25 and 1.5 times IVT.

Waiting time: Another important component of travel time is waiting time that measures the actual duration of waiting at the bus stop by a passenger. There are two different processes of determining the waiting time at the bus stop namely the process of passenger arrivals at stops and the process of headways between vehicles available for boarding. When headways are shorter the passengers arrive at the bus stops randomly and the waiting time is the half the headway. When headways are longer and vehicles adhere to a published timetable passengers try to arrive at the bus stops close to the arrival time of the vehicle. In that case the waiting time is the gap between the arrival time of the passenger and the actual departure time of the vehicle. However, this assumption is only valid if there is no alternative public transport mode on a route.

The presence of alternative modes in the same route invites competition among transport modes and operators and the passengers are likely to wait shorter periods of time, if they are willing to pay higher fares for alternative transport modes. Many passengers pay higher fares to avoid the inconvenience of waiting time. Waiting time also has premium value due to the stress and frustration involved and it is less productive (Wardman, 2004). For this reason, passengers waiting for a bus would prefer to spend their time in comfortable, safe, clean and protected places. Abrantes and Wardman (2011) value bus passenger’s waiting time at between 1.06 and 1.49 times IVT.

In-vehicle time: In studies of the value of time, in-vehicle time (IVT) receives the highest attention followed by walk and wait time (Wardman, 2004). IVT is a relatively small part of the total journey time for short journeys, but it changes as the journey time gets longer so does the value of IVT. Abrantes and Wardman (2011) conducted a meta-analysis of different components of journey time. The findings show that the value of IVT varies with respect to user type (e.g. business), journey purpose (e.g. leisure or work), distance (e.g. shorter or longer journeys) and travel mode (e.g. bus, rail or car). The valuation of IVT also depends on the quality of journey and ambience inside the vehicle. Level of crowding, air conditioning or heating and seating arrangements contribute to the quality of journey and hence the value of IVT. According to Abrantes and Wardman (2011) the value of IVT for commuting trips for a UK bus user varies from 4.4 pence per minute to 5.6 pence per minute in 2008 prices. The value of rail user’s rail travel time for commuting trips is the highest and the value of bus user’s bus travel time is the lowest.

Interchanges: A significant number of public transport trips are multi-leg journeys involving more than one bus or transfer onto a different mode.. Interchange is sometimes referred to as a transfer penalty or transfer time or connection time. Transfer time is an important time element in public transport journeys as it can considerably influence the total journey time. Wardman et al (2001) investigated interchange for bus, train and commuting car users and the effect on travel choices and indicated that an additional interchange reduced the demand for an inter-urban rail travel in the UK by around 20-25%.

Service quality

Apart from the objectively measurable factors of a public transport journey such as fares and time service quality is one of the most important determinants of public transport quality of service that influences demand. Polat (2012) reported that service quality is one of the transport variables with the most direct and powerful influence on patronage and the role of service quality becomes even more important when seeking to maintain market share and increase profitability in a deregulated and privatised market. Service quality is at least as important as fare, if not more so. Bresson et al (2003) argues that in some circumstances a fare rise can be compensated by equivalent service improvements without affecting patronage.

The factors that impact on service quality are quantity of transport service supplied in terms of route length, vehicle-km or more precisely seat-km, service frequency and quality aspects of a public transport journey such as service reliability, comfort, safety, security information provisions, quality of driving, appearance and behaviour of driver, on vehicle and off vehicle attributes, environment inside public transport vehicle etc. The quality aspects of public transport journeys are often called soft attributes and the valuation of these soft attributes is discussed here.

3.4 Classification of public transport attributes

Empirical evidence suggests that a wide range of attributes determine the quality of public transport service and influence the demand. It is natural that all attributes are not equally important and vary in different contexts. It is a formidable task to evaluate all of the attributes and their influence on perceived quality of service. Most empirical studies focus on a limited number of attributes, mostly quantitative related to different legs of journey time, reliability and headway of a public transport mode. These are indicators of service quality. To organise the attributes in a more structured way the attributes are divided in two groups as quantitative and qualitative attributes, sometimes identified as hard and soft attributes.

There is no widely accepted definition of hard and soft interventions but Bristow and Davison (2007) defined hard interventions as objectively measurable aspects of time and money, or generally the finite resources needed to accomplish a journey, and soft interventions are those that impact on the journey experience and perceived time cost and finally reduce the disutility of journey time. Therefore, hard factors are the cost of a journey but the soft factors reflect the quality aspects of a journey that interact with the hard factors. They impact upon the disutility of a journey. Soft factors sometimes interact within themselves and affect the individual valuations depending on the type of interactions.

Measures (attributes) that impact upon the disutility of journey time are grouped into six classes and identified as soft impacts by Bristow and Davison (2007). They are (i) quality of in-vehicle experience, (ii) increased awareness of service availability (off-bus information), (iii) improved knowledge while travelling (on-bus information availability), (iv) ease of use, (v) quality of waiting and walking experience and (vi) safety and security. The quality attributes or soft factors can also be grouped as on-bus and off-bus factors or in the order of a journey progression from planning to the end of a journey.

There is a growing recognition of the ability of soft factors (attributes) to influence mode choice (Balcombe et al, 2006). Attempts have been made to value attributes examine their impact upon overall service quality and their influence on public transport demand. Though the valuation of bus attributes and examination of their role in bus demand is not new, knowledge is still at a developing stage, especially in the case of soft attribute valuation. Therefore, available rail attribute valuation studies have also been reviewed to broaden the evidence base for the soft attribute valuation studies.

3.5 Rail qualitative attributes

The valuation of rolling stock and rail quality attributes in the context of UK is well documented by a number of studies including Wardman and Whelan (2001 and 2011). The evidence suggests that a range of rolling stock and station attributes influence perceived quality of service and so influence mode choice (Wardman and Whelan, 2001). As a result, both rolling stock and attribute valuation are common in the area of railway service quality valuation. Soft attribute valuation studies are conducted mainly by consultants for their clients and most are unpublished reports considered as grey literature. The studies reviewed in this section are Wardman and Whelan (2001 and 2011) in the British railway context, LUL (2000) in the context of British underground, and Douglas Economics (2006) in the context of Australian railway. These are three major rolling stock studies in unique contexts.

Wardman and Whelan (2001) reviewed 20 unpublished British studies (conducted between 1983 and 1993) of rolling stock valuation and also conducted a detailed valuation study of rolling stock attributes using Stated Preference (SP), Revealed Preference (RP), joint SP-RP and rating data aiming to compare the values obtained from RP and SP data and also to test the package effect and role of some elements that might have influence on valuation.

Ten of the twenty studies reviewed by Wardman and Whelan (2001) valued individual attributes along with an overall valuation depending on rolling stock type. However, this review focuses on individual attribute values and variations depending on the attributes of users and trips. There is a variation in the unit of valuation across studies and these are presented in monetary values, percentage of fare or percentage of in-vehicle time.

Seven out of ten studies reviewed by Wardman and Whelan (2001) present the values as a percentage of fare, one study presents the values in monetary terms, one study presents the values in percentage of in-vehicle time and one study presents the values both in monetary terms and in percentage of in-vehicle time. Eight studies segment the values into three groups depending on trip purpose namely employer's business (EB), commuting (C) and leisure (L). The values are derived from stated choice exercises. The values of different attributes presented in percentage of in-vehicle time varied for EB (14% to 25%), L (10% to 26%) and C (7% to 15%).

The attributes evaluated in monetary terms varied between 1.8 pence and 42 pence (in 1993 prices) and the values presented in percentage of fare varied from 0% to 11%. These wide variations in valuation of attributes indicate that there is a variation of user preference for attributes depending on trip purpose. Valuation of attributes by employer business class (EB) is the highest followed by leisure (L) and commuting (C). There is evidence of significant package effect and the values of individual attributes are adjusted by a scaling factor in the studies reviewed by Wardman and Whelan (2001).

Although values vary across studies for the same user class generally valuation follows the trend of EB values being the highest followed by L and C, which is logical. However, the valuation of individual attributes seems quite high and the reasons for high valuation were not explained. The most important attributes are information on board and at the station, safety and security both on board and at the station, cleanliness, heating, crowding and comfort as identified by the review.

From their review Wardman and Whelan (2001) identified seven quality attributes and used these to design SP / RP experiments including: crowding, seating layout, ride quality, ventilation, noise level, ambience, seating comfort and journey time. From the SP model for individual attribute valuation it is found that layout and ventilation were not statistically significant at 95%, but were not far from significant (t values 1.6 for layout and 1.7 for ventilation) but the others were statistically significant. The values were presented in equivalent in-vehicle time saving and also the percentage of in-vehicle time. Comfort, ride quality and ambience are the most important attributes as identified by the model. The sum of the values is equivalent to a 4.6% journey time change that was compared with the overall valuation to check the package effect. The highest valuation was for comfort (1.6% of fare) followed by ride quality (1.1%), ambience (1.0%), ventilation (0.3%), noise level (0.3%), seating layout (0.3%).

A regression model was also developed with rating data to evaluate the package effect and the model estimated the packaging ratio (sum of individual attributes divided by value of the package comprising of the attributes) which was highly significant but the ratio was very low only. It is explained that the value is low as the model was estimated from the mix of SP and RP datasets and there was no strategic bias as the comparison was offered between existing stock types. No clear conclusion was made about the causes of the package effect; however, possible causes are mentioned as interactions, budget constraints, halo effects, artificial nature of SP exercise and unfamiliarity about the improvements.

Douglas Economics (2006) estimated values of on train, station and journey attributes and rolling stock improvements for the Australian Rail Corporation. They used rating exercises, SP exercises and regression models for the valuation of attributes and checking the package effect. For on-board train time, service frequency, transfer, fare, train crowding and station crowding they used choice data for discrete choice modelling, but for the valuation of train service reliability, train appearance & facilities, station appearance & facilities and personal security on trains & stations they used rating data for modelling. The values were expressed in in-vehicle time and also in monetary values for all the attributes. Values were segmented in six groups depending on the trip length (short, medium, long) and the time of the journey (peak and off-peak). Both the train and station attributes evaluated by the study are listed in Table 3.2 and the values are presented in in-vehicle time (minutes) in brackets next to the attributes.

Table 3.2 List of train and station attributes

Train attributes (value in minutes)	
Train outside and appearance (0.15)	Lighting (0.13)
Ease of train boarding (0.22)	Cleanliness (0.26)
Seat comfort (0.07)	Graffiti (0.08)
Smoothness of riding (0.10)	On-train announcements (0.16)
Quietness (0.22)	Layout and design (0.38)
Heating and air conditioning (0.15 min)	
Station attributes (value in minutes)	
Ease of train on and off (0.06)	Graffiti (0.05)
Platform weather protection (0.004)	Toilets (0.01)
Platform seating (0.04)	Safety (0.06)
Platform surface (0.07)	Staff presence (0.09)
Subway/over bridge (0.01)	Car park (0.01)
Station building (0.10)	Car park drop off (0.01)
Lifts/Escalators (0.03)	Taxi availability (0.01)
Signing (0.05)	Bus integration (0.02)
Station announcements (0.05)	Bike facilities (0.02)
Information (0.03)	Telephone (0.01)
Station lighting (0.03)	Retail (0.05)
Cleaning (0.13)	Tickets (0.16)

Source: Adapted from Douglas Economics (2006)

Train attributes are more highly valued than station attributes as presented in Table 3.2. The number of the station attributes (24) is more than the number of train attributes (11). However, the summation of in-vehicle time saving per trip for on train attributes is 1.92 minutes in-vehicle time of the journey and the value of the package is 2.23 minutes. The same for station attributes are total 1.11 minutes and 1.25

minutes for the package respectively. The five most important train attributes are layout and design, cleanliness, ease of boarding, quietness and on-board announcements. Other attributes are similarly important in terms of valuation, but seat comfort and graffiti have the lowest valuation.

Faber Maunsell (2004) reviewed the evidence of soft factor / attribute valuation of public transport. In their review they presented the valuation of different station and on train attributes from a London Underground Limited (LUL) customer preference survey carried out in 1999-2000. The review divides them into two groups of station attributes and train attributes in the same way as Douglas Economics (2006). Discrete choice modelling using rating data were used for the valuation of attributes. However, the details of modelling process are not discussed in their review. But it is reported that the values were scaled using an arbitrary scale factor.

The values estimated by LUL (2000) are primarily grouped as station attributes and on train attributes. The stations attributes are again grouped into four categories. They are station facilities attributes, station cleanliness attributes, station information and station access facilities attributes. All of these attribute valuations are presented in four separate tables, the values are next to the attribute in the table.

Table 3.3 List of station access facilities attribute with values (1999 prices)

Station access facilities attributes (value in pence)	
Step free access in the origin station (0.45)	Quietness of the escalator / lift (0.03)
Step free access between the platform and the train (0.31)	Ease of station identification from the outside (0.12)
Provisions of corner mirrors (0.07)	Integrated bus connections (0.21)
Condition of the escalator/lift (0.17)	Condition of station exterior (0.13)

Source: Adapted from LUL (2000) in FABER MAUNSELL (2004)

Step free access in the origin station is the most important attribute followed by step free access between platform and the train. This means people are not willing to use stairs for access. Integration of bus service is important as people do not want to walk longer for catching the connecting bus. The least important station access attribute is quietness of the escalator / lift.

Table 3.4 List of station facilities attribute with values (1999 prices)

Station facilities attributes (value in pence)

Ticket machine facilities (0.47)	Help points in the walkways (1.03)
Booking tickets via telephone (0.10)	Help points in the ticket hall (0.41)
Availability of public telephone (0.20)	Surveillance cameras on the walkways (0.92)
Customer toilets (0.89)	Surveillance cameras on the platform (0.69)
LUL information leaflets (0.15)	Surveillance cameras in the ticket hall (0.20)
Retail outlets (0.18)	Staff presence in the walkways (0.89)
Appearance of retail outlets (0,14)	Control room at the station (0.27)
Photo booths in the stations (0.16)	Staff knowledge (0.10)
Cash points in the station (0.63)	Staff willingness to help (0.14)
Help points on the platform (0.55)	Staff appearance (0.05)

Source: Adapted from LUL (2000) in FABER MAUNSELL (2004)

22 station facilities attributes were evaluated by the LUL (2000) study and the most important of them are help points in the walkways, surveillance cameras on the walkway, customer toilet, staff presence on the walkway, surveillance camera on the platform. Three of the most important attributes are related to safety and security at the station and one is related to availability of journey related assistance. This means safety and security issues are most important followed by availability of information.

Attributes related to cleanliness and their values are presented in Table 3.5 and it shows that the station cleanliness attributes are quite highly valued, but not as high as some of the station facilities attributes related to safety and security. So cleanliness at the station is important after the safety and security at the stations. Cleanliness of the walkway, cleanliness of the platform area and the litter in all part of the stations the three most important cleanliness attributes by value.

Table 3.5 List of station cleanliness attribute with value (1999 prices)

Station cleanliness attributes (value in pence)	
Cleanliness of the platform area (0.26)	Graffiti on all parts of the station (0.10)
Cleanliness of the walkways (0.41)	Litter in all parts of the station (0.33)
Cleanliness of the ticket hall (0.13)	Brightness of lighting on the platform (0.13)
Condition/appearance of the ticket hall (0.16)	Brightness of lighting on the walkways (0.21)
Condition/appearance of the walkways (0.23)	Brightness of lighting on the ticket hall (0.09)
Condition/appearance of the platforms (0.23)	

Source: Adapted from LUL (2000) in FABER MAUNSELL (2004)

Availability of information is an important attribute both on-board and off-board. Information received through help points received the highest valuation. The next most important attribute according ranked by value is availability of system disruption information on the platform followed by information about the next train in the ticket hall as presented in Table 3.6.

Table 3.6 List of Station information attribute with values (in 1999 prices)

Station information attributes (value in pence)	
Audibility of the PA messages in the station (0.26)	System disruption information on the platform (0.66)
Usefulness of the PA messages in the station (0.33)	Information available via the help points (0.83)
Directional signing (0.15)	Information on the outside of the train (0.06)
System disruption information in the ticket hall (0.20)	Clocks in the ticket hall (0.05)
Next train information in the ticket hall (0.45)	Clocks on the platform (0.07)
Next train information in the platform (0.18)	

Source: Adapted from LUL (2000) in Faber Maunsell (2004)

Of these four groups of station attributes the station facilities group is the most important followed by station information attributes.

Similarly The LUL (2000) train attributes are classified in three groups: security presented in Table 3.7, information presented in Table 3.8 and vehicle cleanliness presented in Table 3.9.

Table 3.7 List of security on train attributes and values (1999 prices)

Security on train attributes (value in pence)	
Staff on the train (0.74)	Ability to see between carriages (0.32)
Customer alarm on the train (2.65)	Brightness of lighting in the train (0.29p)
Access between carriages (1.03)	Ability of staff to stop the train from the platform (3.28)

Source: Adapted from LUL (2000) in Faber Maunsell (2004)

The most important security on train attribute is ability of staff to stop the train from the platform followed by customer alarm on the train. The on train security attributes group is the most important amongst the groups of on train attributes.

Table 3.8 List of on train information attributes and values (in 1999 prices)

On train information attributes (value in pence)	
Availability of PA messages in the train (0.53)	Time of first PA announcements when a delay (0.83)
Usefulness of PA messages in the train (0.78)	Frequency of PA announcements when a delay occurs (0.43)
Interchange and next station information over the train PA (0.24)	State of LUL posters (0.12)
Electronic displays in the carriages (1.37)	

Source: Adapted from LUL (2000) in Faber Maunsell (2004)

The on train information attributes group is the least important group among the three groups of on train attributes. The most important on train information is the time of first announcements when there is a delay followed by usefulness of PA message in the train.

The vehicle cleanliness attributes are presented in Table 3.9. This group of attributes is the second most important groups among the three on train attribute groups. In this group overall cleanliness inside carriage got the highest valuation and it seems that the single attribute covers some of the other cleanliness attributes that might be the cause of high valuation of this attribute. The next highest valuation in vehicle cleanliness group is for the newness of the train followed by the cleanliness of seats of the train and condition of seat of the train.

Table 3.9 List of vehicle cleanliness attributes and values (in 1999 prices)

Vehicle cleanliness attributes (value in pence)	
Cleanliness of seats of the train (0.47)	External decor of the train (0.35)
Condition of seats of the train (0.31)	Surface graffiti on inside of the train (0.41)
Overall cleanliness inside carriage (2.25)	Graffiti on windows and fixtures in the train (0.17)
Newness of the train (0.55)	Graffiti on outside of the train (0.07)
Outside cleanliness of the train (0.35)	Automatic door (0.51)

Source: Adapted from LUL (2000) in Faber Maunsell (2004)

On-board attributes and their values as presented in above table shows that the security aspects of on train attributes is the most important with a value of 8.31 pence followed by cleanliness valued at 5.44 pence and then on train information valued at 4.30 pence per trip. The values have been capped against the perfect service. According to values of on train attributes top five attributes are ability of staff to stop the train from the platform, followed by customer alarm on the train, overall cleanliness inside train, electronic display on the carriages and access between carriages. Of the five most important on train attributes three belongs to security on train group which indicates that passengers are more concerned about safety and security during a journey. However, values of other important issues such as comfort, crowding, noise and staff behaviour were not included in the LUL (2000) study.

Crowding on the train is an important issue in the domain of public transport attribute valuation and has been evaluated in many studies. However, the presentation of crowding level is not uniform across the studies. MVA (2000) cited in Faber Maunsell (2004) studied the value of crowding improvements for rail service for Strategic Rail Authority. The study defined crowding using load factor as a percentage of occupancy against the capacity and used an SP exercise to identify values. The study estimated the values of different level of crowding for suburban and outer suburban services without segmentation and crowding in intercity service for three segments depending on trip purpose (standard business, first class and standard leisure passengers) and the values were presented in terms of base time. The base time was taken as seated in load factor less than 100%.

For the valuation of crowding, five levels of crowding for urban trains and three levels of crowding for intercity trains using load factor were defined by MVA (2002), cited in

Faber Maunsell (2004). The attribute levels for crowding for urban trains are: seating at 120%, seating at 120% – 160%, standing at 100% - 120%, standing at 120% - 160% and standing at over 160%. Those for crowding for intercity trains are: seating at 50% – 80% seating at 110%, and standing at 110%. Urban values of crowding were segmented for inner suburban and outer suburban but the intercity values are segmented for standard business passengers, first class passengers and standard leisure passengers.

Standing in the crowd has been highly valued for both inner and outer suburban passengers and it is as high as 3.8 times the base time which is quite high but given the discomfort of standing in crowd it can be acceptable. The value of crowding suggests valuation varies depending on trip purpose and standing has been valued highly by all passengers and business passenger valued at 3.4 times of base time compared with 2.3 times of base time by first class passengers but the value for leisure passenger is the highest at 3.6 which is higher than the values from the meta-analysis by Wardman and Whelan (2011).

Wardman and Whelan (2011) reviewed the British evidences of rail crowding valuation and conducted meta-analysis for rail crowding valuation and developed an implied IVT (in-vehicle time) multiplier for different level of crowding depending on load factor. Table 3.10 presents the implied multiplier for different level of crowding in seating standing in crowd for commuter and leisure passengers.

Table 3.10 Implied multiplier for crowding

Seated multiplier			Standing multiplier		
LF(%)	Commute	Leisure	LF(%)	Commute	Leisure
50	0.86	1.04			
75	0.95	1.14			
100	1.05	1.26	100	1.62	1.94
125	1.16	1.39	125	1.79	2.15
150	1.27	1.53	150	1.99	2.39
175	1.40	1.69	175	2.20	2.64
200	1.55	1.84	200	2.44	2.94

Source: Wardman and Whelan (2011), Note: LF means load factor

From the review of rail attribute valuation, it can be summarised that there is a range of station and on train attributes that are important to the passenger. Although the list of attributes is long, they are grouped by aspects as presented in the respective tables. The list of station attributes is longer than on train attributes. However, the average value of individual station attributes is not higher than on train attributes. For example, the highest value of on train attribute ability of staff to stop the train from the platform was valued at 3.28 pence per trip in 1999 prices. This attribute is related to on train security. The highest value of station attribute was for help points on the walkways valued at 1.03 pence per trip in 1999 prices is lower than the highest value of the on train attributes.

Among station attributes the attributes related to station facilities are more important to the passenger followed by information at the station. On the contrary, on train security attributes are more important followed by vehicle cleanliness and information. On train attributes are more highly valued than station attributes.

3.6 Bus qualitative attributes

There is a rich literature of quantitative attribute valuation and their impact on travel demand is well documented. Balcombe et al (2004) summarises evidence of the impact of bus attributes on bus demand and presented demand elasticities for different attributes. The study also summarises the available values of soft bus attributes and their impact on bus demand. A number of meta-analysis studies such as Wardman (1998, 2001 and 2004), Abrantes and Wardman (2011) are available for the valuation of different components of journey time and attributes related to time such as headway and reliability. However, the evidence on bus qualitative attribute valuation is less and the understanding of the qualitative attribute valuation and their impact on bus demand is still in a developing stage. Again, the important valuation studies are conducted by the consultants and mostly unpublished grey literature.

Steer Davies Gleave (SDG) carried out a major study determining willingness-to-pay (WTP) for bus service and bus infrastructure improvements in 1995 for London Transport Buses that covered a range of bus qualitative attributes. This study is one of the earliest and has been included in all the major reviews of soft attribute valuation including Swanson et al (1997), Faber Maunsell (2004), Bristow and Davison (2007), AECOM, (2009). Swanson et al (1997) reported those attribute valuations and has summarised the attributes in the order of eight distinct journey stages as compiled in Table 3.11. The figure next to the attribute in parentheses is the value of the WTP for the attribute per trip. The attribute values are based on discrete choice modelling using rating data in a computerised sliding scale. Qualitative attribute levels were presented graphically and a sliding scale was used to rate relative preference of between the attributes presented graphically. These values were capped against a maximum value of willingness-to-pay. Table 3.11

presents the value of bus qualitative attributes by SDG (1996) as reported by Swanson et al (1997).

Table 3.11 Journey stages and attributes with values (1995 prices)

Journey stage	Attribute (value in pence)
Pre-trip information: Available in different formats, its importance depends on the frequency of service and familiarity of the service	• Standard maps at home (3.9) • Standard timetables at home (5.5) • Customised local information (2.0) • Telephone information service (2.8)
The bus top infrastructure: Protects from weather, facilitate ease of waiting, sense of security and can assist useful use of the time while waiting for a bus	• Shelter with roof and end panel (5.6) • Basic shelter, with roof (4.5) • Lighting at bus stop (3.1) • Flip seats at bus stop (2.2) • Clean bus stop (11.8)
Waiting at the bus stop: Information about the service and alternative use of the waiting time is key issue	• Count down (9) • Customised local information (10) • Guaranteed current info. (8.8)
The bus at the kerbside: Picking up and dropping off passenger. Related to driver behaviour influenced by competition structure	• Bus stops close to kerb (5.8) • Low floor bus (2.4) • Bus branding (2.8)
Encountering the driver (one driver operation): Behaviour of driver and appearance	• Driver appearance (n.s) • Driver helpfulness (n.s) • Driver identification (n.s) • Availability of change (4)
Moving to your seat: Crowding level, motion of vehicle, height of the roof and internal configuration of the bus	• Medium crowded (-4.7p • Highly crowded (-9.5p) • Rough vehicle motion (-10.5) • Medium vehicle motion (-6.4)
Travelling in a seat: Design of seat and spaciousness of seat and ambience inside the bus and the experience of time spent in the journey	• Value of time per minute (1.2) • Spacious seats (3) • Bucket seat v standard (n.s) • Dirty bus interior (-8.5) • Ventilation grille v opening window (-2.5)
Leaving the bus: Information about the alighting stop, crowding level	• Electronic display of next stop (3.9) • Two sets of door (4.2)

Source: Adapted from SDG 1996 in Swanson et al (1997)

Note: Figures next to attributes are value of that attribute, n.s means not significant

AECOM (2009) is a key valuation study across ten case study areas in the UK outside London to provide a better understanding of the importance of qualitative factors / attributes in determining bus patronage trends, particularly modal shift from cars and to expand the evidence base further by enabling robust estimates of the economic values of the most important softer factors. The case study areas are Poole, Hull, Tyne & Wear, Kent, Cambridge, Leeds, Warrington, Lancashire, Warwick and Nottingham. The study included a review of evidence of soft attribute valuation by Bristow and Davison (2007). It applied both a qualitative and quantitative approach to identify and value important bus attribute improvements in the case study areas and also checked for the package effect in soft attribute valuation. In Table 3.12 twenty bus attributes are presented in order of the ranking by the respondents.

Table 3.12 Ranking of bus attributes in order of importance

Rank	Attribute	Factor type	Sum	Mean
1	Reliability of bus	Hard	276	6
2	Frequency of bus service	Hard	164	3
3	Fare paid	Hard	131	3
4	Safety at bus stops	Soft	110	2
5	Walk time to bus stop	Hard	86	2
6	Safety walking to bus stop	Soft	78	2
7	Seat availability	Hard	77	2
8	Comfort	Hard	77	2
9	Waiting time at bus stop	Soft	73	1
10	Information provision – Planning	Soft	71	1
11	Bus type (low floor v non low floor	Soft	68	1
12	Driver attitude	Soft	68	1
13	Cleanliness	Soft	61	1
14	Bus stop / shelter feature	Soft	58	1
16	Walk time from bus stop	Hard	36	1
17	In-vehicle time	Soft	35	1
18	Safety from bus stop	Soft	34	1
19	Ticket type	Soft	23	0
20	Marketing / Branding	Soft	10	0

Source AECOM (2009)

The respondents were asked whether each factor was important to them and then asked to rank each factor in order of importance. For each respondent, the factors were then weighted based on relevant ranking provided by each respondent to give clear picture of which factors were considered more important than others. Using only those ranked in the top 5 (where 1 was the most important). The following scores were allocated,

- 10 = Rank 1 (Most important)
- 8 = Rank 2
- 6 = Rank 3
- 4 = Rank 4
- 2 = Rank 5
- 1 = considered important but not in the top 5

Hard attribtues top the ranking but the soft attributes of safety, seat availability, comfort, information provision and cleanliness also received a high importance rating by the respondents. The importance rating values were then segmented depending on the attributes of the travellers including those with special needs.

Segmentation AECOM (2009) shows that information provision for journey planning is important for non-users and people travelling with small children. Bus stop facilities are important for non-users, people travelling with small children or with other adults. Information provision at bus stops is important for people travelling with small children, people with health issues and the unemployed. Low floor buses become important for people travelling with small children; people with health issues, those aged 18-24 (may be some in this group have young children). Driver attitude becomes important for senior citizens (65+). Seat availability is important for people travelling with small children or travelling with other adults and people with health issues. Comfort becomes important for retired people and shoppers. Cleanliness is important for home makers.

Respondents were asked to rank the attributes according to the need for improvement. It was found that the respondents identified the greatest soft attribute improvements needed to be bus shelters, safety at the bus stop, seat availability. Hard factors seem to dominate but soft factors are important for key segments, reliability and frequency are the most important service attributes followed by fare, then safety at bus stop (a soft factor) and walk time to bus. Reliability, bus stop features and safety at bus stops are three things that people would like to see improved. Reliability, safety at bus stop and frequency are three things that people would not like to see to worsen. Soft factors enhance journey experience; however, they can only really influence demand when hard factors such as journey time, reliability and frequency achieve an acceptable level.

In the quantitative discrete choice modelling part of AECOM (2009) study, a number of models were developed to explore the impact of the introduction of soft measures on bus demand. The SP models estimate the values for the improvement of soft factors / attributes in time values for 13 attributes of which two attributes ‘customer charter’ and ‘leather seats’ were not significant. Elasticity based demand models for bus users and car users were developed to forecast demand using the time values estimated by the SP models. The values of the 11 statistically significant soft attributes out of 13 attributes from the SP models are presented in Table 3.13.

From the values of the study summarised in Table 3.13, it is found that the attributes relating to safety and security such as CCTV at bus stops and CCTV on buses have the highest values. Driver training is an important attribute that relates to the skill and behaviour of drivers also relates to safety on-board. The availability of information is also a key public transport attribute. A low floor has a relatively high value that indicates ease of boarding and alighting is important for bus users. The new bus shelter attributes got the lowest valuation, but climate control is important to the users.

In two out of ten case study areas (Cambridge and Nottingham) is the value of the package of improvements lower than the sum of individual attribute values comprising the package which supports the available knowledge about the package effect. However, in eight study areas the sum of the individual attribute values is lower than package as can be seen in Table 3.13 which is contradictory to the so called package effect. It can be mentioned here that the individual values for attributes are derived from the models developed using pooled data from all the different study areas.

Table 3.13 Value of qualitative attributes and the value of package

Attribute Name	Low floor bus	On-screen display	Trained driver	Climate control	CCTV at bus stop	RTPI	New interchange facilities	CCTV on buses	Simplified ticketing	Audio announ-cement	New bus shelters	Package value	Sum of values
Value	1.78	1.29	2.63	1.24	2.91	1.69	1.27	2.54	1.43	1.22	1.08		
Poole	√	√	√	√	√	√						14.14	11.54
Hull	√						√	√	√			7.71	7.02
Tyne & Wear	√		√			√		√	√		√	13.00	11.15
Kent	√		√	√	√	√				√	√	13.53	11.47
Cambridge	√		√			√					√	6.54	7.18
Leeds	√	√		√		√		√		√	√	11.18	10.84
Warrington	√		√			√	√					8.17	7.37
Lancashire	√		√			√		√			√	10.46	9.72
Warwick	√		√								√	7.19	5.49
Nottingham	√		√			√		√	√		√	9.28	11.15

Source: Adapted from AECOM (2009) Value of soft attribute and the value of their packages. All values are in minutes of in-vehicle time

The British evidence of valuation of bus attributes in the case of London was summarised by Bristow and Davison (2007) from Transport for London (TfL) values. The attribute values are presented in six packages of attributes: bus stop shelter infrastructure, bus stop environment, bus stop information, bus environment, cleanliness of bus, and driver & quality of journey. The values are adapted from Bristow and Davison (2007) and presented in tables according to the package.

Table 3.14 Value of bus stop shelter infrastructure

Attributes and levels	WTP (p)	Remark
<u>Cleanliness of bus stop (attribute):</u>		
Dirty patched on shelter	Base case	
Shelter spotlessly clean	1.5	
Shelter reasonably clean	1.5	
<u>Time table illumination (attribute):</u>		
Bus time table not illuminated	Base case	
Bus time table and bus stop sign illuminated	2.7	
<u>Condition of stop and shelter (attribute:</u>		
Stop or shelter in basic working order, some part worn or tatty	Base case	
Stop or shelter in excellent condition, looks like new	0.8	
Stops or shelter in good condition, perhaps slightly faded or signs of repair	0.2	

Source: Bristow and Davison (2007), original Cohen (2007), TfL values

Bus timetable and bus stop sign illuminated are most important attributes in the bus stop shelter infrastructure package as presented in Table 3.14.

Table 3.15 Value of bus stop environment

Attributes and levels	WTP (p)	Remarks
<u>Surveillance camera at bus stop or shelter (attribute)</u>		
No CCTV	Base case	
CCTV recording at all stops	5.6	
CCTV recording at some stops	5.4	
<u>Lighting at bus stop or shelter (attribute):</u>		
No stop or shelter lighting, street lighting only	Base case	
Stop or shelter very bright or reasonably lit	4.0	
<u>Litter at stop/shelter (attribute):</u>		
Lots of litter at bus stop or shelter	Base case	
No litter at the bus stop or shelter	1.4	
Small amount of litter at the bus stop or shelter	0.8	
<u>Graffiti on stop/shelter (attribute):</u>		
Lots of offensive graffiti on bus stop or shelter	Base case	
No graffiti at all on bus stop or shelter	3.1	
Small patches of graffiti on bus stop or shelter	2.6	

Source: Bristow and Davison (2007), original Cohen (2007), TfL values

Security aspects of bus stop attributes such as CCTV recording at all bus stops is the most important followed by stop or shelter are very bright or reasonably lit which is again related to security at the bus stop. The values are presented in Table 3.15.

Table 3.16 Value of bus stop information

Attributes and levels	WTP (p)	Remarks
Countdown sign at bus stop (attribute):		
No countdown sign	Base case	
Electronic display of up to the minute bus arrival times, delays and other information. Audio announcements also available for visually impaired	5.3	
Electronic display up to the minute bus arrival times, delays and other information	5.2	
Information terminals (attribute):		
Printed time table and route information at bus stop	Base case	
Touch screen terminal at some stops giving up to the minute time table and route information, for buses and other local transport PLUS access to TfL website for other transport information	-0.2	
Touch screen terminal at some bus stops giving time table and route information of all buses from that stop	0.1	
Mobile phone bus real time information service (attribute):		
No information about bus service available on mobile phone	Base case	
Send text message with bus stop code and get return text with times of next buses and relevant delay information (your standard text rate will apply)	1.1	
Send text message with bus stop code and get return text with times of next buses (your standard text rate will apply)	0.8	

Source: Bristow and Davison (2007), original Cohen (2007), TfL values

Bus stop information attributes are presented in Table 3.16 above and it shows that the information about the delay of next service is most important attribute in this group. The way information presented is an important issue. Compared with the attribute printed timetable and route information at bus stop the attribute touch screen terminal at some stops giving up to the minute timetable and route information, for buses and other local transport PLUS access to TfL website for other transport information has a negative value. This means people prefer information about the service and route arrangement in the printed form. Access to internet may be an issue in this case. However, with availability of smart phone and the information from website may be more popular than printed information at bus stop in the future.

Table 3.17 Value of bus environment package

Attributes and levels	WTP (p)	Remarks
On-bus CCTV (attribute):		
Posters indicating that bus is monitored by CCTV	Base case	
Screen showing live CCTV views inside the bus, upstairs and downstairs (arctic front & back)	2.2	
Screen showing live CCTV views inside the bus, upstairs only (arctic back only	1.8	
Ventilation (attribute):		
Opening windows giving ventilation to some passengers	Base case	
Air conditioning, ci4rculating cool fresh air throughout the bus	3.1	
Opening windows giving ventilation throughout the bus	2.5	
Wheelchair and buggy space (attribute):		
Dedicated area for wheelchairs and/or buggies or up to six people standing	Base case	
Large dedicated area for wheelchairs and/or buggies or up to ten people standing with, with fewer seats elsewhere	1.1	
Large dedicated area for wheelchairs and/or buggies or up to eight people standing with, with fewer seats elsewhere	0.0	
Electronic information display inside bus:		
No electronic information inside the bus about the next stop	Base case	
Electronic sign and voice announcement of the next stop with some 'alight here' and route information with the text maps and diagrams. In addition to electronic information, driver announcements on route diversions	4.3	
Electronic sign and voice announcement of the next stop with some 'alight here' and route information in text	4.0	

Source: Bristow and Davison (2007), original Cohen (2007), TfL values

Table 3.18 Value of cleanliness of bus

Attributes and levels	WTP (p)	Remarks
Litter (attribute):		
Lots of litter on the bus	Base case	
No litter in the bus	4.7	
Small amount of litter on the bus	4.1	
Cleanliness of interior (attribute):		
Some very dirty areas inside the bus	Base case	
Very clean everywhere inside the bus	5.9	
Reasonably clean everywhere inside the bus	5.6	
Etching windows (attribute):		
Lots of etching on all bus windows	Base case	
Some or no etching on most bus windows	2.2	

Source: Bristow and Davison (2007), original Cohen (2007), TfL values

Bus cleanliness is an important attribute as shown in Table 3.18.

Table 3.19 Value of driver and quality of journey

Attributes and levels	WTP (p)	Remarks
Crowding (attribute):		
Long wait of more than 5 minutes and a seat in the bus	Base case	
Short wait of less than 5 minutes and a seat on the bus	2.9	
Short wait of less than 5 minutes and have to stand on the bus	2.1	
Smoothness of driving (attribute):		
Jerky ride causing those standing to worry about losing their balance	Base case	
Very smooth ride – no jerkiness	2.4	
Fairly smooth ride	3.6	
Noise (attribute):		
Engine produce intrusive noise or vibration throughout the journey	Base case	
No noise or intrusive vibration from engine throughout the journey	2.8	
Engine produces intrusive noise or vibration only while the bus is at stop	0.3	
Attitude and behaviour of driver (attribute)		
Businesslike but not very helpful	Base case	
Polite helpful and cheerful	2.3	

Source: Bristow and Davison (2007), original Cohen (2007), TfL values

In the driver and quality of journey package all of the four attributes under the package such as smoothness of ride, crowding, noise level and attitude and behaviour of driver have similar valuation.

From the review of the TfL study values it is clear that there is a significant WTP for bus stop and bus quality attributes. However, there is a wide variation of valuation depending on the importance of attributes. The important areas of quality attributes are safety and security both at bus stop and on bus, information at bus stop and on bus and cleanliness of bus stop and bus, quality of journey and driver behaviour.

In the Australian context Hensher and Prioni (2002) and Hensher et al (2003) are two important studies that estimated a range of bus attributes. Hensher et al (2003) attempted to develop a bus Service Quality Index (SQI) in the provision of commercial bus contracts. By using stated choice methods, passenger perception of service levels on thirteen predetermined attributes was estimated through an on-board customer survey with the support of 25 bus operators.

A sample of passengers were asked to choose their most preferred packages from a number of alternative packages of service levels based on these thirteen attributes.

Multinomial Logit (MNL) models were estimated to determine the relative influences of each of the statistically significant attributes that represent the contribution of each service attribute to the calculation of an overall SQI.

In the case of Hensher et el (2003), nine service segments were surveyed for ongoing monitoring for each segment, and through aggregation, for each operator. However segmentation was based on routes under different operators that have a service quality variation. But no description of individual service segment was provided except that they are different according to the bus routes. However, there was no such segmentation in the Hensher and Prioni (2002) study. Each package is a combination of attributes and associated levels and is referred to as an unlabelled alternative.

It was found that not all of the attributes were significant across all the segments (Hensher et al, 2003). However, six variables were significant across all of the segments namely bus fare, seat all the way, stand part way, wide entry two steps, seat only at stop and seat under cover. The highest value estimated by Hensher et al (2003) was AUS$ 1.72 which was for seated all the way and the lowest estimated value was for seats only at the bus stop which was AUS$ 0.29. Therefore, bus crowding is the most important attribute. The value of time estimated by Hensher et al (2003) varied from AUS$ 1.99 to AUS$ 4.72. The variation is quite high.

Similarly the highest value estimated by Hensher and Prioni (2002) was for very friendly driver behaviour. The value was AUS$ 0.88. The lowest value estimated was AUS$ 0.39 for very safe journey. Air conditioning with 20% surcharge had a negative valuation of AUS$ -0.36, but air conditioning without cost is not significant. The value of time was AUS$ 4.02. The values are presented both in AUS$ and time units for Hensher and Prioni (2002). But the value of Hensher et al (2003) is not converted into time units as they are segmented values depending on areas served by different bus operators and there are no overall values.

The value of attributes estimated by two studies has been summarised in Table 3.20 for comparison. The equivalent time values of Hensher and Prioni (2002) study are presented in the next right column of value in AUS$ in Table 3.20.

Table 3.20 Comparison of bus attribute values between two Australian studies AUS$ / minute

Attribute and levels	Hensher and Prioni (2002)		Hensher et al (2003)
Bus stop	AUS$	Minute	AUS$
Waiting safety Reasonably unsafe Reasonably safe Very safe	 Base Not significant 0.39	 Base Not significant 5.83	Not included
Bus stop facilities No shelter/seats Seats only Bus shelter with seats	 Base Not significant Not significant	 Base Not significant Not significant	 0.29 to 0.94 0.29 to 0.94
Information at bus stop None Timetable Timetable and map	 Base 0.62 0.41	 Base 9.26 6.12	 -0.59
Vehicle			
Access Narrow entry 4 steps Wide entry 2 steps Wide entry no steps	 Base Not significant Not significant	 Base Not significant Not significant	 -0.68 to -0.91 0.69 to 0.92
Air conditioning None Available no cost Available surcharge 20% of fare	 Base Not significant -0.36	 Base Not significant -5.38	Not included
Cleanliness of seats Not clean enough Clean enough Very clean	 Base Not significant 0.43	 Base Not significant 6.42	 Not significant 0.45 to 0.58
Driver attitude Very unfriendly Friendly enough Very friendly	 Base 0.41 0.88	 Base 6.12 13.45	Not significant
Safety on board: the ride is Jerky, sudden breaking occurs often Generally smooth with rare sudden braking Very smooth, no sudden braking	 Base 0.43 0.74	 Base 6.42 11.05	Not included
Seat availability Stand all the way Stand part of the way Seated all the way	Not included	Not included	 Base 0.38 to 0.43 0.64 to 1.72
Temperature on the bus Too cold Just right Too hot	Not included	Not included	Not in the model
Value of in-vehicle time per hour	4.02		1.99 to 4.72
P^2	0.324		0.69

Source: Hensher and Prioni (2002) & Hensher et al (2003).

Australian Transport Council values for soft bus attributes are summarised by Currie and Willis (2007) from Booz Allen Hamilton (2007), these values are presented in seven packages of attributes including boarding package, cleanliness package, facilities inside the bus package, seating package and comfort package. The value of time for ATC was AUS $10.00 / hour in 2006 prices.

Table 3.21 Australian Transport Council values of soft attributes

Attributes and levels	WTP (min)	Comments
Boarding package		
Step in the door (attribute): Two steps No steps	 Base case 0.1	
Entering through the door (attribute): Single file past drive Two stream boarding, no show pass	 Base case 0.1	
Driver (package)		
Driver attitude (attribute): Business like and not very helpful Very polite helpful cheerful well presented	 Base case 0.4	
Ride quality (attribute): Jerky journey Very smooth journey	 Base case 0.6	
Cleanliness (package)		
Litter (attribute): Lots of litter No litter	 Base case 0.4	
Clean windows (attribute): Dirty windows and etching Clean windows no etching	 Base case 0.3	
Graffiti (attribute): Lots of graffiti No graffiti	 Base case 0.2	
Exterior cleanliness (attribute): Some very dirty areas Completely very clean	 Base case 0.1	
Interior cleanliness (attribute): Some very dirty areas Completely very clean	 Base case 0.3	
Facilities inside bus (package/aspect)		
Clock in the bus (attribute): No clock on the bus Clearly visible digital clock with correct times	 Base case 0.1	
CCTV on bus (attribute): No CCTV CCTV, recorded, visible to driver plus driver panic alarm	 Base case 0.7	

Continued.

Attributes and levels	WTP (min)	Comments
Information (package/aspect):		
External information (attribute):		
Small signs	Base case	
Large route number and destination sign front, side and rear plus line diagram on side	0.2	
Interior information (attribute):		
No information	Base case	
Easy to read route number and diagram	0.2	
Information of next stop (attribute):		
No information	Base case	
Electronic next stop sign and announcements	0.2	
Seating (package/aspect)		
Type and layout (attribute):		
Basic double bench some backwards	Base case	
Individual shaped seats with headrests all facing forward	0.1	
Tip-up seats (attribute):		
All standing area in central aisle	Base case	
Tip up seats in standing/wheelchair area	0.1	
Comfort (package):		
Legroom in seating (attribute):		
Restricted legroom and no space for small luggage	Base case	
Space for small luggage	0.2	
Ventilation (attribute):		
Slide opening window	Base case	
Push open window giving more ventilation	0.1	
Air conditioning (attribute):		
No air conditioning	Base case	
Air conditioning	1.0	

Source: Currie and Willis (2007)

The value estimated by Hensher and Prioni (2002) and Hensher et al (2003) are quite close as can be seen from Table 3.20. The values from Hensher and Prioni (2002) and ATC values in Currie and Willis (2007) can be compared as both the values are in minutes. It is found that the values Hensher and Prioni (2002) values are higher than the ATC values. The variation of value of time can partly explain the reason for the variation in attribute valuation. The value of time estimated by Hensher and Prioni (2002) was AUS$ 4.02 per hour, but the Australian Transport council (ATC) value was AUS$ 10 per hour. For the calculation of ATC values in minutes the journey time was considered 20 minutes and fare was AUS$ 1.5.

Phanikumar and Maitra (2006, 2007) and Phanikumar et al (2004) are important studies for the soft attribute valuation in the Indian context. Phanikumar and Maitra (2007) and Phanilumar et al (2004) studies are for intercity bus service in the rural Indian context, and Phanikumar and Maitra (2006) examined bus attribute valuation in Kolkata. All three studies evaluated qualitative attributes of bus service using stated choice modelling. Although only a few qualitative attributes were included, there is a good evidence of valuation of soft attributes in the context of developing country which is geographically and culturally similar to this research context. As Phanikumar et al (2004) and Phanikumar and Maitra (2007) are the study of intercity service and rural contexts, they are not discussed in detail.

Phanikumar and Maitra (2006, 2007) included fare / km as cost, journey time expressed as speed (kph) of service, and comfort (discomfort) as attributes of a bus service. However, Phanikumar et al (2004) used percentage change in current fare and travel time for defining attribute levels for bus fare and journey time. The attributes and their levels for all the three studies are summarised in Table 3.22.

Table 3.22 Attribute and levels for experiment of three Indian studies

Study	Attribute	Level1	Level2	Level3	Level4	Level5
Phanikumar et al (2004)	Travel time	-15%	-10%	-5%		
	Travel cost	+5%	+10	+15%		
	Discomfort	Seating	Standing comfortably	Standing in crowd		
	Headway	30 min	45 min	60 min		
Phanikumar and Maitra, (2006)	Travel speed (km/h)	10	12.5	15	20	
	Wait time	4 min	8 min	12 min	16 min	
	Discomfort	Comfortable seating	Congested seating	Get a seat	Comfortable standing	Standing in crowd
	Noise level	Very low	Low	High	Very high	
	Appearance	Good	Average	Poor		
	Travel cost	50p/km	75p/km	100p/km	125p/km	
Phanikumar and Maitra, (2007)	Travel cost	35p/km	40p/km	45p/km	50p/km	
	Travel speed (km/hr)	30	35	40	50	
	Headway	15 min	30 min	45 min	60 min	
	Discomfort	Standing	Partly seating	Stand comfortably	Stand in crowd	

Note: P/km means paise per kilometre, (100 paise = 1 Indian Rupee)

Four sets of alternatives were presented to the respondents involving six attributes for the urban study by Phanikumar and Maitra (2006) and four attributes intercity studies by Phanikumar and Maitra (2007) and Phanikumar et al (2004). The survey was conducted in October 2004 for the urban study with 91% male respondents. The proportion of male respondents is very high, may be due to the proportion of male bus passenger is higher than females. Moreover, the survey was conducted near bus stops it may be that female passengers are not interested to give interview on the road side that could be another possible reason for a low number of women in the sample. The WTP values estimated by Phanikumar and Maitra (2006) are presented in Table 3.23.

Table 3.23 WTP values for bus attributes in Kolkata (2006 prices)

Attribute	Unit	WTP (MNL model)	
		Commuting	Non-commuting
In-vehicle time	Paise/min	7.35	7.90
Wait time	Paise/min	3.07	2.96
Standing in crowd		Base level	Base level
Comfortable seating	Paise/km	15.66	16.04
Get seat en route	Paise/km	13.89	13.42 (insignificant)
Comfortable standing	Paise/km	4.76 (insignificant)	1.65 (insignificant)
Very high noise level		Base level	Base level
Very low noise	Paise/km	26.34	29.08
Low noise	Paise/km	24.84	26.03
High noise	Paise/km	2.35	3.51
Poor appearance		Base level	Base level
Good appearance	Paise/km	8.99	10.04

Source: Phanikumar and Maitra (2006). 100 paise = 1 INR and 44 INR = 1 US$

Table 3.23 presents the value for urban commuters and non-commuters from MNL models by Phanikumar and Maitra (2006). It can be seen from Table 3.23 that the value of in-vehicle time (IVT) is higher than waiting time by about 2.4 times for commuters and 2.67 times for non-commuters. This finding is not in line with the evidence that waiting time has premium valuation (Wardman and Abrantes, 2011). This issue may be explained by the level of journey comfort and the condition of waiting environment.

In the case of the qualitative attributes, Table 3.23 shows that for commuters and non-commuters comfortable standing is not statistically significant and additionally for non-commuters getting a seat en-route is not statistically significant. A very low noise level is valued almost 3 times as highly as good appearance, and comfortable seating is valued at nearly 1.5 times as highly as good appearance by commuters. The result suggests that the base noise level was very high. It is important to note that comfortable standing is not significant for commuters and non-commuters find no difference between standing in a crowd and comfortable standing.

Non-commuting travellers also valued the low noise level about 3 times higher than good appearance and comfortable seating nearly 1.6 times higher than a good appearance. For both commuters and non-commuters there is a big leap in WTP values between high noise level and low noise level. High WTP values of qualitative attributes are explained by their importance to the users and the poor quality of existing service on offer. It is quite natural that the WTP values are sensitive to trip purpose, and commuters have higher WTP values than non-commuters for attributes such as waiting time and getting a seat en-route. Non-commuters have slightly higher values for most attributes.

The higher value for in-vehicle time than waiting time suggests that the journey comfort is lower than waiting conditions. The high valuation of qualitative attributes such as noise level and seating comfort justifies the higher valuation of in-vehicle time. It can be argued that there might be interactions of noise level and discomfort with the journey time which was not tested in this study. Again, presentation of the attributes might have caused problems, especially for the presentation of the attributes “time” and “fare” though the model had a reasonable fit. It is not clear how respondents could understand when the fare is expressed per km and time is presented in terms of speed. This study is highly context specific but may be comparable with developing cities such as Dhaka.

3.7 Segmentation of values

Not only do the attributes of the mode influence the valuation, but also the attributes of the user and the characteristics of the trip influence the valuation. Segmented values depending on those attributes are important for a more precise understanding of values. The studies reviewed report values with some degree of segmentation, mostly based on trip purposes. For example, the railway attribute valuations used segmented values based on trip purpose as reported in Wardman and Whelan (2001). There is evidence of segmentation based on used modes and the valuation is sometimes segmented based on the modes used such as car users, bus users and rail or underground passengers. Phanikumar and Maitra (2006 and 2007) estimated values for commuters and non-commuters and AECOM (2009) developed separate models for car and bus users. However, the review shows that few studies conduct segmentation based on users’ characteristics.

3.8 Package effect:

It is found from the literature that the sum of the values of individual attributes is different from their values measured as a whole (package) as an aspect of a journey experience such as in-vehicle and station environment. The value of the package is generally lower than the sum of the values of the individual attributes forming the package which is termed as package effect. Jones (1997) cited in Faber Maunsell (2004) states that the package problem arises when trying to value individual attributes of a journey that collectively contribute to one aspect of the journey experience. However, the causes of the package effect and the extent of its impact could not be precisely known and further study is required to explain this effect. Possible reasons for the package effect are the interaction effect, budget constraints, the halo effect and the artefact of the SP exercise (Faber Maunsell, 2004, Wardman and Whelan, 2001). They also argue that policy bias and the unfamiliarity of the proposed improvements in the SP exercise plays an important role in the package effect.

On the other hand, Douglas Economics (2006) shows that the sum of the values of the individual attributes are lower than the value of the package. However, Douglas Economics (2006) evaluated the attributes by developing models using a rating exercise. Although the methods are different, this contradiction needs proper explanation by empirical studies. A degree of familiarity about the improvement is an issue for the valuation. The AECOM (2009) study has quite similar results as can be seen in Table 3.13. Other studies reviewed in this chapter recognise the package effect and some studies capped the attributes values.

3.9 Conclusions

Soft attributes of the public transport (bus) system are important for travellers and they have significant willingness-to-pay (WTP) for improvements in many aspects of the journey experience. However, the evidence is not enough to develop a sound knowledge to quantify the influence of the soft factors on public transport mode choice behaviour.

The list of soft attributes is quite long and it is a daunting task to evaluate all the attributes. However, it is important to note that, not all of the attributes have a high value and there is a wide variation of the valuation among the attributes. This review of soft attribute valuation suggests that the value of the same or similar attributes is different across studies and contexts. It is not the reason that the same attribute may have different impacts on travellers in different contexts, but it may be the reason that the valuation of soft attributes depend on a complex sets of influences not within the domain of travelling such as the social and cultural values of the society.

An important element is that some of the attributes are closely related and have a similar effect on the improvement of the journey experience. For example, an improvement in frequency has a direct influence on waiting time, and journey ambience has significant influence on valuation of journey time. This means that some attributes interact among themselves and influence their valuation. As a result, a grouping of attributes depending on similar impacts on the journey experience is important and these interactions need to be investigated empirically.

The evidence of soft factor valuation is limited and segmented values are particularly scarce.. From the limited evidence on segmentation by trip purpose business passenger values are the highest followed by commuters and leisure travellers. Mode specific valuation suggests that the car users values are the highest followed by the metro and then bus users. Wardman and Whelan (2001) tested the income effects on valuation and discovered that wealthier people have a higher valuation of the attributes.

From the segmentation by trip length and time of journey, Douglas Economics (2006) found that values increase with trip length and peak-passengers value rail attributes more highly than off-peak passengers. The study also suggests that the base level rating of the attribute (existing condition of the attribute) influences the value and concluded that lower the base level rating the higher the value, and that it diminishes with the improvement of base level rating. The evidence also suggests that some attributes are especially important to certain user groups meaning there is an influence of passengers’ attributes such as age, gender, life stages and special need requirements.

The availability of information both on-board and off-board is one of the important aspects of a public transport journey. There is a significant difference in value between methods of delivering information (print or electronic) and places of delivery (at home at station or on-board) but usefulness of information is more important than the means of delivery. Safety and security are also important issues in public transport, cleanliness, comfort, crowding, in-vehicle and station environment, ease of boarding and alighting, noise level, inner and outer appearance of vehicle, driver appearance and behaviour are important soft attributes from the review.

In a comparison of the qualitative and quantitative attributes, quantitative attributes (reliability, frequency and time) are more highly rated than the qualitative attributes as reported in AECOM (2009) as seen in Table.3.12. Although qualitative attributes interact with the quantitative attributes in their valuations, the qualitative attributes can only influence mode choice or travel behaviour when the quantitative attributes reach a certain acceptable level. However, the determination of an acceptable level of quantitative attributes is again an issue.

One of the challenges with valuation is the correlation between the attributes and levels as some of the attributes are closely related to each other. This has been identified as a cause of package effect. The effect of attribute correlation on valuation needs further attention. The package effect is an important issue for the valuation of soft attributes that can go either way. That means the sum of the valuation of individual attributes can be either more than (Wardman and Whelan, 2001) or less than (Douglas Economics, 2006) the overall valuation. However, AECOM (2009) does not find the presence of a packaging effect. Although four possible causes for a package effect have been identified, the relative influence of individual causes on overall valuation has yet to be determined by empirical studies.

Finally, it can be concluded that: the valuation of soft attributes of public transport (bus) system is a relatively new research area. The area of soft attribute valuation in the context of developing cities is even more pertinent and given the lack of evidence on the valuation of soft attributes in the context of developing cities.

As some of the attributes and their valuation is context specific, the values are not directly transferrable from studies carried out elsewhere. As a result, a set of new bus attribute valuation in Dhaka is contextually novel and will add new insight in the bus attribute valuation.

The variation in attribute valuation depends on key segments and investigating key interactions between attributes has a clear lack of evidence. It needs studies to deepen understanding in this area of attribute valuation. An appropriate methodology to be developed for this valuation is discussed in the next Chapter.

Chapter 4 Development of methodology

4.1 Introduction

To pursue the overall aim and objectives of the research, a suitable methodology has been developed. A literature search was conducted to determine the potential public transport (bus) attributes that significantly affect public transport quality of service and initiate behaviour change. However, the study of travel behaviour and bus attribute valuation is a new research area in developing countries, especially in Dhaka. As this area is less researched in the context of a developing country, a qualitative study on the attributes of public transport in Dhaka is needed to meet the first research objective of "examining key issues of bus operation in Dhaka and identifying important quality attributes". Section 4.2 discusses the qualitative research techniques suitable for this study.

This research attempts the valuation of bus attributes (research objective 2), the variation of valuation depending on socioeconomic variables (research objective 3) and an examination of individual taste heterogeneity (research objective 3). A review on the methodological approach of discrete choice modelling for bus attribute valuation is discussed in Section 4.3. Section 4.4 discusses the theoretical background of random utility theory, followed by experimental design in Section 4.5. A conclusion is made in Section 4.6.

4.2 Qualitative research

There are different methods of conducting exploratory qualitative research to achieve research objective 1 such as individual interviews, workshops, discussions, and focus group discussions (Bloor, 2001). Interviews and observations are among the methods of collecting qualitative data, and these methods have advantages and limitations depending on the purpose of the study, and the nature of the data required.

However, there are doubts about the accuracy of individual interviews that use a predetermined questionnaire with close-ended response choices. The major disadvantages of this approach are that the limited choices offered to the respondents, and the findings, may be unintentionally influenced by the interviewer through oversight or omission.

As the objective is to explore the perceptions, feelings, and thinking of people (both public transport users and non-users) about the attributes of public transport, individual interviews with questionnaire would not be suitable. Though non-directive open-ended questions allow the respondents to share their views, opinions and feelings about an issue in detail, discussion in a small group is more helpful to probe issues with comments from the other respondents, which would not be possible in an individual interview.

Focus groups have five key characteristics: (1) people who (2) possess certain characteristics (3) provide qualitative data (4) in a focused discussion (5) to help understand the topic of interest (Crueger and Casey, 2000). So with an enabling environment, appropriately selected participants, the right number of participants, and an efficient moderator, a focus group discussion is the most suited method to explore the bus attributes and attitudes of the people towards these attributes of the public transport, in order to meet the research objective 1.

4.2.1 Focus Groups

The selection of participants for focus groups is very important and can be undertaken by precisely defining the screening questions, and identifying the suitable people depending on the objective of the study. In this study five focus groups were undertaken. The social and cultural context in Dhaka means that some females may not be willing to participate in a group discussion with males. If they participate they may not feel comfortable to discuss issues freely. However, it is not impossible to get female participants who would be willing to participate with males for group discussion. Taking both of these realities in consideration, one all female group and four mixed groups were conducted.

One public transport non-users group was formed to capture their opinions, views and perceptions about the public transport. The remaining groups were formed by the participants who use public transport, including para-transit, for commuting, shopping and to go to school. The mixed gender groups comprised of at least two participants from each gender (Screen question 1) who use public transport in the study corridor (Screen question 2), and at least one in employment from each gender (Screen question 3).

Participants were selected randomly from different bus stops or parking lots along the study corridor and from the shopping centres and educational institutions, to ensure inclusion of commuters, shoppers and students. The sampling was undertaken at different times (morning, afternoon and evening), so that participants of the group were diverse according to trip nature. Emphasis was also given to finding participants from different age groups and socioeconomic background. Three age brackets and four income brackets were used as an additional screening question to ensure that at least one participant from each age and income group were included in the focus groups.

The quality of the response depends on the quality of the questions and the ability of the moderator to probe into the issues. A set of open-ended questions were prepared for the focus group discussion. The group discussion was commenced with an introduction asking participants to discuss their experience of public transport use and expectations from public transport services according to a designed topic guide discussed in detail in Section 5.2. The following open-ended questions were asked (with probing where appropriate):

a) What is good about public transport?
b) What is bad about public transport?
c) Is there anything that prevents you using public transport? Why is that?
d) What may be the barriers for others to use public transport and how?
e) What influences your transport choices?
f) Why do you use public transport or why not?

After the focus group discussion, the participants were asked to answer a questionnaire to evaluate the relative importance and level of satisfaction on a number of public transport attributes, to arrange the attributes according to their relative importance as perceived by the users.

Considering the convenience of the participants, the focus groups were conducted at the Roads and Highways Department (RHD) officers' club in Banani area and at the HDM (Highway Development and Management) conference room of RHD headquarters in Ramna area adjacent to the corridor. Two focus groups were conducted at RHD officers' club and three focus groups were conducted at HDM conference room. The findings are reported in Chapter 5 of this thesis.

4.3 Review on methodical approach suitable for attribute valuation

Three research objectives are related to the bus attribute valuation (research objectives 2, 3 and 4) in the context of Dhaka, Bangladesh. Discrete choice modelling using stated preference and revealed preference data sets has been widely used for the estimation of the willingness-to-pay (WTP) in developed countries. Discrete choice models for the estimation of WTP are also used in the context of developing countries including Bangladesh.

There are two distinct categories of transport models, aggregate models and disaggregate models. The disaggregate models use discrete choices (ranking, rating and choice) made by individuals as an input data for developing models and are called discrete choice models. There is clear advantage of discrete choice models over aggregate models, as discrete choice models provide a sound behavioural basis and they avoid the process of aggregating and averaging independent variables that could lead to a biased parameter estimate (Ben-Akiva and Lerman, 1985).

Both RP and SP datasets have been used for the estimation of transportation mode choice predictions and have successfully been able to predict the modal share of different competing modes. They have also been used to estimate the WTP for quantitative and qualitative attributes (eg. travel time, cost, comfort, safety and security) of a public transport system. There are some limitations of using RP datasets. RP data cannot accommodate the hypothetical scenario or nonexistent attributes and also requires a large number of data (Train, 2003). However, SP data can include hypothetical scenarios and nonexistent variables and their changes. Though SP datasets are useful for the estimation of utility functions and marginal WTP, it is not advised to use a SP dataset alone (Phanikumar and Maitra, 2006) and it needs comparison with the results from other models estimated in the similar context. According to Ortuzar and Willumsen (2001), in appropriate cases, revealed and stated preference data and methods may be employed in complementary senses with the strengths of both approaches recognised and combined.

There are different methods of measuring SP data, which includes rating, ranking, and choice. Predictions on the basis of Stated Choice (SC) have a sound theoretical background based on the economic theory of utility which uses the rational behaviour of the transport users. This means the consumers calculate the trade-offs and try to maximise the utility gained from any product or services they consume. However, for transport services the utility is basically disutility and the users try to minimise or avoid it. SP experiments provide the opportunity to calculate relative marginal disutility of variations in attributes and their potential correlations.

4.3.1 Evidence of discrete choice modelling

Discrete choice modelling has been of interest to researchers for many years in a variety of disciplines and the probabilistic choice models were first used in mathematical psychology by Luce and Tukey (1964). Discrete choice models based on observed choices made by individuals helped overcome some of the limitations of aggregate models. Despite the early research by Warner (1962), Oi and Shuldiner

(1962) as mentioned by Ortuzar and Willumsen (2009), which made apparent serious deficiencies of aggregate models, thus continued to be used until early 1980s (Ben-Akiva and Lerman, 1985 and Ortuzar and Willumsen, 2009).

Citing Lisco (1967), Quaramby (1967), Lave (1969), Stopher (1969), de Donnea, (1971), and Winger (1973), Ortuzar and Willumsen, (2009) stated that early transportation applications of discrete choice models were made for the binary choice of travel mode and some of these studies focused on the estimation of a "value of time," a trade-off between travel time and travel cost implied by a travel demand model. This value has been used to assign a monetary value to the travel time savings in the evaluation of alternative transport projects. Some of the researchers have used discrete choice models for the development of policy-sensitive models for the prediction of the market shares of alternative modes (eg. Daniel McFadden, Bay Area Rapid Transit in mid-seventies).

In the UK, early stated preference based discrete choice modelling was done by Hoinville and Johnson, as cited by Hoque (2005). The SDG (1981) study of demand forecasting for British railway is known for its reliable forecasting as cited by Wardman (1998). Phanikumar and Maitra (2006, 2007) and Phanikumar et al (2004) used discrete choice models to evaluate the willingness-to-pay (WTP) for bus attributes and the relative importance of different qualitative and quantitative attributes of the multimodal public transport system in India. Phanikumar and Maitra (2007) also estimated the segmented value for the commuting and non-commuting trips and successfully tested individual taste heterogeneity.

In Bangladesh, Halcrow Fox (1996) used discrete choice models for a value of time study, Alam et al (1999) used discrete choice models for valuation of bus travel time and some other bus attributes in Dhaka. DFID (2002) study used discrete choice models for valuation of travel time in the context of rural Bangladesh. Hoque (2005) and finally DHUTS (2010) used discrete choice modelling techniques for the valuation of travel time in Dhaka. This evidence suggests that discrete choice modelling has been successfully used in the transport sector for attribute valuation and demand forecasting purposes in different contexts since the 1980s.

4.4 Theoretical background of discrete choice modelling

The underlying theoretical framework of discrete choice modelling is based on random utility theory. Discrete choice models are derived under an assumption of utility-maximising behaviour of the decision maker where an individual decision maker has perfect information about the alternatives and acts rationally (utility maximising behaviour). The probability of individuals choosing a given option is a function of their socioeconomic characteristics and the relative attractiveness of the option (Ortuzar and Willumsen, 2001, p220).

Following Train (2003), the researchers observe some attributes (factor) of the alternatives x_{nj} (attributes of alternative j) $\forall_j$ (j is one of the available alternatives) as faced by the decision maker n, and the attribute of a decision maker is labelled as s_n. A function can be specified that relates these observed factors to the decision maker's utility V_{nj} (known as representative utility). Accordingly, the function is defined as $V_{nj} = V(x_{nj}, s_n)$ $\forall_j$ which is called the representative utility. This representative part of the total utility, V depends on the parameters that need to be estimated statistically.

It is neither possible nor necessary to observe all aspects of the utility for practical reason, so the representative utility is not equal to the real utility ($V_{nj} \neq U_{nj}$). Therefore, real utility can be decomposed as $U_{nj} = V_{nj} + \varepsilon_{nj}$, where ε_{nj}, (called random utility) captures the unobserved part of the utility that are not included in V_{nj}..The random utility ε_{nj} is the difference between the real utility U_{nj} and the observed utility V_{nj}. According to the definition, the characteristics of ε_{nj}, such as its distribution, depends critically on the researcher's specification of V_{nj}.

The term ε_{nj} $\forall_j$ is not known to the researcher and therefore this term is treated as random. The joint density of the random vector $\varepsilon_n = (\varepsilon_n 1, \ldots\ldots\ldots \varepsilon_n j)$ is denoted by $f(\varepsilon_n)$. With this density a probabilistic statement about the decision maker's choice can be made. From Train (2003), the probability that decision maker n chooses alternative *i* is

$$P_{ni} = \text{Prob}(Uni > Unj \ \forall_j \neq i)$$

$$= \text{Prob}(Vni + \varepsilon_{ni} > Vnj + \varepsilon_{nj} \ \forall_j \neq i)$$

$$= \text{Prob}(\varepsilon_{nj} - \varepsilon_{ni} < Vni - Vnj \ \forall_j \neq i) \quad (1)$$

According to Train (2003), this probability is a cumulative distribution, namely, the probability that each random term $\varepsilon_{nj} - \varepsilon_{ni}$ is below the observed quantity Vni – Vnj. Using the density $f(\varepsilon_n)$, the cumulative probability can be written as

$$\int_\varepsilon I(\varepsilon_{nj} - \varepsilon_{ni} < Vni - Vnj \ \forall_j \neq i) \, f(\varepsilon_n) \, d\varepsilon_n \quad (2)$$

In equation 2 $I(\varepsilon_{nj} - \varepsilon_{ni} < Vni – Vnj \ \forall_j \neq i)$ is the indicator function, equalling 1 when the expression in the parentheses is true and 0 otherwise. This is a multidimensional integral over the density of the unobserved portion of the utility, $f(\varepsilon_n)$. Different discrete choice models are derived from different specifications of this density, that is, from different assumptions about the distribution of the unobserved portion of the utility.

According to Train (2003), the form of the integral depends on the specification of the indicator function, and under certain specifications the indicator function takes the closed form and can be calculated analytically and if the form is not closed then the integral can be done by simulation. The definition/specification of the indicator function plays the key role in the choice modelling and depending on the specification of the indicator function different models can be defined. For example logit and nested logit have closed-form expression for this integral.

These models are derived under the assumption that the unobserved portion of the utility is identically and independently distributed (iid) with a Weibull (also called Gumbel) distribution. The Probit model is derived under the assumption that $f(.)$ is a multivariate normal, and mixed logit is based on the assumption that the unobserved portion of the utility consists of a part that follows any distribution specified by the researcher plus a part that is iid extreme value. With the Probit and Mixed Logit (MXL) sometimes called Random Parameter Logit (RPL), the resulting integral does not have a closed form and is estimated numerically through simulation.

In a Multinomial Logit model (MNL), it is assumed that the distribution of ε (disturbance or error term) is iid Gumbel distribution and the probability that an individual n chooses an alternative i can be given by the following model (McFadden, 1974; Ben-Akiva and Lerman, 1985; Train, 2003).

$$P_{ni} = \frac{e^{V_{ni}}}{\sum_j e^{V_{nj}}} \tag{3}$$

Where V_{ni} and V_{nj} are observed part of the utility of alternative i and j respectively to the decision maker n. The coefficients of a disaggregate Logit model are estimated by maximum likelihood as this would give the best explanation of individual's discrete choices. By estimating the coefficients of the attributes, the WTP for different bus attributes can be estimated which is the second objective of the study. The Logit model is by far the most widely used discrete choice models. From Train (2003), the critical part of the assumption is that the unobserved factors of the utility function are uncorrelated over alternatives and have the same variance for all alternatives.

This assumption provides the convenience and popularity of the Logit model, but results in a problem of proportional substitution which is not always the case. At some situations the factors of the utility functions may be related (the blue bus red bus hypothesis). However, by using Nested Logit (NL) models this limitation can be overcome. Furthermore, the MNL model assumes that each choice is independent of others and would persist into the next period, which may not be the case and may induce dependence among the choice over time (panel data) or repeated choice made by same respondent at the same time. The MNL can represent systematic taste variation related to the characteristics of the decision makers. However, MNL cannot represent the random taste variation which is the third limitation of MNL.

MNL models can meet the third research objective (to examine the influence of socioeconomic variables on the valuation of bus attributes) by collecting socioeconomic information of the respondent (respondent attributes) to interact them with the attributes of the alternative. The fourth research objective is to examine the individual taste heterogeneity in the valuation of bus attributes. However, MNL models cannot estimate random taste variation which is related to the fourth research objective. As a result, MNL models can meet two research objectives, but not the fourth research objective. They also cannot estimate models with repeat observations.

The three limitations of the MNL models as discussed above have necessitated the development of different models that can overcome the limitations. Apart from the MNL models, that can efficiently handle the limitation of proportional substitution, Probit models can handle random taste variation, as they allow any pattern of substitution. They are applicable to panel data with temporally correlated errors. With all the advantages of the probit models over MNL models, its limitation is that it uses normal distribution for all unobserved components of utility. 'In many, perhaps most situations, normal distributions provide an adequate representation of the random components. However, in some situations, normal distributions are inappropriate and can lead to perverse forecasts' (Train, 2003 p 101).

Compared to the MNL models discussed earlier, Mixed Logit (MXL) is highly flexible and can approximate any random utility model. (McFadden and Train, 2000; Train 2003). Due to its flexibility in assuming the distribution of the random part of the utility function (unobserved portion of the utility) and random variation in parameters, it can capture all of the limitations of MNL models. Unlike Probit, it is not restricted to normal distributions. Though MXL models have been known for many years, they were not used due to their disadvantage of the non-closed form of integral which could not be integrated analytically. With the improvement of computing technology and the advent of simulation, MXL models have become fully applicable and popular. Phanikumar and Maitra (2006, 2007) used MXL model for the estimation of willingness-to-pay (WTP) for the improvement of bus attributes in both the rural and urban context of in India. Therefore, MXL models can meet all of the three research objectives related to attribute valuation (research objective 2, 3 and 4). The rationale for MXL is discussed in the following paragraphs.

According to Train (2003), the MXL probability can be derived from utility-maximising behaviour in several ways that are formally equivalent, but provide different interpretations. The most straight forward derivation, and most widely used in recent applications, is based on random coefficients and is called Random Parameter Logit (RPL) models. Theoretically, MXL probabilities are the integral of MNL probabilities over a density of parameters (β) which can be expressed in the form as presented in Train (2003)

$$P_{ni} = \int L_{ni}(\beta) f(\beta) d\beta \tag{4}$$

where $L_{ni}(\beta)$ is the Logit probability evaluated at parameters β :

$$L_{ni}(\beta) = \frac{e^{V_{ni}(\beta)}}{\sum_{j=1}^{J} e^{V_{nj}(\beta)}} \tag{5}$$

and $f(\beta)$ is a density function. $V_{ni}(\beta)$ is the observed portion of the utility, which depends on the parameters β . If utility is linear in β then

$V_{ni}(\beta) = \beta' x_{ni}$. In this case MXL takes its usual form:

$$P_{ni} = \int \left(\frac{e^{\beta' x_{ni}}}{\sum_j e^{\beta' x_{nj}}}\right) f(\beta) d\beta \tag{6}$$

The mixing distribution $f(\beta)$ can be discrete or continuous depending on the specification of the researcher’s requirement. In most MXL applications, $f(\beta)$ is specified to be continuous for the mixing distribution. If the density of β is specified to be normal with mean *b* and covariance *W* the choice probability under this density becomes:

$$P_{ni} = \int (\frac{e^{\beta' x_{ni}}}{\sum_j e^{\beta' x_{nj}}})\ \phi(\beta \mid b, W) d\beta \tag{7}$$

Here $\phi(\beta \mid b, W)$ is the normal density with mean *b* and covariance *W* which is estimated by the modelling process. Generally the integral cannot be evaluated analytically and it can easily be solved using simulation method for probabilities (Train, 2003). By examining the statistical significance of the covariance the random taste heterogeneity is tested and the percentage of the coefficients having opposite signs can be calculated by using the unique property of the normal distribution.

4.4.1 Distributions of random parameter for MXL models

From the theoretical development of the MXL models it is clear that any distribution which satisfies expectation about behaviour can be specified. Therefore, variation in tastes that are related to observed attributes of a decision maker are captured through the specification of the explanatory variables and / or the mixing distribution. Different distributions for random parameters such as normal, lognormal, uniform and triangular have been attempted by researchers while developing MXL models (Phanikumar and Maitra, 2007)

Regarding the choice of the distribution $f(\beta)$, Phanikumar and Maitra (2006, 2007) argue that the lognormal distribution is suitable if the mean of the random parameter needs to be of a specific (e.g. non-negative) sign. However, the lognormal distribution produces a long upper tail which estimates higher values of WTP. A uniform distribution with a (0, 1) bound is suitable for dummy variables. Due to the bounded nature, the triangular distribution, where the density function looks like a tent with a peak in the centre and dropping off linearly on both sides of the centre, is advantageous over normal or lognormal distribution (Train, 2003).

However, due to spread (standard deviation), like other distributions triangular distribution has a disadvantage of producing the wrong sign to some shares. As the disadvantage is due to the spread of the triangular distribution, it can be overcome through constraining the spread equal to mean which minimises the effect of spread on WTP estimates, yet producing WTP estimates with the appropriate sign (Hensher and Greene, 2001). So, there are some advantages of a constrained triangular distribution over other distributions which have been summarised by Phanikumar and Maitra (2006) as:

- The bounded nature of the triangular distribution helps in early convergence of the model.
- It keeps the sign of the estimate the same for all respondents unlike normal or triangular distributions.
- It provides simplicity in WTP estimations

When the triangular distribution is constrained by fixing the spread equal to the mean, the WTP for any attribute can be calculated directly from the ratio of the random parameter of that attribute over the mean of the parameter of the cost attribute. But for the other distributions (normal or triangular), the standard deviation is considered for the calculation of WTP. For this reason the application of constrained triangular distribution for the estimation of MXL is advantageous for the estimation of WTP. However, it is not possible to calculate the percentage of coefficients having opposite signs (opposite tastes) from the constrained triangular distribution which is a unique property of normal distribution. As a result, a normal distribution was used for this research for the mixing function.

4.5 Method used for the research

After successful completion of qualitative part of the research (focus group) the qualitative attributes and their appropriate levels were finalised. The attributes identified in the focus groups were compared with those used for similar studies in Bangladesh and elsewhere, and a set of qualitative attributes with appropriate levels were selected to design the SP experiments. The issues related to experimental design will be discussed in Chapter 6. Deciding their levels of attributes will be discussed in Section 6.2 and the design of choice experiment will be discussed in Section 6.6.

A pen and paper based household survey was conducted for data collection of the research. The questionnaire had two sets and three subsets of each set comprising five sections dedicated for specific purposes. The details of questionnaire design are discussed in Section 7.2.

4.5.1 Sampling and data collection

The sample households were selected randomly from the household water supply connections database of DWASA (Dhaka Water Supply and Sewage Authority).

The DWASA database was divided in twelve zones and there were a number of subzones within each zone. From the GIS map of Dhaka, the catchment area of the household survey was defined as one km each side of the corridor under research (map). It was expected that people would walk 20 minutes to catch a bus within the corridor. Primary filtering was undertaken for the zones so that areas not falling in the catchment area were excluded. Four of the twelve zones were partly within the catchment area. Within the zones, there were subzones and smaller units defined by area, and these smaller areas that fell in the catchment area were extracted from the main database to create a database of households for the main survey.

The size of the database was 92,767 households. Of these, 800 households were randomly selected for the main survey. The number of households selected was double the number of the actual households required as the refusal rate could be as high as 50% (STP, 2005).

For carrying out the survey, fourteen enumerators were trained, especially for the choice experiments. It took about 50 minutes to complete one interview, as reported by enumerators. As the enumerators had to travel a distance to get to the next household, they could finish four interviews in a day on an average. For a household interview, random selection of a suitable respondent from a household was difficult and needed a strategy as there might be a number of qualified respondents in a household. If a systematic within-household respondent selection method was not used, the resulting sample at the person-level would be comprised of the “most-willing” or “most-available” person.

Evidence suggests that for telephone interviews, the responses are biased as the person who receives the phone call has the higher chance of being selected in case of sampling by randomly selected phone numbers (Németh, 2003). Similar things happen if respondents within a household are selected on the basis of most recent birthdays or next coming birthdays. In this case, the younger members of the household are more likely to be selected as their birthdays are celebrated and remembered. This technique is not suitable in Bangladesh as most people in Bangladesh cannot remember their birthdays and there is no unique database for telephone numbers. These limitations were overcome by using KISH grids for sampling within a household in a pen and paper based survey.

The expression “Kish grid” comes from the name of Leslie Kish, the Hungarian born American statistician. Kish was one of the world’s leading experts on survey sampling. He developed a grid (table) that gives equal chance of any suitable household member being selected for an interview. For the pilot and main survey the KISH table was used to select the respondent within the household randomly and the method is described below.

There are three components of KISH method:

- Kish list of household
- Kish summary of eight tables
- Kish household conversion sheet

Each household is assigned a Kish table number from one of the eight tables. The summary of eight tables determines which individual from a household should be selected based on the assigned Kish Table number (A, B1, B2, C, D, E1, E2, F) and the number of adults (1, 2, 3, 4, 5, 6 or more) in a household. For interview the adults of the household are listed and assigned numbers in a decreasing order of age, first the males and then continued numbering for females. Consulting the list of the selection table and the total number of adults in the household, the person to be interviewed was selected randomly.

4.5.2 Selection of suitable models for the study

Advantages and disadvantages of different choice models were discussed in Section 4.4. Although MNL models can estimate the WTP values which is the second research objective, they can also be used for segmentation which is related to third research objective, but they cannot estimate individual taste heterogeneity which is related to the fourth objective of the research. Moreover, they cannot address the problem of repeated choice limits the scope of gathering more choice data from an individual respondent. In this study each respondent evaluated ten choice scenarios which is a case of repeat observation. However, MXL models are more flexible and can address all of the limitations of the MNL models discussed in this Chapter.

Mixed Logit (MXL) models with normal distribution as a mixing function were suitable for the research. MNL models were developed as base models and then MXL models were developed with the choice data collected for this research.

4.6 Conclusions

Focus groups discussion with a predesigned topic guide was used as a qualitative research tool to identify qualitative bus attributes in the context of Dhaka. Five focus groups were conducted with a predefined topic guide. Appropriate screens were defined to ensure participants were from different socio-economic backgrounds. Two special groups were included, one all female group was conducted considering religious values, and a public transport nonuser group was conducted to explore the perceptions and expectations from public transport.

In the transport sector, the discrete choice modelling technique is used to estimate WTP for different attributes of transport modes, to forecast demand of different modes and to explain travel behaviour. Various types of discrete choice models have been used for different purposes by researchers.

Advantages and limitations of different models and possible datasets for the discrete choice modelling have been discussed in this Chapter. Considering the research objectives, the MNL models can estimate willingness-to-pay (WTP) for bus attributes which is the second research objective. It can also estimate WTP for different segments by collecting respondent's socioeconomic attributes and allowing interaction with attributes of the alternative. Therefore, MNL model can meet the third research objective. However, MNL models cannot estimate the individual taste heterogeneity which is the fourth objective of this research. Moreover, MNL models cannot address the issue of repeat observation, but in this research each respondent complete ten choice exercises. Therefore, MNL models cannot meet all the research objectives and the problem of repeat observation

MXL models can meet all the research objectives related to bus attribute valuation, but MNL models cannot, and they can address the issue of repeat observation using panel data specification for MXL models. As the fourth objective of the research is to examine the individual taste heterogeneity, some of the respondents may have opposite utility from some of the attributes. For example, females may gain utility from maintaining priority seats for female in the buses, but males may gain disutility from the same attribute. To determine the percentage of respondents having opposite utility from any attribute the unique property of normal distribution can be used. As a result, a MXL model with normal distribution as mixing function and panel data specification with significant interaction, can meet all of the three objectives of this research related to attribute valuation.

Chapter 5 Design, implementation and result of focus groups

5.1 Introduction

Understanding of public transport attribute valuation especially soft attributes, its importance and influence on public transport mode choice behaviour is a completely new subject in Dhaka. Focus groups are conducted to deepen understanding about the people's attitude, experience and expectations about public transport in Dhaka to explore new soft attributes emanated from the existing market structure (competition regime). This Chapter discusses the topic guide developed in Section 5.2. Section 5.3 discusses the implementation of focus groups and is followed by data analysis in Section 5.4. The results of the focus groups are presented in Section 5.5 that gives and insight about the new attributes of public transport system in Dhaka. A conclusion is drawn at the end the chapter in Section 5.6 that finalises the attributes relating to the existing bus operation structure in Dhaka that will be evaluated in this study.

5.2 Topic guide

It is the key that the discussion continues in line with the objective avoiding the danger areas of discussion that helps optimum use of the time for the discussion. A topic guide was planned in advance that outlined the areas for discussion, key ideas and questions to be discussed. Selection of participants for focus group is very important and it can be undertaken by precisely defining the screens, and identifying the suitable persons depending on the objective of the study. Four screens were defined for this study to ensure the groups are diverse in gender (screen1), income and age (screen 4), employment status (screen 3) and familiarity about the route (screen 2).

Due to the limitation of time and also resources, only five groups were formed and maximum effort was given to achieve the saturation from these five focus groups. Given the social and religious background (90% of the population are Muslim), some females may not be willing to participate in a group discussion with males if they participate they may not feel comfortable to discuss issues freely. However, it is not impossible to get female participants who would be willing to participate with males for group discussion. Taking both these realities into consideration one all female group with four mixed groups was conducted.

As the car users might have different expectations and attitudes about the public transport due to their less experience of using public transport and social standard, a car users group was also conducted. The remaining groups were formed by the participants who use public transport including para-transit for commuting, shopping and to go to schools and other trip purposes. The mixed gender groups comprised of at least two participants from each gender (Screen 1) who used public transport in the proposed route (Screen 2), at least one in employment from each gender (Screen 3), at least one from three predefined age (less than 25 years, between 25 and 50 years and over 50 years) and income (lower income, middle income and high) groups (screen 4).

The focus groups continued in four stages started with the introduction of the topic by the moderator (the researcher himself) and consent was taken for audio recording of the discussion and finished with a closing remark from the moderator. Then before moving onto the discussion each participant were requested to introduce himself / herself around the table telling his / her first name loudly to be recognised later on for transcribing the discussion. Then went the discussion session and the moderator (the researcher himself) facilitated the discussion. The discussion was continued for about an hour and at the end of the discussion a quick rating exercise was carried out by the participants to rate their importance and satisfaction about 17 bus attributes and their basic socio-demographic information.

The quality of the response depends on the quality of the questions and the ability of the moderator to probe into the issue. A set of open-ended questions were prepared for the focus group discussion covering range of issues but focusing to the problems related to using public transport and attributes of public transport. The topic guide of the discussion is presented here.

Starting of the focus group

Good morning / afternoon. My name is Md Abdullah Al Mamun, sub-divisional engineer in the roads and highways department, government of Bangladesh. This is my colleague Ms Afifa Khaton. Thank you for coming. This is a focus group which is a relaxed discussion. This is part of my research for a PhD at Loughborough University, UK.

Presenting the purpose of this discussion

We are here today to talk about your attitude, experience / perception and expectation about the bus system in Dhaka. I am not here to share information, or to give you my opinions. Your attitudes, experience / perception and expectation are what matter. There is no right or wrong or desirable or undesirable answers. You can disagree with each other, and you can change your mind. I would like you to feel comfortable saying what you really think and how you really feel about the topic.

Procedure of discussion

Ms Khaton, will be taking notes and tape recording the discussion so that I do not miss anything you have to say. I explained these procedures to you when we discuss about the confirmation of participation for this focus group. As you know everything is confidential. No one will know who said what. I want this to be a group discussion, so feel free to respond to me and to other members in the group without waiting to be called on. However, I would appreciate it if only one person did talk at a time. The discussion will last approximately one hour and I will follow the discussion around six questions about bus service in Dhaka and the transport system as a whole. There is a lot I want to discuss, so at times I may move us along a bit.

Participant introduction

Now, let's start by everyone sharing their name, how they generally travel, and how often they travel along the corridor.

Discussion

Topic question1: What is good about public transport?

(Benefits of using public transport to an individual and to the society overall)

Probes: Tell me more about the overall benefit along with individual benefit. How public transport use saves fuel import? Tell me about the impact of public transport on environmental and health benefits. Can you discuss about the cost of Public transport in Dhaka. Is it cheap or expensive?

Topic question2: What is bad about public transport?

(Any bad impact on an individual or society, limitations and weaknesses of public transport)

Probes: Can you use public transport when you want to? Is public transport suitable for all types of trips you want to make? How do you think about privacy, comfort, safety and security issues for using public transport? Why do you think competition for passenger is bad from the user point of view?

Topic question3: Is there anything that prevents you using public transport? Why is that?

Probes: How these prevent you using public transport? Does it equally affect all the people? Can you elaborate how crowding prevents you from using public transport? Why does not it equally affect all segment of the society? Does the public transport system respond to the need of all the people who want to use public transport?

Topic question4: What are the difficulties of using public transport? What may be the barriers for using public transport and how?

Probes: What makes boarding and alighting difficult for you? Why do the drivers pick up and drop off passengers on moving? How do boarding and alighting system and picking up and dropping off passengers on moving make it difficult to use public transport. Does crowding levels affect differently to males and females?

Topic question5: What influences your transport mode choice?

Probes: What are your considerations for planning a trip by a specific mode of travel? Can you elaborate the issue of availability, comfort, safety and security for using public transport? Do you consider health and environmental benefits for your mode choice?

Topic question6: Why do you use public transport or why not?

Probes: Tell me the reasons for using public transport irrespective of your level of use? Those who do not use public transport for any types of trip, tell me the reasons for not using public transport? What can make you interested in using public transport in future?

Closure

Though there were many different opinions about the expectations from public transport, good and bad about public transport, it appears unanimous that prevailing quality of service is very poor. Does anyone see it differently? It seems most of you agree that a certain percent of seats need to be reserved for females or person with special needs, but some think that there should be space for luggage as well. You also agreed that the competition for passengers and revenue maximising attitudes are the major causes of poor service quality in terms of picking up and dropping off passengers on moving, poor driving quality, improper driver and crew behaviour and not maintaining timetable for service. Does anyone want to add or clarify an opinion on this?

Is there any other information regarding your experience regarding the use of public transport in Dhaka that you think would be useful for me to know?

Thank you very much for coming this morning / afternoon. Your time is very much appreciated and your comments have been very helpful. There is map of Dhaka for each of you as complement from my end for contributing to my research work.

At the end of focus group discussion the participants were asked to answer a questionnaire to evaluate the relative importance and the level of satisfaction on 16 public transport attributes in the scale of 7 to arrange the attributes according to their relative importance as perceived by the users.

These focus groups were carried out in August-September, 2008 in Dhaka.

5.3 Implementation

Participants for focus groups were recruited randomly from different bus stops / parking areas along the study route and from the shopping centres and the educational institutions to ensure a rich blend of participants from commuters, shoppers and students. The sampling was done at different times (morning, afternoon and evening), so that participants of the groups were diverse according to four predefined screens discussed in previous section. Five focus groups were conducted in two different locations along the study corridor at Banani and Ramna) in three different dates.

A female only group of seven participants and a public transport non-user group of six participants were discussed to capture any special needs of the female users and to get the opinion of the public transport non-users. As a result, overall number of females is more and the participant with access to private car is more than car ownership in Dhaka. These two special groups may also have contributed towards the higher side of the average income of the participants of the focus groups.

The number of participants in each group varied between six and seven and the turnout was 67% (33 out of 50) which was quite high, only complementary gift (a map of Dhaka city) and refreshments were provided but no money was given for attending the discussion except reimbursing their travel cost. Though ten people were invited for each group, younger people were more interested to participate than the older people.

Table 5.1 shows the socio-demographic characteristics of the participants and Table 5.2 shows that the average household income of the focus groups was BD Taka 20,900 and the average household income of public transport non-user group is highest among the groups which is BD Taka 27,000 followed by the female only group which has average household income of BD Taka 24,000. Most of the participants were in the age group of 35-44 which is third of the participants followed by the age group of 18-24 which represents 30% of the participants in the focus groups. One of the reasons for the low average age of the participants may be the young people travel more than the old people and young people use more public transport than old people.

Table 5.1 Demographics and socioeconomics of the participants

AGE	Number
18-24	10
25-34	8
35-44	11
45-57	4
Above 57	0
STATUS	
Employed full time	21
Employed part time	0
Looking after home or family	1
Permanently retired from work	0
In education	11
GENDER	
Male	14
*Female	19
HOUSEHOLD CAR OWNERSHIP	
**Access to Private Car	8
No-Access to Private car	25
HOUSEHOLD INCOME (BD TK)	
5,000-14999	7
15,000-24999	16
25,000-34,999	4
35,000-45,000	5
Above 45,000	1

Note: * There was a female only group of 7 participants, ** There was a group of private car users only of 6 participants

There are several reasons for the higher average household income of the focus group participants. Firstly, the corridor serves the three high income areas of Dhaka city – Banani, Gulshan and Uttra. Secondly, as the participants were selected randomly from the bus station, parking lots, educational institute and shopping centres, representation of lower income people may be less in those places. Thirdly, there were two predefined groups: a public transport non-use group (group 3) and an all female group (group 4). The average income of the public transport non-user group is high and the average household income of the all female group is also high. The reason is the participants of all female groups are working women and families with working women tend to have have higher income.

Table 5.2 Demographics and socioeconomics of each focus group

Group No.	Group memeber	Gender		Employment		Av. Age	HH Income	Access to car	50+
		Male	Female	Student	Work				
1	7	4	3	4	3	29	18,000	2	-
2	7	5	2	4	3	25	12,500	0	-
*3	6	3	3	0	6	34	27000	6	1
**4	7	0	7	1	6	42	24000	0	1
5	6	2	4	2	4	33	23000	0	-
Total	33	14	19	11	22	29	20,900	8	2

Note: * only private car user group ** female only group

5.4 Data analysis

For the analysis of data, Krueger (1994) provides a series of structured steps and that was followed. The important quotes about the attitudes, experiences and expectations are compiled in the findings section. Data analysis consisted of four distinct stages and the most important stage was developing themes from the interviews and analysing the data on the basis of themes following the line of the questions discussed as mentioned in Section 5.2. The themes are developed focusing the objectives of this focus group of exploring qualitative attributes of bus system that include environment and public transport, availability of public transport, ease of using public transport, safety and security in public transport, concerns and expectations about public transport. In the data analysis the socio-demographic characteristics was given emphasis to identify variations depending on the key participant characteristics.

From the data it is found that the discussion was more concentrated on the limitations of bus system, concerns of the participants and finally their expectations from the bus service. Quality of bus service is one of the major issues which have been covered under the theme concerns and expectation about public transport. There are some potential barriers to use bus for particular group of users and this issue has been analysed under ease of using public transport theme.

5.4.1 Environment and public transport

The total number of participants was 33 divided in five different groups. While discussing good and poor public transport generally, participants were focused on individual benefits they get from the public transport. If public transport fails to meet their expectations they considered those as poor side of the public transport. Only two participants, one from group 3 and one from group 4 were concerned about environmental benefits of using public transport. However, other five participants considers about environment in taking decision about choosing modes for travelling. So, there is awareness about the environmental concerns of mode choice in general, although at lower level. After probing questions about the environment of Dhaka, most participants (30) mentioned that the environment in Dhaka is very poor. They blamed the overall transport system for this poor environment, but some of them did not realise that public transport is better than private car from the environmental point of view. It may be the reason that the vehicle fleet is generally old and human haulers are in dilapidated condition.

On the contrary, with varying degree of concerns all the participants emphasised that private cars are mainly responsible for traffic congestion in Dhaka. Four of the participants mentioned that smaller public transport vehicles (human haulers) are also contributing to the traffic congestion. Interestingly the two environmentalist participants were from the two dedicated groups (female only and non-user group). Both of the participants have average income more than average and both are employed and educated. This result suggests that the level of awareness and concern about the environment may have relationships with the level of education and social status.

All of the participants identified that everybody can use public transport if they can afford it and want to use it which is a good side of the public transport (bus). On the other hand 30 participants are unhappy with the availability of the bus. Participants are generally more interested about discussing negative aspects rather than the positive from their personal experience and perceptions about public transport (bus). Crowding and the difficulties in using bus were the main area around which the discussion was centred.

5.4.2 Availability and affordability of public transport

Availability of the bus is an issue and most participants stressed that the bus should be available within walking distance but 17 participants cannot avail bus within walking distance and have to use the rickshaw instead. Two of the participants have to use rickshaws at a higher cost as there is no bus route for them to commute. Most of the participants felt that a bus service is not easily available as the services are concentrated on the main roads and there is no service in internal roads. As a result, they have to rely on rickshaw even though it is expensive compared to bus.

Four of the participants mentioned that sometimes they cannot use bus because of crowding and two of those were females and expressed their serious annoyance that 'there are buses on the road and all of them are crowded'. They always had to wait for a long time to get a less crowded bus to be able to board. One of the female participants had serious concerns about time budgets as she was a working lady who had to manage household works and often had to take rickshaw instead. The level of crowding is an important aspect in determining availability of public transport. Relatively few participants in the focus groups (five participants), none of them from the dedicated groups, raised concerns about the fare level indicating fare is not an issue in general. However, two of the participants out of the five who raised concern about the price had to walk sometimes as they cannot afford the bus for all commuting trips. All (2 out of 2) of elderly participants (50+) mentioned that they cannot use bus in spite of their willingness because of crowding and the difficulties in boarding and alighting.

Accessibility, crowding and difficulties in boarding and alighting are issues as reported by the participants that in a real sense determines the availability of bus in Dhaka.

5.4.3 Ease of using public transport

Boarding and alighting and the inner dimension and the layout of vehicle are the key issues as identified in the discussion give the basis for determining the ease of using public transport (bus). 27 out of 33 participants raised concerns about the ease of using the bus service because of undisciplined boarding and alighting, high level of crowding and the picking up and dropping off passengers on moving. Inside layout and the size of the seats are important issues that actually determine comfort of the journey as identified by the participants. When ease of using the public transport (bus) is an issue all of the females (19) are concerned about ease of using public transport and the only 8 out of the 14 male participants are concerned about ease of using public transport. All the older participants (50+) are concerned about ease of using public transport.

Age and gender are two determinant factors for ease of using public transport. A moderate jump is required to get in and off the bus on moving, and a decent push is required to get into the bus through narrow doors and steep steps. It is difficult for the females and elderly people to overcome these hurdles for boarding and alighting in a moving crowded bus. Therefore, female and elderly people are more concerned about ease of using public transport than males and younger persons.

5.4.4 Safety and security of using public transport

Both on-board and off-board safety and security issues were raised in the discussion. 20 participants raised the issue of safety and security with different dimensions of it. All of the participants who raised concern about the safety and security mentioned the quality of driving and system of issuing driving licence are closely related to safety and security of public transport system. 17 out of 20 participants were seriously concerned about the poor driving test standards and drivers with fake driving licences. 13 participants identified that en route competition for passengers among competing operators are responsible for speeding, poor driving standards, impolite driver and poor crew behaviour.

In addition to driving quality, pick-pocketing inside bus was identified as safety and security concerns by two participants, and one of the participants in the focus groups raised the issue of the drugging and robbing of passengers on the bus. This is not an issue in developed countries but it may happen when travelling by bus in Dhaka, although it is very rare. Sometimes robbers in the guise of a passenger sit next to a target passenger, drug the passenger, usually by offering some refreshment and then rob them. One participant had an experience of pick-pocketing when she was travelling in a crowded bus. There is a much higher security risk in the evening as one of the participants said that one of his friends was robbed after being poisoned (drugged). However, the risk of pick-pocketing is still high during peak hours when the buses are overcrowded.

5.4.5 Concerns and expectations from public transport

A number of general concerns were raised in the focus groups. An inadequate road network and less coverage of bus routes are transport problems in Dhaka as identified by 21 participants. Crowding inside the bus is a serious issue as identified by all the participants and females consider crowding as a barrier for using bus especially in the peak hours. 11 of the 19 female respondents were denied by the crew to use crowded bus at least once in previous one year, some of them had the same experience more than once. Therefore, they raised serious concern about excluding females to use bus in crowding though they were even willing to use crowded bus. Reliability is a serious concern for 17 participants and most of the participants that raised reliability an issue are in employment. There is no published timetable and the identification of route for bus system in Dhaka that is a serious concern as reported by 7 participants. 11 participants raised concern about the driver and crew behaviour and 7 of them are female.

Competition for passengers is the root cause for poor driving standard and driver behaviour as agreed by 30 out of 33 passengers that included picking up and dropping off passengers on moving. There is no provision for passengers with special need and passengers carrying luggage and large bags are excluded from the public transport system. There is no night bus service in Dhaka that is a concern raised by 3 participants. Old vehicle fleet and dilapidated minibus and human hauler are bad image of public transport system in Dhaka agreed by all of the participants. Locally manufactured body of vehicle that has lower headroom, legroom, smaller seats and small narrow doors with steep steps are serious concern of all of the participants. Poor driver test mechanisms and issuing driving licence without proper testing to the public transport vehicle driver are serious concerns as identified by 16 participants and the widespread use of fake driving licence is an issue for on-board safety raised by 19 participants.

There is a huge expectation for better public transport, especially for a newer and standard vehicle fleet for bus system in Dhaka. 15 participants stressed for immediate introduction of mass rapid transit system. Introduction of high quality buses with air conditioning is also an expectation of 21 passengers. Disciplined driving and improved driver behaviour is an expectation.

5.5 Findings of the focus group

The discussion was centred on six central questions with appropriate probing questions as discussed in Section 5.2. Five themes were developed to analyse the data as presented in Section 5.4. This section summarises the findings presented in four areas of interest of this focus groups and presented in four sub sections.

5.5.1 Positive aspects of public transport

One of the participants of a focus group (group 5) started the discussion with a question:-

"Is there any public transport system in Dhaka city?"

Though it is an extreme comment about the public transport system in Dhaka city, it can give a basic idea about the existing public transport system in Dhaka. The discussion started with the positive side of public transport system in the context of Dhaka. This varied across the groups and in discussion, most of the participants were concerned about the personal direct benefits of using public transport rather than the economic and environmental benefits of using public transport.

"If there is no public transport, especially mass public transport, I will not be able to work as I have no means to travel except walking and I cannot afford individualised public transport even rickshaw". One of the participants of the focus group explained the good side of public transport in this way. This view reflects the feeling and situation of most of the captive users of the public transport in Dhaka. In the positive side of public transport the groups have the common view that public transport can be used for any type of trip and time if they have money. However, they also pointed out that the frequency of public transport in off-peak hours is lower and no mass public transport at night is available which is a problem for the captive users.

It is interesting to note that the public transport non-users group is more aware of the benefits of the public transport compared to the captive users. This may be due to their socioeconomic background and level of education. Most important benefits of using public transport as identified by (group 3) are the reduction of congestion and pollution and the effect is savings of journey time, a reduction of health cost and a reduced need to import petroleum. These are the generic advantages of public transport.

In the groups there were some participants who are more environmentalist and they are very much in favour of public transport and non-motorised transport especially rickshaw. *"Improved and integrated public transit system is only solution to the transport problem of Dhaka city as we do not have much road space for the use of private car or any type of individualized transport*" (group 2). One of the participants (group 2) was arguing in this way and mentioned that *"there is a need for about 25% area for road and public facilities in a well planned city but in Dhaka, we have only about 8% of road area, so mass rapid transit is only solution to the transport problem of Dhaka"*.

On the positive side of public transport use, non-user group agreed that public transport is cheap compared to the private car. However, the concern for the safety and security of the private car in parking, a lack of designated secured parking facility and maintaining of drivers are the down-sides of private car use. In Dhaka due to cheap labour, it is common practice that the owner of a private car appoints a driver for the car and the driver drives the car as required by the member of the family. All the participants of the non-user group noted that maintaining drivers for private car is problematic not only for monetary reasons but also from a management point of view. *"I don't want to maintain private car but I am forced to do it due to absence of dependable, reliable and comfortable public transport system and I want to quit using private car due to the problem of parking and maintaining the individual driver for private car on top of fuel cost and regular maintenance cost"* (group 1).

On the basis of the discussion, the positive side of public transport use can be identified as:

- it reduces congestion and pollution
- safer compared to individualised transport
- fuel efficient and reduces overall transport fuel demand
- less costly compared to a car
- no need to maintain private car with driver which is expensive
- increase social interaction
- ensures mobility for all
- reduces health service cost

It can be summarised that regarding the positives of public transport use there were three areas of general agreement including reduction of congestion and pollution, role in mobility of all and reduction in transport energy demand. The car user group agreed that managing a driver (chauffeur) for a private car is very difficult and using public transport can reduce dependency on chauffeur driven car. About a half of the participants agreed that public transport use reduces the medical cost and increases social interaction.

5.5.2 Negative aspects of public transport

Most of the participants of the focus group were more interested in discussing the negative side of public transport system as they have lots of complaints about the service delivered by the existing public transport (bus) system in Dhaka. Probably it is not negative side of public transport (bus) system in general rather they were interested to point out the limitations of the existing public transport system in Dhaka. The concern over limitations of public transport system varies depending on the socioeconomic and demographic characteristics of the users. Some of the concerns of female participants are different from men. They felt excluded from the public transport system in Dhaka when the demand for public transport is very high. In the peak hour there is a little scope for a woman to use public transport due to huge crowding. One of the participants from the female only group was keen to share her experience of using public transport.

"There is no seat vacant in the bus so they (bus crews) are not interested to let female passengers in the bus and the conductors and helpers do not let me in the bus" (group 4). According to this participant it is the common attitude of the bus crews towards the female passengers during rush hours. From the religious and cultural point of view female passengers feel uneasy to stand in a crush with male passengers, so they need more space when standing to avoid squash. Therefore, if they allow female passengers boarding on the crowded bus they cannot take more passengers in crammed condition. This point was supported by all the participants of not only the female participants but also the male participants of the other groups.

Availability in terms of seats in the bus and an adequate number of buses in peak hours are the concern of all the participants of all the focus groups. *"As there is huge shortage of supply against huge demand of public transport in Dhaka there is a little scope to improve the situation without ensuring sufficient supply of public transport as the market is controlled by the suppliers not the consumers"* (group 5). One of the participants mentioned that the list of limitations of public transport would be long unless the proper supply of public transport could be ensured.

Boarding and alighting at the non-designated stops especially in the off peak hours for collecting more passengers and not proper stopping for alighting and boarding of passenger during peak hours as bus is full and the motivation is to save time for more trips. These have been identified as the major problems in public transport use in the context of Dhaka. This aspect of public transport acts as a barrier for females, the users with special need and elderly and passengers with luggage or kids. Other aspects like lack of shelter and security in bus stop and lack of proper bus stops were also identified as a bad side of public transport. However, the issue of shelters has been highly emphasised as bus stop facilities are virtually non-existent and the survey was conducted during the monsoon period when shelter is very important for protection from the rain. But it is true that there are problems of proper bus stop facilities with adequate shelter, safety and security.

The cost of public transport is a concern for low income people and for students. The student participants argued for the introduction of a half fare scheme for students and some participants demanded subsidy in public transport system to reduce the cost of transport. It is clear from the discussion on the limitations of public transport different users have different level of concerns about different limitations. More things can be discussed and analysed in this aspect of public transport in Dhaka. The list of the negative aspects of the public transport system is long and they are classified as:

1. service is not reliable especially in terms of journey time reliability,
2. absence of published time table for bus operation and the route number is not painted on the bus,
3. dispute with the passengers and the crew on fare,
4. long waiting time in off peak hours as the drivers try to maximise the number of passengers, blocks other bus for getting more passengers,
5. speeding and overtaking other buses to get more passengers,
6. crowding inside the bus in peak hours,
7. less comfort,
8. pick-pocketing inside the crowded bus,
9. small seats and less space to moving inside the bus for boarding and alighting,
10. less flexibility,
11. difficult to board and alight as the bus doesn’t stop properly for boarding and alighting,
12. no facility for the disabled and persons with special needs,
13. poor bus stop facility that includes the insufficient shelter and security,
14. behaviour of the conductors and the crews is not up to the desired level,
15. system is not properly integrated, walkways and cycling facilities are inadequate,
16. no facilities for travellers with luggage and passengers with special needs,
17. seats are not cleaned and inside the bus is dirty,
18. picking and dropping of passengers out of the bus stops and
19. bus fare is high compared to average income of the commuters.

It can be noted here that the negatives (limitations) of public transport as listed above are not listed in the order of importance. But there were high levels of agreement about the limitations of the public transport system listed above, and it was difficult to rank the issues in order of their importance from the qualitative statements. However, there were variations of degree of agreements that can help finding out most important issues. There was consensus about seven issues including wide spread crowding inside the bus, speeding for winning passenger, difficulties in boarding and alighting on moving, picking up and dropping off passengers out of bus stop even on moving, insufficient bus stop facilities, low standard of vehicle cleanliness and driver behaviour.

5.5.3 Barriers to the use public transport

In search of the answer to the third and fourth question about the difficulties in using public transport and the reason that prevents the participants using public transport, different groups had different views. However, almost all the groups have similar views that crowding inside bus, travelling with family members and carrying luggage are not suitable for using mass public transport (bus) which prevents them using it. When people travel with family members, especially they have to use individualised public transport modes such as taxicab or CNG, but they are very expensive for those with a low disposable income.

Similarly, for the potential barriers for other people to use public transport the groups have similar views. This can be summarised as:

Public transport (bus) system is designed that there is little provision for the people with special needs and this aspect has been ignored by the policy makers and the transport operators. There are no priority seats for the person with special needs which is the potential barrier for the use of public transport for the elderly and disabled persons. Poor facilities for boarding and alighting are regarded as a potential barrier for public transport use in Dhaka. Due to cultural and religious reasons some women do not feel comfortable to share seats with male passengers and also feel uncomfortable travelling in a crowded bus. Therefore, inside crowding is a potential barrier for the female to travel by public transport (bus) in Dhaka .

5.5.4 Mode choice behaviour

In search of the answer to the fifth and sixth questions that ultimately related to factors that influence mode choice decisions, generic responses were found. However, most of the users in Dhaka can be regarded as captive users of public transport (bus) and many of them do not have other options. However, they have options among different types of public transport and in this case apart from the cost, time, comfort, safety security, trip purpose and the time of journey play an important role.

"I never use individualized public transport like taxicab and CNG three wheelers at night as there is a huge safety and security risk for using this type of mode and I would prefer mass public transport" (group 3). Recognising the issue of safety and security in individualised public transport modes, all the focus groups agreed about the necessity of night bus service in Dhaka.

Why do you use public transport or why not? – As mentioned earlier, the most popular reason is there is no alternative available to them and it is cheap and available. But non-captive users of public transport use public transport in the weekends for seeing friends and family or light shopping if not accompanied by family members. The reason is there is less demand of public transports in weekends and also seats are available in weekends and holidays. The female participants of the discussion who have access to a private car do not like public transport for crowding and lack of privacy. As the people prefer to travel by bus in the weekend due to less crowded buses it can be argued that people will choose buses if they are not crowded, comfortable and takes reasonable time.

5.5.5 Importance and satisfaction rating of public transport attributes

A survey was conducted among the participants of the focus groups (33) and an additional 20 public transport users, to evaluate the importance of and their satisfaction levels with some predefined attributes of public transport system in the context of Dhaka. The questionnaire was completed after the focus group discussion. An additional 104 people were approached to fill in the questionnaire at the bus stops but 84 refused to respond due to time constraints. However, some people standing in the queue filled in the questionnaire. This gave a total sample size of 53. A better response might be obtained if the questionnaire was given one day and collected the next day but this was not practically possible.

A seven point likert scale was used to measure importance and satisfaction. For importance a rating of 7 represents ‘extremely important’ through to 1 which represents ‘not important at all’. The value of 4 is the median value of the scale. For satisfaction, a rating of +3 represents ‘highly satisfied’, -3 represents ‘highly dissatisfied’ and 0 is the neutral point on the scale meaning ‘neither satisfied nor dissatisfied’. The importance and satisfaction levels are shown in Table 5.3.

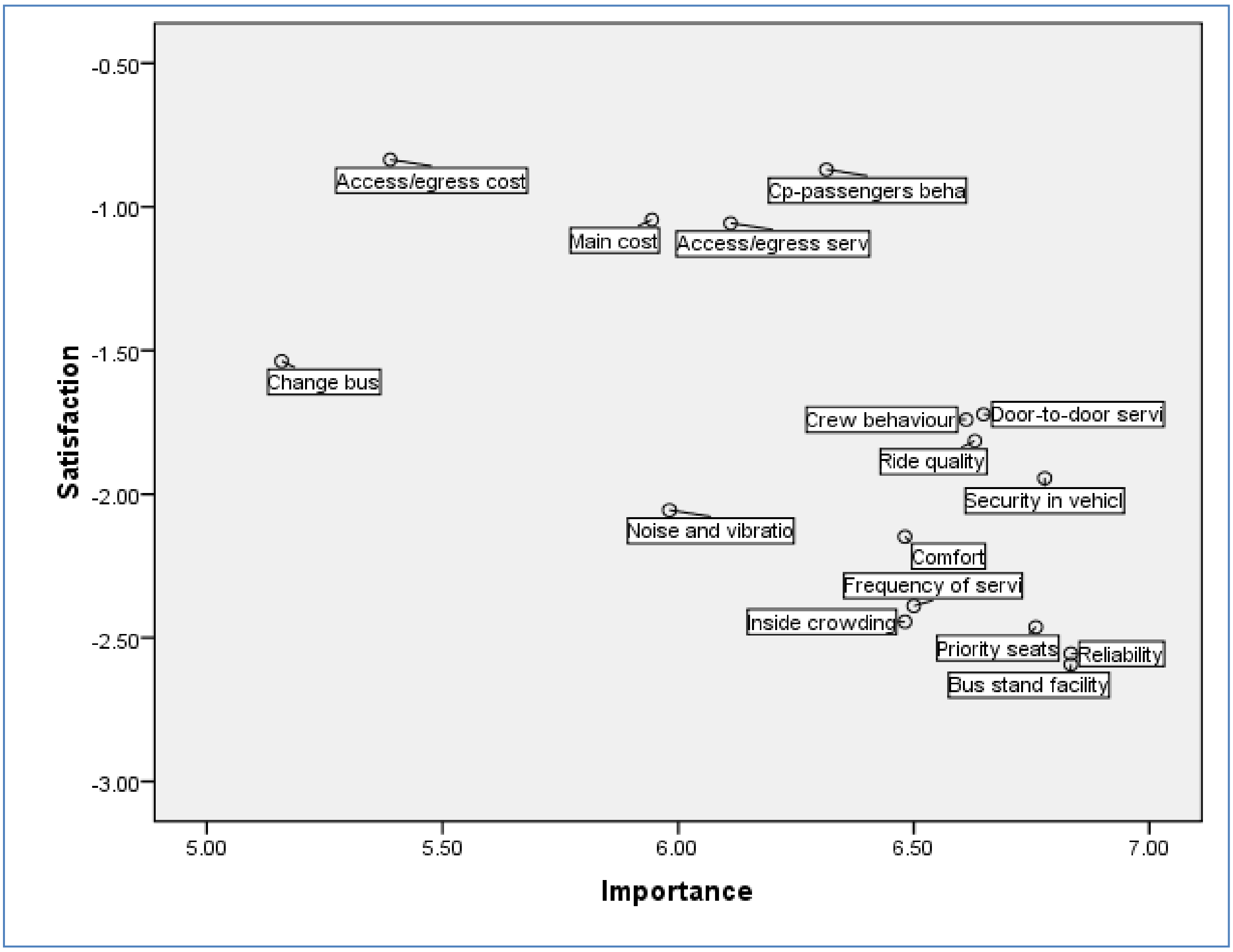
Table 5.3 Importance and satisfaction rating of selected bus attributes (n=53)

Public transport attributes	Importance		Satisfaction	
	Mean	Standard Error	Mean	Standard Error
Bus stand facility	6.83	0.07359	-2.60	0.97261
Reliability	6.83	0.05119	-2.56	0.10124
Security in vehicle	6.78	0.10463	-1.94	0.20547
Priority seats	6.76	0.12381	-2.46	0.15120
Door-to-door service	6.65	0.12159	-1.72	0.26358
Ride quality	6.63	0.09270	-1.81	0.21160
Crew behaviour	6.61	0.08932	-1.74	0.19097
Frequency of service	6.50	0.14419	-2.39	0.13842
Inside crowding	6.48	0.15581	-2.44	0.16649
Comfort	6.48	0.10816	-2.15	0.19499
Co-passengers behaviour	6.31	0.15822	-0.87	0.25772
Access/egress service	6.11	0.18441	-1.06	0.27789
Noise and vibration	5.98	0.19334	-2.06	0.18010
Main cost	5.94	0.18955	-1.04	0.2019
Access / egress cost	5.39	0.26385	-0.84	0.19742
Change bus	5.16	0.26795	-1.54	0.25727

From the frequency distribution of the data, most of the respondents have the tendency to choose extreme values to express their opinions. To ascertain the importance of the public transport attributes on the seven point scale, there is a tendency of choosing seven among the respondents. Five respondents just chose seven for the importance of all the attributes. Similarly for expressing their satisfaction level there is an explicit tendency to choose -3. For the reason the overall mean value for the importance of attributes is 6.34 and the overall mean value for the level of satisfaction on different attributes is -1.83 and the standard error is quite low for the most important attributes which indicates the consistency of the respondents on putting importance. The importance of attributes is similar with low standard deviations. However, there is more variation with the satisfaction on existing public transport attributes. In Table 5.3 the attributes are arranged on the basis of their relative importance (highest first). According to the level of dissatisfaction, the top six attributes are bus stand facility, reliability of service, priority seats, frequency of service, inside crowding and comfort. If a score lower than -2 (very dissatisfied) is a boundary value, then noise and vibration inside the bus is an important attribute.

Bus stop facility has been come out as the most important attribute of the multi-modal public transport (bus) system. The reason may be that the survey was conducted in the later part of the monsoon when shelters are very important due to rain. As the reliability of the service is low and the users have to wait for a long time for the bus, they put more importance on the bus stand facilities. Reliability of journey time has been given the same importance as bus stand facilities. From the satisfaction level it is found that user dissatisfaction is the highest for these two attributes. It seems that there is a positive relationship between the importance of the attributes and the level of dissatisfaction. It may be due to the reason that where the user felt improvement is needed they put more importance on that attributes. A scatter diagram is plotted with the mean value of importance and satisfaction rating for all the sixteen attributes shown in Figure 5.1.

Figure 5.1 Importance and satisfaction rating of selected bus attributes



Priority seats, bus stop facility, reliability, inside crowding, frequency of service and comfort got the highest importance rating and highest dissatisfaction rating. These attributes of public transport system need to be investigated further for valuation in the next stage of the research.

Access / egress cost and change bus got relatively lower importance rating but access / egress service, access / egress cost main cost and co-passengers behaviour got relatively low dissatisfaction rating. The reason may be most of the participants do not need the change of bus for their journey or use rickshaw other than bus again to get to the destination. For the access / egress cost the users are least dissatisfied with, this may be the reason that the users walk to and from the bus stop.

The following can be suggested from the focus groups:

- There is a possibility of modal shift from private car to bus if comfortable, reliable and dependable service can be offered,

- Inadequate supply of the service in terms of the availability of seat and sufficient number of bus is the main problem of the public transport (bus) system,.
- It is true that there is a demand for improved quality bus service there is also demand for low cost bus service for the poor people of the city,
- Boarding and alighting condition is a potential barrier for female and users with special needs,
- Crowding inside the bus can lead to women being refused access to the public transport service,
- There are not enough priority seats for the female and the vulnerable users and the boarding alighting system is not suitable for them and
- Among working females guaranteed seat service would be popular even with high cost.

5.6 Conclusions

It can be concluded that an inadequate supply of public transport (bus) compared to excessive demand and the existing competition for passengers are at the centre of most of the problems relating to the public transport (bus) quality of service in Dhaka. An interesting finding is that the crowding inside the bus potentially excludes the female users in absence of the priority seats for the female and the users with specials needs and elderly people. Improper boarding and alighting also acts as potential barrier for the public transport use. Picking up and dropping off passengers on moving is also a barrier for the bus use. The behaviour of drivers and crew and quality of driving are two important issues mainly resulted from the on-street competition for passengers to maximise the revenue. The size of the door and the steps are also important issues and a key determinant for using bus. Guaranteed seat service, popularly known as the sitting service / gate lock service, has a high demand amongst females, especially working female for commuting trips. There is a demand for night bus services in Dhaka. These findings of the focus groups were used alongside the literature review to finalise the attributes for valuation. The next chapter (Chapter 6) discusses the experimental design for the valuation of the selected bus attributes using discrete choice modelling.

Chapter 6 Experimental design

6.1 Introduction

One of the research objectives is the valuation of selected bus attributes in Dhaka using stated choice experiments. The first task to achieve the objective is to identify the attributes that influence bus preference in Dhaka. In order to determine the attributes that influence bus preference, a review of soft attribute valuation was undertaken and presented in Chapter 3 to come up with a comprehensive list of attributes that may influence bus choice in Dhaka. Background information about the bus system and its operation is presented in Chapter 2 that gives an account of bus operation in Dhaka.

A Focus Group Discussion (FGD) on bus service quality was conducted in August-September 2008 to come up with a list of attributes specific to Dhaka. Thirteen attributes were finalised for design of experiment for the valuation of these attributes. After finalising the list of attributes the next important task was to decide the levels of these attributes. The thirteen attributes and their levels are discussed in Section 6.2. Issues related to experimental design and choice data collection such as response burden, lexicographic answering and biases to stated choice valuation are discussed in Section 6.3, 6.4 and 6.5 respectively. Then the method used for experimental design and development of choice cards are discussed in Section 6.6. Finally a conclusion is drawn in Section 6.7.

6.2 Levels of attributes for the design of experiment

Different studies found different attributes of public transport (bus) as important and considered for valuation as discussed in Chapter 3. From the review of the soft attribute valuation and the findings of the focus groups discussed in Chapter 5 the following thirteen bus attributes in Dhaka were identified for the estimation of willingness-to-pay (WTP). This section discusses and finalises the levels of these attributes for the experimental design.

Travel cost: Cost of travel is a continuous variable and it explains bus demand the most, and the WTP for other attributes is estimated using the cost coefficient. The bus fare in Dhaka is regulated by the government on the basis of distance travelled. The current bus fare is BDT 1.5 / km for minibus and BDT 1.60 / km for large bus. As the cost is not for any defined origin and destination it was presented as a percentage of current cost of a bus trip. The five levels were decided as 80% of current bus fare, 100% of current bus fare, 120% of current bus fare, 140% of current bus fare and 160% of current bus fare.

Journey Time: Journey time is a continuous variable of bus system and other attributes can be evaluated in terms of journey time. Travel time is one of the most important attributes in bus system (Wardman, 1998, 2001, 2004) and it is easy to understand. Some studies use speed of journey instead of travel time. For stated preference experiments there are evidences of using the absolute time in minute / hour or a change of time in percentage compared to time of current trips. According to Fjellstrom (2004), peak hour journey speed in Dhaka is around 10 km/hour and off-peak speeds are around 30% higher in 2004. People are more concerned about the journey time not about the speed of the journey, so using time instead of speed is more appropriate in this case. The travel time may be included in terms of absolute time value in minute / hours. This is suitable if the survey is conducted for specific origin / destination. However, the research is focused on a specific corridor rather that a route or a specific origin / destination. Therefore, the relative slowness / fastness is considered as the level for the attribute. Travel time is defined in 5 levels as percentage of current journey time. The five levels of journey time were decided as 80% of current time, 100% of current time, 120% of current time, 140% of current time and 160% of current time.

Waiting time: Waiting time is an important attribute of bus system and it depends on the frequency of service. Phanikumar and Maitra (2006) found wait time as a highly significant attribute of the bus system. In high frequency service the wait time is less compared to the less frequency service. Maximum and minimum number of bus routes in the study corridor is 34 at Airport and 14 at Kakrail respectively (Bhuiyan, 2007). According to Fjellstrom (2004), human hauler route was operated at a very high frequency, averaging 46 buses (human haulers) per hour, and headway survey results show that most passengers arriving at the bus stop could expect to wait less than 1 minute for the next arriving human hauler. For the minibus the frequency is lower than the human hauler and the frequency of large bus is even lower than the frequency of minibus. Therefore, the waiting time varies for the human haulers, minibuses and large buses depending on the route of service. According to Fjellstrom (2004) the operating frequencies at Rampura Bridge along different routes vary between 4 and 52 buses per hour / direction toward city. In the morning peak there was one gap of 9 minutes between buses, with the next longest wait being 5 minutes (Fjellstrom, 2004 pp37). If the minibuses and human haulers are replaced by the large buses or articulated buses the number of the buses for the same number of passenger flow would be lower than the existing number of buses and the frequency will be lower than present frequency. Therefore, resembling the current wait time and the future scenario using high capacity bus three levels of waiting time were defined. They are 10 minutes, 20 minutes and 30 minutes.

Headway: Headway of bus service is related to the demand of the service and passenger carrying capacity of the bus, again the demand varies considerably depending on peak and off-peak. According to Fjellstrom (2004), in the corridors, bus frequency regularly exceeds 500 buses / hour / direction in the peak hours. Most of the buses are human haulers and the minibuses. Frequency is a function of demand and the capacity of the bus. For example, one of the high frequency routes along the corridor at airport section, the frequency of human haulers is as high as 9 human haluer / hour / direction and only one human hauler route passes that point so frequency of human haulaer is 9 per hour.

Similarly at the same point peak bus flow is 524 (both city and intercity services) buses / hour / per direction and 34 city routes pass that point that can be seen in Table 2.1. In absence of classification of city and intercity bus counts 70% of the buses are assumed as city buses. Therefore, average bus frequency per route in peak hour is 10 buses per hour. Then peak headway is 6 minutes (one bus in six minutes). There is no published data about the off-peak vehicle count in the corridor.

As discussed earlier and pointed out by Fjellstrom (2004), the less frequent large bus routes are less reliable and waiting time is very high and most of times users have to switch to other modes to avoid high waiting time in absence of published timetables. For higher frequencies the user turns up to the bus stops at a random fashion. However, for lower frequency (longer intervals) passengers turns up to the bus stops following the timetable and reliability of the published timetable is more important. For high frequency service (shorter interval) wait time is less, as the length of the waiting time has the impact on valuation for wait time so a balance is needed to replace the high frequent minibuses with less frequent large buses to optimise wait time.

In a high demand corridor peak frequency would be very high and waiting time would be less. Different bus operators operate services in different routes along the corridor with varying service quality. Apart from the classification on the basis of just the ownerships there are three distinct types of buses operate in the corridor. They are large bus (double deck bus and single deck), minibus and human hauler. The overall frequency of bus in the corridor is very high. However, frequency of bus of an individual bus type along a specific route is lower than that of the overall frequency. When a particular bus user decides to take a particular bus service along a particular route, the frequency of that service rather than the overall frequency is important to him. If all the buses were uniform in their major attributes running in the same route and users choose any type of service at random then the overall frequency rather than the frequency of individual service along a specific route could be considered for the SP design.

Someone may argue that ‘wait time’ and ‘frequency’ are more or less similar in terms of their effect on utility function and use of both the two attributes in a single experiment may be debated. Apparently it seems that there is a straight relationship between the waiting time and the frequency which means that the waiting time varies between 0 and headway of the service with the average waiting time equals half the headway. However, this is only true with the assumption that if the passengers turn up to the bus stops at random. As discussed earlier for the low frequency service the passengers depends more on the timetable and do not turn up to the bus stop at random. So ‘wait time’ and frequency have different implication to the users. Hensher and Prioni (2002) used ‘frequency’ and ‘reliability’ expressed in wait time in the same experiment as the two attributes have different implications to bus users with the variation of level of frequency with a published timetable. So frequency can be considered as a separate attribute along with wait time in the same experiment. Five levels of headway are defined as every 5 minutes, every 10 minutes, every 15 minutes, every 20 minutes and every 25 minutes.

Bus stop facility: The bus stops have a critical role to play in the bus route network design for a city. Bus stop capacity, location, distance between stops, design of bus stops to allow accessibility for boarding and alighting of passengers all play a critical role. Seats or shelters at bus stops in Dhaka are generally absent (refer serial no. 13 in Section 5.5.2) , or, where provided, are generally unused (at least by the bus passengers) and in derelict conditions and passengers waiting for bus do so in poor condition, unprotected from wind, rain, sun or passing vehicles (Fjellstrom, 2004). The ranking exercise conducted during the focus group discussion, bus stop facility was identified as the most important attribute for the bus system in Dhaka. Though there is a high demand for the bus stop facility in Dhaka there is no proper (adequate) facilities at most of the bus stops along the corridor. According to Bhuyian (2007) bus stop infrastructure in most bus stops is very inadequate or missing. Private companies, with the intention of advertisement, have established bus stops infrastructure in a number of locations. But due to lack of guidelines it cannot be said to be optimally deigned from the point of view of accessibility of the passenger to the buses. Adequate capacity and the proper shelter from adverse weather condition could be most important for the bus stop facility in the context of Dhaka. Though Hensher and Prioni (2002), found that infrastructure at the bus stop have no significant effect on the quality of bus service in Australian context but it has influence on bus service as found in the focus group. So bus stop facility needs to be included in the SP experiment. Considering the importance of bus stop facility it was defined as an attribute with three levels. The levels are bus stops with adequate shelter, passenger shed available but no proper shelter and no shed and shelter at the bus stop.

Ease of boarding and alighting: The attribute boarding and alighting condition refers to the ease of boarding and alighting in a bus which is important for the bus choice as identified in focus group. It is found from the focus group discussion that boarding and alighting condition can potentially cause barriers to some users especially female, elderly and the passengers carrying luggage (refer to serial no. 11, 12 and 16 in Section 5.5.2). There are two separate issues about the attribute. One related to the quality of driving that includes how the bus approaches to/leaves from the kerb side and is the time allowed for boarding and alighting sufficient. This issue can be taken care of by the quality of ride and the levels regarding this aspect may not be considered under this attribute.

The other issue is number of doors and their width, number of steps in the doors. This issue is quite important especially in developing countries as the buses are not well designed in terms of approved standards. At present doors of most of the buses especially the minibuses are narrow with high steps that create problem for boarding and alighting. The minibuses have only one door for boarding and alighting. Though the large buses have two doors but most of the times only the front door is used for both boarding and alighting. Bhuiyan (2007) suggests separate doors for women for boarding and alighting. Ease of boarding and alighting were defined as three level attribute. The levels are narrow door and steep steps, difficult to get in, wide door and mild steps to get in and one wide door for getting in and one for getting off.

Priority seats for women: Though male bus passengers in Dhaka outnumber their female counterparts, the number of female passengers is increasing with an increasing number of females entering into paid work force and higher education. However, due to social norms and values some females do not like to travel sitting beside males and more priority seats for females were demanded by females as well as some males in the focus group (refer to Section 5.5.3). However, it is not uncommon that some females are travelling sitting beside the male passengers. Though there are some priority seats for women in buses but the priorities are not often maintained and the participants of the focus group generally agreed that the number of priority seats for females (about 5%) is quite insufficient. Providing priority seats for females or providing all-female buses may attract more female passengers to bus system. The provision of all female bus in Dhaka was introduced in early 1980s and it was on and off as the chosen route was of relatively low profitability, however, and the service was finally stopped (Peters 2002). So the all female bus could be an attribute of bus system in Dhaka and can be tested.

Peters (2002) summarises that stakeholder consultation with women, housewives, students, and workers in Dhaka all indicated the demand for such services, calling for a reconsideration of the practice with a perhaps more careful route selection. As a very practical, low-cost alternative, women suggested that the previous policy of reserving 5% of all seats for women be reinstated and properly maintained, together with a designation of a women-only and a men-only door in all larger, two-door buses. Bus service is not very popular to the female passengers due to some limitations of the bus, such as boarding and alighting difficulties, inside crowding etc. Though it is expensive individualised public transport such as CNG, rickshaw, taxicab etc are popular mode for the working females in Dhaka. Priority seats for women were considered as an attribute with three levels. The levels are 10% seats reserved for women, 20% seats reserved for women and 30% seats reserved for women.

Air conditioning: There is a demand for air conditioned bus especially in hot and humid summer, so availability of air conditioning is an important attribute of bus system in Dhaka. There are some air conditioned premium bus services in operation on some routes along the corridor but the fares are higher compared to the bus without air conditioning. It is understood that providing air conditioning adds comfort with some extra cost. According to Fjellstrom (2004) the fare of air conditioned premium buses is around double the fare of other services. So the premium for air condition is almost 100% of the fares. Hensher and Prioni (2002) found that air conditioning without surcharge is not statistically significant relative to no air conditioning. In contrast the provision of air conditioning with 20% surcharge on existing fares is statistically significant with a negative sign suggesting that users would sooner not have air conditioning if it means paying higher fares. So it may be an option for the higher income people depending on the cost. The bus attribute air conditioning was defined with two levels. The levels are air conditioning and without air conditioning.

Cleanliness inside bus: Cleanliness is an important attribute that has an impact on users' choice; it is quite straight forward and easily understood by the users. This issue has been identified in focus group (refer serial number 17 in Section 5.5.2). However, the perception of cleanliness would differ from passenger to passenger. At present most of the buses, especially minibuses are not properly cleaned and that creates the poor image of bus service. However, the large buses are generally cleaner than minibus and human hauler. Cleanliness was included as an attribute with two levels. They are deck and seats are clean and tidy and deck and seats are dirty and messy.

Crowding inside bus: Inside crowding affects the comfort and the quality of a bus journey. Comfort and / or discomfort has been used as an attribute of bus service by different researchers with different levels of crowding expressed in terms of availability of seats during a bus trip (Phanikumar and Maitra, 2004, 2006, 2007). Level of inside crowding has an impact on bus choice. The present level of occupancy of bus can be compared with their seat capacity to have a baseline of the level of crowding inside the bus in the context of Dhaka.

Table 6.1 Level of bus crowding in Dhaka

Type of bus	**Large bus**	**Minibus**
Capacity (person)	56	30
Occupancy (person)	88.4	41.5
Occupancy factor	1.58	1.38

Source: Bhuiyan (2007)

Actual occupancy figures and the capacity are taken from Bhuiyan (2007) and the occupancy factors are calculated from that, but in the occupancy figure of large bus double deck buses are also included. The capacity of single deck large bus has been used that's why the occupancy factor for large bus is higher than that of minibus. However, this can give an idea about the level of crowding in Dhaka. The Occupancy factor for human haulers is one as the service is seating and nobody can stand inside. More crowded the bus, less the journey comfort which can adversely affect the demand for bus in the long run. But this figure supports that most of the bus users are captive in nature and they do not have any alternative feasible mode to switch. Inside crowding is most common in peak hours. It is related to the passenger carrying capacity of the bus system against demand for bus service. However, Inside crowding can be reduced by increasing capacity by introducing large buses (may be articulated bus) or by increasing the number of buses in the route (higher frequency of buses in the peak). However, in the context of Dhaka inside crowding has been considered as an important attribute for bus system (refer serial number 17 in Section 5.5.2). Therefore, the attributes inside crowding was defined at level three. They are standing in a crush, standing comfortably and seating all the way.

Driving quality: Safety on-board is an issue which includes driving behaviour, vehicle conditions, road condition and skill of driving or driving quality. Public transport is considered safer than individualised transport in the context of Dhaka as far as accident and severity of accident are concerned (refer to serial number 5 in section 5.5.2). Condition of road and the condition of vehicle have influence on safety on-board and quality of ride. However, both the issues are not the focus of this research. So driving quality may be considered as an attribute that has impact on quality of bus service. This attribute is related to the driving skill so the attribute was defined as driving quality with three levels. The levels are unskilled driver risky journey, skilled driver safe journey and young driver reckless journey.

Driver and crew behaviour: Driver and crew behaviour has come out as an important attribute in the focus group as some of the participants had bad experience about the driver and crew behaviour (refer to serial number 3 and 14 in section 5.5.2). The participants in the focus group expressed their dissatisfaction over driver and crew behaviour. The way public transport business developed and managed in Bangladesh allowed limited space to accommodate qualified and well-behaved crews and driver in the bus operation. However, the situation is changing over couple of years due to the introduction of new bus operations managed by companies rather than individual owners. So driver and crew behaviour should be considered as an attribute for the SP design. Driver and crew behaviour was included as an attribute with two levels. They are friendly and sober crew behaviour and unfriendly and rude crew behaviour.

Picking up and dropping off passenger: Picking up and dropping off passenger sometimes defined as bus at the kerb side is an important parameter that reflects the ease of boarding and alighting which is again related to the quality of driving. It determines how the bus stops at the kerb side for boarding and alighting of the passengers and how long it stops. There are some options such as mandatory stopping at every stops, stop the bus by raising hands, go get into the bus and stops the bus by pressing buttons to get off the bus. It also determines how the passengers board in and alight off the bus, especially discipline in boarding and alighting is an issue in Dhaka. However recently passengers are waiting in the queue and disciplines are maintained during boarding, but this is not the case for all the bus operators. From the focus group it was fund that buses don't stop properly at the kerb side and do not allow sufficient time for proper boarding and alighting to save time in peak hours (refer serial number 18 in section 5.5.2). This attributes may be related to the attribute 'ease of boarding and alighting' and also the 'quality of driving'. This attribute was defined at two levels. They are bus stops properly at designated places and picks up and drops off passenger on moving.

The 13 attributes were divided in two sets, A and B and two separate stated choice experiments were designed accordingly. The attribute levels for sets A and B before and after pre-testing are shown in Tables 6.4 and 6.5 respectively at the end of this chapter.

6.3 Respondent burden

When stated preference experiments are applied to study complex decision making that involves many attributes, this often results in problems of information overload and respondent burden, potentially jeopardising the validity of such experiments. As a result of respondent burden, the respondents cannot trade-off properly among different alternatives. More attributes, levels and alternatives make an SP experiment complex and put serious strain on the cognitive process. As a result, the respondents may ignore some of the attributes in their decision process. It is not the case that the respondents always ignore attributes due to the cognitive burden. There are other reasons for ignoring the attributes such as lexicographic attitude, non-familiarity about the attributes and levels and not taking the experiments seriously. Some respondents have strong weaknesses for some attributes and do not want to trade-off that attributes with others which fall in the lexicographic attitudes. The lexicographic attitude needs further discussion as the issue is important in the contingent valuation process. However, there is a lack of research about the threshold of complexity that causes the respondent burden. According to Caussade et al (2005) there is no real reason to avoid complex design just for the fear of respondent burden. There are different ways to avoid a complex design, but before applying those ways an understanding about the design dimensions that creates the complexity need to be presented.

Complexity of design is encompassed by: number of available alternatives, number of attributes used to characterise the alternatives, number of choice situations presented to the respondents, number of attribute levels, and variance range of the attribute levels. Caussade et al (2005) attempted to explain the respondent burden depending on the design dimensions mentioned as: respondent burden measured as the variance of error decreases as the number of alternative increase and the variance of error increases for the further increase in the number of alternatives and the alternatives between 2-4 can be used for optimising the respondent burden as far as the number of alternative as a design dimension is concerned. More simplistic models violate the compensatory behaviour assumptions. However, the variance of error increases with the increase in number of attributes.

Experimental complexity should increase as the number of attribute level grows simply because longer number of comparisons to be made. Number of choice situation to be assessed which is the most controversial design dimension. It has marginal effect on initial consistency improvement for the decision process. With the increase in the number of choice situation the variance of error term decrease up to a threshold and after that the variance of error term increases with the increase of choice situation. It has been explained by the learning effect, as the respondent assesses the more choice situation he learns about the process and assessment improves but after certain threshold the performance drops due to respondent burden. The threshold value is around 15 according to Caussade et al (2005). They also argue that the number of attributes impacts more severely to respondent burden than the number of attribute levels.

It is of interest to see if the quality of stated preference data depends on the literacy of the respondents and the method of presentation of the experiment. As the SP experiment will be assessed by the respondents from the developing country in Dhaka, the method of presentation and the literacy level of respondent could be an issue. It is expected that the respondents will not be very aware about evaluating alternatives depending on various attributes. Arentze et al (2003), using a route choice study in the context of South Africa, conclude that it is the task complexity that has a significant influence on data quality, not the method of presentation. There is also no effect on data quality related to literacy level.

When respondents need to respond to a large number of profiles or choice sets increasing burden and perhaps it implies that respondents start adopting simplifying decision heuristics. To reduce respondent burden when a large number of attributes is required to realistically represent the choice problem is still under investigation.

However, Stopher and Hensher (2000) found that task complexity up to 32 profiles has only a marginal impact on elasticity. Concerns about respondent burden have been raised and have stimulated the development of alternative methods. Rigorous empirical analysis of the effects of task complexity or the validity of response measures in stated preference and choice analysis in transport research is still very limited indeed. Fatigue effect and lexicographic behaviour has the impact on data quality which can be addressed in the experimental design process.

6.4 Lexicographic answering

Lexicographic answering in stated preference studies implies that the respondent constantly chooses the alternative that is best with respect to one particular attribute or aspect of a journey. For example, cost, respondents' weakness over a particular mode, say choice of train over bus, choice of seating only service over crowded service and choice of direct service over local service. Generally if the experiment includes such an attribute that the respondents do not want to trade-off, may be safety in the air travel can initiate lexicographic answering.

Two forms of lexicographic preferences were identified by Randall et al (2003). They are strict and modified lexicographic responses.

Strict lexicographic preferences are the traditional meaning of the concept. That is, preferences for different types of goods are defined by a lexical ordering of these goods based on some perceived or felt attribute(s). In a strict lexicon, certain goods in any quantity or quality always take precedence in the expressions of preferences over all quantities or qualities of other goods. Thus, no indifference functions are definable. Randall et al (2003), however, concluded that the strict lexicographic preferences are unacceptable. The absolute priority of one good may imply total sacrifice on the part of the individual which is not always rational. A martyr would fit this category, but this type of individual is very rare. In the case of contingent valuation in the context of transport this type of preference would not be a serious issue. A large bus as an alternative may have a chance to get precedence over minibus or human hauler by some respondents, this attribute has been removed and the other attributes that can represent them have been considered to avoid lexicographic responses.

A more tenable position is offered in the form of modified lexicographic preferences. Unlike strict lexicographic preference, the modified lexicographic preferences are related to the threshold of some the attributes beyond which respondents are not willing to trade off some alternatives or goods. Lockwood (1996) develops a system of lexicographic preferences based on thresholds. This argument states that there exist certain thresholds, or minimum levels of a good that are necessary and prior to choices for other goods. For example, if the level of crowding exceeds certain levels females in Bangladesh cannot trade of these attributes with other and virtually they have to forgo that mode and have to choose other alternative. These two types of lexicographic answering have been taken into consideration for defining the levels and attributes for the alternative for the experimental design.

6.5 Bias in Stated Choice valuation

Bias is an issue for any kind of sampling in an empirical study, which includes but not limited to bias in sampling. To eliminate or reduce biases in sampling and to get a representative sample, there are different tools for sampling that address the issue of bias in sampling. However, in contingent valuation hypothetical bias is an issue that concerns the validity of the willingness-to-pay results estimated through stated preference experiments (Murphy, 2005). It is more a validation issue than a design issue for the SP experiments and calibration factors are available for different types of estimation. However, a well designed experiment that reflects the reality can reduce the scale of hypothetical bias. Individuals are widely believed to overstate their economic valuation of a good by a factor of two or three. Therefore, preferences expressed in terms of hypothetical contexts have come under serious scrutiny and the issue of hypothetical bias has become an issue in contingent valuation (List & Gallet, 2001). They also argue that hypothetical bias varies between the valuation of private goods and public goods, and hypothetical bias for private goods is less than the hypothetical bias for public goods.

Quite a few studies have been conducted to estimate the hypothetical bias if that exists and what influences the hypothetical bias. Murphy et al (2005) and List & Gallet (2001) conducted meta-analysis to look into the issue of hypothetical bias. List & Gallet (2001) referring to the meta-analysis suggests that certain experimental protocol influence deviations in hypothetical and actual statements. For example, willingness-to-pay studies yield smaller hypothetical-to-actual ratios than willingness to accept studies. Murphy et al (2005), however, argue that the primary factor that explains hypothetical bias is the magnitude of the hypothetical value. So the issue of hypothetical and actual statements and deciding the magnitude of hypothetical value is an issue that needs attention at the design stage of stated preference experiments. The valuation of the willingness-to-pay for the attributes of the bus system in Dhaka is a valuation of a private good not a public good, and the hypothetical values have been decided on the basis of the reality of the transport market.

Experiments can be simplified by applying different strategies, optimising the number of alternatives, attributes, levels and choice situations. More than one experiment can be designed if it the number of attributes is too high. Molin and Tmmermans (2009) suggest for the Hierarchical Information Integration (HII) design to minimise the design complexity.

6.6 Design of choice experiment

The main objective of designing a choice experiment is to develop choice scenarios for the respondents to choose one alternative from the set of available alternatives (both real and hypothetical) that gives them maximum utility. To design a choice experiment the alternative to be decided first then the attributes that explains the alternatives with appropriate levels. Depending on the purpose of the researcher two types of alternatives can be used such as labelled alternative or unlabelled alternative (Greene, 2004). Accordingly, mode specific and generic coefficients can estimated through the modelling process.

As the objective of this research is to estimate the willingness-to-pay (WTP) for the bus attribute, a choice situation between two unlabelled bus alternatives can meet the objective of this research. Both full factorial and fractional factorial design can be developed but the efficiency of design is an issue here. To keep the choice task easier and simpler two separate choice experiments were designed for this research where each experiment had seven attributes, two attributes at level five, three attributes at level three and two attributes at level two for each of the experiments. The attributes and their levels are shown in Table 6.4 and Table 6.5 at the end of this Chapter.

Using statistical package SAS V 2.1 fractional factorial D-optimal designs were produced for two sets of attributes. Each design produced 30 choice scenarios and it is not possible for one respondent to evaluate all of the choice scenarios. To minimise the cognitive burden of the respondents the 30 choice scenarios were divided in three groups. Accordingly three subsets of questionnaire were designed for each set of choice experiment. The choice card designed by the statistical package can be shown in Table 6.2 for experiment A.

Table 6.2 Sample choice card for set A attributes

Scenario 1

Serial	Attributes	BUS A	BUS B
1	One way bus fare	20% less fare as now	60% more fare as now
2	Travel time	20% less time as now	60% more time as now
3	Waiting time (minutes)	10 minutes	10 minutes
4	Bus stop facilities	shelter with seating	No shelter at all
5	Ease of boarding and alighting	Narrow door and steep steps, difficult to get in	Wide door and mild steps to get in
6	Picking and dropping passengers	Bus stops properly at designated places	Picks up and drops off passengers while moving
7	Air conditioning	Air conditioning	Air conditioning
I would choose		☐	☐

Similarly a choice card for experiment B can be shown in Table 6.3.

Table 6.3 Sample choice card for experiment B

Scenario 9

Serial	Attributes	BUS A	BUS B
1	One way bus fare	60% more fare as now	20% less fare as now
2	Headway (minutes)	10 minutes	5 minutes
3	Priority seats for women	30% reserved for women	10% seats reserved for women
4	Crowding inside the bus	Standing comfortably	Standing in a crush
5	Driving Quality	Unskilled driver, risky journey	Unskilled driver, risky journey
6	Driver and crew behaviour	Friendly and sober crew behaviour	Friendly and sober crew behaviour
7	Cleanliness inside bus	Deck and seats are clean and tidy	Deck and seats are clean and tidy
I would choose		☐	☐

6.7 Conclusions

The attributes of the bus system are discussed with their levels for the experiment design to estimate willingness-to-pay (WTP) for the bus attributes in Section 6.2. Stopher (2000) suggests that little is known about the basis for rejecting complex design or accepting simple design. Experiment can be simplified by applying different strategies, optimising the number of alternatives, attributes, levels, choice situations. Again more than one experiment can be designed if the number of attributes is too high. As number of attributes is relatively high (13), the attributes are divided in two sets for the design of two separate experiments. Statistical package SAS V 2.1 is used to develop fractional factorial D-optimal design. 30 choice scenarios were developed for each experiment and they were divided in three groups by SAS to reduce respondent burden. A pilot study was conducted with two experiments having seven attributes each keeping travel cost common in both the experiments and it worked well.

Table 6.4 Proposed modification of levels for Set A attributes

Attributes	Original Levels	Proposed Change (after pre-test)	Reason / Comment
One way bus fare	1. Only 80% of current bus fare 2. 100% of current bus fare 3. 120% of current bus fare 4. 140% of current bus fare 5. 160% of current bus fare	1. Only 80% of current bus fare 2. 100% of current bus fare 3. 120% of current bus fare 4. 140% of current bus fare 5. 160% of current bus fare	No change
Journey time	1.Only 80% of current time 2. 100% of current time 3. 120% of current time 4. 140% of current time 5. 160% of current time	1.Only 80% of current time 2. 100% of current time 3. 120% of current time 4. 140% of current time 5. 160% of current time	No change
Waiting time	1. 10 minutes 2. 20 minutes 3. 30 minutes	1. 10 minutes 2. 20 minutes 3. 30 minutes	No change
Bus stop facilities	1. Bus stop with adequate shelter 2. Passenger shed available but no proper shelter 3. No shed and shelter at the bus-stops	1. Bus stop with adequate shelter 2. Passenger shed available but no proper shelter 3. No shed and shelter at the bus-stops	No change
Ease of boarding and alighting	1. Narrow door and steep steps, difficult to get in 2. Wide door and mild steps to get in 3. One wide door for getting in and one for getting off	1. Narrow door and steep steps, difficult to get in 2. Wide door and mild steps to get in 3. One wide door for getting in and one for getting off	No change
Picking up and dropping off passengers	1. Bus stops properly at designated places 2. Picks up and drops off passenger while moving	1. Bus stops properly at designated places 2. Picks up and drops off passenger while moving	No change
Air conditioning	1. Air conditioning 2. Without air conditioning	1. Air conditioning 2. Without air conditioning	No change

Table 6.5 Proposed modification of levels for Set B attributes

Attributes	Original levels	Proposed Change (after pre-test)	Reason / Comments
One way bus fare	1. Only 80% of current bus fare 2.100% of current bus fare 3. 120% of current bus fare 4. 140% of current bus fare 5. 160% of current bus fare	1. Only 80% of current bus fare 2.100% of current bus fare 3. 120% of current bus fare 4. 140% of current bus fare 5. 160% of current bus fare	No change
Frequency	1. Every 5 minutes 2. Every 10 minutes 3. Every 15 minutes 4. Every 20 minutes 5. Every 25 minutes	1. Every 5 minutes 2. Every 10 minutes 3. Every 15 minutes 4. Every 20 minutes 5. Every 25 minutes	No change
Priority seats for women	1. 10% seats reserved for women 2. 20% seats reserved for women 3. 30% seats reserved for women	1. 10% seats reserved for women 2. 20% seats reserved for women 3. 30% seats reserved for women	No change
Crowding inside the bus	1. Standing in a crush 2. Standing comfortably 3. Sitting all the way	1. Standing in a crush 2. Standing comfortably 3. Sitting all the way	No Change
Driving quality	1. Unskilled driver, risky journey 2. Skilled driver, safe journey 3. Young driver reckless journey	1. Unskilled driver, risky journey 2. Skilled driver, safe journey 3. Young driver reckless journey	No Change
Crew behaviour	1. Friendly and sober crew behaviour 2. Unfriendly and rude crew behaviour	1. Friendly and sober crew behaviour 2. Unfriendly and rude crew behaviour	
Cleanliness inside bus	1. Deck and seats are clean and tidy 2. Deck and seats are dirty and messy	1. Deck and seats are clean and tidy 2. Deck and seats are dirty and messy	

Chapter 7 Pilot study

7.1 Introduction:

Efficiency is the central element in any survey or data gathering method for any type of research. A pilot survey can reduce the number of unanticipated problems as it gives an opportunity to redesign any part of a questionnaire to overcome difficulties that the pilot survey reveals. A pilot study also provides enough data to decide whether to go ahead with main study. Therefore, this pilot survey was a preliminary testing of experimental design, the checking of unforeseen ideas, approaches that would increase the chance of obtaining clear findings in the main study. The other goals of the pilot survey were to check the statistical and analytical procedures to evaluate their usefulness for the data to change data collecting methods if needed. A questionnaire for a pen and paper based household survey was designed and a pilot survey was conducted to test the questionnaire and the experimental design for discrete choice modelling. The pilot survey was conducted in October 2011. Before that, a pre-test of the questionnaire was undertaken on ten respondents to check the translation from English to Bengali and that question meaning and flow were maintained.

This Chapter covers the questionnaire design in Section 7.2. Section 7.3 discusses changes to the structure of the questionnaire after the pre-test to improve the questionnaire. Issues relating to implementation of the pilot survey are discussed in Section 7.4. Section 7.5 gives an account of the socio-demographics of the respondents. Section 7.6 discusses the mode choice behaviour and preference of available public transport modes. Section 7.7 examines the details of public transport trips. Results of importance and satisfaction rating of the bus attributes are presented in Section 7.8 followed by development of discrete choice models in Section 7.9. Section 7.10 discusses the issues identified in the pilot and necessary changes needed in the questionnaire and the execution of final data collection. Finally a conclusion is drawn in Section 7.11.

7.2 Questionnaire design

A questionnaire for pen and paper based household survey called “Dhaka Transport Survey 2013” was designed for data collection. The questionnaire had five sections and the final version may be found in Appendix-A. Section A collects mode choice data on the corridor and the detail of a public transport trip by the respondent on the corridor. The trip detail included information about the origin-destination, access / egress bus stops, access / egress modes, their fares and time, waiting time at the bus stops, journey time, and detail of any interchange including number of changes, waiting time and the similar detail about the mode change part of the public transport journey.

Section B was designed to obtain importance and satisfaction ratings for the bus attributes later used in the stated choice experiment. The importance scale ranged from 7 for the most important and 1 for the least important and for the satisfaction rating 7 for highly satisfied and 1 for highly dissatisfied. This data was used to check the consistency of the outcome of the discrete choice modelling.

Section C collects data on the socioeconomic and demographic characteristics of the respondents including gender, age, household income, household car ownership and occupation of the respondents. Section D contains the stated choice experiment. In this choice exercise the respondent had to choose one of the two alternative bus services presented in the choice cards. The importance and satisfaction rating and socio-economic part were presented before the choice exercise section so that the respondents could consider their own situation and the bus attributes during the choice exercise. There was one question at the end of this section if the respondent had ignored any attribute during the choice exercise.

Finally Section E was designed to test the attitudes of respondents to the attributes of the bus system used in the choice experiment in Section D. One attitudinal statement related to each attribute was included to check any inconsistency of the rating exercise and modelling exercise if any. This was a rating exercise in the scale of five where 5 represented strong agreement and 1 represented strong disagreement.

7.3 Tweaking of the questionnaire after pre-test

A pre-test was undertaken to check the correctness of translation and flow of the questionnaire. It is to be mentioned here that the questionnaire was translated from English into Bengali and survey was conducted in Bengali, the native language of the respondents. In the first section there were two questions about mode choice, one about mode choice on the corridor and the other about overall mode choice. As the survey was conducted along the catchment area of the corridor the answers to the two questions were similar. Therefore, finally only one question about the mode choice on the corridor was kept and the other question was not used. No further changes were made after the pre-test before the pilot survey.

7.4 Implementation of pilot survey

A pilot survey is a strategy used to test the questionnaire using a smaller sample compared to the planned sample size to check the correctness of the questionnaire and to find out possible difficulties / problems for conducting the survey if any. In this phase of conducting a survey, the questionnaire was administered to a percentage of the total sample population. The pilot survey had a plan to obtain approximately 40 responses (10% of the intended main sample size of 400 respondents) and some respondents from car owning households. Respondents were randomly selected in Banani, Gulshan, Mohakhali and part of Uttara, falling in the catchment area of the research corridor and five interviews were taken from car owning household.

The survey was administered according to the implementation plan of the final survey, so that the limitation of the plan could be identified and addressed before the main survey. For the purpose of the pilot survey, 50 households were randomly selected from the sample of the final survey. Four of the 14 enumerators trained for the main survey conducted the pilot survey and the result of the pilot survey and the lessons learnt from the pilot is presented in the subsequent sections of this chapter.

7.5 Socio-demographics of the respondents

In the data collection process 40 households out of 50 were reached and 35 interviews were completed of which 31 were complete. Among the respondents 20 were male and 11 were female. By occupation status, 11 respondents were in employment and the second highest were housewives with seven respondents. The number of businesspersons and students were both four followed by three unemployed and two retired persons. The major age group was thirties (30 – 39) with 6 respondents followed by three aged below 20 years and 3 in their sixties. In the case of household car ownerships, 11 households out of 31 had access to car. Of the car-owning households, four households had two cars and the remaining seven households had one.

8 households in the lowest income bracket of BDT 5,000 to 15,000, followed by 7 in the next highest bracket of BDT 65,000 to 75,000 followed by 6 in 25,000 to 35,000 bracket which was close to average household income in urban areas. Thus car ownership and income are high compared to the overall average for the city, but acceptable as the survey area for the pilot study is a relatively wealthy area of the city and is surrounded by low income areas. Five interviews were taken from the

households with car that had contributed to higher car ownership compared to overall car ownership in the city (less than 10%).

The results of the pilot survey are presented and discussed below under headings of each section of the questionnaire, with difficulties faced and lessons learned from the pilot that needed to be addressed in the main survey. However, the discrete choice modelling part of the pilot survey result is discussed at length for any adjustment for the final survey. Also, the attitudinal part of the questionnaire was looked at carefully if there is any need for tweaking the attitudinal statements.

7.6 Mode choice along the corridor

In the questionnaire, the respondents were presented a table of all possible modes of available transport and the frequency of use of that mode as presented in Table 7.1. Large bus, minibus, walking, rickshaw and car were the most frequently used modes. CNG and Taxicabs, the individualized public transport mode were used but not for frequent journeys. It can be seen that car trips are high compared to the average share of car trips in Dhaka as the sample was taken from the wealthier part of the city and five purposefully taken car owning interviewers were in the pilot sample.

The mode choice data along the corridor is presented in Table 7.1. It shows that the Double deck bus trips are almost non-existent. BRTC (Bangladesh Road Transport Corporation) only operate double deck buses in the corridor but the number of double deck buses is limited which has been reflected in the pilot survey.

Human hauler is the generic name used for the small para-transit modes operating in Dhaka. However, they are more popularly known by their vernacular names including “MAXI”, DURUNTO”, “LEGUNA” etc. As a result, although human haulers operate some parts of the corridor respondents might have misunderstood human haulers as the vernacular name for them were not used, so these trips were limited. Having said that the number of human hauler routes covering the area surveyed for the pilot study is limited. Motorcycle and bicycle trips were never used by respondents although one household owned a motorcycle and another owned a bicycle. It may be the case that the member of those household that answered the questionnaire did not use motorcycle or the bicycle for their trips and they are used by other member of the family.

Table 7.1 Mode choice along the corridor (n = 31)

	Frequency of transport use over last one year				
Mode	Never	Once / twice a year	Once / twice a month	Once / twice a week	Most days of the week
Double Decker Bus	30	1	0	0	0
Large Bus	4	4	7	4	12
Minibus	16	2	3	9	1
Human Hauler	30	0	0	0	1
Microbus	20	9	1	0	1
Taxi-cab	12	9	8	2	0
CNG	6	4	15	5	1
Rickshaw	1	0	5	2	22
Private Car	17	1	1	2	10
Motor Cycle	31	0	0	0	0
Bicycle	31	0	0	0	0
Walking	2	1	0	4	24

For trip purpose, eight possible purposes were listed in the questionnaire to choose from and there was a blank space if the purpose of trip was not covered by these eight trip purposes. The purpose of trips as found in the pilot is summarised in Table 7.2. No respondents travelled for excursion / leisure or for escorting. These two trip purpose needed to be revisited in the context of Dhaka. It may be the case that the respondents failed to understand the meaning of these two trip purposes due to improper translation or needing further explanation. Escorting was translated “as going along” but it may need further clarification like going to pick and drop children at school or taking the patients to doctor or hospitals. Similarly, a proper word for leisure could have been selected or some examples provided.

Table 7.2 Trip purpose

Trip purpose	Frequency (%)	Trip purpose	Frequency (%)
Work	17 (55)	Excursion/Leisure	0 (0)
Going for a walk	1 (3)	Shopping	2 (7)
Visit friends and family	5(16)	Escorting	0 (0)
Education	3 (10)	Other	1 (3)
Walking out	2 (6)		

7.7 Details of public transport trips

Of the 27 respondents who used bus for their last trip, 7 changed buses to get to the final destination. So three-quarters of bus trips were direct. Out of these 7 respondents who changed bus, 3 changed their buses more than once. A limitation of the questionnaire was identified that there was no room to record the name of interchange points and there was only one place to record the details of the changed leg of journey, as a result only one change detail was recorded in pilot survey. Therefore, it was decided that in final questionnaire, three places were to be kept to record the details of the change of buses as there were some bus changes numbers (25%) of changes of bus for accomplishing a public transport trip.

Two respondents changed bus twice and one respondent changed bus more than twice and the remaining four respondents changed buses once in their public transport journey. A good number of public transport trips in Dhaka are not direct and rickshaw is a very popular access / egress mode. Rickshaws provide access / egress support for bus journeys along with walking. However, bikes or other modes (park and ride for example) are not used for either access or egress leg of a bus journey. 63% of bus trips are supported by rickshaws in the access leg but the share of rickshaws in the egress leg is 30% which is about half of the access share of rickshaws. It is also interesting that a number of respondents that used rickshaws as their access or egress mode but only 3 respondents used rickshaw for both the access and egress leg of a bus journey.

A question was asked to determine the cost of different legs of a public transport trips, including access and egress links. The average reported rickshaw fare was BDT 12.50 for access trips. For egress trips the average was found BDT 17.50, higher than access fare. As the catchment area was 1 km and if the average distance of access was roughly 750 m then the average cost of rickshaw is around BDT 17.00 per km which is comparable with the prevailing rickshaw fare in Dhaka. The overall average access time was about 15 minutes but the same for egress leg was 12 minutes.

It can also be noted that the rickshaw fare is about BDT 1.00 per minute in the case of access leg, but for egress leg it is about BDT 1.50 per minute. So the average rickshaw fare per minute is more than BDT 1.00 per minute. Access by rickshaw should be faster compared to walking. However, the mode is not much more time efficient over a short distance compared to walking as there is a waiting time for the rickshaw, bargaining to agree the fare and also time wasted at intersections. Therefore, there is a possibility of shifting a good modal share from rickshaw to walking by improving walking facilities.

Average waiting time in the pilot survey was found to be just a quarter of an hour. However, maximum waiting time was as high as three quarters of an hour. Therefore, the waiting time in off-peak hour is quite high but during peak hours waiting time is as low as 3 minutes. This indicates that there is a significant variation in waiting time. There is no published time-table for any bus service and the people turn up to the bus stops randomly. Average in-vehicle time was calculated from these responses and it was 45 minutes (total in-vehicle time). Where more than one bus was used for the same trip waiting time for changing bus was excluded. Average bus fare calculated from the pilot survey was BDT 13.50; the trip length was not identified for the journey. However, from the average journey time and average speed of the bus it can be calculated that the average trip length is about 8.5 km. Therefore, if the average trip length is 8.5 km then the cost of travel would be about BDT 1.58 per km.

Average waiting time at the bus change points was 8 minutes and was less than waiting time in the first (access) bus stops. Perhaps change points are busy stops and buses are more frequent there. In this case, the in-vehicle time for this leg of the changed bus journey was just more than 15 minutes and the average bus fare in the second part of the bus journey was BDT 8.00.

In the investigation of reasons for choosing bus by respondents who used the bus, most people use bus as they do not have any alternative available and the second most important reason was that bus is the cheapest among available public transport alternatives such as rickshaws, taxicab or CNG. Similarly, the respondents who have never used the bus in the previous year for any kind of trips did not use bus due to poor service quality. Table 7.3 summarises the reasons for using bus in Dhaka.

Table 7.3 Reasons for using buses as the main mode of transport

Serial	Reason to choose bus	Frequency (%)
1	Cheapest mode	9 (28)
2	Safe mode	0 (0)
3	No alternative available	24 (72)
4	Bus-use reduces pollution and congestion	0 (0)
5	Other	0 (0)

Though the respondents were allowed to choose multiple options, only a few opted for multiple choices. Most of the users are captive as 72% responses showed that there were no other options, and 28% respondents said bus as the cheapest among the available modes. Only two reasons were chosen, the basic causes of choosing the bus.

Only three respondents did not use bus for any type of their trip in the previous. All of them said the quality of service was not good. Two of the three respondents said that bus is not a safe mode; two also mentioned that bus travel takes a longer time compared to their private cars.

7.8 Importance and satisfaction rating of bus attributes

The importance and satisfaction ratings for 13 selected bus attributes were tested in two groups presented in set A and set B questionnaires (termed as set A and set B attributes respectively). The summary of ratings for both sets of attributes is presented in two separate tables for importance (Table 7.5 for set A attributes and Table 7.6 for set B attributes) and two separate tables for satisfaction 7.7 for set A attributes and Table 7.8 for set B attributes). In general, the responses are at the extreme ends both for importance and satisfaction rating as in case of the rating exercise conducted during focus groups. For example, the highest importance was common in the responses. It is the evidence that the importance of the bus attributes as identified by focus group discussions was important in the context of the bus service in Dhaka that has been discussed in Chapter 5. The summary of the rating exercise for the importance rating is shown in the Table 7.4 for set A attributes and Table 7.5 shows the same for set B attributes.

Table 7.4 Importance rating of A set bus attributes

Attributes (SET A)	Importance (frequency)								
	1	2	3	4	5	6	7	Ave	Rank
Wait time	1	0	0	0	1	0	9	6.27	1
Travel time	1	0	0	1	1	2	6	5.82	2
Bus stop facilities	0	0	1	2	0	3	5	5.82	2
Picking and dropping of passenger	1	0	0	1	2	1	6	5.72	3
Boarding and alighting system	0	1	0	4	0	0	6	5.45	4
Bus fare	2	1	0	1	2	0	5	4.82	5
Air conditioning	3	2	0	2	0	0	4	3.90	6
Total (%)	8 (10%)	4 (5%)	1 (1%)	11 (14%)	6 (8%)	6 (8%)	41 (53%)	5.40	

The rating point 1 means not important at all and rating point 7 means highly important. Overall importance rating was 5.40 which is above the median value of 4 as shown in the Table 7.4. From the Table 7.4 it is found that the highest rating value is 6.27 for the waiting time and the lowest importance rating was 3.90 for air conditioning. Bus fare is the second least important attribute implying other attributes are more important than bus fare, but the importance rating for bus fare is just below the median value (4) of the rating scale. These findings are in line with the findings in the focus group conducted for the research.

In Table 7.5 for set B attributes, the overall importance rating was found to be 6.05. The highest average rating value was 6.85 for bus frequency and the lowest importance rating was 5.15 which referred to bus fare. However, none of the attributes received importance rating less than the median value (4) of the scale of seven. Therefore, bus fare is relatively less important attribute as perceived by the respondents.

The seven attributes used in the choice exercise for the respective set of questionnaire were used for both importance and satisfaction ratings in each set of questionnaire. However, all of the respondents could evaluate all of the 13 attributes under study if presented to them in each set of questionnaire which was not done in the pilot study.

Table 7.5 Importance rating of B set bus attributes

Attributes (SET B)	Importance (frequency)								
	1	2	3	4	5	6	7	Ave	Rank
Frequency	0	0	0	0	0	3	17	6.85	1
Priority seat for women	1	0	0	0	1	0	18	6.60	2
Crowding inside bus	1	0	0	1	2	0	16	6.35	3
Driving quality	1	0	0	0	2	3	14	6.35	3
Driver and crew behaviour	1	1	0	2	4	3	9	5.60	4
Cleanliness inside the bus	1	1	2	3	1	0	12	5.50	5
Bus fare	2	0	5	1	1	0	11	5.15	6
Total (%)	7 (5%)	2 (1%)	7 (5%)	7 (5%)	11 (8%)	9 (6%)	97 (69%)	6.05	

The exercise of satisfaction rating was also conducted for the same 13 attributes divided into two groups as the importance rating. The rating was done in the scale of 7, from 1 for highly dissatisfied to 7 for highly satisfied. In this scale there was no distinct neutral point which was the limitation that needed to be corrected by using a scale of seven presented as -3 for highly dissatisfied and +3 for highly satisfied and 0 for neither satisfied nor dissatisfied. It was found that the overall average rating was 1.92 for the set A attributes which is less than median value (4) of the scale. The value of average rating for each attribute varied between 1.27 and 2.91 Therefore, it can be termed as the dissatisfaction rating rather than satisfaction rating. Table 7.6 and Table 7.7 shows the satisfaction / dissatisfaction rating for set A and set B attributes respectively

The respondents were most dissatisfied with “crowding inside bus” and the least dissatisfied with “Priority seat for women”. This means crowding inside bus is prevailing in the context of Dhaka which is an important issue. On the other hand, respondents are least dissatisfied with “priority seat for women” which may be the reason that some bus services already had reserve seats for women although it was insufficient and male respondents might be against maintaining priority seats for women. Moreover, the respondents are not much dissatisfied with the present level of bus fare as the bus fare is the attribute that got second least dissatisfaction rating only before priority seat for women. These finding were consistent with focus groups discussed in Chapter 5.

Table 7.6 Dissatisfaction rating of set A bus attributes

Attributes (SET A)	Satisfaction (frequency)								
	1	2	3	4	5	6	7	Av	Rank
Wait time	10	0	0	1	0	0	0	1.27	1
Picking and dropping of passenger	9	0	2	0	0	0	0	1.36	2
Boarding and alighting system	7	2	1	1	0	0	0	1.45	3
Bus stop facilities	7	0	4	0	0	0	0	1.73	4
Travel time	7	1	0	1	1	1	0	2.18	5
Air conditioning	6	0	1	3	0	0	1	2.55	6
Bus fare	5	0	0	4	1	1	0	2.91	7
Total (%)	51 (66%)	3 (4%)	8 (10%)	10 (13%)	2 (3%)	2 (3%)	1 (1%)	1.92	

The satisfaction / perception ratings for set B attributes are shown in Table 7.7. Respondents were less dissatisfied with set B attributes compared to set A. Average rating for satisfaction for all of the attributes was 2.29 for Set B attributes which was significantly lower (42.75%) than the median value (4) of the scale that varied between 1.25 and 3.25 represented for “crowding inside the bus” and “priority seats for women” respectively. The respondents were dissatisfied with all the set A attributes and they were most dissatisfied with “waiting time” and the least dissatisfied with “bus fare”.

The rating of dissatisfaction varies between 1. 27 and 2.91 for A set attributes, which is well below the middle value of 4 which means the respondents are dissatisfied with all the attributes but the degree of dissatisfaction varies. It is interesting that the respondents are least dissatisfied with the bus fare and most dissatisfied with the waiting time. Again, the same conclusion can be drawn that bus fare may be quite low and the other attributes need more improvement. From the importance / satisfaction rating it can be concluded that respondents put a higher importance on the attributes but generally dissatisfied with all of the attributes. This means that there is a demand for the improvement of these attributes and users would be willing to pay for the improvement of these attributes. The attribute “bus fare” was common for both the sets and obtained a similar rating of 2.91 in set A and 2.65 in the set B. It shows the consistency of rating exercise. The finds of the rating exercise is also comparable with the findings of the focus groups.

Table 7.7 Dissatisfaction rating of set B bus attributes

Attributes (SET B)	Satisfaction (frequency)								
	1	2	3	4	5	6	7	Ave	Rank
Crowding inside bus	17	1	2	0	0	0	0	1.25	1
Driving quality	11	1	5	2	1	0	0	1.85	2
Frequency	11	4	0	4	0	1	0	2.05	3
Driver and crew behaviour	9	2	3	5	1	0	0	2.35	4
Cleanliness inside the bus	9	2	1	5	2	1	0	2.60	5
Bus fare	11	0	2	3	2	0	2	2.65	6
Priority seat for women	8	0	4	2	2	1	3	3.25	7
Total (%)	76 (54)	10 (7)	17(12)	21 (15)	8 (6)	3 2)	5 (4)	2.29	

7.9 Development of pilot models

Bus attributes determine the quality of service that finally determines the demand and mode choice behaviour of bus users. For the valuation of bus attributes in Dhaka thirteen attributes of bus comprising four quantitative and nine qualitative attributes were selected through the literature review and focus groups. Models using pilot data were developed to test the experiments. A single experimental design with all attributes in one experiment will create a cognitive burden to the respondents as discussed in Section 6.3. To avoid this cognitive burden the attributes were split into two sets keeping one way bus fare as common attribute in both sets.

Linear in parameter multinomial logit (MNL) models were developed for both sets of attributes in a binary choice situation between two unlabelled bus alternatives (Bus A and bus B) .Including dummy variables and an alternative specific constant total 10 coefficients were estimated for both the models. Set specific model development, analysis and interpretations are discussed in this section.

7.9.1 Model development

Three of the quantitative attributes had 5 levels and the remaining one had 3 levels. Of the nine qualitative attributes five had 3 levels and remaining four had 2 levels. Attribute levels for both sets of attributes can be seen in the Table 7.8 and Table 7.9.

Table 7.8 Levels for A set attributes

Attributes	Levels	Comments
One way bus fare (TC)	1. Only 80% of current bus fare 2. Same as current bus fare 3. 120% as more as current bus fare 4. 140% as more as current bus fare 5. 160% as more as current bus fare	Quantitative attributes
Travel time (TT)	1. Only 80% of current travel time 2. Same as current travel time 3. 120% as more as current travel time 4. 140% as more as current travel time 5. 160% as more as current travel time	
Waiting time (WT)	1. 10 minutes 2. 20 minutes 3. 30 minutes	
Bus stop facilities (BSF)	1. Bus-stops with adequate shelter 2. Passenger shed available but no proper shelter 3. No shed and shelter at the bus stops	Qualitative attributes
Ease of boarding and alighting (BNA)	1. Narrow door and steep steps, difficult to get in 2. Wide doors and mild steps to get in 3. One wide door for getting in and one for getting off	
Picking up and dropping off passengers (PND)	1. Bus stops properly at designated places 2. Picks and drops passengers on moving	
Air conditioning (AC)	1. Air conditioning 2. Without air conditioning	

Table 7.9 Levels for B set attributes

Attributes	Levels	Comments
One way bus fare (TC)	1. Only 80% of present bus fare 2. Same as current bus fare 3. 120% as more as current bus fare 4. 140% as more as current bus fare 5. 160% as more as current bus fare	Quantitative attributes
Headway (HWY)	1. Every 5 minutes 2. Every 10 minutes 3. Every 15 minutes 4. Every 20 minutes 5. Every 25 minutes	
Priority seats for women (PRS)	1. 10% seats reserved for women 2. 20% seats reserved for women 3. 30% seats reserved for women	
Crowding inside the bus (CWD)	1. Standing in a crush 2. Standing comfortably 3. sitting all the way	Qualitative attributes
Driving quality (DQ)	1. Unskilled driver, risky journey 2. Skilled driver, safe journey 3. Young drivers reckless driving	
Driver and crew behaviour (BVR)	1. Friendly and sober behaviour 2. Unfriendly and rude behaviour	
Cleanliness inside bus (CLN)	1. Deck and seats are clean and tidy 2. Deck and seats are dirty and unclean	

For the estimation of choice models, qualitative attributes need to be coded as dummy variables. For dummy coding of the qualitative attributes a base level was defined first and all the other dummy variables are defined relative to the respective base levels. So attributes defined at level three have two dummy variables and the attributes with two levels have one dummy variable. All these dummy variables are included in the utility functions.

The coding of dummy variable for model A (set A attributes) is presented in Table 7.10. Accordingly the utility function of model A is defined.

The utility function for model A:

Utility (A) = $ASC + \beta_{TC} * TC + \beta_{TT} * TT + \beta_{WT} * WT + \beta_{BSF1} * BSF1 + \beta_{BSF2} * BSF2 + \beta_{BNA1} * BNA1 + \beta_{BNA2} * BNA2 + \beta_{PND} * PND + \beta_{AC} * AC$

Table 7.10 Dummy variables for set A qualitative attributes

Attribute	Dummy variable	Coefficient
Bus stop facilities (BSF)	Bus stop with adequate shelter (BSF2)	β_{BSF2}
	Passenger shed available but no proper shelter (BSF1)	β_{BSF1}
	No shed and shelter at the bus stop	Base
Ease of boarding and alighting (BNA)	One wide door for getting in and one for getting off (BNA2)	β_{BNA2}
	Wide door and mild steps to get in (BNA1)	β_{BNA1}
	Narrow door and steps, difficult to get in	Base
Picking and dropping passengers (PND)	Bus stops properly at designated places (PND)	β_{PND}
	Picks and drops passengers on moving	Base
Air conditioning (AC)	Air conditioning (AC)	β_{AC}
	Without air conditioning	Base

Similarly, the coding of dummy variable for model B (set B attributes) is presented in Table 7.11. Accordingly the utility function of model B is defined.

The utility function for model B:

Utility (B) = ASC + β_{TC} * TC + β_{HWY} * HWY + β_{PRS} * PRS + β_{CWD1} * CWD1 + β_{CWD2} * CWD2 + β_{DQ1} * DQ1 + β_{DQ2} * DQ2 + β_{BVR} * BVR + β_{CLN} * CLN

Table 7.11 Dummy variables for set B qualitative attributes

Attribute	Dummy variable	Coefficient
Crowding inside the bus (CWD)	Sitting all the way (CWD2)	β_{CWD2}
	Standing comfortably (CWD1)	β_{CWD1}
	Standing in a crush	Base
Driving quality (DQ)	Skilled driver, safe journey (DQ2)	β_{DQ2}
	Unskilled driver, risky journey (DQ1)	β_{DQ1}
	Young driver, reckless driving	Base
Driver and crew behaviour (BVR)	Friendly and sober behaviour (BVR)	β_{BVR}
	Unfriendly and rude behaviour	Base
Cleanliness inside bus (CLN)	Deck and seats are clean and tidy (CLN)	β_{CLN}
	Deck and seats are dirty and unclean	Base

According to the dummy coding as presented in Table 7.10 and Table 7.11 data files for choice modelling were prepared to develop discrete choice models. For the model estimation BIOGEME V 1.8 was used and the results of the models are discussed in the next section. Models with all of the qualitative and quantitative attributes gave the most desired model fit in MNL model. The same was undertaken for binary probit model and gave the consistent results. Therefore findings of MNL models with all of the attributes are discussed.

7.9.2 Results of model A

Two different experiments were designed by using statistical package SAS V 2.1 to estimate the willingness-to-pay (WTP) for two sets of attributes to meet the research objectives 2, 3 and 4 of this study. Accordingly, two pilot models (model A for A set of attributes and model B for B set of attributes) were developed based on the experiments to test the robustness of the experimental design for the modelling process with a smaller dataset. The pilot was done so that any necessary changes to the experimental designs could be made before going to final data collection process. Each model had seven attributes with travel cost a common attribute across both the models. The main purpose of the pilot modelling process was to look at the sign of the coefficients and the overall model fit to test the robustness of the experimental design. The model is presented in Table 7.12. The value of adjusted rho-square is 0.202 which indicates that the model is robust and the experiment can be used in the main survey.

Table 7.12 Pilot MNL model A

Variables	Coefficient	t-values
Air conditioning (AC)	0.472	1.44
Alternative specific constant (ASC)	1.09e-015	0.00
Wide door and mild steps to get in (BNA1)	0.258	0.40
One wide door for getting in and one for getting off (BNA2)	-0.176	-0.44
Passenger shed available but no proper shelter (BSF1)	1.16	2.23**
Bus stop with adequate shelter (BSF2)	0.689	1.47
Bus stops properly at designated places (PND)	2.18	3.15***
Travel cost (TC)	-0.116	-2.23**
Travel time (TT)	-0.0388	-3.23***
Waiting time (WT)	-0.0471	-1.97**
Final LL = -39.786		
Adjusted rho squared value = 0.202		
Number of respondents (choice data) 9 (90)		

Note: * 90% significance level ** 95% significance level, *** 99% significance level

The sign of all the quantitative attributes are as expected and also the coefficients of the qualitative attributes have the desired sign except for one of the dummy variables BNA2 (one wide door for getting in and one wide door for getting off). This indicates that the definition of the level of this attribute needed to be revisited in the final experiment and choice cards.

All of the three quantitative attributes defined as one way bus fare (TC), journey time (TT) and waiting time (WT) were statistically significant with desired negative sign at 95% level of significance. From the model the value of in-vehicle time is calculated as

BDT 20.00 per hour and that of waiting time is calculated as BDT 24.00 per hour. Waiting time is more onerous than in-vehicle time as a result latest meta-analysis for value of time study by Wardman and Abrantes (2011) suggests that waiting time is generally in the order of 1.25 to 1.50 times of in-vehicle time. In this pilot data, waiting time is only 1.20 times of in-vehicle time which is just below the lower end of the range. The trade-off between waiting time and in-vehicle time is related to bus stop facility, reliability and frequency of service along with riding comfort. All of these attributes are highly significant in the context of Dhaka as shown in model B.

At the same time the qualitative attribute picking up and dropping off passengers (PND) is highly significant with a desired sign. For picking and dropping of passenger base case was defined as "picks and drops passengers while moving" and the dummy variable bus "stops properly at designated places" has a coefficient of 2.18. If this is translated into economic price then the willingness-to-pay (WTP) for stopping buses at designated places is BDT 18.80 per trip.

Similarly one of the dummy variables for the attribute "bus stop facilities" defined as "passenger shed available but no proper shelter" compared to the base case of "no shed and shelter at the bus stop" came out highly significant with a coefficient of 1.16. However, the other dummy variable of the same attribute **"**bus stop facilities" coded as "bus stop with adequate shelter" failed to be statistically significant. The coefficient has the desired sign, but the coefficient is lower than the dummy variable "passenger shed available but no proper shelter" which is not expected. This may be the reason that the respondents failed to understand the phrasing of the levels or they might think such a bus stop is not feasible (or not needed in all the bus stops) in the context of Dhaka. If the coefficient is translated into willingness-to-pay (WTP), this value for a passenger shed is BDT 10.00 per trip.

The air conditioning attribute failed to be statistically significant which may be logical in the context of Dhaka given the economic condition of the passenger and affordability. Again, the basic supply is at a very lower level, the quality of service is poor and people do not expect air conditioning on their bus service. It may be expected that if the sample were segmented on the basis of socio-economic variables (including gender) then this attribute could be significant for higher income people and for women. Recently two services with air conditioning discontinued their services in the corridor under study and the finding supports it.

The other qualitative attribute related to the design of bus, "ease of boarding and alighting" coded as three-level attribute, failed to be significant. The dummy variable "wide door and mild steps to get in" compared to the base case of "narrow door and steep steps, difficult to get in" was not significant but had the desired positive sign. However, the other dummy variable "one wide door for getting in and one for getting off" also failed to be significant with a negative sign which was unexpected. This meant that this level is even worse than the base level. It may be the case that going all the way through the crowded bus to the other end to get off may be more difficult as perceived by the respondents. Another reason may be the difficulties in understanding the descriptions of levels. Better descriptions needed to distinguish between levels. It is more logical to define the levels on the steepness of the steps, irrespective of the size of the door. Levels of this attribute were re-worded in the final survey. It was expected that this attribute would be significant to the elderly people or for the people with physical difficulties and women.

The value of time savings contribute a major share to benefit calculated for appraisal of transport projects, and evidence is available for the estimation of the value of time. Some of the studies estimated value of time at a national level; some did for Dhaka. There is also evidence for a value of time study in rural Bangladesh. The method of estimation also varies significantly as most studies derive values relative to income levels, GDP growth and inflation. There are some studies based on discrete choice modelling. Findings of the value of bus attributes are summarised in the literature review chapter. However, the studies those are relevant to this work are summarised in Table 7.13 to compare the value estimated by the models of the pilot study.

Table 7.13 Comparison of available value of time in Dhaka (in 2011 prices in BDT)

Study	Author	Year	Value of IVT	Value of WT	Method of estimation
Dhaka Eastern bypass	Halcrow Fox (International)	1996	48.80	NA	SP study Intercity travel
DFID (UK)	IT Transport (UK)	2002	5.50	NA	SP study: rural Bangladesh
Hoque (2005)	Leeds University (UK)	2005	30.60	NA	SP Dhaka urban
WTP study by DTCB	BUET, Bangladesh	2010	79.00	NA	SP Dhaka urban
Pilot study		2011	20.00	24.36	SP Dhaka urban

From the coefficients of the three quantitative attributes, the value of in-vehicle time and waiting time for bus users was calculated in the context of Dhaka. This value of time can be compared to the findings of previous study in Bangladesh, especially in Dhaka. From the model it was found that the value of in-vehicle time was BDT 20.00

per hour which is about 20% more than the national minimum wage rate (national minimum wage for garment workers in 2010 is BDT 3,000 per month). There is a recent study to compare the value of time in the context of Dhaka. The Dhaka Urban Transport Study (DHUTS) 2010 estimated willingness-to-pay for time saving for any types of trips for bus passengers at BDT 74.40 which is very high compared to the minimum wage rate. In the DHUTS (2010) study, discrete choice modelling using SP technique was used. There is another stated choice based study by Hoque (2005). Hoque (2005) estimated mode specific value of time for five different modes and the value of time for ordinary bus which was estimated at BDT 27.00. Value of waiting time is calculated as BDT 24.36 which is 21.80% higher than the value of in-vehicle time.

7.9.3 Results of model B

The result of model B is presented in Table 7.14.

Table 7.14 Pilot model B

Variable	Coefficient	t-value
Alternative specific constant (ASC)	3.91e-016	0.00
Friendly and sober behaviour (BVR)	0.530	2.00**
Deck and seats are clean and tidy (CLN)	0.187	0.75
Standing all the way (CWD1)	0.368	1.29
Seating comfortably (CWD2)	0.674	2.15**
Unskilled driver risky journey (DQ1)	0.0186	0.06
Skilled driver safe journey (DQ2)	1.46	4.32***
Headway (HWY)	-0.0276	-1.73*
Priority seat for women (PRS)	0.0241	1.99**
Travel cost (TC)	-0.0605	-2.26**
Final LL= -100.226		
Adjusted rho squared value = 0.117		
Number of respondents (choice data) 18 (180)		

Note: * 90% significance level ** 95% significance level, *** 99% confidence level

Model B with B set of attributes was developed to test the experiment and to determine the WTP for the attributes. The overall model fit as explained by adjusted rho-square is 0.117, and it is workable. All the attributes both quantitative and qualitative attributes have the desired sign. So, the experiment can be used for final data collection and the model developed with the final data can be used for valuation of attributes. Three out of four qualitative attributes were statistically significant. Only one attribute that failed to be significant, “cleanliness inside bus”, though it was found to be an important attribute in focus groups. It could be concluded that the cleanliness inside bus was the least important attribute compared to other three qualitative attributes.

The two-level attribute “driver and crew behaviour” dummy coded as “friendly and sober behaviour” is statistically significant and a 53% higher value was attached to this attribute compared to the base level of “unfriendly and rude behaviour”. The focus group discussion suggested that bus passengers were not satisfied with the behaviour of driver and crew and it came out statistically significant. The willingness-to-pay for this attribute as estimated by the model was BDT 8.76 per trip per passenger.

One of the dummy variables of the three-level attribute “driving quality” dummy coded as “unskilled driver, risky journey”, failed to be statistically significant compared to the base level of “young driver, reckless driving”. However, the dummy variable “skilled driver, safe journey” came out as statistically significant. The respondents attach a 1.46 times higher value for “skilled driver, safe journey compared to the base case of “young driver reckless driving”. The willingness-to-pay for the attributes estimated by the model was the highest among the qualitative attributes at BDT 24.13 per trip per passenger. It is evident that two levels of driving quality, “young driver, reckless driving” and “unskilled driver risky journey” are not much different as perceived by the passengers. This may the reason that the “unskilled driver, risky journey” is not significant compared to the base level. This attribute levels need to be redefined and it can be seen in Table 7.19 at the end of this chapter.

Similarly, for “crowding inside bus” coded as a three-level attribute, the dummy variable “sitting all the way” came out statistically significant compared to the base level of “standing in a crush”. However, the dummy attribute “standing comfortably” failed to be statistically significant. Due to a low supply against a high demand of bus, crowding inside bus is a common phenomenon in Dhaka and passengers are highly dissatisfied with this attribute. The passengers attached a 67.4% higher value to “sitting all the way” compared to the base level of “standing in a crush”. Standing comfortably was given a 37% higher value compared to standing in a crush. This actually implies that there was huge crowding inside bus and people would be even happy if they could stand comfortably. Willingness-to-pay for sitting all the way per trip per passenger was estimated as BDT 11.14.

The qualitative attribute “priority seats for women” came out significant and the willingness to pay estimated for this attribute was BDT 0.40 per percent of seats reserved as priority seats for women. The willingness-to-pay values (WTP) estimated by the models are summarised in Table 7.15.

The findings of the model are consistent with the findings of the focus group discussion presented in Chapter 5 that also determined the importance / satisfaction of public transport attributes in Dhaka. It is shown that the attributes with higher importance have the higher levels of dissatisfaction. The six bus attributes with highest dissatisfaction by the users in Dhaka are bus stand facility, reliability of service, priority seats for women, frequency of service, inside crowding and comfort. Reliability of service was not included in the model but crowding inside bus may be considered as a proxy for comfort. All the attributes are statistically significant.

Table 7.15 Willingness-to-pay (WTP) values estimated by pilot models

Attribute	Willingness-to-pay (BDT)
Travel time	20.00/hour
Waiting time	24.36/hour
Priority seats for women	0.04/% of priority seats
Headways	27.37/hour
Bus stop facilities	10.10/trip
Picking and dropping of passengers	18.80/trip
Driver and crew behaviour	8.76/trip
Driving quality	24.13/trip
Crowding inside bus	11.14/trip

As the number of responses is very low the values estimated by the models cannot be used as a representative values from a statistical point of view. However, the predicted sign of the coefficients estimated by the models are important to check the soundness of the experimental design. Therefore, the willingness-to-pay (WTP) values for these attributes can be treated as indicative and appropriate values.

7.9.4 Respondents' attitude towards the attributes

The consistency of the willingness-to-pay (WTP) values for bus attributes estimated by discrete choice models can be validated by examining the respondents' attitudes towards those attributes. In a likert scale, respondents' agreement or disagreement with the statements related to each attributes was rated to validate the consistency of the valuation. The agreement and disagreement were rated in a scale of five: 1 for strong agreement; 2: for agreement; 3 for neither agree nor disagree (neutral); 4 for disagreement and 5 for strong disagreement. The result of the attitudinal ratings is presented in this section for both the sets of attributes.

Seven attitudinal statements, one statement related to each of the attributes, were presented to the respondents to express their agreement or not to them. These responses are summarised and can be used to validate the values estimated by the discrete choice models. Table 7.16 presents the rating for the attitudinal statements related to set B attributes and Table 7.17 presents the rating for set A attributes.

Table 7.16 Summary of attitudinal responses for set B attributes

Statement	Agreement rating (frequency)					
Related to set B attributes	1	2	3	4	5	Ave
I do not use bus as the bus frequency is very low	9	3	3	1	4	2.40
I would not get on a bus if the driver does not have a valid driving licence	7	1	9	0	3	2.55
Cleanliness inside buses is not important to me	1	2	4	3	10	3.29
Bus fare is not important to me for any type of journey	3	3	6	0	8	3.35
I don't care about the behaviour of the driver and crew	1	2	6	2	9	3.80
There is no need to keep reserved seats for women	3	1	0	2	14	4.15
I don't mind travelling in crowded bus	2	0	0	1	17	4.55

Note: 1 = strongly agree to 5 = strongly disagree

The mean value of the scale is 3 which represents neither agree nor disagree. It is not expected that bus fare would not be important. The degree of agreement or disagreement depends on the socio-economic conditions of the respondent. The average rating on this statement is 3.35 which show evidence of disagreement that bus fare is important. Four attitudinal statements: “There is no need to keep reserved seats for women”, “I don’t mind travelling in crowded bus”, “I don’t care about the behaviour of the driver and crew” and “Cleanliness inside buses is not important to me” expected disagreement and the result showed that all the four statement got average rating more than 3 which varies from 3.29 to 4.55. The remaining two statements got agreement ratings as expected. These statements are “I do not use bus as the bus frequency is very low” and “I would not get on a bus if the driver does not have a valid driving license”.

Similarly for set A attributes it was expected that bus fare is important and that degree of agreement depends on the socio-economic conditions of the respondent. It was expected that the respondents would disagree with the statement “Bus fare is not important to me for any type of journey”. From the findings of the attitudinal statement rating in Table 7.17 it was found that the average rating for the statement related to bus fare was 3.36 slightly higher than the median value of 3 which means the respondents are not very dissatisfied with the bus fare. This may suggest that bus fare is low and the finding is consistent with the importance / satisfaction rating.

Table 7.17 Summary of attitudinal responses for set A attributes

Statement	Agreement rating (frequency)					
Related to set A attributes	1	2	3	4	5	Ave
Passengers suffer if there is no shed and shelter in bus stop	11	0	0	0	0	1.00
If bus does not stop properly it is risky for the passenger to get in and off the bus	10	1	0	0	0	1.09
It is boring to wait for a bus	9	1	1	0	0	1.27
Size of the door and the type of steps to get in and off the bus is very important	9	0	1	0	1	1.55
As travel takes a lot of time I can manage less time for friend and family	7	0	3	0	1	1.91
Many people does not use bus as there is no AC in buses	4	0	4	1	2	2.73
Bus fare is not important to me for any type of journey	3	0	3	0	5	3.36

Note: 1 = strongly agree to 5 = strongly disagree

The other attitudinal statements for set A attributes as presented in Table 7.17 shows that the average rating varying from 1 to 2.73. One statement related to bus fare was common in both the sets and that was “Bus fare is not important to me for any type of journey”. The rating for the same statement in B set was 3.35 and same for B set was 3.36 both are slight disagreement.

7.10 Issues addressed in the questionnaire for the main survey

The method of sampling and execution process had been designed to minimise the errors in sampling. However, the execution of a household survey is challenging and much of it depends on the enumerators for pen and paper based survey. Considering its importance 14 enumerators were trained to collect household data in the main survey (for the pilot survey four of the trained enumerators collected the data). From the examination and analysis of the pilot data some issues have been identified. The issues and the required modifications are discussed in this section.

Section A: About your daily travel

Only one respondent used “Double Decker bus”, “Human Hauler” and no respondents used “Motor Cycle” and “Bicycle” to travel in the corridor, but all of these modes are in operation in different sections of the corridor. As a result, these modes were kept in the list of available modes. However, the para-transit mode “Human Hauler” was assisted by the vernacular names (e. g. MAXI, DURUNTO, and LEGUNA). In Dhaka, generally all the private cars are driven by chauffeurs, mentioned in Section 5.5, and they take passengers on payment for extra income, sometimes without informing the owner of the car. This was not appreciated before the pilot survey. As a result this type of mode “private car on payment” was included in the final questionnaire.

For trip purpose, “escorting” and “leisure” were given an explanation and “were going for a walk” and “walking out” will be included in “leisure” by explanation. Escorting means going with someone, for example, with child to school, with patient to a doctor or hospital”

New questions needed to be added about changing at bus stops “What was the name of changing bus stop?” and two more additional spaces were provided to record the detail of the next leg of bus trip for change bus.

Section B: Bus service of your choice

All of the 13 attributes under examination were added in all sets of questionnaire for importance and satisfaction rating. Between satisfaction and dissatisfaction there is a neutral point (neither satisfied nor dissatisfied), it was more logical to represent the neutral point by 0. As a result, for satisfaction rating the scale for the main survey was from -3 to +3 where -3 for most dissatisfied and +3 for most satisfied and 0 for neither satisfied nor dissatisfied.

Section C: You and your family

No change was needed in this section except the lowest age for the respondent should be 16 years. Without specifying the lowest age limit of the respondents the number of young respondents was comparatively high in the pilot.

Section D: Choice experiment

The coefficients of dummy variables estimated by pilot models are discussed in detail in Section 7.9. From the examination of the signs and values of the estimated coefficients of dummy variables it was found that some of the attribute levels needed to be re-worded for better understanding by the respondents. Users are more sensitive to valuation of deteriorations than improvements of an attribute (Phanikumar and Maitra, 2007). Both improvements and deterioration of quantitative attributes (cost and time) were presented in the experiment. There was one level for improvement, one level for same as now and three levels for deterioration for cost and time. However, the number of levels for improvements and deteriorations were kept the same in the final experiments and the levels are modified accordingly. The modifications of levels are presented at the end of this section in Table 7.18 and Table 7.19.

Section E: Characteristics of the bus service in Dhaka

All 13 attitudinal statements were included for rating by all the respondents in each set of questionnaire. For agreement / disagreement rating the scale was modified like satisfaction rating in section in Section B. It was from -2 to +2 where -2 for strongly disagree and +2 for strongly agree and 0 for neither agree nor disagree.

7.11 Conclusions

The planning, execution and analysis of the pilot survey data gave an important understanding about the refinement of the final questionnaire and execution of the main survey, the “Dhaka Transport Survey 2013”. For example, after the pilot survey one important change to the questionnaire was suggested to include all of the 13 attributes for importance / satisfaction rating and all of the 13 attitudinal statements for agreement / disagreement rating in each set of questionnaire rather than seven attributes / statements.

The models developed from the pilot survey data predicted expected signs of the coefficients (Section 7.9) and also the model fit was acceptable (rho-squared value 0.202 for model A and 0.117 for model B). All of the quantitative attributes and six out of nine qualitative attributes were statistically significant as estimated by pilot models. Though it is not the purpose of the pilot survey to precisely examine the willingness-to-pay (WTP) values estimated by the models but the values were not abnormally high or low beyond expectations. However, the value of time estimated from the model can be compared with the available value of time in Dhaka, but other values cannot be compared as there is no evidence of valuation for these attributes. The value of time estimated by the pilot model is significantly lower than the available values, but this may be due to the smaller dataset.

It can be concluded that the pilot study has been able to meet the intended purpose of refining the questionnaire and to test the experimental design used for the valuation of attributes. The next chapter presents the main survey data and analysis.

Table 7.18 Final attribute and level for set A attributes

Attributes	Attribute levels in pilot	Final attribute levels (after pilot)	Reason / Comment
One way bus fare	1. Only 80% of current bus fare 2. 100% of current bus fare 3. 120% of current bus fare 4. 140% of current bus fare 5. 160% of current bus fare	1. Bus fare is 40% lower than current fare 2. Bus fare is 20% lower than current fare 3. Bus fare is same as now 4. Bus fare is 20% higher than current fare 5. Bus fare is 40% higher than current fare	Balancing the number of improvements and number of deteriorations of levels for the of attribute
Journey time	1.Only 80% of current time 2. 100% of current time 3. 120% of current time 4. 140% of current time 5. 160% of current time	1. Journey time is 40% less than current time 2. Journey time is 20% less than current time 3. Journey time is same as now 4. Journey time is 20% more than current time 5. Journey time is 40% more than current time	Balancing the number of improvements and number of deteriorations of levels for the of attribute
Waiting time	1. 10 minutes 2. 20 minutes 3. 30 minutes	1. you have to wait 10 minutes for a bus 2. You have to wait 20 minutes for a bus 3. You have to wait 30 minutes for a bus	Minor tweak
Bus stop facilities	1. Bus stop with adequate shelter 2. Passenger shed available but no proper shelter 3. No shed and shelter at the bus-stops	1. Bus stops with shed and seating arrangements 2. Bus stops with shed but no seating arrangements 3. Bus stops with no shed and seating arrangements	Clear clarification about the availability of seat and shed are made
Ease of boarding and alighting	1. Narrow door and steep steps, difficult to get in 2. Wide door and mild steps to get in 3. One wide door for getting in and one for getting off	1. Narrow door and steep steps, difficult to get in 2. Wide door and mild steps to get in 3. A low floor bus without steps on entry	Minor change
Picking up and dropping off passengers	1. Bus stops properly at designated places 2. Picks up and drops off passenger while moving	1. Bus stops properly at designated places 2. Picks up and drops off passenger while moving	No change
Air conditioning	1. Air conditioning 2. Without air conditioning	1. Air conditioning 1. Without air conditioning	No change

Table 7.19 Final attribute and level for set B attributes

Attributes	Attribute levels in pilot	Final attribute levels (after pilot)	Reason / Comment
One way bus fare	1. Only 80% of current bus fare 2.100% of current bus fare 3. 120% of current bus fare 4. 140% of current bus fare 5. 160% of current bus fare	1. Bus fare is 40% lower than current fare 2. Bus fare is 20% lower than current fare 3. Bus fare is same as now 4. Bus fare is 20% higher than current fare 5. Bus fare is 40% higher than current fare	Balancing the number of improvements and number of deteriorations of levels for the of attribute
Frequency	1. Every 5 minutes 2. Every 10 minutes 3. Every 15 minutes 4. Every 20 minutes 5. Every 25 minutes	1. A bus every 5 minutes 2. A bus every 10 minutes 3. A bus every 15 minutes 4. A bus every 20 minutes 5. A bus every 25 minutes	No change
Priority seats for women	1. 10% seats reserved for women 2. 20% seats reserved for women 3. 30% seats reserved for women	1. 10% female seats reserved in this bus 2. 20% female seats reserved in this bus 3. 30% female seats reserved in this bus	No change
Crowding inside the bus	1. Standing in a crush 2. Standing comfortably 3. Sitting all the way	1. You will be standing in a crush all the way 2. You will be standing comfortably all the way 3. You will be sitting all the way	No change
Driving quality	1. Unskilled driver, risky journey 2. Skilled driver, safe journey 3. Young driver reckless journey	1. The journey will be jerky and unsafe 2. The journey will be jerky but safe 3. The journey will be safe and smooth	Minor change
Crew behaviour	1. Friendly and sober crew behaviour 2. Unfriendly and rude crew behaviour	1. Friendly and sober crew behaviour 2. Unfriendly and rude crew behaviour	No change
Cleanliness inside bus	1. Deck and seats are clean and tidy 2. Deck and seats are dirty and messy	1. Deck and seats are clean and tidy 2. Deck and seats are dirty and messy	No change

Chapter 8 Analysis of survey data

8.1 Introduction

This chapter begins with a short description of sampling and data collection in Section 8.2. Section 8.3 presents the socio-economic and demographic characteristics of the respondents. Mode choice data is presented in Section 8.4 focusing on the use of all the available modes in the study corridor and also the purpose of the trips made. Use of modes in the corridor including public transport, individualised public transport and private transport modes are detailed in separate sub-sections. Data related to various aspects of bus trips including access / egress, inter-change, cost and time of bus trips, reasons for choosing or not choosing public transport in the study corridor is presented with a brief discussion in Section 8.5. Two rating exercises to evaluate the importance and satisfaction of 13 bus attributes and one rating exercise to evaluate attitudes towards those attributes are reported Section 8.6, which also includes the stated choice experiment dataset. Finally, conclusions are drawn in section 8.7.

8.2 Sampling and data collection

The sampling of households and the random selection of qualified respondents from the sampled households are two challenging issues for the execution of data collection in Dhaka. For the selection of households, DWASA's (Dhaka Water and Sewage Authority) MS Access household pipeline connection database was used. A GIS (Geographical Information System) map of Dhaka was used to define the catchment area of the corridor. Households falling within that catchment area were extracted from the DWASA database to define the population of households for interview. A random number generator within MS Excel was used to select 800 households for interview. This has been discussed in more detail in Section 7.4.

The KISH method was then used for the random selection of respondents within households. Six KISH tables were used for the random selection of respondents (see Section 7.4). Tables were allocated against the household and depending on the number of people in the household. Household members were arranged in age order in two groups, male and female. The table then gives the serial number of the person to be interviewed.

To ensure enough responses from important segments of population for discrete choice modelling, and to draw statistically sound conclusions, a minimum number of responses are required from each segment of respondents. Different segments of population have varying travel needs and mode choice behaviour that should to be taken into consideration. For example females have special requirements from public transport (bus) system as identified in focus groups. The number of females joining the paid workforce is growing and so is household car ownership in Dhaka Therefore, along with household income (high and low income group), car ownership (with car and without car) and gender (male and female) were considered as important socio-economic characteristics for segmentation.

As a result, a minimum of 40 responses from each segment was targeted in the data collection process. The defined segments are “women in paid jobs”, “households with car”, and “income groups” and the minimum number of respondents from each segment was fixed at 40. All the segments met the minimum 40 number of respondents in standard data collection process except car owning households. Therefore an additional 18 interviews were taken from car owning households.

The main survey was planned in January 2013 but it took place between May and June 2013 because of political strikes (called ‘hartal’) in Bangladesh in response to the trial of war criminals. The strikes brought normal life and economic activity to a halt in Bangladesh. Dhaka was the worst affected city. Due to the hartals, most vehicles were off the road and people could not travel normally. As the traffic and transport system was not functioning properly, data collection had to stop until the situation returned to normal. The situation came back to normal by the end of April 2013 and then data collection commenced. Fourteen enumerators, who were given training on the questionnaire and the method of the execution of data collection, conducted the survey.

The enumerators collected data, mostly at the weekends to maximise the availability of the randomly selected respondents during their visit and submitted the data for checking. The data collected by the enumerators was checked by a supervisor. The data supervisor maintained the record of the number of enumerators working every day along with number of household approached for interview and the number of refusal with causes.

Table 8.1 summarises the number of respondents approached for interview, direct refusals, and successful interviews at the first attempt, successful interviews in the second attempt, and the number of interviews that could not be arranged though the respondents were willing to give interview due to their busy schedules. 441 responses were collected by the enumerators and 10 of the responses were rejected due to incomplete responses. Therefore, valid data for 431 respondents were collected in the survey. The success rate of qualified data was 71.48% which is encouraging and quite similar to the success rate of the pilot survey.

One of the reasons for the encouraging success rate for this survey is the weekend-only data collection, as people are available at home in the weekends. Another important reason may be people want to speak about transport system in Dhaka as it was a critical issue associated with political strikes. As the respondents within the household are randomly selected using the KISH method, the sample is not biased due to weekend data collection. A weekend data collection results in a relatively higher response rate without affecting data quality.

Table 8.1 Response rate for Dhaka travel survey 2013

	Number of respondents (%)
Approached	603 (100%)
Straight refusals	145 (24.05%)
Incomplete data	10 (1.66 %%)
Stopped in the middle of interview	5 (0.83%)
Not possible to arrange a second visit	12 (1.99%)
Complete data	431 (71.48%)

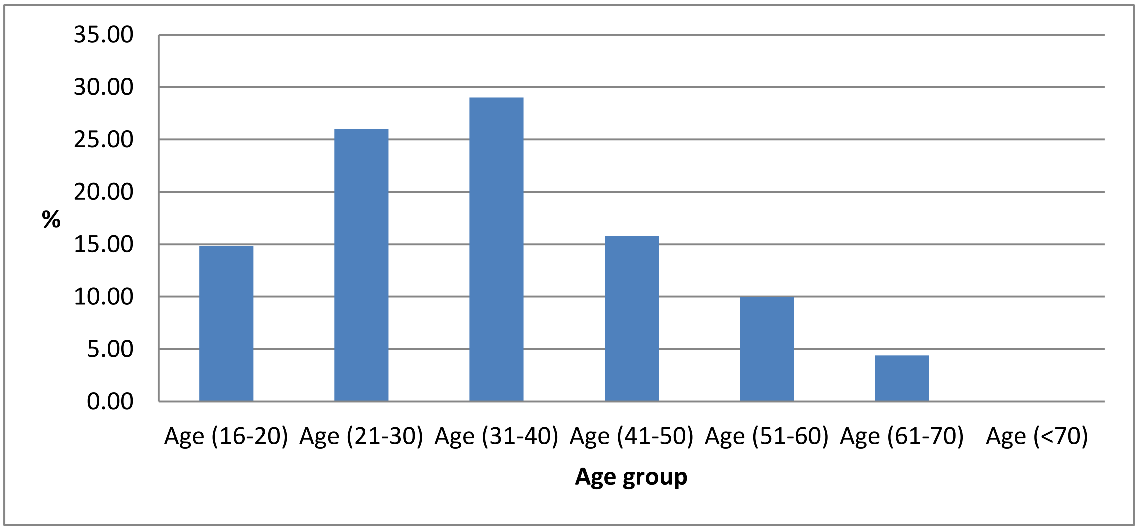
8.3 Socio-demographics of the respondents

Socio-economic and demographic characteristics of the sample are important for analysis and the explanation of travel behaviour and so the valuation of attributes of a bus system. The socio-demographics of the respondent include gender, age, income distribution and household vehicle ownership.

The sample is fairly evenly distributed on the basis of gender with 58% male and 42% female. It is expected that the distribution of the sample should be closer. However, the refusal rate for females was higher than for male. The main reasons for higher refusal by females, as recorded by the enumerators, were religious barriers and at the weekends women were busy with household chores during the visit of the enumerators and could not make time for an interview.

People’s role and responsibility in the family, financial freedom and physical ability changes with age and so does the choice of mode and the travel needs and flexibility. Moreover, age is a proxy of life cycle stages that influences the mode choice. Therefore, age influences travel behaviour changes and is an important variable for travel behaviour analysis. Survey respondents younger than 16 years of age were not interviewed and the respondents were divided in seven groups. Figure 8.1 shows the age distribution of the respondents and it can be seen that the sample is well distributed by age, but there is lower number of older people than younger and middle aged people. It is not unusual in case of Dhaka as it is the major centre of employment (for both formal and informal) and education, 70% of the population is under 40 years of age.

Figure 8.1 Age profile of the sample



Household income is one of the important economic parameters to explain travel behaviour and transport mode choice. So, it is necessary to know about the distribution of household income of the respondents. The household income distribution is presented in Table 8.2.

Table 8.2 Monthly household income distribution of the sample (n=431)

Income group (BDT)	No of respondents (%)
<5,000	2 (0.46%)
5,001-15,000	84 (19.50%)
15,001-25,000	134 (31.08%)
25,001-35.000	123 (28.54%)
35,001-45.000	42 (9.75%)
45,001-55,000	18 (4.18%)
55,001-65,000	8 (1.85%)
65,001-75,000	7 (1.62%)
>75,000	13 (3.02%)

Nine pre-defined income classes were set in the questionnaire with an interval of BDT 10,000. For testing the variation of WTP depending on income two groups called low income group (LIG) and high income group (HIG) were prepared for segmentation. The monthly average household income of the sample is BDT 27,250.58 and the median income is BDT 30,000 per month. About 60% of the household's have an income between BDT 15,000 to BDT 35,000. So, households that have a monthly income of more than BDT 35,000 per month are defined as high income group and households with income lower than BDT 35,000 are defined as the low income group for the segmentation purpose.

According to the household income and expenditure survey 2010, the average urban household income in Bangladesh was BDT 10,463 in 2005 rising to BDT 16,477 in 2010 (BBS, 2010). The average household income in Dhaka is higher than the overall urban average household income, as Dhaka is the capital of Bangladesh. Given the higher household income in Dhaka and the rate of increment of household income, an average household income of BDT 27,250.58 in 2013 seems representative (especially as car users, who will normally be high income, were deliberately over-sampled).

Household car ownership is regarded as an important factor that influences mode choice and also the travel behaviour. It is a proxy of household income as car ownerships is related to income. It can be mentioned that as the household car ownership is very low in Dhaka and to achieve the minimum quota of 40 households having access to a car, 18 additional interviews were taken from the respondents having at least one car. 87.02% of households do not have access to car, 10.44% household has access to one car and 2.54% household has more than one car. So car ownership is very low in Dhaka.

In the case of motorcycle and bicycle ownership it is found that 77.71% of households do not have a motorcycle which is quite low for Dhaka. The bicycle ownership by the household is even lower at only 4.17%. Lack of cycling facilities and cycling environment are the main reasons for low bicycle ownership. There are no separate lanes for bicycles and it is not safe to cycle around motorised vehicles due to safety concerns which is a barrier for cycling. Females do not drive motorcycles due to social and religious values that may contribute to low motorcycle ownership.

Table 8.3 Status of the respondents

Occupation	Number of respondents (%)
Student	101 (23.43)
Business (self employed)	81 (18.79)
Looking after family	61 (14.15)
Employed (job)	146 (33.87)
Unemployed	25 (5.80)
Retired	14 (3.25)
Other	3 (0.70)

Table 8.3 shows that almost a quarter of respondents are students, around a third are employed and around a fifth is in business (self employed). Apparently the unemployment rate seems around 6% but if people looking after the family are considered as unemployed then the rate of unemployment will be a fifth of the population which is more realistic for the case of Dhaka. Retired respondents in the sample are only 3% which seems very low. From the age distribution of sample it is clear that less than 5% of the sample are 60 years of age or older which is consistent with the percentage of retired population for Dhaka.

8.4 Mode choice along the corridor

For travel behaviour analysis, or the prediction of mode choice behaviour, it is important to know the way people travel in the study corridor. User preferences amongst the available 13 modes of transport (including walking) were examined accordingly. In some parts of the corridor non-motorised modes (rickshaws) are not allowed to operate. It can be mentioned that articulated bus has been introduced recently in one of the routes along the corridor on a pilot basis which was not included in the questionnaire as they started operation only during the data collection process. The detailed characteristics of the public transport modes have been discussed in Section 2.6.

For convenience of further analysis and discussion these 12 modes of transport (excluding walking) are grouped in three categories. They are *public transport* (double deck bus, large bus, minibus, human hauler and microbus) *individualised public transport* (taxicab, CNG, private car on payment, rickshaw) and *private transport* (private car, motorcycle and bicycle). The extent of use of those modes were also divided in five classes, namely “frequently”, “less frequently”, “occasionally”, “rarely” and “never”.

Table 8.4 shows the overall choice of modes along the corridor by respondents during the previous year. *Frequent* means three days or more in a week, *less frequent* means one to two days a week, *occasional* means one to two days a month, *rare* means less than twelve days a year and finally *never* means not a single trip made by the mode in last one year.

Table 8.4 Mode choice in the study corridor (N=4310

Mode	Three or more days a week (%)	One or two days a week (%)	One or two days a month (%)	Less than 12 days a year (%)	Never (%)
Double deck Bus	14 (3.25)	88 (20.42)	132 (30.63)	72 (16.71)	125 (29.00)
Large bus	167 (38.75)	96 (22.27)	82 (19.03)	28 (6.50)	58 (13.46)
Minibus	99 (22.97)	94 (21.810	72 (16.71)	65 (15.08)	101 (23.43)
Human Hauler	26 (6.03)	39 (9.05)	74 (17.17)	79 (18.33)	213 (49.42)
Microbus	3 (0.70)	7 (1.62)	32 (7.42)	77 (17.87)	312 (72.39)
Taxicab	1 (0.23)	8 (1.86)	69 (16.01)	189 (43.85)	164 (38.05)
CNG	6 (1.39)	51 (11.83)	128 (29.70)	173 (40.14)	73 (16.94)
Rickshaw	145 (33.64)	166 (38.52)	49 (11.37)	31 (7.19)	40 (9.28)
Private car	36 (8.35)	26 (6.03)	28 (6.50)	27 (6.26)	314 (72.85)
Private car on payment	1 (0.23)	6 (1.39)	48 (11.14)	72 (16.71)	304 (70.53)
Motor cycle	34 (7.89)	32 (7.42)	42 (9.74)	32 (7.42)	291 (67.52)
Bicycle	4 (0.93)	3 (0.70)	7 (1.62)	7 (1.62)	410 (95.13)
Walk	234 (54.29)	126 (29.23)	17 (3.94)	28 (6.50)	26 (6.03)

Apart from walking, rickshaw and public transport are the most frequently used modes in the corridor. About three quarters 72.85% of the people in Dhaka never used private car in the previous year. For bicycle and motorcycle, the share of never use is 95.13% and 67.52% respectively. Therefore, the ownership of the private modes indicates a very low level of motorisation in the study corridor.

Taxicab is the least used and rickshaw is the most used individualised public transport mode in Dhaka. On the other hand, CNG is a significant choice as a mode of transport for *occasional* and *rare* types of trips. Fare and availability may be an issue here. The highest proportion of people for taxicab (43.85%) rarely used one in the previous year, and 38.05% people did not use taxicab at all over the same period of time. Apart from availability and fare, safety and security could be an issue for the very low use of taxicab. According to BRTA (2013) registration data total number of CNG (auto rickshaw) is 7,937 and the total number of taxicab in Dhaka is 36,109. Therefore, the number of registered taxicabs is more than four times the number of registered CNG (auto rickshaw), but mode choice data shows that the number of CNG user is more than that of taxicabs. It may be concluded that taxicabs are a less used mode compared to CNG and the total number of taxicabs is not in operation. This finding confirms the reality of premature retiring of taxicab due to lower engine capacity and poor maintenance of vehicle as identified by DevCon (2009) study mentioned in Section 2.6.

In the case of private transport modes, cars and motorcycles are the main modes of transport in many countries, but for frequent trips on the study corridor fewer than 10% people use those modes. The number of private cars and motorcycles registered in Dhaka is 215,411 and 303,930 respectively up to the end of 2013 as can be seen in Table 2.5. On the other hand bicycles are not a significant mode of transport in Dhaka, as less than 1% people use those modes for their frequent trips. From vehicle registration data it is found that the total number of registered microbus in Dhaka is 54,612 (BRTA, 2013). However, there is no reliable data for the registration of bicycles. Officially there is restriction for the registration of rickshaw and only about 85,000 rickshaws have registration from Dhaka City Corporation (DCC). However, more than 0.6 million rickshaws ply their trade in Dhaka without valid registration (Bhuyian, 2007).

It is clear that public transport is by far the most used mode on the corridor, though there is a significant variation in usage within group depending on the type of buses. In the group of most frequently used modes, large bus (38.75%), minibus (22.97%), human haulers (6.03%) and double deck bus (3.25%) is the order from highest to lowest preference (use). In case of never used the mode in the previous year human hauler (49.42%), double deck bus (29.00%), minibus (23.43%) and large bus (13.46%) is the order.

Data shows that large bus and minibus are the main public transport modes and human hauler and double deck bus can be considered as supplementary public transport modes in Dhaka. A fewer number of human hauler and double deck bus routes pass through the corridor and their smaller fleet size compared to large bus and minibus is the reason for a lower share of double deck bus and human hauler in public transport group. Though there is no separate number for registered double deck buses in BRTA database, the only operator of double deck bus is the state owned Bangladesh Road Transport Corporation (BRTC). From their data it is found that they have 119 double deck buses in their fleet but not all of the double deck buses operate in Dhaka. It is clear from the mode choice data that the availability of the type of public transport determines the mode choice as there are not many options available to the people in Dhaka.

For the case of individualised public transport modes, rickshaw is widely used along the corridor and one of the highest used across all modes. 33.64% people use rickshaw three or more days a week, second to large bus (38.75% people use it), and 22.97% people use minibus three or more days in a week. Taxicab, CNG (auto rickshaw) and private car on payment are not very popular choices. Low car ownership is the reason for lower use of private car. Taxicab and CNG are more expensive than public buses and the mode choice data shows that only 1.86% people use taxicab one or two days in a week and 11.83% people use CNG at the same frequency. However, for one or two days a month 16.01% people use taxicab but 29.70% people use CNG at the same frequency. After rickshaw, CNG is the second most popular individualised public transport and taxicab is the least favoured choice possibly due to high fares and low quality of vehicle.

In the group of individualised private transport mode, car and motorcycle are frequently used but their share in overall transport modes is very low. A low ownership of individualized private transport modes is the reason behind their low share.

Looking into the choice (use) of modes for the household with ownership of individualised private transport modes, such as car, all of the members of the household use it as almost all the cars are chauffer driven in Dhaka. Therefore, the issue of holding of driving license is not important in the case of using the car. So, although the car ownership is low, the modal share can be more compared to the car ownership as most car users are passengers.

Apparently, it seems that people frequently walk or use large bus, rickshaw and minibus for travelling along or across the corridor. Private car, human hauler and motorcycle are also important choice of modes. So, it can be argued that the above modes are mostly used for commuting purpose. However, at the same time those modes are widely used for less frequent to occasional nature of trips as well. The preference of modes for less frequent trips is still walking, large bus and minibus. However, double deck bus and human hauler come as significant modes for trips of less frequent to occasional nature. Two important types of individualised public transport are CNG and taxi cab. CNG is chosen for either less frequently, occasionally or rarely in Dhaka. However, taxi cab is only used occasionally and rarely. A further two individualised transport modes, motorcycle and bicycle, are in use but the use of bicycle is far lower than motorcycle and both the modes are uniformly used for frequent to rare types of trips.

As car ownership in Dhaka is very low most of the public transport users are captive in nature. Many routes use the study corridor, but the number of double deck bus and human hauler routes is less than large bus and minibus routes so is their mode share compared to large bus and minibus. Within mass public transport group share of large bus is highest followed by minibus, human hauler and double deck bus.

Why people travel is an important aspect for analysing travel behaviour and mode choice, as the purpose of trip sometimes imposes spatial and temporal rigidities. Different trips offer different levels of flexibility in respect of temporal (time of trip) and spatial (destination) choice. Due to trip chaining a single trip might have more than one purpose. However, the main purpose of trip was recorded for the study. Table 8.5 summarises the purposes of travel when people take a trip on the study corridor.

Table 8.5 Trip purpose (n=431)

Trip Purpose	Frequency (%)
Work	227 (52.67)
Education	80 (18.56)
Visit friends and family	74 (17.17)
Shopping	26 (6.03)
Escorting	15 (3.48)
Leisure	8 (1.86)
Others	1 (0.23)

More than a half of the trips along the corridor are for work and almost a fifth of the trips are for education. Work and education trips are temporally and spatially constrained, or in other words less flexible. The next highest share of trip is visiting friends and family with almost the same share as education trips, followed by shopping trips with a share of 6.03%. These trips are more flexible compared to work and education trips. Escorting has 3.48% share of trips and the leisure has only 1.86% share. The distribution of trip purpose may not be the same as for overall Dhaka as the data presents the trips along the study corridor.

8.5 Details of public transport trips

Public transport is primarily a multimodal system, not only for access and egress changes, but sometimes changes in the main haul become necessary. As transfers impose additional cost, sometimes referred to as a transfer penalty, in terms of time and inconvenience, passengers always prefer seamless connectivity between origin and destination (O-D) of their trips if possible. However, it is practically neither possible to eliminate transfers nor economically efficient for public transport route planning and operation. As a result, transfer penalty is considered an important component of generalised cost of public transport trips that influences public transport mode choice behaviour and finally its demand. So the purpose of public transport system planning is to optimise the number of transfers by proper network and route planning for public transport.

In the current study along the corridor, 356 (85.57%) trips out of 416 public transport trips were direct and 60 (14.42%) trips needed transfer. Of these 60 indirect trips 55 (13.22%) trips needed one change and 5 (1.20%) trips needed two changes, but more than two changes were not found. From the connectivity point of view it can be noted that the network is well connected along the corridor. However, it is not always the case that minimising the transfer is always efficient from an operational point of view. Too many routes in a public transport network create disparity among the routes in terms of revenue generation and profitability for the operators. A significant overlap of routes along a corridor may create competition among different route operators along that stretch of the corridor.

Generally transfer bus stops are busier than access or egress bus stops. As a result, the waiting time at the interchange bus stops is generally lower than the waiting time at access bus stops. It is found from the survey data that average waiting time at access bus stops is 12.89 minutes; average waiting time at the first change bus stop is 7.28 minutes and the average waiting time at the second change bus stop is 7.00 minutes.

As a multimodal system, for better understanding of the system and integration with other modes along the line of public transport routes for improved connectivity and door-to-door transport service, a careful investigation is needed. Access / egress links of a public transport trip are generally undertaken by walking, cycling, rickshaw, park & ride, and other informal public transport modes. However, it depends on the context and availability of those modes for access / egress. Walking facilities and environment, safety, and security are of concern to individuals as well as time and cost. Similarly, cycling facilities and the integration of rickshaw with the route are key issues. All of these elements ultimately contribute to the better accessibility and availability of the public transport system. Only mode choice for the access / egress part of public transport trips, cost (if any) and time have been investigated in this study. Other aspects such as safety and security, walking and cycling facilities and integration to rickshaw with bus system need to be investigated.

Walking, cycling, rickshaw, park & ride, pick and drop by private car and other informal public transport are possible candidates for access / egress modes. However, there are no park & ride facilities and also no secured parking facilities for bicycles / motorcycles in Dhaka, so these modes are not used as either access or egress modes. On the other hand, informal public transport such as human haulers and tempo could be considered as access / egress modes, but for this study they were not considered as access / egress modes rather considered as public transport modes (bus) as these modes operate under defined routes.

Walking and rickshaw are the two main access modes in Dhaka. There is evidence of dropping off at the bus stops by private car and some passengers share rides of individualised public transport such as CNG or taxi cab to access the bus stops.

Table 8.6 Access and egress mode choice (n=403)

Mode	Access Frequency	Egress frequency
Walking	228 (56.58%)	307 (76.17%)
Rickshaw	148 (36.72%)	87 (21.58%)
Car	3 (0.70%)	3 (0.70%)
Others	24 (6.00%)	6 (1.49%)

It is found that the share of walking is 57% and that of rickshaw is 37% and other has a share of 6% and the main other mode is auto tempo.

Access time is one of the important issues for public transport to be defined as accessible / available to the users. According to Murray et al (2003), a good public transport system should be accessible within a 15 minute walk and anything beyond a half hour walk is inaccessible. The overall average access time for the bus system in the corridor is 12.43 minutes, which is very good from a public transport accessibility point of view. The population density in Dhaka is very high and the density along the corridor is also very high, which is highly favourable for the development of mass transit system. The catchment area for the sampling of the study was taken as a one km offset in each side of the corridor. The mode specific average access time is 13.23 minutes for rickshaw and 10.33 minutes for walking. It was found that on average trips longer than average 10 minutes of walk have been taken by rickshaw

Considering access time, perhaps a greater number of access trips could be conveniently made by walking compared to current levels from the survey. Walking has a 57% share of access trips followed by 37% share of rickshaw. It is not the case that rickshaw is used only for access / egress, but that it is also a dominant mode of transport in Dhaka. Walking has direct economic benefits compared to other modes, even rickshaw, by saving transport cost and indirect health benefit through contributing to improved physical fitness. It seems that there are still possibilities to improve the share of walking to and from a bus stop by introducing walking-friendly policy and development in Dhaka.

For the bus system in Dhaka access / egress mode choice behaviour is analysed. Access / egress cost of a bus trip in Dhaka is the rickshaw fare which is the direct cost to get to the bus stop or get to the destination from the bus stop. The average rickshaw fare to get to the bus stop is BDT 15.84 which is almost equal to the main haul fare (BDT 16.50) by any types of bus at 2013 prices. This means that although rickshaw is a popular access / egress mode it is quite expensive. Though it is expensive, the rickshaw is environment-friendly and one of the major sources of employment for the unskilled poor, mostly surplus agricultural labourer from rural Bangladesh. Descriptive statistics for the access rickshaw time and fare is summarised in Table 8.7.

Table 8.7 Summary statistics for access time and fare by rickshaw

Access Rickshaw time (Min)		Access rickshaw fare (BDT)	
Mean	13.23	Mean	15.84
Standard Deviation	6.89	Standard Deviation	8.06
Minimum	3.00	Minimum	5.00
Maximum	35.00	Maximum	50.00

After access and egress time waiting time contributes to inefficiency of a bus system and it is directly related to the frequency of service. Waiting time is generally considered as the third important factor after cost and journey time to contribute to the quality of bus service. The greater the waiting time, the more inefficient the system is. Waiting time is generally valued higher than in-vehicle time, which means reduction of a minute of waiting time has higher impacts on the quality of bus service than the same reduction of in-vehicle time. However, higher frequency inversely affects the load factor and also the revenue generated per trip. Therefore, frequency is related to temporal variation of demand for the public transport. As a result peak hour frequency is higher than off peak. Improving the reliability and maintaining the timetable can help reduce the wait time at the bus stops. On an average, a bus passenger's waiting time at the bus stop is 12.90 minutes along the corridor. This means that overall average frequency of bus in a specific route is about 26 minutes which is quite low. Waiting time varies depending on the peak and off-peak travel. So the waiting time during peak hour is 5 minutes and the in the off peak the waiting time is just over 30 minutes.

The absence of a published timetable and revenue maximising attitudes of the bus operators play a significant role in the variation of waiting time in Dhaka. In the peak hours the service is frequent and the waiting time is comparatively low. However, in the off-peak the frequency is very low and waiting time is quite high. Passengers have to wait for a bus as most are captive users. Intentional delays at the starting points and also delays en route as drivers wait for a full bus to maximise revenue are additional causes of longer waiting time and unreliability of bus services in the off-peak.

Like access link, walking and rickshaw are the most used modes with their total share of 97.75%, in which the share of walking is 76.80%. Therefore, share of rickshaw in egress link is lower than access link. It is clear that most people walk for both access and egress link for their bus trips. However, some use rickshaw for both access and egress, but among those who use rickshaw in either access or egress link, for access link the use of rickshaw is higher. The reason for not using rickshaw for both access and egress links may be the high rickshaw fare and limited budget. However, it is not clear why people prefer to use rickshaw in access link compared to egress link. The summary of the egress mode choice is presented in the Table 8.8.

Table 8.8 Egress mode choice in Dhaka

Egress mode	Frequency
Walking	307 (76.17%)
Rickshaw	87 (21.58%)
Car	3 (0.7%)
Others	6 (1.49%)

Again for egress walking dominates even more than that of access leg. Like access time and cost egress time and cost are also important as they impact on the overall time and cost of a public transport journey.

Table 8.9 Summary statistics for egress time and fare by rickshaw (n=403)

Egress rickshaw fare (BDT)		Egress rickshaw time(Min)	
Mean	15.00	Mean	10.75
Standard Deviation	6.30	Standard Deviation	5.44
Minimum	2.00	Minimum	2.00
Maximum	35.00	Maximum	30.00

Descriptive statistics for the egress rickshaw time and egress rickshaw fare is presented in Table 8.9. From the table it is found that egress rickshaw time is 10.75 minutes and egress rickshaw fare is BDT 15.00. However, overall time and cost and mode specific time for both access link and egress link is presented in Table 8.10. It is also of importance to know the average time to walk to the bus stop and also the time to access the bus stop by rickshaw. Similarly, time to walk to the destination and also the time to get to the destination by rickshaw.

Table 8.10 Comparison of time and fare among access / egress modes in Dhaka

	Fare (BDT)	Time(Min)	Time (Min)	Overall Time (Min)
Mode	Rickshaw	Rickshaw	Walk	
Access	15.84	13.23	10.33	12.43
Egress	15.00	10.75	7.78	8.45

In-vehicle time is the most important attribute that contributes to the quality of bus service the most. Average in-vehicle time along the corridor is 31.8 minutes which is moderate with 14 km / hour average speed of bus in Dhaka (STP 2005). Average trip length of the bus part of the journey can be calculated as about 7.42 km. If proper cycling facilities are provided some of the bus trips could be even made by bicycle in Dhaka.

Bus fare is one of the major components of the total cost of a bus trip; other components are fare of access / egress modes if used other than walking and cycling. It can be mentioned that, though bus fare in Bangladesh is regulated by the government, it is general practice that due to poor enforcement regulated fare is difficult to implement. As a result, the bus fare in Dhaka is virtually deregulated. From the survey, it is found that average bus fare is BDT 16.50 per trip. Considering the trip length of 7.50 km as calculated earlier, bus fare in Dhaka is BDT 2.20 / km against an official fare of BDT 1.60 / km, which means operators on the average charge 33% more than the official fare set by the government. On the other hand, the rickshaw fare is completely deregulated and the bus is cheaper than rickshaw.

Average waiting time to change bus at the first bus stop is 7.26 minutes which is less than the waiting time at the access bus stops. This is logical as changes are made generally at busier bus stops than those at the access points. Similarly, average waiting time for the change bus at the second bus stops is 7 minutes and there is no third change.

Average in-vehicle time for the first change bus is 28.54 minutes which is slightly lower than that in the first bus. Considering the average bus operating speed of 14 km / hour the length of the trip is 6.66 km and average fare for this part of the trip is BDT 14.25 and average per-km fare is BDT 2.15, which is consistent with the previous rate of BDT 2.20 / km. Average in-vehicle time for the second change bus is 10.25 minutes and the average fare is BDT 8.75 and the rate of fare is BDT 2.80 / km.

In the questionnaire, four alternative reasons for using buses were presented to the respondents to choose as reasons they thought appropriate for them to choose bus. There was also a blank space to write if they think they had other reasons for using buses. Most respondents chose from the given reasons for using bus. Though the question allowed choosing more than one option most respondents chose one, main reason for using bus. The combination of reasons mentioned by the respondents is also included in Table 8.11.

Table 8.11 Reasons behind choosing bus in Dhaka (407)

Reason for using bus	Frequency (%)
Single reason	
Cheapest available mode	318 (78.13%)
Safest mode	20 (4.92%)
No alternative	54 (13.23)
Environmentally friendly	1 (0.25%)
Other	1 (0.25%)
Two reasons	
Cheap and safe	8 (1.96%)
Cheap and no alternative	3 (0.75%)
Safe and no alternative	2 (0.50)

Around 80% of the respondents use bus as it is the cheapest among the available alternative modes. Then the second most important reason for choosing bus is no other alternatives available to them followed by bus is the safest mode. From the data it seems that people along the study corridor cannot afford other alternative modes of transport available to them and they are captive users. There was a reason for choosing public transport as it is environmentally friendly but it was chosen by only one respondent. It is stated earlier in Section 2.7 that transport supply in Dhaka is much lower than the transport demand and affordability is an issue, so the choice is determined by the availability and affordability.

The 25 respondents who did not use buses over the previous year for any type of travel were asked to explain their reasons for not using buses. The majority of the respondents in this group said that they do not use buses as they have a private car. Therefore, higher ownership of car will negatively impact on the demand for bus travel. The next most popular reason was that the bus is unsafe. Bus users consider bus as safe compared to modes like individualised public transport such as taxicab and CNG that is available to the bus users, but non-users think bus may not be safe. Again, the perception of safety and security of bus users and car users might vary depending on their socioeconomic condition and the way they travel.

8.6 Importance, satisfaction and attitudes towards bus attributes

There were two questions to estimate the importance people put on bus attributes and the satisfaction they get from them for all 13 bus attributes under study in Dhaka. For importance, the order of importance is “7” for most important and “1” is for least important. On the other hand, for satisfaction rating “+3” is for highly satisfied and “-3” is for highly dissatisfied and 0 being neither satisfied nor dissatisfied. Another rating exercise was designed to evaluate respondents' attitude towards those attributes. The frequency distribution for both importance and satisfaction rating is tabulated and presented in Table 8.12 and Table 8.13 respectively.

Table 8.12 Frequency of importance rating of the attributes with ranking

Attributes	1	2	3	4	5	6	7	Ave	Rank
One way bus fare	1	2	4	13	37	84	290	6.469	1
Journey time	0	5	20	15	10	83	298	6.413	2
Frequency	0	0	11	23	27	108	262	6.362	3
Waiting time	0	3	18	22	19	100	269	6.325	4
Picking and dropping of passengers	9	9	6	10	28	96	273	6.292	5
Crowding inside bus	3	7	9	14	47	117	234	6.206	6
Cleanliness inside bus	6	12	11	24	37	120	221	6.058	7
Driving quality	6	10	25	23	28	114	225	6.014	8
Priority seats for women	14	12	20	26	32	74	253	5.979	9
Bus stop facilities	8	9	19	31	51	154	159	5.798	10
Driver and crew behaviour	10	16	21	31	67	133	153	5.645	11
Boarding and alighting	12	25	16	32	57	142	147	5.578	12
Air conditioning	49	9	12	39	31	66	225	5.534	13

From Table 8.12 it can be seen that the highest average rating is 6.469 out of 7 for "one way bus fare", and the lowest average rating point is 5.534 for "air conditioning". The overall average of 13 attributes is 6.052. So it is clear that all 13 attributes under study are very important in Dhaka. However, the average importance rating for the quantitative attributes of “one way bus fare”, “frequency”, “journey time” and “waiting time” is 6.40 and for the qualitative attributes is 5.90. Therefore, quantitative attributes are rated more highly than the qualitative attributes. Among the qualitative attributes, “picking up and dropping off passengers”, “crowding inside the bus”, driving quality” and “cleanliness inside the bus” received an average rating of higher than 6.00. It is interesting that top four attributes according to importance are quantitative attributes of the list.

From the importance rating, the top five most important attributes are “travel cost”, “travel time”, “headway”, “waiting time” and “picking up and dropping off passengers”. It is interesting that all of the four quantitative attributes came in the top four positions according to importance. This means quantitative attributes are more important than qualitative attributes to bus travellers.

Table 8.13 Frequency of satisfaction rating of the attributes with ranking

Attributes	-3	-2	-1	0	1	2	3	Ave	Rank
Priority seats for women	58	37	32	12	102	113	77	0.647	1
Boarding and alighting	61	59	60	31	163	53	4	-0.186	2
Driver and crew behaviour	69	66	77	13	148	53	5	-0.341	3
Frequency	115	80	42	20	104	64	6	-0.689	4
Waiting time	148	64	61	18	80	53	7	-0.988	5
One way bus fare	152	82	41	10	84	47	15	-1.016	6
Driving quality	133	82	74	9	98	31	4	-1.079	7
Journey time	198	74	49	16	60	30	4	-1.529	8
Cleanliness inside bus	186	91	78	14	40	21	1	-1.701	9
Air conditioning	259	4	31	105	19	1	12	-1.761	10
Bus stop facilities	185	94	95	18	33	5	1	-1.838	11
Picking and dropping of passengers	256	81	30	2	44	13	5	-2.030	12
Crowding inside bus	251	83	64	5	13	8	7	-2.165	13

From Table 8.13 it can be shown that respondents are dissatisfied with all of the attributes except priority seats for women and the highest average dissatisfaction rating is -2.165 out of -3 and it is for “crowding inside bus”. Overall the average rating for dissatisfaction is -1.129 and the average for quantitative attributes is -1.056 and for qualitative attributes is -1.161. It shows that satisfaction for qualitative attributes is lower than that of the quantitative attributes. Unlike the importance rating, in the case of satisfaction rating the qualitative attributes generally receive highest dissatisfaction which needs careful analysis and explanation. “Crowding inside bus” and “picking up and dropping off passenger” are the two attributes the users are highly dissatisfied with and received the highest dissatisfaction rating from of -2.17 and -2.03 respectively. After these two attributes, “bus stop facilities”, “air conditioning” and cleanliness inside the bus” received the highest dissatisfaction rating. There were no air conditioned buses operating in Dhaka during the survey. It seems that respondents are highly dissatisfied with the absence of air conditioning in Dhaka buses.

From the satisfaction rating the top five attributes the respondents are dissatisfied with are “crowding inside the bus”, “picking up and dropping off passengers”, bus stop facilities”, “air conditioning” and “cleanliness inside the bus”. It is interesting that all of these attributes are qualitative attributes unlike the importance ratings.

Table 8.14 Statistics of importance and satisfaction rating of the attributes

Average importance rating		Average satisfaction rating	
Mean	6.052	Mean	-1.129
Standard Deviation	0.327	Standard Deviation	0.825
Minimum	5.534	Minimum	-2.165
Maximum	6.469	Maximum	0.647

Generally, there is a negative correlation between average satisfaction rating and average importance rating; this means people put higher importance rating to those they are highly dissatisfied with. Higher dissatisfaction can be considered as a proxy for the demand for improvement and so is the importance rating. However, this relation between importance rating and satisfaction rating for quantitative and qualitative attributes need to be analysed further.

A separate section of a questionnaire was dedicated to examine the attitudes of the respondents about the bus service and the overall bus system in Dhaka in respect of those attributes under study. One statement, positive or negative was included for each of the 13 attributes used in the choice experiment. This is again a rating exercise using a 5 point scale to express agreement or disagreement with the statements. The results are shown in Table 8.15.

Table 8.15 Summary of the attitudinal statements rating with ranking

Statement	-2	-1	0	1	2	Av	Rank
Bus fare in Dhaka is comparatively cheap	177	154	23	66	11	-0.97	9
I do not use bus as bus frequency is very low	215	123	60	22	11	-1.18	8
There is no need to keep priority seats for women	272	106	15	25	13	-1.39	3
I do not feel uncomfortable when travelling in a crowded bus	272	122	3	32	2	-1.46	2
I would not travel by a bus that use unskilled drivers	190	124	51	25	41	-0.92	11
I do not care about the behaviour of the crew	138	186	29	63	15	-0.85	12
I feel very uneasy when I travel in a dirty bus	27	41	10	197	156	0.96	10
Huge time is wasted while travelling by a bus	16	25	7	170	213	1.25	7
It is boring to wait for a bus	7	12	4	197	211	1.37	4
Passengers suffer if there is no shed and shelter in the bus stop	2	13	12	237	167	1.28	6
It is difficult to getting on and off the bus for steep stairs in the door	6	13	23	170	219	1.35	5
Picking up and dropping off passengers should be done nicely	7	2	1	41	380	1.82	1
Many people do not use bus as there is no air conditioning in buses	38	38	115	159	81	0.48	13

Respondents were asked whether they agree or disagree with each statement, a positive score indicates agreement, negative score disagreement and a zero uncertainty. Thus the attitudinal statement related to priority seats for women “there is no need to keep priority seats for women” and its negative rating of -1.39 indicates there is a perceived need for priority seats for women in the context of Dhaka.

The attitudinal statement related to crowding inside the bus “I do not feel uncomfortable when travelling in a crowded bus” is a positive statement and has a negative rating of -1.46 indicates that people are uncomfortable suggesting that crowding inside the bus is a serious issue in Dhaka.

According to the strength of agreement / disagreement, the top two qualitative attributes are picking up and dropping off passengers and crowding inside the bus. The same attributes are also top amongst the qualitative attributes according to the importance and (dis)satisfaction ratings in Table 8.12 and Table 8.13. Other qualitative attributes follow the similar order which indicates consistency of the findings and validate the findings of the soft attribute valuations.

8.7 Conclusions

The dataset represents a good mixture of respondents on the socio-economic and demographic attributes. Though there are 13 different modes of transport available in the corridor, public transport (mainly bus and minibus), walking and rickshaw are the dominant modes of transport. This finding is in line with the present modal share of these modes across Dhaka. In Dhaka, people had to either use public transport or walk. The use of private transport modes is very low where ownership is an issue as access to private car is less than 10%. At the same time, individualised public transport modes are used either occasionally or rarely; here cost is an issue.

Considering different aspects of the bus system and assessing the access / egress links, it can be concluded that the bus system can be developed to the best service of the passengers as it is easily accessible. Walking and rickshaws are dominant access and egress modes, and walking and rickshaw shares of access mode are 57% and 37% respectively. The figures for the egress link are 76% and 21% respectively. Average access time by walking and rickshaw are 10.33 minute and 13.23 minute respectively and the same for the egress link is 7.78 minute and 10.75 minute respectively. Access and egress cost by rickshaw is on an average BDT 15.84 and BDT 15.00 respectively.

Considering the distance for access and egress, it is possible to shift some rickshaw trips to walking. If proper facilities are provided, it is possible to promote more environmentally friendly cycling though the present share of cycling is negligible. Again, ownership of vehicle is an issue. Though bus fare is regulated in Dhaka, the findings show that bus fare is virtually deregulated, average fare of a single bus journey is BDT 16.5 and the fare is 33.33% higher than the regulated fare on an average.

Changing bus is not much for any trip and more than one change is even lower. The bus routes can be rationalised for optimising time and cost. Average waiting time at the first bus stop is 12.90 minutes and the average journey time is 31.8 minutes. Taking all the time components for a bus journey into consideration the total time required for a bus journey is 65.58 (12.43 + 12.90 + 31.80 + 8.45) minutes which is quite high. So a commuter who uses bus for commuting has to spend 131.16 minutes daily which puts serious pressure on their travel time budget. This finding indicates that the average time budget of one hour in developed countries as mentioned in Section 3.3 is not applicable in this context. Bus speed is low during peak hours due to congestion; waiting time is high during off-peak hours due to low bus frequency. Therefore, longer in-vehicle time, high waiting time and high access / egress time contribute to higher travel time budget.

All of the bus attributes under study are very important as rated by the respondents, but the importance rating for quantitative attributes are generally higher than qualitative attributes. On the other hand, for satisfaction ratings respondents are generally more dissatisfied with the qualitative attributes. The top five important attributes are travel cost, travel time headways, wait time and picking up and dropping off passengers and top four are the quantitative attributes. Similarly top five attributes in dissatisfaction rating are crowding inside the bus, picking up and dropping off passengers, bus stop facilities, air conditioning and cleanliness inside bus. There is a negative correlation between average importance and satisfaction rating, which means satisfaction is lower when importance is higher, this finding also confirms the findings of the focus group.

User attitude towards the bus attribute is measured by the rating exercise of attitudinal statements related to the attributes. The statements in effect express the users' concern about the attributes and the relative agreement and disagreement measures their concern about the attribute related to the statement. From the ranking of the attitudinal statement ratings, it is found that the top five attributes the respondents concerned about are picking up and dropping off passengers, crowding inside the bus, priority seats for women, wait time and boarding and alighting. There is a general consistency among the three rating exercises conducted in this research.

Chapter 9 Discrete choice modelling

9.1 Introduction

This Chapter presents the results of the stated choice experiments for the estimation of willingness-to-pay (WTP) for the bus attributes in Dhaka. The chapter describes the bus attributes and dummy variables with coding for discrete / category variables used in the models in Section 9.2. Then the model development process is discussed to obtain robust models to meet the research objectives in Section 9.3 followed by data and model specification issues in Section 9.4 to shed some light on the model development process. Before going straight to model results important features of the attributes have been discussed to clearly explain the variation of valuations of those attributes. The models are presented and explained in Section 9.5 which also explains the interactions and segmentation followed by valuation of willingness-to-pay (WTP) for the attributes in Section 9.6. Evidence on taste variation is explained in Section 9.7 a conclusion about this chapter is drawn in Section 9.8.

9.2 Bus attributes and coding of dummy variables

It has been explained in Chapter 6 that two separate experiments have been designed for two different sets (set “A” and set “B”) of attributes to minimise the cognitive burden of the respondents for evaluating choice scenarios. Each experiment contains seven attributes, with only the cost attribute being common. Accordingly two sets of models have been developed in line with the research objectives 2, 3 and 4 to estimate WTP for bus attributes to explain bus preference with segmentation and individual taste heterogeneity. Both of the experiments are identical in terms of the number of attributes (three quantitative and four qualitative attributes) and their levels (three attributes at level three, two attributes at level five and two attributes at level two). Table 9.1 shows the attributes with dummy variable coding for “A” set attributes for model A and Table 9.2 shows the attributes with dummy variable coding for “B” set attributes used for model B.

In the set A four out of the seven attributes are categorical / discrete variables and the same for set B. As a result they were coded as dummy variables for modelling. The attributes of “bus-stop facilities” and “ease of boarding and alighting” are three-level attributes. Similarly, the attributes “picking up and dropping off passengers” and “air conditioning” are two level attributes. As a result two dummy variables were coded against a base level for three level attributes and one dummy variable was coded against a base level for two level attributes. The levels of A set attribute can be seen in Table 7.18 in Chapter 7 and the dummy coding can be seen in Table 9.1.

Table 9.1 Dummy variable coding for qualitative attributes of model A

Attribute	Dummy variable coding	Coefficient
Bus-stop facilities (BSF)	Bus-stops with no shed and seating arrangements	Base
	Bus-stops with shed but no seating arrangements (BSF1)	β_{BSF1}
	Bus-stops with shed and seating arrangements (BSF2)	β_{BSF2}
Ease of boarding and alighting (BNA)	Narrow door with steep steps for boarding and alighting	Base
	Wide door and mild steps for boarding and alighting (BNA1)	β_{BNA1}
	Low floor bus (BNA2)	β_{BNA2}
Picking and dropping of passenger (PND)	Bus does not stop at designated places, picks up and drops off passengers on moving	Base
	Bus stops properly at designated places (PND)	β_{PND}
Air conditioning (AC)	Without air conditioning	Base
	Air conditioning (AC)	β_{AC}
Travel cost (TC)	Travel cost (TC)	β_{TC}
Travel time (TT)	Travel time (TT)	β_{TT}
Waiting time (WT)	Waiting time (WT)	β_{WT}

Similarly the attribute levels for B set attribute can be seen in Table 7.19 and the dummy variable coding of these attributes can be seen in Table 9.2. Two attributes crowding inside the bus and driving quality have two dummy variables as these attributes are defined at level three, The attribute driver and crew behaviour and cleanliness inside bus have one dummy variable each as these attributes are defined at level two.

Table 9.2 Dummy variable coding for qualitative attributes of model B

Attribute	Dummy variable coding	Coefficient
Crowding inside the bus (CWD)	Standing in a crush all the way	Base
	Standing comfortably all the way (CWD1)	β_{CWD1}
	Seating all the way (CWD2)	β_{CWD2}
Driving quality (DQ)	Jerky and unsafe journey	Base
	Jerky but safe journey (DQ1)	β_{DQ1}
	Smooth and safe journey (DQ2)	β_{DQ2}
Driver and crew behaviour (BVR)	Driver and crew are rude and unfriendly	Base
	Driver and crew are sober and friendly (BVR1)	β_{BVR}
Cleanliness inside bus (CLN)	Deck and seats are dirty and unclean	Base
	Deck and seats are clean and tidy (CLN)	β_{CLN}
Headway (HWY)	Headway (HWY)	β_{HWY}
Percent of priority seats for women (PRS)	Percent of priority seats for women (PRS)	β_{PRS}
Travel cost (TC)	Travel cost (TC)	β_{TC}

9.3 Defining model

Linear in parameter utility functions have been defined for the estimation of discrete choice models using the stated preference dataset. Multinomial Logit (MNL) models with significant interactions are developed as base models and presented as model A1 and B1 for A and B sets of attributes respectively in Table 9.3 and Table 9.4. Finally, Mixed Logit (MXL) models are developed and presented as model A2 and B2 in Table 9.3 and Table 9.4 to explain taste variations for different attributes. The utility functions for both the models are defined as in equation 9.1 and equation 9.2. Alternative specific constants (ASC) are included in the models, but there is no alternative specific attributes as both of the alternatives are unlabelled buses as presented in the choice exercise. Generic coefficients have been estimated for all the attributes.

$$\text{Utility (A)} = ASC + \beta_{AC} * AC + \beta_{PND} * PND + \beta_{BSF1} * BSF1 + \beta_{BSF2} * BSF2 + \beta_{BNA1} * BNA1 + \beta_{BNA2} * BNA2 + \beta_{TC} * TC + \beta_{TT} * TT + \beta_{WT} * WT \quad (9.1)$$

$$\text{Utility (B)} = ASC + \beta_{BVR} * BVR + \beta_{CLN} * CLN + \beta_{CWD1} * CWD1 + \beta_{CWD2} * CWD2 + \beta_{DQ1} * DQ1 + \beta_{DQ2} * DQ2 + \beta_{HWY} * HWY + \beta_{PRS} * PRS + \beta_{TC} * TC \quad (9.2)$$

In the model development process, debriefing questions to respondents regarding ignored attributes (if any) are taken into consideration. Not many respondents ignored attributes in the choice exercise. Taking this data issue into consideration the model does not improve significantly. There are segmented values of time and other attributes depending on trip purpose (Whelan and Wardman, 2001), mode used (AECOM, 2009) and income (Balcombe, 2004). Depending on gender noteworthy difference of importance on some qualitative attributes were found in the focus group as discussed in Chapter 5. Moreover, the third research objective was to examine the variation of valuation depending on important socio-demographic characteristics of the respondents. Therefore, in the model refinement process, the interaction of income, gender and household car ownership was included in the model.

9.4 Model specifications and data issue

According to the research method and survey design for stated preference exercise each respondent evaluates ten choice scenarios. This choice data has the characteristics of panel data, as each individual evaluates ten different choice scenarios for the same experiment. In case of model A, there is 2,100 choice data from 210 respondents and for model B there is 2,070 choice data from 207 respondents. Evidence suggests that different choice responses from the same respondents are likely to be correlated which is known as problems of repeat choices / observations that needs to be addressed. It has been addressed by using MXL model specification in BIOGEME V1.8, allowing correlations between ten responses of each respondent in panel data specification. The equivalent MNL model is estimated from MXL specifications, not allowing all the parameters to vary randomly.

MNL models with significant interactions have been developed as base models. MXL models have been developed to compare the coefficients for both types of models and also to explain the taste heterogeneity of the respondents for bus attributes in Dhaka. According to Hess et al (2005), three model specification issues arise with the use of the MXL model: the selection of which parameters should be modelled as being randomly distributed across respondents, the choice of statistical distribution for these coefficients, and the economic interpretation of randomly distributed coefficients. Three aspects of the specification of heterogeneity are all clearly closely inter-related. To address the first issue, all of the coefficients are allowed to be randomly distributed and the significant variations are considered for final modelling. A normal distribution is used for the statistical distribution for MXL model estimation process. Careful attention is needed to interpret the result from the normal distribution as it allows both positive and negative values for any coefficient for different respondents. This can be addressed by using other statistical distributions or by forcing the distribution to take only positive or negative values. However, this process undermines the possible limitations of the dataset, if any, and flexibility of model development process that could even explain the unexpected sign of the coefficients for some respondents. Taking those issues into consideration, a normal distribution is used as statistical distribution for MXL model estimation process that allows both the signs (positive and negative) for any coefficient.

9.5 Model results

Table 9.3 represents MNL model A1 and MXL model A2. All of the attributes including the interaction of income on travel cost are statistically significant at 99% confidence level with expected sign for both the models. MXL model A2 has a final log likelihood value of -957.710 and adjusted rho-squared value of 0.330 compared to log likelihood value of -979.604 and adjusted rho-squared value of 0.319 for MNL model A1. The cost coefficient is for low income group by default and the coefficient for the high income group is calculated from the interaction coefficient.

Table 9.3 Model A (MNL and MXL) with significant interactions

	Model A1 (MNL)		Model A2 (MXL)			
Variables	Coeff.	t-stat	Coeff.	t-stat	St.dev	t-stat
Alternative specific constant	-0.1910***	-3.01	-0.312***	-3.66	Fixed	
Without air conditioning	Base		Base		Base	
Air conditioning	0.5070***	6.35	0.706***	6.34	Fixed	
Picking up and dropping off passengers on moving	Base		Base		Base	
Bus stops at designated places and picks and drops passengers nicely	0.9390***	7.88	1.200***	7.29	Fixed	
Narrow door with steep steps for boarding and alighting	Base		Base		Base	
Wide door and mild steps for boarding and alighting	0.8140***	6.98	1.100***	7.03	Fixed	
Low floor bus with no steps	0.4930***	4.90	0.702***	5.39	Fixed	
Bus-stops with no shed and seating arrangements	Base		Base		Base	
Bus-stops with shed but no seating arrangements	0.8280***	6.04	0.930***	5.78	0.66***	-3.06
Bus-stops with shed and seating arrangements	0.4410***	3.27	0.526***	3.27	0.67***	-3.75
Travel cost	-0.0934***	-8.09	-0.124***	-7.09	0.08***	-4.31
Travel time	-0.0561***	-12.77	-0.0722***	-10.38	0.04***	4.78
Waiting time	-0.0760***	-13.01	-0.098***	-10.56	0.05***	-4.72
Interaction of income on cost (high income =0)	0.0413***	2.94	0.0535***	2.80	Fixed	-
Final log likelihood	-979.604		-957.710			
Adjusted rho-squared	0.319		0.330			
Total observations	2100		2100			
Total respondents	210		210			

99% confidence level ***, 95% confidence level ** 90% confidence level *

The coefficient of travel time and waiting time is -0.0722 and -0.098 respectively and the coefficient of “waiting time” is 1.36 times higher than travel time. So the waiting time has a premium value compared with in-vehicle time. According to Wardman and Abrantes (2011) the value of waiting time is about 1.25 to 1.50 times higher than in-vehicle time in case of a UK valuation of time study. However, this valuation depends on the overall journey experience and the waiting environment for a journey. Crowding inside the bus is very common in Dhaka and the poor driving conditions in Dhaka both act negatively towards the overall journey experience. At the same time, inadequate bus-stop facilities act negatively for waiting environment. Therefore, a 1.36 times higher valuation of waiting time compared with in-vehicle time is low compared to UK valuations, but it is logical and expected.

The value of the coefficient for any attribute contributes to the overall utility of the trip from the mode used for the trip. In the case of qualitative attributes, in model A2 “picking up and dropping off passengers” (dummy variable bus stops at designated places, picks and drops passenger nicely) has the highest coefficient of 1.20 followed by “boarding and alighting of passengers” (dummy variable wide door and mild steps for boarding and alighting), “bus stop facilities” (dummy variable bus stops with shed but no seating) and “air conditioning”. Interestingly the importance rating maintains the similar order as predicted by the model fifth, twelfth tenth, and thirteenth as can be seen in Table 8.12. The satisfaction rating also shows that “picking up and dropping off passenger” has the highest dissatisfaction followed by “bus stop facilities”, “air conditioning” and “boarding and alighting” as presented in Table 8.13 which is consistent with the findings of the model.

In the case of the attribute “bus stop facilities”, the dummy variable “bus stops with shed but no seating arrangements” has a positive coefficient of 0.930 and the dummy variable “bus stops with shed and seating arrangements” has a positive coefficient of 0.526. It is not expected that “bus stops with shed and seating arrangements” will have lower valuations than dummy variable “bus stops with shed but no seating arrangements” which needs careful explanation. Preference / taste heterogeneity may explain this unexpected situation. The issue of preference / taste heterogeneity has been discussed in separate Section 9.7.

As discussed in Chapter 2 and according to the findings of the focus groups discussed in Chapter 5, “boarding and alighting” is an important bus attribute in Dhaka. For this attribute, the dummy variable “wide door and mild steps for boarding and alighting” has a coefficient of 1.10 and dummy variable “low floor bus with no steps" has coefficient of 0.702 against the base level "narrow doors with steep steps for boarding and alighting" which is unexpected.

In order to explain this finding, issues related to boarding and alighting that contribute to the ease or difficulties of boarding and alighting have to be considered. Passengers maintain queues for boarding after buying their tickets from the counters for the large buses under company operations (operation regime 2 as mentioned in Chapter 2). However, for buses under individual operation (operation regime 1 as mentioned in Chapter 2) passengers do not necessarily maintain the queue for boarding, but there is a competition to board quickly and get a seat. As a result, not only the steepness of the steps but also the size of the door is important for passengers to quickly get into the bus. For this reason the dummy variable "wide door and mild steps for boarding and alighting" may have higher coefficient than the dummy variable "low floor bus with no steps". In addition, respondents are not quite familiar with the low floor buses which may be another reason for low valuation of dummy variable "low floor bus with no steps" for boarding and alighting.

The interaction of income with travel cost is significant at 99% confidence level and the default cost coefficient is for the low income group which is 0.0535. This means the high income group has the lower cost coefficient than the low income group which supports the theory of economics. The cost coefficient for the high income group is calculated by adding up this interaction coefficient (0.0535) with the cost coefficient (-0.124) which is -0.0705. The ratio of cost coefficient of the high income group to the low income group is 1.76 that means the high income group has 76% higher willingness-to-pay (WTP) values than the low income group.

Table 9.4 represents MNL model B1 and MXL model B2 for B set of attributes. Except "driver and crew behaviour" all of the attributes including the interaction of gender with priority seats for women are statistically significant at 99% confidence level. However, the interactions of gender with dummy variable seating all the way and income with travel cost are significant at 95% confidence level and the interaction of gender with standing comfortably all the way is statistically significant at 90% confidence level for both MNL and MXL models.

Table 9.4 Model B (MNL and MXL) with significant interactions

	Model B1 (MNL)		Model B2 (MXL)			
Variables	Coeff.	t-stat	Coeff.	t-stat	St Dev	t-stat
Alternative specific constant	0.208***	3.70	0.247***	3.42	Fixed	-
Driver and crew are rude and unfriendly	Base		Base		Base	
Driver and crew are sober and friendly	0.0425	0.61	0.0751	0.81	Fixed	-
Deck and seats are dirty and unclean	Base		Base		Base	
Deck and seats are clean and tidy	0.275***	3.33	0.398***	3.52	0.41*	1.68
Standing in a crush all the way	Base		Base		Base	
Standing comfortably all the way	0.645***	4.57	0.767***	4.42	0.50*	-1.89
Seating all the way	1.480***	9.56	2.03***	8.48	0.97***	-4.98
Jerky and unsafe journey	Base		Base		Base	
Jerky but safe journey	0.265**	2.43	0.357***	2.45	0.41*	1.82
Smooth and safe journey	0.533***	4.65	0.728***	4.61	0.51*	-1.71
Headway	-0.0657***	-11.75	-0.0922***	-9.03	0.06***	5.18
Percent priority seats for women	0.0299***	4.46	0.0382***	4.21	0.04***	3.32
Travel cost	-0.0678***	-6.59	-0.0863***	-5.93	0.06***	3.61
Interaction of income on cost (high income = 0)	0.0344***	2.51	0.0382**	2.17	Fixed	-
Interaction of gender on priority seats (male=0)	-0.0379***	-4.66	-0.0475***	-4.38	Fixed	-
Interaction of gender on seating all the way (male=0)	-0.488**	-2.30	-0.563**	-2.10	Fixed	-
Interaction of gender on standing comfortably (male=0)	-0.311*	-1.70	-0.332	-1.43	Fixed	-
Final log likelihood	-1123.842		-1101.103			
Adjusted rho-squared	0.207		0.217			
Total observations	2070		2070			
Total respondents	207		207			

99% confidence level ***, 95% confidence level ** 90% confidence level *

MXL model B2 has a final log likelihood value -1101.103 and an adjusted rho-squared value of 0.217 compared with final log likelihood value of -1123.842 and adjusted rho-squared value of 0.207 of MNL model B1, MXL model B2 is therefore more robust than MNL model B1. This B2 model is referred for all future explanations and valuation of attributes. The WTP value of all of the attributes is calculated for both high and low income groups and also for male and female and is presented in Table 9.6.

In model B2 the qualitative attribute “crowding inside the bus” (dummy variable seating all the way) has the highest coefficient of 2.03 followed by “driving quality” (dummy variable smooth and safe journey) of 0.728 and “cleanliness inside the bus” (dummy variable deck and seats are clean and tidy) of 0.398. The importance rating also predicts the similar order of sixth, eighth and seventh for these attributes as presented in Table 8.12. The coefficient of “per percent of priority seat for women” is 0.0382. If 10% seat is reserved for women then the coefficient would be 0.382 and it would be after cleanliness inside bus ranked ninth just after the attribute “driving quality”. This implies the attributes with higher importance rating have higher valuation which is logical and expected and the result of the importance rating and modelling is consistent.

From the satisfaction rating of these attributes in Table 8.13 it can be found that the order of satisfaction is thirteenth for “crowding inside bus”, followed by ninth for “cleanliness inside bus”, seventh for “driving quality” and first for “priority seats for women”. This means the attributes that has higher dissatisfaction rating has higher WTP for improvement which is logical and expected and the result of satisfaction rating and modelling is consistent.

Furthermore, dummy variables “seating all the way” and “standing comfortably all the way” have coefficients 2.03 and 0.767 respectably against a base level of “standing in a crush all the way”. These coefficients seem quite high compared to other coefficients of qualitative attributes, but logical given the high levels of crowding inside the bus in Dhaka. A comparatively low value of “standing comfortably all the way” indicates that though it is better than “standing in a crush all the way” passengers want to avoid standing.

Similarly, the dummy variables “smooth and safe journey” and “jerky but safe journey” have coefficients of 0.728 and 0.357 respectively against a base level of “jerky and unsafe journey”. These coefficients are related not only to smoothness of ride but also safety on board; and the values do not seem too high given the very poor driving condition and individual concerns about the existing practices of issuing licences to the bus drivers. Cleanliness inside the bus is an important bus attribute and the dummy variable “deck and seats are clean and tidy” has a coefficient of 0.398 compared with a base level of “deck and seats are dirty and unclean”.

In model B2, the interaction coefficient of income with travel cost is 0.0382 which has the expected sign and the cost coefficient (-0.0863) represents the coefficient of the low income group. By adding up the interaction coefficient (0.0382) with the cost coefficient (-0.0863) for the low income group the coefficient of the high income group is estimated at -0.0481. The ratio of the coefficient for high income group to low income group is 1.79. This means higher income group has 79% higher WTP value than low income group which is logical and consistent with economic theory.

The interaction coefficient of gender with “percent priority seats for women” as estimated by the model is -0.0475 has expected sign as the variable “percent priority seats for women” coefficient (0.0382) is for females. By adding up the interaction coefficient (-0.0475) with the coefficient of “percent priority seats for women” (0.0382) for women the coefficient for males is calculated as -0.0093. Interestingly the coefficient of “percent priority seats for women” is negative for men which means men have disutility from this attribute. It is logical as maintaining priority seats for women means less seats for men in the bus.

The interaction of gender with dummy variable “seating all the way” against a base level of “standing in a crush all the way” is -0.563 and the sign is expected as the coefficient of dummy variable “seating all the way” for low income female is 2.03 and it is logical and expected that the same coefficient for male of the same group would be lower as per the findings of the focus group that females are more sensitive to crowding than males. One interesting finding is that the interaction of gender with the dummy variable “standing comfortably all the way” is not statistically significant. This means both males and females want to avoid standing in a journey and the coefficient of the dummy variable “standing comfortably all the way” is the same for both males and females.

9.6 Willingness-to-pay for bus attributes

In line with the second research objective of estimation of willingness-to-pay (WTP) for bus attributes in Dhaka the values are estimated and presented in Table 9.5 for set A attributes and in Table 9.6 for B set attributes. These values are then compared with available values in Dhaka and presented in Table 9.7. As the interaction of income with travel cost is significant for both models, the values for both low and high income groups are calculated for both models (A2 and B2).

The interactions of gender with "percent priority seats for women" and with the attribute "crowding inside the bus" is statistically significant the value of these attributes for both males and females is calculated and presented in Table 9.6. Willingness-to-pay (WTP) value is calculated by dividing the coefficients of respective attributes by the cost coefficient for each group such as low income and high income group and males and females for getting segmented values.

Table 9.5 Segmented (high and low income) WTP values for A set attributes

Model	Model A1 (MNL)		Model A2 (MXL)		
Variables	Value (HIG)	Value (LIG)	Value (HIG)	Value (LIG)	Unit
Without air conditioning	Base	Base	Base	Base	-
Air conditioning	9.73	5.43	10.01	5.69	BDT/trip
Picking up and dropping off passengers on moving	Base	Base	Base	Base	-
Bus stops properly, picks and drops passengers nicely	18.02	10.05	17.02	9.68	BDT/trip
Narrow door steep steps for boarding and alighting	Base	Base	Base	Base	-
Low floor bus	9.46	5.28	9.96	5.66	BDT/trip
Wide door and mild steps for boarding and alighting	15.62	8.72	15.60	8.87	BDT/trip
Bus stops with no shed and no seating arrangements	Base	Base	Base	Base	-
Bus stop with shed and seating arrangements	8.46	4.72	7.46	4.24	BDT/trip
Bus stop with shed, but no seating arrangements	15.89	8.87	13.20	7.50	BDT/trip
Travelling time	1.08	0.60	1.02	0.58	BDT/min
Waiting time	1.46	0.81	1.39	0.79	BDT/min

Note: Bangladeshi Taka (BDT), Low Income Group (LIG), High Income Group (HIG), £1 = BDT 130

Table 9.5 shows that the WTP for the dummy variable "bus stops properly, picks and drops passengers nicely" is BDT 17.02 per trip for the high income group. The WTP value for low income group is BDT 9.68 per trip which is highest among qualitative attributes in set A. The WTP value for "wide door and mild steps for boarding and alighting" is BDT 15.60 per trip for the high income group and the value is BDT 8.87

per trip for the low income group. "Bus-stops with shed but no seating" has a WTP of BDT 13.20 per trip for the high income group and BDT 7.50 per trip for the low income group. For the "air conditioning" WTP value for the high income group is BDT 10.01 per trip and BDT 5.69 per trip for the low income group. Compared to average bus fares these WTP values seem high. However, given the very poor condition of the existing level of service these values are acceptable. The value of travel time and waiting time for the high income group is BDT 61.20 per hour and BDT 83.40 per hour and for low income groups is BDT 34.80 per hour and BDT 47.40 per hour.

Table 9.6 Segmented (high and low income) WTP values for B set attributes

Model	Model B1 (MNL)		Model B2 (MXL)		
Variable	Value (HIG)	Value (LIG)	Value (HIG)	Value (LIG)	Unit
Driver and crew are rude and unfriendly	Base		Base		-
Driver and crew are sober and friendly	ns	Ns	Ns	Ns	BDT/trip
Deck and seats are dirty and unclean	Base	Base	Base	Base	-
Deck and seats are clean and tidy	8.23	4.06	8.27	4.61	BDT/trip
Standing in a crush all the way	Base	Base	Base	Base	-
Standing comfortably all the way (for female)	19.31	9.51	15.95	8.89	BDT/trip
Standing comfortably all the way (for male)	10.00	4.93	9.04	5.04	BDT/trip
Seating all the way (for female)	47.31	23.30	42.20	23.52	BDT/trip
Seating all the way (for male)	32.69	16.11	30.52	17.01	BDT/trip
Jerky and unsafe journey	Base		Base		-
Jerky but safe journey	7.93	3.91	7.42	4.14	BDT/trip
Smooth and safe journey	15.96	7.86	15.14	8.44	BDT/trip
Headway	1.97	0.97	1.92	1.07	BDT/min
Percent of priority seats for women (for female)	0.90	0.44	0.79	0.44	BDT/%
Percent of priority seats for women (for male)	-0.24	-0.12	-0.19	-0.11	BDT/%

Note: HIG means High Income Group, LIG means Low Income Group

Table 9.6 shows that the dummy variable "seating all the way" has the highest WTP value which is significantly different according to gender and income. For high income females, the value is BDT 42.20 per trip and BDT 23.52 per trip for low income females. For high income males the value is BDT 30.52 per trip and BDT17.01 per trip for low income males. This value for high income females seems to be very high given the average bus fare of BDT 15.60. However, the difficulties faced by women given the level of crowding means that this value is acceptable. The WTP for the “smooth and safe journey” is BDT 15.14 per trip for the high income group and it is BDT 8.44 per trip for the low income group. The dummy variable “deck and seats are clean and tidy” has a WTP value BDT 8.27 per trip for the high income group and for the low income group is BDT 4.61 per trip, which is reasonable.

The attribute “percent priority seats for women” has a positive valuation by females but negative valuation by males which is interesting. The WTP value of “percent priority seats for women” is BDT 0.79 per % of priority seats for women for the high income females and BDT 0.44 per % of priority seats for women for the low income females. However, high income males have a negative value of BDT - 0.19 per % of priority seats for women and low income males have a negative value of BDT - 0.11 per % of priority seats for women. WTP for headway for the high income group is BDT 115.20 per hour and for the low income group is BDT 61.20 per hour. This seems to be high and reflects unreliable waiting time and lack of timetable. Including more quantitative attributes such as travel time and waiting time with headway in the same model could give an opportunity to compare the value of headway with travel time and waiting time from the same model.

The data cannot be pooled to estimate a single model as the common attribute between the two models was travel cost which is one of the limitations of the study. However, considering the issue of response burden and unfamiliarity of stated choice exercise to the respondents in Dhaka the experiment was kept as simple as possible. Therefore, the number of attributes was limited to seven in each experiment as discussed in Section 6.4. Keeping more attributes common in both the experiments would reduce the scope of more new attribute valuation. To strike the balance, one attribute was kept common to enable more attribute valuation.

There is a limited evidence of the valuation of bus qualitative attributes in Dhaka including Alam et al (1999) and Hoque (2005), but there is more evidence of the valuation of travel time using discrete choice modelling technique. Table 9.7 gives a comparison of available value of time from by different studies in Dhaka.

Table 9.7 Comparison of available value of time in Dhaka (BDT 2013)

Study	Average (BDT)	LIG (BDT)	MIG (BDT)	HIG (BDT)	Comments
Halcrow Fox (1996)	56.10/hr	-	-	-	Intercity travelling in Bangladesh
Hoque (2005)	36.95/hr	-	-	-	Dhaka city
DHUTS (2010)	-	34.42/hr	81.67/hr	45.89/hr	Dhaka city
Current study	-	34.80/hr	-	61.20/hr	Dhaka city

Note: All the values are estimated by stated choice and values are in 2013 prices

As shown in Table 9.7, the value of time estimate in the current study is comparable with other studies in Dhaka. The value of time estimated by Halcrow Fox (1996) is for intercity travellers in Bangladesh, so it is higher than the value of inner city travellers. The value of time for middle income group as estimated by DHUTS (2010) is more than the value for the high income group in this study which is unusual. The overall value of time (BDT 36.95 / hr) estimated by Hoque (2005) is comparable with the valuation of this study.

9.7 Evidence of taste heterogeneity

Respondent's taste heterogeneity for both sets (set A and set B) of attributes is discussed in this section. In the beginning of the modelling process, all the coefficients were allowed to vary randomly; the coefficients not showing significant taste heterogeneity were not allowed to vary randomly in the further model refinement process.

Model A2 as presented in Table 9.3, estimates significant taste variations for the attributes "bus-stop facilities", "travel cost", "travel time" and "waiting time" at a 99% level of significance. According to the data coding for the interaction coefficient (high income = 0), the estimated coefficients and their standard deviations are for the low income group by default. From the coefficients of the low income group and the interaction coefficients, the coefficients for high income group were calculated for the valuation purpose. Similarly, the taste heterogeneity for high income group can also be estimated by developing a model with data using separate coding (low income = 0) for interaction coefficients.

Model A2 presented in Table 9.3 shows that there is significant taste heterogeneity for dummy variable "bus stop with shed but no seating arrangements" and it can be calculated that 6.81% of low income respondents have a negative utility from the dummy variable “bus stop with shed but no seating arrangements” and 21.77% have a negative utility from the dummy variable “bus-stops with shed and seating arrangements”.

In Bangladesh there is no rain in winter and people enjoy the sunshine, so passenger sheds may not be important in winter, though it may be very important in rainy season as indicated by the focus groups. So it is not conclusive that seasonal variations can cause the unexpected taste heterogeneity for this attribute. The socio-political environment in Dhaka may explain this variation a bit further. It is the culture that the maintenance of public facilities is not regular and it is difficult to ensure the use for intended purposes and encroachment is common, as discussed in Chapter 2.

Most of the pavements / footpaths are occupied by road side vendors and the bus stops are the places where hawkers sell their goods. So, there is a possibility that the bus stops with proper shed and seating may be illegally occupied by on-street vendors and may be used by the homeless people at night and for anti-social purposes. For this reason, some of the respondents might have negative coefficients for this attribute. It is difficult to define this group of respondents by their socio-economic and demo-graphic attributes. However, the level of education and the awareness about the socio-political situation can lead to this variation of taste in case of the attribute “bus stop facilities”.

Only 6.06% of respondents have positive coefficients from the “travel cost”. This amount is very low and can be ignored as noise (disturbance) of the data set. However, it may be the reason that the respondents with positive coefficients are paid by their employer for their travel and the cost is reimbursed by some incentives from their employer. As expected, though there is significant taste heterogeneity for the attribute “travel time”, there are no respondents from the low income group who have positive coefficients for this attribute. Trip purpose and the journey experience influence the valuation of travel time and it is possible that travel time can have positive coefficients (Hess et al, 2005). For “waiting time” there is significant taste variation but no positive coefficient for this attributes.

Similarly, model B2 presented in Table 9.4 shows that there is significant taste heterogeneity for the dummy variables “deck and seats are clean and tidy”, “standing comfortably all the way”, “jerky but safe journey” and “smooth and safe journey” at the 90% level of significance, but “seating all the way” is significant at 99%. However, the taste heterogeneity for attributes “headway”, “percent priority seats for women” and “travel cost” are significant at the 99% level of significance. The cost coefficient (high income = 0) and standard deviations presented in Table 9.4 are for the low income group by default. Similarly, the coefficients (male = 0) for “crowding inside the bus” and “percent priority seats for women” are for females by default.

Model B2 estimates respondent’s taste heterogeneity for the dummy variable “deck and seats are clean and tidy” with 16.60% negative coefficients for low income people which is unexpected and hard to explain. Data quality and model specification can be responsible for a considerable amount of negative coefficients for the attribute “cleanliness inside the bus”.

There is significant taste heterogeneity for the dummy variable “standing comfortably all the way” and the model estimates that 6.30% of the low income females have a negative coefficient for the variable “standing comfortably all the way” compared to “standing in a crush all the way”. Though it is unexpected, it can be explained that these low income females do not think it is a better option compared to “standing in a crush all the way”, which means standing in a bus irrespective of crowding level does not add any significant positive utility to these 6.30% of low income females. For the dummy variable “seating all the way” though there is a significant taste variation, but there are no negative coefficients which is expected and indicates that seating is the most preferable for all low income female respondents.

For the low income group 19.22% of respondents have negative coefficients for the dummy variable “jerky but safe journey”, which is unexpected. One explanation is that these respondents do not care about the driving quality, not because of it is not important which is most unlikely, but that they feel that it is not possible to improve the driving quality under the present legal and regulatory framework. The attribute ”driving quality” is mainly related to the quality of drivers and driving environment (driving culture) coming from the “cream-skimming” attitudes of the driver of a bus operating under “competition within market” structure as discussed in Chapter 2.

Not only does the attitude of drivers play an important role in this respect but also their qualifications and competence do play a role. However, it is the harsh reality that a significant proportion of drivers do not a have valid driving license, minimum level of qualifications or competence to drive a public bus to obtain a valid driving license as per the legal requirement. Therefore, these respondents may think that it is not possible to improve the quality of driving and may not take this attribute seriously.

For the low income group around 7.78% of respondents have negative utility for the variable “smooth and safe journey” which is unexpected. Like the previous explanation 7.78% of respondents from the low income group think it is not possible to improve the driving quality from “jerky and unsafe” to “smooth and safe” under the present regulatory system.

It is expected that no respondents would have positive coefficients for the “headway” attribute. However, the result shows that 6.68% of respondents have a positive coefficient for headways. It may be the case that these respondents can use the time of waiting in a positive way, for example shopping or hanging around with friends. However, this small amount can be accepted as the noise (disturbance) of the data set. Though it is unexpected 6.68% percent of low income females have negative coefficients for the attribute “percent priority seats for women”, which means they do not like reserved seats for females. This small fraction can be also allowed as noise of the data set. However, it can be possibly explained that these respondents believe that gender equality should be maintained everywhere and the females should not get special favour in the bus.

For the travel cost attribute, 8.08% of low income respondents have a positive coefficient which is unexpected. This small difference can be considered as the noise of the data set. However, it may be the case that these low income people are paid by their employer and the cost is recovered by the employer with some incentives as explained for model A2.

If respondents are unfamiliar with the current level of the attributes and sceptical about the level of improvements, the scenarios are not presented nicely that can result in misleading choices. In case of this survey the scenarios were presented carefully in show cards so only unfamiliarity of attributes and the doubt about the level of improvements may contribute to misleading choices.

The taste heterogeneity was tested for the high income group and the males also and a similar result was found as the low income group and the females. It was found that high income male respondents did not have significant taste variation for “percent priority seats for women” and the coefficient had a negative sign indicating that males did not want priority seats for female and there was no significant difference in opinion.

9.8 Conclusions

Evidence of the valuation of bus attributes in Dhaka has not been carried out before except for the valuation of travel time savings and a few other attributes. So it is important to explain / interpret the values carefully; however the compatible value of travel time suggests that the values estimated by the models are acceptable. MXL models show a better fit than MNL models for both A and B models.

The models with adjusted rho-square values of 0.330 for model A2 and the same of 0.217 for model B2 indicated that the models are robust. The valuation of qualitative attributes and some quantitative attributes is new in the context of Dhaka. Some of these attributes are context specific and emanated from the present competition structure (competition within market) in the bus market in Dhaka discussed in Chapter 2 that may not be relevant in developed cities. So this study is contextually novel and the valuation of soft attributes are new in the case of Dhaka as well as for other developing cities.

According to the importance rating top four important attributes are the four quantitative attributes as can be shown in Table 8.12 which confirms the precedence of quantitative attributes over qualitative attributes supported by AECOM (2009). However, the qualitative attributes receives the highest dissatisfaction rating as shown n in Table 8.13 which is a proxy for demand for improvement and confirms that there is a high demand for improvement of qualitative attributes.

The value of time BDT 34.89 / hr for low income group is compatible with the available value of time in Dhaka. Waiting time is a premium value and 1.36 times higher than the in-vehicle travel time (IVT). Phanikumar and Maitra (2007) found value of waiting time to be less than value of in-vehicle time and they argue that high levels of noise and crowding might be responsible for the high valuation of IVT compared with waiting time.

The latest meta-analysis of value of time study in a UK context by Wardman and Abrantes (2011) argue that the value of waiting time (WT) is a premium value and the multiplying factor being 1.7 and the finding of the current study is consistent with tthe meta analysis. The value of headway is BDT 64.20 which is higher than IVT estimated by a separate model. Faber Maunsell (2004) argues that the value of headway can be as high as the value of IVT and Wardman and Abrantes (2011) found the multiplying factor for headway was 0.78 times IVT. The value of time and the value of headway have been estimated from two different models in this study that may be the underlying cause of this variation.

In the case of qualitative attributes, the five most influential attributes according to willingness-to-pay (WTP) values are crowding inside the bus, picking up and dropping off passengers, the boarding and alighting system, driving quality and bus stop facilities. According to the importance rating exercise, the most important qualitative attribute is picking up and dropping off passengers, but according to WTP values picking up and dropping off passenger is second to crowding inside bus. Crowding inside the bus is the second most important of qualitative attributes as identified by the ranking exercise. So the highest two qualitative attributes are the same as identified by the modelling and the ranking exercises.

Driving quality is the fourth most important attributes according to the rating exercise as shown in Table 8.12 and the willingness-to-pay (WTP) value for driving quality estimated by models also predicts the attribute as fourth most important qualitative attribute. The valuation exercise predicts bus stop facilities as the fifth most important qualitative attribute, but bus stop facilities stands as the sixth most important qualitative attribute according to the importance rating and the prediction is very close. However, boarding and alighting system has been identified as the third most important attribute by the model according to the willingness-to-pay (WTP) value but the importance rating exercise put the attribute at eighth position only before air conditioning. However, the values estimated by the model are consistent with the findings of the importance rating exercise.

According to satisfaction rating the crowding inside the bus, picking up and dropping off passengers and bus stop facilities received the lowest, second and third lowest satisfaction rating as can be seen in Table 8.13 which is consistent with the WTP values. Similarly driving quality was at the middle in the satisfaction rating with the similar average rating point of other three. So the WTP values estimated by the models are consistent with the findings of the rating exercise that validates the models.

The valuation varies across different segment of respondents such as income and gender. Household income has an influence on the cost as expected. Gender has an influence in the valuation of some qualitative attributes, but the household car ownership does not have an influence on the valuation of attributes in Dhaka. Data for household with car is limited in number and household income can capture the effect of household car ownership and may be the reason of the interaction of household car ownerships not being statistically significant. It is interesting that all of the selected attributes except “driver and crew behaviour” are highly significant and WTP values of qualitative attributes are quite high compared to present levels of bus fare. The reason for high WTP values for qualitative attributes indicate that present level of service is very low and there is high demand for improvement of service. These values are in line with the findings of the focus groups presented in Chapter 5.

This study is important as it examined the interaction of gender variables on the bus attribute valuation which is new and original. It found that there is a significant interaction of gender on the selected qualitative bus attributes, especially sensitivity to females as identified in focus groups (discussed in Chapter 5). This study reveals the fact that males and females have opposite valuation for the attribute priority seats for women. Priority seats for women limit the chance for getting seats on a crowded bus by the males so they have negative utility from the attributes, but females have positive utility for this attribute which is interesting and shed lights to the difference of valuation depending on gender. Similarly, for the valuation of crowding, females are more sensitive to crowding compared to males. This finding is supported by the findings of the focus groups.

There is significant taste heterogeneity for some of the attributes which is not unexpected. The examination of taste heterogeneity for the valuation of qualitative attributes is new and first attempt made by this study. All of the four quantitative attributes of travel time, travel cost, waiting time and headway have taste heterogeneity at a 99% confidence level and all of them have negative coefficients.

Bus stop facilities, priority seats for women and the dummy variable of seating all the way show taste heterogeneity at a 99% confidence level. Cleanliness inside the bus, the dummy variable standing comfortably all the way, drives quality show the taste heterogeneity at a 90% confidence level. For qualitative attributes, the explanation of taste heterogeneity for valuating bus attributes is not straight-forward as the influence of different dimensions of respondents plays an important role here and is difficult to capture all in the models. Apart from the range of respondent attributes the prevailing socio-political situation, cultural and religious practice might have played a role in the valuation of qualitative attributes that demand special attention and it can help better explanation of taste heterogeneity for qualitative attributes. The examination of taste heterogeneity for qualitative attributes is new. Further study is required in this area to deepen understanding about the stimuli behind the valuation of soft attributes.

Chapter 10 Conclusions

10.1 Introduction

This thesis has examined thirteen bus attributes relating to the existing market structure and competition arrangements and evaluated these attributes in the context of Dhaka, Bangladesh by using discrete choice modelling. Four of these attributes are quantitative, namely travel cost, travel time, wait time and headway. To meet the research objectives an appropriate methodology was developed using both qualitative and quantitative research methods. As a qualitative research tool, focus groups were conducted to deepen understanding about the qualitative bus attributes and levels for choice modelling. The quantitative research technique was used to examine mode choice behaviour, attribute valuation and examination of users' importance and satisfaction ratings of these attributes. A pen and paper based household interview survey was conducted to collect data for the research.

Conclusions are presented according to the research objectives. Section 10.2 is for the first research objective of examining the bus operation in Dhaka to find out important bus attributes that impacted on the quality of bus service. The second research objective of evaluating the key bus attributes to determine willingness-to-pay (WTP) for the improvement of quality of service is discussed in Section 10.3. The third research objective was to examine the variation of valuation among the population segments and the fourth objective was to investigate the individual taste heterogeneity, both are summarised in Section 10.4 and 10.5 respectively. The policy implications of this research are listed in Section 10.6. Contribution to knowledge is discussed in Section 10.7, and the limitations, as well as the scope for further research, are discussed in Section 10.8.

10.2 Identifying key issues of bus operation in Dhaka

The first research objective was to examine the bus operation in Dhaka to find out important bus attributes that impacted on the quality of bus service. A review of bus operation in Dhaka as presented in Chapter 2 and the focus groups as presented in Chapter 5 identified the salient issues of bus operation that need to be addressed to improve the bus service quality in Dhaka. The important issues identified in Chapter 2 are inadequate supply of bus service, poor quality of service, deficient market competition structure, inefficient regulation of bus sector with lack of institutional capacity and absence of appropriate policy. These issues are interrelated and mutually reinforcing and discussed in following sub sections. The attributes identified in focus groups are presented at the end of this section.

10.2.1 Inadequate supply of bus service

The quality of public transport depends on the quantity supplied, the higher the quantity supplied better the quality of service (Polat, 2012). In Dhaka, the road length under bus route operation is a meagre 200 km, concentrated in the primary road network and the service is very inefficient for low capacity vehicles compared to high demand. There are 141 bus / minibus and human hauler routes served by these roads of which 38 are human hauler routes. Over 6,000 buses and minibuses, mostly minibuses, and more than 1,500 human haulers operate on this network. The existing bus network is already saturated, over congested and overcrowded by low capacity minibuses (15 to 32 passenger capacity) and human haulers (less than 15 passenger capacity) and some of the bus routes have higher demand that cannot be served by conventional bus services. Therefore, inadequate bus supply in term of route length, vehicle-km or in seat-km is the primary issue.

To augment the supply of bus service, the bus routes need to be rationalised and to be extended to the secondary network where possible. High-speed (more direct) high capacity bus services need to be introduced in the primary road network to increase the capacity of service. The introduction of a mass rapid transit system (such as BRT or metro) in appropriate routes is necessary to meet the demand of public transport in Dhaka.

10.2.2 Poor quality of service

The existing bus market is highly fragmented and dominated by individual operators popularly known as the ‘one bus one operator system’ that offers a poor quality of bus service. Huge on-street competition for passengers is contributing to low service quality which is an issue for bus operation in Dhaka. A complete transfer of revenue risk to the operators and allowing ‘within market competition’ with poor regulatory oversight are responsible for the poor quality of service. The poor service quality includes substandard old vehicle fleet, non-availability of information about the operation of service, huge inside crowding, difficulties in boarding and alighting, problems in picking up and dropping off passengers and poor driving standards. All of these issues for bus service quality improvements need to be addressed and the market needs to be consolidated.

10.2.3 Deficient market competition structure

The bus fare in Dhaka is regulated by government without incentives for improved service quality is an issue which acts as a barrier for attracting formal investment in this sector. This limits the scope for the introduction of standard / quality bus service in Dhaka by formal bus operators. Many operators on the same route with flat regulated fare arrangements potentially drive out quality bus service provided under organised company operation. Therefore, existing market structure and competition arrangement is highly inefficient and only favours the low quality para-transit type services offered by minibus and human hauler in a fragmented ownership structure. Introduction of competition for market with predefined service quality through appropriate contracting arrangement can help improve the bus service quality.

10.2.4 Inefficient regulation of bus sector

Bus fares are regulated and the fare is flat based on distance travelled (per km) irrespective of service quality and cost of operation. In a bus market that has a wide variation in quality of service and the cost of operation, the regulated flat fare system only favours the low quality services (minibuses and human haulers) with low operating cost.

The company operated services with standard vehicle fleets and professional management cannot compete with these substandard services due to a higher operating cost of their standard services. In the absence of regulatory oversight substandard services offered by minibuses and human haulers can be considered as a problem rather than a solution to the transport problem in Dhaka. A better appropriate financial incentive mechanism for the consolidation of bus industry needs to be introduced to encourage standard bus fleets with professional operation and management.

10.2.5 Lack of institutional capacity and appropriate policy

Institutional capacity is an important issue for overall operation and management of public transport system in Dhaka. In Bangladesh, MVO (1983) identifies a number of roles to regulate road transport services through different regulatory organisations such as the Bangladesh Road Transport Authority (BRTA), Dhaka Metropolitan Police (DMP) and Dhaka Metropolitan Regional Transport Committee (DMRTC). Key areas for regulation are identified as vehicle registration, fitness testing, driver licensing, bus route planning, issuing permits and enforcing traffic rules. BRTA is responsible for three areas of regulation including vehicle registration, fitness testing, driver licensing. Route planning and issuing permits are the responsibility of DMRTC and enforcing traffic rule is the responsibility of DMP. All of these organisations have lack of capacity for delivering the regulatory responsibilities for proper operation and management of public transport system in Dhaka which is a key issue that needs immediate attention for improvement.

10.2.6 Important bus attributes identified in focus groups

The focus groups agreed that the bus quality in Dhaka is very poor and needs improvement, and identified some bus attributes in the context of Dhaka that contributes to bus quality. These attributes are critical for the improvement of bus quality in Dhaka. They are picking up and dropping off passengers, boarding and alighting facilities, crowding inside the bus, priority seats for women, driving quality, bus stop facilities, driver and crew behaviour, cleanliness inside the bus, and air conditioning. Prevailing fierce competition for passengers with poor regulatory arrangements are the underlying cause for this poor quality of bus service.

Females and males have difference of priorities for some of the attributes such as priority seats for women, crowding inside the bus, picking up and dropping off passengers and boarding and alighting. These attributes act as a barrier for the female to use bus in Dhaka under existing competition regime. There is demand amongst women for female only bus and seating only bus.

10.3 Willingness-to-pay for the bus attributes

In line with the second research objective, estimating the willingness-to-pay (WTP) for the improvement of key bus attributes in Dhaka, thirteen bus attributes, both quantitative and qualitative, were evaluated using discrete choice modelling techniques. These thirteen attributes were evaluated by two different models, namely A models (A1 and A2) and B models (B1 and B2), with seven attributes in each model. Cost was the common attribute in both models, as discussed in detail in Section 9.3. A1 and B1 models are multinomial logit (MNL) models with adjusted rho squared values of 0.319 and 0.207 respectively. A2 and B2 models are mixed logit (MXL) models with adjusted rho squared values of 0.330 and 0.217 respectively. Both of the models are robust, but MXL models have better model fit than MNL models.

Nine of the attributes were qualitative and the rest were quantitative. All of the attributes except driver and crew behaviour are highly (99% confidence level) significant with an expected sign. From the rating exercise as discussed in Section 8.7 it was found that the driver behaviour was rated as the eleventh out of thirteen most important attribute and in the satisfaction rating it was third among the thirteen attributes. However, this attribute was not statistically significant. The findings of the willingness-to-pay (WTP) for each attributes are discussed separately.

Travel cost

Travel cost is the most important attribute and ranked first according to the rating exercise and the coefficient is highly significant in both of the models (model A and model B). The interaction of income with travel cost is statistically significant and lower income people have higher cost coefficients than higher income people which is logical. The cost coefficient is used to evaluate the WTP for the bus attributes. Higher income people have 76% higher WTP values compared to low income people estimated by model A2. Similarly the high income people have 79% higher WTP values compared to low income people as estimated by model B2 and these values are quite close.

Travel time

According to the rating exercise, travel time is a very important attribute only second to travel cost which is logical. The hourly value of time for low income people is BDT 34.80 and the same for the high income people is BDT 61.20. This value is comparable with available value of time estimated in the context of Dhaka as presented in Table 9.7. This means that the WTP values for other attributes are acceptable. Though this value is not new for Dhaka, it adds to the evidence.

Waiting time

The value of waiting time for low and high income people in Dhaka is BDT 47.40 and BDT 83.40 respectively. This is premium value as expected, and waiting time is 1.36 times higher than the value of in-vehicle time (IVT) which is consistent with the existing empirical evidence in developed countries. However, Phanikumar et al (2006) estimated value of waiting time lower than in-vehicle time (IVT), but the value is for intercity travel where waiting time is only a small proportion of travel time and noise level inside the bus is very high. This value of waiting time is the first time estimate for Dhaka and thus adds to knowledge.

Bus stop facilities

Two dummy variables for bus stop facilities namely ‘bus stop with shed and seating arrangements’ and ‘bus stop with shed, but no seating arrangements’ were evaluated. The WTP value for bus stop with shed and seating arrangements is BDT 7.46 for high income group and BDT 4.24 for low income group and the same for the dummy variable bus stop with shed, but no seating arrangement is BDT 13.20 for the high income group and BDT 7.50 for the low income group. This is the first time this attribute has been valued in Dhaka that adds to knowledge of soft attribute valuation.

Ease of boarding and alighting

The WTP values for two dummy variables 'low floor bus' and 'wide door and mild steps for boarding and alighting' were evaluated and it was found that the WTP value for dummy variable low floor bus is BDT 9.96 for the high income group and BDT 5.66 for the low income group and the same for the dummy variable wide door and mild steps for boarding and alighting is BDT 15.60 for the high income group and BDT 8.87 for the low income group. Interestingly WTP value of the dummy variable low floor bus is lower than the dummy variable wide door and mild steps for boarding and alighting. The respondents are not familiar with the low floor bus that could be an explanation of the lower valuating of low floor bus. This WTP value is the first time estimation in the context of Dhaka and adds to the knowledge.

Picking up and dropping off passengers

The qualitative attribute picking up and dropping off passenger is context specific qualitative variable. The WTP value for the dummy variable 'bus stops properly, picks and drops passengers nicely' is BDT 17.02 for the high income group and BDT 9.68 for the low income group. This is the first valuation of this qualitative attribute that will add new evidence to the existing knowledge of soft attribute valuation.

Air conditioning

Air conditioning is an important bus quality attribute. The WTP value for air conditioning is BDT 10.01 for the high income group and BDT 5.69 for the low income group. There is an evidence of WTP value for air conditioning in Dhaka and the value estimated by the research will enrich the valuation of qualitative bus attribute in the context of Dhaka.

Headway

Headway is an important bus attribute that was evaluated in this study for the first time.

There is no published time table for bus service and people randomly come to the bus stop and average waiting time is half of the headway. The hourly WTP value of headway for the low income group is BDT 64.2 and BDT 115.20 for the high income group which is high compared to the IVT. Journey time is unreliable due to high levels of traffic congestion and profit maximising (cream skimming) behaviour of driver and crew. This finding reflects that service headway is very important in absence of a published timetable and in the context of unreliable waiting time. The estimation of the value of headway is for the first time in the context of Dhaka and this is new evidence for the headway valuation.

Priority seats for women

Maintaining priority seats for women in public buses is an important issue due to religious and cultural values in the context of Bangladesh, which may not be an issue in developed and some of the developing countries. It is interesting that females have utility gain from this attribute, but males have disutility from priority seats for women. Maintaining priority seats for women means less available seats for males and is an issue especially in crowded buses. Therefore, the difference of valuation between males and females for priority seats for women is logical. The WTP value for the percentage of priority seats women is BDT 0.79 for high income females and BDT 0.44 for low income females. Similarly the WTP value for the percentage of priority seats for women is BDT -0.19 for high income male and BDT -0.11 for low income male. This is the first value for this attribute and adds new insight to the soft attribute valuation and the role of gender in soft attribute valuation.

Driving quality

Driving quality is an important bus attribute in the context of Dhaka. The WTP value for the dummy variable 'jerky but safe journey' is BDT 7.42 for the high income group and BDT 4.14 for the low income group. The WTP value for the dummy variable 'smooth and safe journey' is BDT 15.14 for the high income group and BDT 8.44 for the low income group. These are the new values and add new insight to existing knowledge.

Crowding inside the bus

Crowding inside the bus is an important attribute in Dhaka and there is a significant variation of WTP value for males and females. For females, the WTP value for the dummy variable standing comfortably all the way is BDT 15.95 for the high income group and BDT 8.89 for the low income group. Similarly, for males, the WTP value for the dummy variable 'standing comfortably all the way' is BDT 9.04 for the high income group and BDT 5.04 for the low income group.

Again, for female, the WTP value for the dummy variable 'seating all the way' is BDT 42.20 for high income group and BDT 23.52 for low income group. The WTP value for the dummy variable 'seating all the way' is BDT 32.53 for high income males and

BDT 17.01 for low income males. There is evidence of valuation of crowding in term of load factor. However, this interaction is a new finding for soft attribute valuation and it will add new insight to the existing knowledge.

Cleanliness inside the bus

Cleanliness inside the bus is an important bus attribute and the WTP value for the dummy variable 'deck and seats are clean and tidy' is BDT 8.27 for the high income group and BDT 4.61 for the low income group. This is a new value in the context of Dhaka.

10.4 Variation of valuation among key segments of population

The third research objective was to investigate the influence of three important socio-demographic attributes of respondents on key bus attributes. These are income, gender and household car ownership. The interaction of income with cost attribute, the interaction of gender with crowding inside the bus, and priority seats for women were statistically significant. However, the interaction of household car ownership on any of the bus attributes was not statistically significant.

For model A2, the interaction coefficient of income on cost is 0.0535 and the default cost coefficient is for low income group is -0.124. So, the cost coefficient for high income group is -0.0705. The willingness-to-pay (WTP) for high income group is 76% higher than the values for low income group. Similarly, for model B2, the interaction coefficient of income on cost is 0.0382 and the cost coefficient for low income group is -0.0863 by default, so the cost coefficient for high income group is -0.0481. Therefore, the willingness-to-pay (WTP) for high income group is 79% higher than that of the low income group. It can be noted that both models estimate a similar variation of valuation between the low and high income group which is an important test of consistency for the values estimated by two separate models.

From the focus groups, as discussed in Chapter 5, it was found that female participants were highly concerned about two attributes of the bus system in Dhaka, namely the provision of a certain percent of priority seats for women in the public bus and crowding inside the bus. The crowding inside bus acts as a barrier for the females to use bus and priority seats for women or female only bus cab help overcoming the problems faced by the female passengers in Dhaka. As a result, the interaction of gender on the priority seats for women and crowding inside bus were tested in model B. Interestingly, interaction of gender on both the attributes were statistically significant and this result confirms the findings of the focus group.

The interaction coefficient of gender on priority seats for women is -0.0475 and the default coefficient of priority seats for women is 0.0382 for female. As a result, the coefficient of priority seats for women is -0.0093 for males. Females gain utility from priority seats for women, but males gain disutility from priority seats for females. It is logical, priority seats for female means less seats for males in the bus.

Similarly, the interaction coefficient of gender on crowding inside the bus is -0.563; the coefficient of crowding for female is 2.03 by default. As a result, the coefficient of crowding inside the bus is 1.467 for males. This means that females' valuation of crowding is 38% higher than for males. There is evidence of segmented valuation for different income groups and different passengers' class (business, standard, leisure etc) and mode specific (train, underground, bus etc) valuation. However, segmented values of soft attributes depending on gender are new and add insight to present understanding of soft attribute valuation.

10.5 Individual taste heterogeneity for bus attributes in Dhaka

The fourth research objective was to examine the individual taste heterogeneity for the attribute valuation especially for the soft attributes. Every individual is a different entity for the valuation of attributes and it is logical to show individual taste heterogeneity. This objective was achieved by the development of discrete choice models by simulation that allowed the estimation of coefficients for individual respondents (Train, 2003). The so-called mixed logit models (MXL), gave the opportunity to examine individual taste heterogeneity for individual attribute valuation.

Therefore, to meet the fourth research objective, MXL models with normal distribution were developed and presented as model A2 for A set of attributes and model B2 for B set of attributes, as presented in Table 9.3 and Table 9.4 respectively. All of the quantitative attributes showed significant taste variation as explained in detail in Section 9.8. From the standard normal distribution the percentage of coefficients having opposite signs were checked for all of the attributes having significant taste heterogeneity.

For quantitative attributes, there was significant taste heterogeneity as expected given that individual's attributes have established influence on the valuation of quantitative attributes. The four quantitative attributes under examination were travel cost, travel time, wait time and headway. From the examination of taste heterogeneity, it was determined that all of the attributes had significant taste variation but interestingly all of the coefficients had expected negative signs. This means there is significant variation of degree of disutility that respondents gain from these attributes which is logical.

In the examination of individual taste variation for qualitative attributes it was found that a considerable amount of coefficients for some qualitative attributes had an opposite sign which was very difficult to explain. For example, about a fifth of low income respondents had negative sign for dummy variable bus stop with shed and seating. The explanation for this variation was shown in Section 9.8. The prevailing socio-political environment can help explain this unusual taste variation.

Therefore, it can be noted that a significant number of coefficients for the same attribute have an opposite sign. Only the normal socioeconomic and demographic attributes of respondents and trip characteristics may not be able to explain these unexpected taste variations. New socioeconomic and demographic attributes of the respondents, as well as the context specific socio-political situation, can help explain this unexpected taste heterogeneity.

10.6 Policy implications of this research

There is no explicit policy documentation for urban bus operation and management in Dhaka. There is fare regulation, but regulatory oversight is limited. However, research findings have highlighted bus system issues with important policy implications. High willingness-to-pay (WTP) for the improvement of bus attributes indicates that the present level of service is very poor and there is a demand for high quality bus service even with a higher fare. However, a flat fare regulation policy that has an impact on quality of bus service is against the introduction of price quality differentials, and it needs to be changed.

The attributes came from the ‘within market competition’ structure in a highly fragmented bus market such as ’picking up and dropping off passengers’, ’boarding and alighting facilities’, ’driving quality’ have high valuation. The ’within market competition structure in a fragmented market, in the absence of defined service quality, is primarily responsible for these attributes. Bus quality standards should be defined and monitored by the competent regulatory authority. A ’competition for market’ structure with predefined standards under appropriate contracting arrangement could help improve the quality of bus service. Therefore, the existing ’within market competition’ structure could be replaced by ’competition for market’ structure with basic standards for bus operation to meet the requirement of participating in the tendering process.

The current regulatory guidelines for bus market consolidation are not effective in the absence an of appropriate economic and financial incentive mechanism to encourage consolidation (see in Chapter 2). A policy allowing 'competition for market' with appropriate contracting arrangement ensuring incentives for companies with larger bus fleet, high quality vehicles, qualified drivers and professional management is recommended.

The significant variation of willingness-to-pay (WTP) depending on income demonstrates that, although there is a demand for improved quality of service, there is still a need for a basic low cost transport service that should be maintained. A targeted subsidy system could be introduced as a policy tool. The interaction of gender with some attributes (such as crowding inside the bus and percent priority seats for women) of the bus system shows that there is a significant difference of need from the bus system between males and females. As a result, the policy should address the need of females and other users group with special needs.

10.7 Contribution to knowledge

The evidence of bus attribute valuation using stated choice models is limited from cities in developing countries. There is evidence of quantitative attribute valuation, generally value of time, but qualitative attribute valuation is not as common. The development of robust choice models in this study, using a new dataset, shows that stated choice experiments can be successfully used in developing countries. The values of time generated in this study are comparable with existing evidence. The models are robust and the values of other attributes are logical and consistent with the importance and satisfaction ratings, as well as with the findings of focus groups. The values for both qualitative and quantitative attributes generated in Chapter 9 are contextually novel and add to the existing knowledge base, especially for the valuation of soft attributes in the context of cites within developing countries.

The value of waiting time and headway for bus service are the first values estimated for Dhaka. Similarly the values estimated for qualitative attributes including: bus stop facilities, ease of boarding and alighting, picking up and dropping off passengers, priority seats for women, driving quality, crowding inside the bus and cleanliness inside the bus are the first estimates for Dhaka. These willingness-to-pay (WTP) values provide valuable information in the context of cities within developing countries. The only previous studies of qualitative attributes in Dhaka valued air conditioning and crowding inside the bus using load factor (Alam et al, 1999 and Hoque, 2005). The significant interaction of gender with two qualitative attributes such as priority seats for women and crowding inside the bus is a particularly new, relevant finding that enhances existing knowledge of soft attribute valuation.

10.8 Limitation of the research and scope of further research

As there is less evidence of qualitative bus attribute valuation in cities within developing countries, the intention was to estimate WTP for as many qualitative attributes as possible. Two separate models were developed using the Dhaka data and only cost attribute was common in both models in order to accommodate more qualitative attributes. Therefore, data could not be pooled to develop a combined single model which is a limitation of this study. In addition, the travel time attribute was not included in the same model where there was a headway attribute. As a result, the value of headway could not be compared with the value of travel time from the same model.

Further study should examine more quantitative attributes such as travel time, and waiting time, along with headway, that could give more reliable headway values. The considerable amount of taste heterogeneity for qualitative attributes is also worth further investigation. More evidence generated from a stated choice study in Dhaka would enrich the evidence of bus attribute valuation in Bangladesh, as well as other cities in developing countries.

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Appendix A:

A copy of the Dhaka Transport Survey 2013 questionnaire – English and Bengali

SECTION A: GENERAL INFORMATION ABOUT YOUR DAILY TRAVEL ALONG THE CORRIDOR

Q1. How often do you use the following methods of travel for any kind of journey on the Uttara-Mohakhali-Ramna-Sadarghat corridor? It does not necessarily mean that you have to travel all the way from Uttara to Sadarghat or from Sadarghat to Uttara to answer the question. Travel on any part of the corridor will do. *Please tick **one** box for each method.*

	3 or more days a week	1-2 days a week	1-3 days a month	less than 12 days a year	Never
Double decker					
Large bus					
Mini bus					
Human hauler*					
Micro bus					
Taxicab					
CNG (3 wheelers)					
Rickshaw					
Car**					
Car with payment***					
Motorcycle					
Bicycle					
Walking					

* Human hauler means all paratransits including MAXI, RIDER, DURONTO, and LEGUNA
** Car includes utility vehicles and sports utility vehicles
*** Car with payment means trip in someone else's car with an agreed fare for the trip

Please write down most frequently used mode (bus) from above table____________________________
Please answer following questions for your most recent bus trip on the corridor; if you never travel by any type of bus in last one year then you please go to Q31 to answer next questions

Q2. What was the main purpose of the trip? *Please tick **one** box*

To work	☐	Education	☐	Visiting friend	☐	Shopping	☐
Leisure*	☐	Escorting**	☐	Other	☐		

*Leisure includes going out, going for a walk, going for fun. **Escort means going with someone, say; with child to school, with patient to doctor or hospital.

Other: Please explain: ____

Q3. Did you need to change buses during the trip?

Yes	☐	No	☐

Q4. If yes, how many times?

once	☐	Twice	☐	More than two	☐

Q5. Where did you start your journey from? (address/location):

House No.		Area/Ward	
Road No.		Thana& Post Code	

Q6. Where did you travel to? (address/location):

House No.		Area/Ward	
Road No.		Thana& Post Code	

Q7. Name of the bus stop you started your journey: ____________________________

Q8. How did you get to the bus stop? *Please tick **one** box*

Walk	☐	Rickshaw	☐	By car	☐	Other	☐

Other: (please explain)____

Q09. How long did it take to get to the bus stop? ________________________ (minutes)

Q10. If you used rickshaw, what was the rickshaw fare? _____________________ (BDT)

Q11. How long did you wait for the bus? ____________________________ (minutes)

Q12. How long did the bus part of the journey take? ____________________ (minutes)

Q13. What was the bus fare? ____________________________________ (BDT)

Answer the next question if you changed bus (if not go to Q26):

Q14 Name of 1st change bus stop ______________________________________

Q15. How long did you wait for the bus? ___________________________ (minutes)

Q16. How long did the bus part of the journey take? ___________________ (minutes)

Q17. What was the bus fare? ___________________________________ (BDT)

Answer the next questions if you changed bus for second time (if not go to Q26):

Q18. Name of the 2nd change bus stop ____

Q19. How long did you wait for the bus? ______________________________ (minutes)

Q20. How long did the bus part of the journey take? ______________________ (minutes)

Q21. What was the bus fare? ____ (BDT)

Answer the next questions if you changed bus for third time (if not go to Q26):

Q22. Name of the 3rd change bus stop____

Q23. How long did you wait for the bus? ______________________________ (minutes)

Q24. How long did the bus part of the journey take? _______________________ (minutes)

Q25. What was the bus fare? ____ (BDT)

Q26. Name of final destination bus stop____

Q27. How did you get to the destination from the bus stop? *Please tick **one** box*

Walk	☐	Rickshaw	☐	By car	☐	Other	☐

Other: (please explain)____

Q28. If you used rickshaw, what was the rickshaw fare? ____________________ (Taka)

Q29. How long did it take to get to your destination from the bus stop? _________ (minutes)

Q30. Why did you use bus for your main means of travel?

Cheaper than other alternatives	☐	Safer than other alternative	☐	No alternative	☐
More environmentally friendly compared to car	☐	Other	☐		

Other: (please explain)____

Please go to Section B

Q31. Why do you not use bus as a means of travel? *Please tick **one** box*

More expensive	☐	Unsafe	☐	poor servise	☐
Not environment friendly	☐	Have a car	☐	Other	☐

Other: ____

SECTION B. BUS SERVICE QUALITY

We are interested in the importance of attributes of bus system and your level of satisfaction with the existing service. Even if you never use bus we are still interested in your opinions.

Q32. **IMPORTANCE RATING:**

Could you please rate the following attributes of bus service in Dhaka according to their importance to you in choosing a bus service in a scale of seven **(7: EXTREMELY IMPORTANT 1: NOT AT ALL)**? *Please tick **one** box for each attribute*

Attributes	Not at all						Extremely important
One way bus fare level	1	2	3	4	5	6	7
Frequency	1	2	3	4	5	6	7
Priority seats for women	1	2	3	4	5	6	7
Crowding inside the bus	1	2	3	4	5	6	7
Driving quality	1	2	3	4	5	6	7
Crew behaviour	1	2	3	4	5	6	7
Cleanliness inside bus	1	2	3	4	5	6	7
Journey time	1	2	3	4	5	6	7
Waiting time	1	2	3	4	5	6	7
Bus stop facilities	1	2	3	4	5	6	7
Picking up and dropping off passenger	1	2	3	4	5	6	7
Ease of boarding and alighting	1	2	3	4	5	6	7
Air conditioning	1	2	3	4	5	6	7

Q33. **SATISFACTION/PERCEPTION RATING:**

Could you please rate the following attributes of bus service in Dhaka according to your satisfaction in scale of 7 **(3: HIGHLY SATISFIED 0: NEITHER SATISFIED NOR DISSATISFIED -3: HIGHLY DISSATISFIED)**? *Please tick **one** box for each attribute*

Attributes	Highly dissatisfied			dissatisfied			Highly satisfied
One way bus fare level	-3	-2	1	0	1	2	3
Frequency	-3	-2	1	0	1	2	3
Priority seats for women	-3	-2	1	0	1	2	3
Crowding inside the bus	-3	-2	-1	0	1	2	3
Driving quality	-3	-2	-1	0	1	2	3
Crew behaviour	-3	-2	-1	0	1	2	3
Cleanliness inside bus	-3	-2	-1	0	1	2	3
Journey time	-3	-2	-1	0	1	2	3
Waiting time	-3	-2	-1	0	1	2	3
Bus stop facilities	-3	-2	-1	0	1	2	3
Picking up and dropping off passenger	-3	-2	-1	0	1	2	3
Ease of boarding and alighting	-3	-2	-1	0	1	2	3
Air conditioning	-3	-2	-1	0	1	2	3

SECTION C. YOU AND YOUR HOUSEHOLD

Please could you tell us about yourself?

Q34. Are you male or female? *Please tick **one** box*

Male	☐	Female	☐

Q35. Please state your age (years). *Please tick **one** box*

16-20 yrs	☐	41-50 yrs	☐	<70 yrs	☐
21-30 yrs	☐	51-60 yrs	☐		
31-40 yrs	☐	61-70 yrs	☐		

Q36. Which of the following best describe your monthly gross household income (BD Taka)? *Please tick **one** box*

Below 5,000	☐	25,001-35,000	☐	55001-65,000	☐
5,000-15,000	☐	35,001-45,000	☐	65,001-75,000	☐
15,001-25,000	☐	45,001-55,000	☐	Over 75,000	☐

Q37. Access to transport (Number of following in your household) *Please tick a box*

Car	None	☐	One	☐	Two	☐	>Two	☐
Motor cycle	None	☐	One	☐	Two	☐	>Two	☐
Bicycle	None	☐	One	☐	Two	☐	>Two	☐

Q38. Which of the following best describes your current situation? *Please tick one box*

Student	☐	Looking after family	☐	Unemployed	☐
Self employed	☐	Employed	☐	Retired	☐
Other	☐				

Other: (please explain)____

SECTION D: CHOICE EXPERIMENT (CHOICE CARDS)

Q39.Two hypothetical buses (“BUS A” and “BUS B”) have been presented below to choose one; they are different depending on seven attributes as presented in different scenarios everything else is the same. (Please choose one by ticking at the bottom of the choice card)

Scenario 1	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 20% lower than current fare	Bus fare is 60% higher than current fare
A bus every 5 minutes	A bus every 10 minutes
30% female seats reserved in this bus	30% female seats reserved in this bus
You will be sitting all the way	You will be standing in a crush
Unskilled driver, unsafe journey	Skilled driver rough journey
Unfriendly and rude crew behaviour	Unfriendly and rude crew behaviour
Deck and seats of the bus are dirty and messy	Deck and seats of the bus are dirty and messy
☐	☐

Scenerio 2	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is same as now	Bus fare is 20% lower than current fare
A bus every 5 minutes	A bus every 25 minutes
10% female seats reserved in this bus	30% female seats reserved in this bus
You will be sitting all the way	You will be standing comfortably
Skilled driver safe journey	Unskilled driver, unsafe journey
Friendly and sober crew behaviour	Unfriendly and rude crew behaviour
Deck and seats of the bus are dirty and messy	Deck and seats of the bus are dirty and messy
☐	☐

Scenario 3	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 20% lower than current fare	Bus fare is 20% lower than current fare
A bus every 10 minutes	A bus every 25 minutes
10% female seats reserved in this bus	30% female seats reserved in this bus
You will be standing in a crush	You will be standing in a crush
Skilled driver rough journey	Skilled driver safe journey
Unfriendly and rude crew behaviour	Friendly and sober crew behaviour
Deck and seats of the bus are clean and tidy	Deck and seats of the bus are clean and tidy
☐	☐

Scenario 4	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 60% higher than current fare	Bus fare is 60% higher than current fare
A bus every 10 minutes	A bus every 10 minutes
20% female seats reserved in this bus	10% female seats reserved in this bus
You will be standing in a crush	You will be sitting all the way
Skilled driver safe journey	Unskilled driver, unsafe journey
Unfriendly and rude crew behaviour	Unfriendly and rude crew behaviour
Deck and seats of the bus are dirty and messy	Deck and seats of the bus are clean and tidy
☐	☐

Scenario 5	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 20% lower than current fare	Bus fare is 20% higher than current fare
A bus every 25 minutes	A bus every 25 minutes
10% female seats reserved in this bus	10% female seats reserved in this bus
you will be standing comfortably	you will be standing comfortably
Skilled driver safe journey	Skilled driver rough journey
Unfriendly and rude crew behaviour	Friendly and sober crew behaviour
Deck and seats of the bus are dirty and messy	Deck and seats of the bus are dirty and messy

Scenatio 6	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 20% higher than current fare	Bus fare is 20% lower than current fare
A bus evcery 25 minutes	A bus every 25 minutes
30% female seats reserved in this bus	30% female seats reserved in this bus
You will be sitting all the way	You will be sitting all the way
Unskilled driver, unsafe journey	Unskilled driver, unsafe journey
Friendly and sober crew behaviour	Friendly and sober crew behaviour
Deck and seats of the bus are clean and tidy	Deck and seats of the bus are clean and tidy

Scenario 7	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 20% higher than current fare	Bus fare is 40% higher than current fare
A bus every 5 minutes	A bus every 5 minutes
30% female seats reserved in this bus	10% female seats reserved in this bus
You will be standing in a crush	You will be standing comfortably
Skilled driver safe journey	Skilled driver safe journey
Friendly and sober crew behaviour	Friendly and sober crew behaviour
Deck and seats of the bus are clean and tidy	Deck and seats of the bus are clean and tidy

Scenatio 8	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 60% higher than current fare	Bus fare is 60% higher than current fare
A bus every 10 minutes	A bus every 10 minutes
30% female seats reserved in this bus	30% female seats reserved in this bus
You will be sitting all the way	You will be sitting all the way
Skilled driver rough journey	Skilled driver safe journey
Unfriendly and rude crew behaviour	Friendly and sober crew behaviour
Deck and seats of the bus are dirty and messy	Deck and seats of the bus are dirty and messy

Scenario 9	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 60% higher thann current fare	Bus fare is 20% lower than current fare
A bus every10 minutes	A bus every 5 minutes
30% female seats reserved in this bus	10% female seats reserved in this bus
You will be standing comfortably	You will be standing in a crush
Skilled driver rough journey	Skilled driver rough journey
Friendly and sober crew behaviour	Friendly and sober crew behaviour
Deck and seats of the bus are clean and tidy	Deck and seats of the bus are clean and tidy

Scenario 10	
BUS SERVICE A	**BUS SERVICE B**
Bus fare is 20% higher than current fare	Bus fare is 60% higher than current fare
A bus every 25 minutes	A bus every 5 minutes
10% female seats reserved in this bus	30% female seats reserved in this bus
You will be standing comfortably	You will be standing comfortably
Unskilled driver, unsafe journey	Skilled driver safe journey
Unfriendly and rude crew behaviour	Unfriendly and rude crew behaviour
Deck and seats of the bus are clean and tidy	Deck and seats of the bus are clean and tidy
☐	☐

Q40 . Did you ignore any/some of the attribute(s)? *Please tick* ***one*** *box*

Yes	☐	No	☐

If yes: Please tick the attribute(s) that you have ignored?

One way bus fare	☐	Frequency	☐
Priority seats for women	☐	Driving quality	☐
Crowding inside the bus	☐	Cleanliness inside bus	☐
Driver and crew behaviour	☐		

SECTION E. ATTITUDE TO BUS SYSTEM IN DHAKA

Q41. To what extent do you agree with these statements? *Please tick **one** box for each statement:* 2: **Strongly agree;** 1: **Agree;** 0: **Neither agree nor disagree;** -1: **Disagree;** -2: **Strongly disagree**

Statements	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Bus fare in Dhaka is comperatively cheap	-2	-1	0	1	2
I do not use bus as the bus frequency is very low	-2	-1	0	1	2
There is no need to keep reserved seats for women	-2	-1	0	1	2
I do not feel much uncomfortable when travelling in a crowded bus	-2	-1	0	1	2
I would not travel by buses that have unskilled driver	-2	-1	0	1	2
I do not care about the behaviour of the crew	-2	-1	0	1	2
I feel very uneasy when I travelin a dirty bus	-2	-1	0	1	2
Huge time is wasted while travelling by a bus	-2	-1	0	1	2
It is boring to wait for a bus	-2	-1	0	1	2
Passengers suffer if there is no shed and shelter in the bus stop	-2	-1	0	1	2
It is difficult to getting on and off the bus for steep stairs in the door	-2	-1	0	1	2
Picking up and dropping off of the passenger should be done smoothly	-2	-1	0	1	2
Many people do not use bus as there is no air conditioning in buses	-2	-1	0	1	2

Q42. Please state any further comments on the questionnaire, including difficulties or problems with any of the questions.

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____

____

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THANK YOU FOR FILLING IN THE QUESTIONNAIRE

SECTION A: GENERAL INFORMATION ABOUT YOUR DAILY TRAVEL IN THE CORRIDOR

Q1. How often do you use the following methods of travel for any kind of journey on the Uttara-Mohakhali-Ramna-Sadarghat corridor for any type of journey? It does not necessarily mean that you have to travel all the way from Uttara to Sadarghat or from Sadarghat to Uttara to answer the question. Travel on any part of the corridor will do. *Please tick **one** box for each method.*

	3 or more days a week	1-2 days a week	1-2 days a month	less than 12 days a year	Never
Double decker					
Large bus					
Mini bus					
Human hauler*					
Micro bus					
Taxicab					
CNG					
Car**					
***Car on payment					
Motorcycle					
Rickshaw					
Bicycle					
Walking					

* Human hauler means all paratransits including MAXY, RIDER, DURONTO, LEGUNA
** Car includes utility vehicles and sport utility vehicles
*** Car on payment means trip by someone's care with agreed fare for a trip

Please write down most frequently used mode on this route________________________________

Please answer following questions for the last trip of your most frequently used bus service, if you never travel by any types of bus in 1 year then you please move straight to Q31 to answer next questions

Q2. What was the purpose of the trip? *Please tick **one** box*

To work	☐	Education	☐	Visiting friend	☐	Shopping	☐
Leisure*	☐	Escorting**	☐	Other	☐		

*Leisure includes going out, going for a walk, going for fun. **Going with someone, say with child to school, with patient to doctor or hospital.

Other: Please explain: ____

Q3. Did you have change buses for the trip?

Yes	☐	No	☐

Q4. If yes, how many times?

once	☐	Twice	☐	More than two	☐

Q5. Where did you start your journey from? (address/location):

House No.		Area/Ward	
Road No.		Thana& Post Code	

Q6. Where did you travel to? (address/location):

House No.		Area/Ward	
Road No.		Thana& Post Code	

Q7. Name of the bus stop you started your journey: ______________________________

Q8. How did you get to the bus stop? *Please tick **one** box*

Walk	☐	Rickshaw	☐	By car	☐	Other	☐

Other: (please explain)____

Q9. How long did it take to get to the bus stop? ________________________ (minutes)

Q10. If you used rickshaw, what was the rickshaw fare? _____________________ (BDT)

Q11. How long did you wait for the bus? _____________________________ (minutes)

Q12. How long did the bus part of the journey take? ____________________ (minutes)

Q13. What was the bus fare? ______________________________________ (BDT)

Answer the next question if you changed bus (if not go to Q26):

Q14. Name of 1st change bus stop ________________

Q15. How long did you wait for the bus? ____________________________ (minutes)

Q16. How long did the bus part of the journey take? ____________________ (minutes)

Q17. What was the bus fare? ______________________________________ (BDT)

Answer the next question if you changed bus for second time (if not go to Q26):

Q18. Name of the 2nd change bus stop ____________________

Q19. How long did you wait for the bus? ___________________________________ (minutes)

Q20. How long did the bus part of the journey take? __________________________ (minutes)

Q21. What was the bus fare? ____ (BDT)

Answer the next question if you changed bus for third time (if not go to Q26):

Q22. Name of the 3rd change bus stop____________________

Q23. How long did you wait for the bus? ____________________________________ (minutes)

Q24. How long did the bus part of the journey take? ___________________________ (minutes)

Q25. What was the bus fare? ____ (BDT)

Q26. Name of final destination bus stop____

Q27. How did you get to the destination from the bus stop? *Please tick **one** box*

Walk	☐	Rickshaw	☐	By car	☐	Other	☐

Other: (please explain)____

Q28. If you used rickshaw, what was the rickshaw fare? ________________________ (Taka)

Q29. How long did it take to get to your destination from the bus stop? ___________ (minutes)

Q30. Why did you use bus for your main method of travel?

Cheaper than other mode	☐	Safer than other mode	☐	No alternative	☐
Less congestion/pollution	☐	Other	☐		

Other: (please explain)____

Please go to Section B

Q31. Why did you not use bus as a mean of your travel? *Please tick **one** box*

Expensive	☐	Unsafe	☐	poor servise	☐
Takes longer time	☐	Have a car	☐	Other	☐

Other: ____

SECTION B. BUS SERVICE QUALITY

We are interested in the importance of some of the attributes of bus system and the level of satisfaction from the existing service. If you never use bus we are interested in your perception about the attribute.

Q32. **IMPORTANCE RATING:**

Could you please rate the following attributes of bus service in Dhaka according to their importance to you in choosing an alternative bus service in a scale of seven **(7: EXTREMELY IMPORTANT 1: NOT AT ALL)**? *Please tick **one** box for each attribute*

Attributes	Not at all						Extremely important
One way bus fare level	1	2	3	4	5	6	7
Frequency	1	2	3	4	5	6	7
Priority seats for women	1	2	3	4	5	6	7
Crowding inside the bus	1	2	3	4	5	6	7
Driving quality	1	2	3	4	5	6	7
Crew behaviour	1	2	3	4	5	6	7
Cleanliness inside bus	1	2	3	4	5	6	7
Journey time	1	2	3	4	5	6	7
Waiting time	1	2	3	4	5	6	7
Bus stop facilities	1	2	3	4	5	6	7
Picking up and dropping off passenger	1	2	3	4	5	6	7
Ease of boarding and alighting	1	2	3	4	5	6	7
Air conditioning	1	2	3	4	5	6	7

Q33. **SATISFACTION/PERCEPTION RATING:**

Could you please rate the following attributes of bus service in Dhaka according to your satisfaction in scale of 7 **(3: HIGHLY SATISFIED 0: NEITHER SATISFIED NOR DISSATISFIED -3: HIGHLY DISSATISFIED)**? *Please tick **one** box for each attribute*

Attributes	Highly dissatisfied			dissatisfied			Highly satisfied
One way bus fare level	-3	-2	1	0	1	2	3
Frequency	-3	-2	1	0	1	2	3
Priority seats for women	-3	-2	1	0	1	2	3
Crowding inside the bus	-3	-2	-1	0	1	2	3
Driving quality	-3	-2	-1	0	1	2	3
Crew behaviour	-3	-2	-1	0	1	2	3
Cleanliness inside bus	-3	-2	-1	0	1	2	3
Journey time	-3	-2	-1	0	1	2	3
Waiting time	-3	-2	-1	0	1	2	3
Bus stop facilities	-3	-2	-1	0	1	2	3
Picking up and dropping off passenger	-3	-2	-1	0	1	2	3
Ease of boarding and alighting	-3	-2	-1	0	1	2	3
Air conditioning	-3	-2	-1	0	1	2	3

SECTION C. YOU AND YOUR HOUSEHOLD

Please could you tell us about yourself?

Q34. Are you a male or a female? *Please tick **one** box*

Male	☐	Female	☐

Q35. Please state your age band (years). *Please tick **one** box*

16-20 yrs	☐	41-50 yrs	☐	<70 yrs	☐
21-30 yrs	☐	51-60 yrs	☐		
31-40 yrs	☐	61-70 yrs	☐		

Q36. Which of the following best describe your monthly gross household income (BD Taka)? *Please tick **one** box*

Below 5,000	☐	25,001-35,000	☐	55001-65,000	☐
5,000-15,000	☐	35,001-45,000	☐	65,001-75,000	☐
15,001-25,000	☐	45,001-55,000	☐	Over 75,000	☐

Q37. Access to car (Number of car/motorcycle in your household) *Please tick a box*

Car	No	☐	One	☐	Two	☐	>Two	☐
Motor cycle	No	☐	One	☐	Two	☐	>Two	☐
Bicycle	No	☐	One	☐	Two	☐	>Two	☐

Q38. Which of the following best describes your current situation? *Please tick one box*

Student	☐	Looking after Family	☐	Unemployed	☐
Business person	☐	Employed	☐	Retired	☐
Other	☐				

Other: (please explain)____

SECTION D: CHOICE EXPERIMENT (CHOICE CARDS)

Q39.Two hypothetical buses (“BUS A” and “BUS B”) have been presented below to choose one; they are different depending on seven attributes as presented in different scenarios. (please choose one by ticking at the bottom of the choice card)

Scenario 1			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	20% less fare as now	60% more fare as now
2	Travel time	20% less time as now	60% more time as now
3	Waiting time (minutes)	10 minutes	10 minutes
4	Bus stop facilities	shelter with seating	No shelter at all
5	Ease of boarding and alighting	Steep steps in the door	Shallw steps in the door
6	Picking and dropping passengers	Bus stops properly at designated places	Picks and drops passengers on moving
7	Air conditioning	Air conditioning	Air conditioning
	I would choose	☐	☐

Scenario 2			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	20% less fare as now	20% less fare as now
2	Travel time	20% less time as now	20% more time as now
3	Waiting time (minutes)	10	10
4	Bus stop facilities	No shelter at all	shelter with seating
5	Ease of boarding and alighting	Steep steps in the door	Shallw steps in the door
6	Picking and dropping passengers	Picks and drops passengers on moving	Picks and drops passengers on moving
7	Air conditioning	Without air conditioning	Air conditioning
	I would choose	☐	☐

Scenario 3			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	20% more fare than now	20% more fare as now
2	Travel time	60% more time than now	20% more time as now
3	Waiting time	30 minutes	10 minutes
4	Bus stop facilities	No shelter at all	No shelter at all
5	Ease of boarding and alighting	Shallw steps in the door	Low floor no steps
6	Picking and dropping passengers	Picks and drops passengers on moving	Bus stops properly at designated places
7	Air conditioning	Without air conditioning	Without air conditioning
	I would choose	☐	☐

Scenario 4			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	20% less fare as now	20% less fare as now
2	Travel time	60% more time as now	60% more time as now
3	Waiting time (minutes)	10 minutes	30 minutes
4	Bus stop facilities	shelter with seating	No shelter at all
5	Ease of boarding and alighting	Low floor no steps	Steep steps in the door
6	Picking and dropping passengers	Picks and drops passengers on moving	Picks and drops passengers on moving
7	Air conditioning	Without air conditioning	Air conditioning
	I would choose		

Scenario 5			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	60% more fare as now	20% less fare as now
2	Travel time	60% more time as now	20% more time as now
3	Waiting time (minutes)	20 minutes	30
4	Bus stop facilities	Shelter but no seating	shelter with seating
5	Ease of boarding and alighting	Shallw steps in the door	Shallw steps in the door
6	Picking and dropping passengers	Bus stops properly at designated places	Picks and drops passengers on moving
7	Air conditioning	Air conditioning	Without air conditioning
	I would choose		

Scenario 6			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	20% less fare as as now	60% more fare as now
2	Travel time	60% more time as now	20% more time as now
3	Waiting time (minutes)	10 minutes	30 minutes
4	Bus stop facilities	shelter with seating	Shelter but no seating
5	Ease of boarding and alighting	Shallw steps in the door	Low floor no steps
6	Picking and dropping passengers	Picks and drops passengers on moving	Bus stops properly at designated places
7	Air conditioning	Air conditioning	Without air conditioning
	I would choose		

Scenario 7			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	60% more fare as now	20% less fare as now
2	Travel time	20% less time as now	60% more time as now
3	Waiting time (minutes)	30 minutes	30 minutes
4	Bus stop facilities	No shelter at all	Shelter but no seating
5	Ease of boarding and alighting	Low floor no steps	Steep steps in the door
6	Picking and dropping passengers	Bus stops properly at designated places	Picks and drops passengers on moving
7	Air conditioning	Air conditioning	Without air conditioning
	I would choose		

Scenario 8			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	60% more fare as now	60% more fare as now
2	Travel time	20% more time as now	80% current time
3	Waiting time (minutes)	30 minutes	30 minutes
4	Bus stop facilities	Shelter but no seating	shelter with seating
5	Ease of boarding and alighting	Low floor no steps	Low floor no steps
6	Picking and dropping passengers	Bus stops properly at designated places	Bus stops properly at designated places
7	Air conditioning	Air conditioning	Air conditioning
I would choose		☐	☐

Scenario 9			
1	One way bus fare	20% less as now	60% more fare as now
2	Travel time	20% more time as now	60% more time as now
3	Waiting time (minutes)	30 minutes	10 minutes
4	Bus stop facilities	Shelter but no seating	No shelter at all
5	Ease of boarding and alighting	Shallw steps in the door	Steep steps in the door
6	Picking and dropping passengers	Picks and drops passengers on moving	Bus stops properly at designated places
7	Air conditioning	Air conditioning	Air conditioning
I would choose		☐	☐

Scenario 10			
Serial	**Attributes**	**BUS A**	**BUS B**
1	One way bus fare	60% more fare as now	60% more fare as now
2	Travel time	60% more time as now	60% more time as now
3	Waiting time (minutes)	30 minutes	10 minutes
4	Bus stop facilities	shelter with seating	Shelter but no seating
5	Ease of boarding and alighting	Steep steps in the door	Steep steps in the door
6	Picking and dropping passengers	Picks and drops passengers on moving	Picks and drops passengers on moving
7	Air conditioning	Without air conditioning	Air conditioning
I would choose		☐	☐

Q.40 Did you ignore any/some of the attribute(s)? *Please tick **one** box*

Yes	☐	No	☐

If yes: Please tick the attribute(s) that you have ignored?

One way bus fare	☐	Frequency	☐
Priority seats for women	☐	Driving quality	☐
Crowding inside the bus	☐	Cleanliness inside bus	☐
Driver and crew behaviour	☐		

SECTION E. ATTITUDE TO BUS SYSTEM IN DHAKA

Q41. To what extent do you agree with these statements? *Please tick **one** box for each statement*

2: **Strongly agree;** 1: **Agree;** 0: **Neither agree nor disagree;** -1: **Disagree;** -2: **Strongly disagree**

Statements	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Bus fare in Dhaka is comperatively cheap	-2	-1	0	1	2
I do not use bus as the bus frequency is very low	-2	-1	0	1	2
There is no need to keep reserved seats for women	-2	-1	0	1	2
I do not feel much uncomfortable when travelling in a crowded bus	-2	-1	0	1	2
I would not travel by buses that have unskilled driver	-2	-1	0	1	2
I do not care about the behaviour of the crew	-2	-1	0	1	2
I feel very uneasy when I travelin a dirty bus	-2	-1	0	1	2
Huge time is wasted while travelling by a bus	-2	-1	0	1	2
It is boring to wait for a bus	-2	-1	0	1	2
Passengers suffer if there is no shed and shelter in the bus stop	-2	-1	0	1	2
It is difficult to getting on and off the bus for steep stairs in the door	-2	-1	0	1	2
Picking up and dropping off of the passenger should be done smoothly	-2	-1	0	1	2
Many people do not use bus as there is no air conditioning in buses	-2	-1	0	1	2

Q42. Please state any further comments on the questionnaire, including difficulties or problems with any of the questions.

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THANK YOU FOR FILLING IN THE QUESTIONNAIRE

Loughborough University

ঢাকা নগর পরিবহন জরিপ '২০১৩'

অংশ 'ক' আপনার দৈনন্দিন ভ্রমন সংক্রান্ত তথ্যাদি ঃ-

উত্তরা-সদরঘাট রাস্তায় (করিডোরে) আপনার দৈনন্দিন ভ্রমন সর্ম্পকে জানতে চাই

প্রশ্ন ১ ঃ উত্তরা-বনানী-মহাখালী-রমনা-সদরঘাট সড়কে (করিডোরে) যেকোন ভ্রমনের জন্য নিম্নলিখিত মাধ্যমগুলো আপনি কি হারে ব্যবহার করেন ?

এই প্রশ্নের উত্তরের জন্য আজ থেকে গত এক বছরের ভ্রমণ বিবেচনা করুন, এবং উল্লেখ্য যে, উত্তরা থেকে সদরঘাট পর্যন্ত পুরো করিডোর ভ্রমনের দরকার নেই। এই করিডোরের যে কোন অংশে ভ্রমন করলেই চলবে। অনুগ্রহ করে প্রত্যেক মাধ্যমের জন্য একটি করে বক্সে টিক চিহ্ন দিন।

	সপ্তাহের অধিকাংশ দিন (৩ ও ৩ দিনের অধিক)	সপ্তাহে এক-দুই দিন	মাসে এক থেকে তিন দিন	বছরে দুই-একবার (বছরে ১২ দিনের কম)	কখনওনা
১। দ্বিতল বাস	৫	৪	৩	২	১
২। বড় বাস	৫	৪	৩	২	১
৩। মিনি বাস	৫	৪	৩	২	১
৪। হিউম্যান হলার*	৫	৪	৩	২	১
৫। মাইক্রোবাস	৫	৪	৩	২	১
৬। ট্যাক্সিক্যাব	৫	৪	৩	২	১
৭। সিএনজি	৫	৪	৩	২	১
৮। রিক্সা	৫	৪	৩	২	১
৯। প্রাইভেট কার**	৫	৪	৩	২	১
১০। ভাড়ায় প্রাইভেট কার***	৫	৪	৩	২	১
১১। মটরসাইকেল	৫	৪	৩	২	১
১২। বাইসাইকেল	৫	৪	৩	২	১
১৩। পায়েহাটা	৫	৪	৩	২	১

*হিউম্যান হলার মানে ম্যাক্সি, রাইডার, দুরন্ত, লেগুনা ইত্যাদি। ** প্রাইভেট কার মানে কার সহ সকল পাজেরো, নিশান ও অন্যান্য প্রাইভেট গাড়ি। *** ভাড়ায় প্রাইভেট কার মানে অন্যের প্রাইভেট কারে টাকা দিয়ে ভ্রমন

উপরের ছকে সর্বাধিক ব্যবহৃত গণমাধ্যমটি চিহ্নিত করুন এবং এখানে লিখুন ----------
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আপনার সর্বাধিক ব্যবহৃত গণপরিবহনের সর্বশেষ ট্রিপ সম্পর্কে বিস্তারিত জানতে চাই। (আপনি যদি গত ১ বছরে কখনোও গণপরিবহন ব্যবহার না করেন তাহলে সরাসরি প্রশ্ন ৩১ এ চলে যান। না হলে নিম্নেবর্ণিত প্রশ্নগুলোর উত্তর দিন।)

প্রশ্ন ২ ঃ উক্ত ভ্রমনের উদ্দেশ্য কি ছিল ? অনুগ্রহ করে টিক দিন।

১	কাজে যাওয়া	৪	কেনাকাটা	৭	অন্যান্য
২	স্কুল/কলেজ	৫	বিনোদন*	ব্যাখ্যা করুনঃ --------	
৩	বেড়াতে যাওয়া	৬	সাথে যাওয়া**	--------------------	

*যে কোন বিনোদনের জন্য ভ্রমন, ** স্কুল/কলেজগামী ছাত্রদের স্কুল/কলেজে আনা-নেয়া বা রোগীর সংগে ডাক্তারের কাছে বা হাসপাতালে যাওয়া-আসা ইত্যাদি

প্রশ্ন ৩ ঃ উক্ত ভ্রমনের জন্য বাস/টেম্পু বদল করেছেন কি না?

১	হাঁ	২	না

প্রশ্ন ৪ ঃ হাঁ হলে কতবার?

১	১ বার	২	২ বার	৩	>২বার

প্রশ্ন ৫ ঃ উক্ত ভ্রমন কোথা থেকে শুরু করেছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৬ ঃ অনুগ্রহ করে বলবেন কি আপনি কোথায় গিয়েছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৭ ঃ যাত্রা শুরুর বাসস্টপের নামঃ --

প্রশ্ন ৮ ঃ বাসস্টপে/টেম্পু স্টপে কিভাবে গিয়েছিলেন?

১	পায়ে হেঁটে	২	রিক্সা	৩	প্রাইভেট কার	৪	অন্যান্য

অন্যান্য (৪)ঃ ব্যাখ্যা করুনঃ --

প্রশ্ন ৯ ঃ বাস/টেম্পু স্টপে যেতে কতক্ষণ সময় লেগেছিল? -----------------মিঃ

প্রশ্ন ১০ ঃ রিক্সা হলে ভাড়া কত ছিল ? -----------------------------------টাকা

প্রশ্ন ১১ ঃ বাস/টেম্পুর জন্য কতক্ষণ অপেক্ষা করেছিলেন? ----------------মিঃ

প্রশ্ন ১২ ঃ বাসে/টেম্পুতে কতক্ষণ সময় লেগেছিল? -----------------------মিঃ

প্রশ্ন ১৩ ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-------------------------------টাকা

(বাস/টেম্পু ১ম পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৪ঃ যে স্টপে ১ম বার বাস বদল করেছেন তার নামঃ ---------------------

প্রশ্ন ১৫ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? -------------------মিনিট

প্রশ্ন ১৬ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? -----------------------------মিনিট

প্রশ্ন ১৭ঃ বাস/টেম্পুর ভাড়া কত ছিল ?--------------------------------টাকা

(বাস/টেম্পু ২য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৮ঃ যে স্টপে ২য় বার বাস বদল করেছেন তার নামঃ ------------------------

প্রশ্ন ১৯ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ২০ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল ? ------------------------------মিনিট

প্রশ্ন ২১ঃ বাস/টেম্পুর ভাড়া কত ছিল ?----------------------------------টাকা

(বাস/টেম্পু ৩য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ২২ঃ যে স্টপে ৩য় বার বাস বদল করেছেন তার নামঃ -----------------------

প্রশ্ন ২৩ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ২৪ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? --------------------------------মিনিট

প্রশ্ন ২৫ঃ বাস/টেম্পুর ভাড়া কত ছিল ?----------------------------------টাকা

প্রশ্ন ২৬ঃ গন্তব্য বাসস্টপের নামঃ ---

প্রশ্ন ২৭ ঃ বাস/টেম্পুস্টপ থেকে গন্তব্যে গিয়েছিলেন কিভাবে ?

১	পায়ে হেঁটে	২	রিক্সা	৩	কার	৪	অন্যান্য

অন্যান্য ঃ (৪) ব্যাখ্যা করুন --

প্রশ্ন ২৮ ঃ রিক্সা হলে ভাড়া কত ছিল ? ------------------------------------টাকা

প্রশ্ন ২৯ ঃ গন্তব্যে যেতে কতক্ষণ সময় লেগেছিল ? ------------------------মিঃ

প্রশ্ন ৩০ ঃ যে কারনে আপনি বাস/টেম্পুতে ভ্রমন করেছিলেন? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাস সবচেয়ে সস্তা	৩	কোন বিকল্প নেই	৫	অন্যান্যঃ
২	বাস সবচেয়ে নিরাপদ	৪	প্রাইভেট কারের চেয়ে পরিবেশ বান্ধব	(৫) লিখুনঃ--------------- ------------------------	

প্রশ্ন৩১ ঃ যে কারনে আপনি বাসে ভ্রমন করেন নাই? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাসের ভাড়া বেশী	৩	সার্ভিস ভাল নয়	৫	নিজের প্রাইভেট কার আছে
২	বাস নিরাপদ নয়	৪	বাসে অনেক সময় লাগে	৬	অন্যান্যঃ (লিখুন)----------- --------------------------- ---------------------------

অংশ 'খ' ঃ যেমন বাস সার্ভিস আপনার পছন্দঃ

ঢাকা শহরের বাসসার্ভিস এর মানোন্নয়নের লক্ষ্যে বাস সার্ভিসের বিভিন্ন বৈশিষ্ট্য সর্ম্পকে আমরা আপনার মতামত জানতে চাই।

প্রশ্ন ৩২ ঃ গুরুত্বের মূল্যায়ন ঃ- আপনি কোনো বাস ভ্রমনের পূর্বে কোনো বাস সার্ভিসের নিম্নলিখিত বৈশিষ্ট্যগুলো কেমন গুরুত্বের সাথে বিবেচনা করেন ? সাত সংখ্যার স্কেলে মূল্যায়র করুন। যেখানে **৭= সর্বাধিক গুরুত্বপুর্ন ১=সর্বনিম্ন গুরুত্বপুর্ন** ।

বৈশিষ্ট্য	গুরুত্ব						
১ বাসের ভাড়া	১	২	৩	৪	৫	৬	৭
২ দুইটি বাস ছাড়ার মধ্যের সময়	১	২	৩	৪	৫	৬	৭
৩ মহিলাদের জন্য সংরক্ষিত আসন	১	২	৩	৪	৫	৬	৭
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	১	২	৩	৪	৫	৬	৭
৫ বাস চালানোর ধরণ	১	২	৩	৪	৫	৬	৭
৬ চালক ও হেলপারের ব্যবহার	১	২	৩	৪	৫	৬	৭
৭ বাসের ভিতরের পরিচ্ছন্নতা	১	২	৩	৪	৫	৬	৭
৮ ভ্রমনের সময়	১	২	৩	৪	৫	৬	৭
৯ অপেক্ষার সময়	১	২	৩	৪	৫	৬	৭
১০ বাসস্টপের সুবিধাসমূহ	১	২	৩	৪	৫	৬	৭
১১ যাত্রী উঠানো ও নামানোর ধরণ	১	২	৩	৪	৫	৬	৭
১২ হেলপার/টিকেট মাস্টারের আচরন	১	২	৩	৪	৫	৬	৭
১৩ এয়ার কন্ডিশনের ব্যবস্থা	১	২	৩	৪	৫	৬	৭

প্রশ্ন ৩৩ ঃ সন্তুষ্টির মূল্যায়ন ঃ ঢাকা শহরে বাস ভ্রমনের অভিজ্ঞতা/ধারনা থেকে কোন বাস সার্ভিসের নিলিখিত বৈশিষ্ট্য সম্পর্কে আপনার সন্তুষ্টি ৭ (সাত) সংখ্যার স্কেলের মূল্যায়ন করুন। **(-৩= মোটেও সন্তুষ্ট না ৩= খুবই সন্তুষ্ট)**

বৈশিষ্ট্য	সন্তুষ্টি						
১ বাসের ভাড়া	-৩	-২	-১	০	১	২	৩
২ দুইটি বাস ছাড়ার মধ্যের সময়	-৩	-২	-১	০	১	২	৩
৩ মহিলাদের জন্য সংরক্ষিত আসন	-৩	-২	-১	০	১	২	৩
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	-৩	-২	-১	০	১	২	৩
৫ বাস চালানোর ধরণ	-৩	-২	-১	০	১	২	৩
৬ চালক ও হেলপারের ব্যবহার	-৩	-২	-১	০	১	২	৩
৭ বাসের ভিতরের পরিচ্ছন্নতা	-৩	-২	-১	০	১	২	৩
৮ ভ্রমনের সময়	-৩	-২	-১	০	১	২	৩
৯ অপেক্ষার সময়	-৩	-২	-১	০	১	২	৩
১০ বাসস্টপের সুবিধাসমূহ	-৩	-২	-১	০	১	২	৩
১১ যাত্রী উঠানো ও নামানোর ধরণ	-৩	-২	-১	০	১	২	৩
১২ হেলপার/টিকেট মাস্টারের আচরন	-৩	-২	-১	০	১	২	৩
১৩ এয়ার কন্ডিশনের ব্যবস্থা	-৩	-২	-১	০	১	২	৩

সেকশন.গ ঃ আপনার এবং আপনার পরিবার সংক্রান্ত তথ্যাদি

অনুগ্রহ করে আপনার সম্পর্কে কিছু বলুন।

প্রশ্ন ৩৪ ঃ আপনি ?

১	পুরুষ	২	এহিলা

প্রশ্ন ৩৫ ঃ আপনার বয়স (বছর)

১	১৬-২০বঃ	৩	৩১-৪০বঃ	৫	৫১-৬০বঃ	৭	>৭০বঃ
২	২১-৩০বঃ	৪	৪১-৫০বঃ	৬	৬১-৭০বঃ		

প্রশ্ন ৩৬ ঃ আপনার মোট পারিবারিক আয় (টাকা)?

১	>৫০০০	৪	২৫০০০-৩৫০০০	৭	৫৫০০১-৬৫০০০
২	৫০০১-১৫০০০	৫	৩৫০০১-৪৫০০০	৮	৬৫০০১-৭৫০০০
৩	১৫০০১-২৫০০০	৬	৪৫০০১-৫৫০০০	৯	<৭৫০০০

প্রশ্ন ৩৭ ঃ পারিবারিক মালিকানাধীন মোটর গাড়ীর সংখ্যা ?

প্রাইভেট কার	০	নাই	১	১টি	২	২টি	৩	>২টি
মোটর সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি
বাই-সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি

প্রশ্ন ৩৮ ঃ আপনার পেশা ?

১	ছাত্র/ছাত্রী	৩	সাংসারিক কাজ	৫	বেকার	৭	অন্যান্য
২	ব্যবসায়ী	৪	চাকুরিজীবী	৬	রিটায়ার্ড		-------------

সেকশন ঘ ঃ চয়েস পরীক্ষণ

প্রশ্ন ৩৯ ঃ তুলনামুলক চিত্রের মাধ্যমে দুইটি বাস সার্ভিস উপস্থাপন করা হল (বাসসার্ভিস-১ এবং বাসসার্ভিস-২) সার্ভিস দুইটি সাতটি নির্দিষ্ট বৈশিষ্টের বিচারে আলাদা কিন্তু অন্যান্য বৈশিষ্ট্যগুলো একই।। আপনার নিজের সার্বিক অবস্থার (অর্থনৈতিক, সামাজিক, পরিপ্রেক্ষিত) বিচারে একটি বাস বার্ভিস পছন্দ করতে বললে আপনি কোনটি পছন্দ করবেন যার ফলে আপনি সর্বোচ্চ লাভবান হয়েছেন বলে মনে করবেন? আপনার পছন্দের সার্ভিসটির জন্য নির্দিষ্ট যায়গায় টিক চিহ্ন দিন ।

চিত্র- ১	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ কম হবে	এই বাসের ভড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসে ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসে ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৩	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৪	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ২০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৫	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৬	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৭	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি হবে না
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৮	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিবিহীন নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৯	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১০	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে	এই বাসের ভাঁড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

প্রশ্ন ঃ ৪০ উপরোক্ত চয়েস কার্ড সমুহ পূরণ করার সময় বর্নিত কোন বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন কিনা?

যদি হ্যাঁ হয় ঃ যে বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন তার পাশে টিক চিহ্ন দিন।

১	বাসের ভাড়া	৪	বাসের মধ্যে ভিড়	৭	বাসের পরিচ্ছন্নতা
২	বাস ছাড়ার হার	৫	বাস চালানোর ধরণ		
৩	মহিলা আসন	৬	হেলপার/টিকেট মস্টারের ব্যবহার		

অংশ 'ঙ'ঃ ঢাকা শহরের বাস সার্ভিসের বৈশিষ্ট্য

ঢাকা শহরের বাস সার্ভিসের বিভিন্ন বৈশিষ্ট এবং সার্বিকভাবে বাস সার্ভিসের গুনগত মান সম্পর্কে আপনার অনুভূতি জানতে আগ্রহী।

প্রশ্ন ৪১ ঃ নিম্নবর্ণিত কথার সাথে আপনি কি পরিমান একমত/দ্বিমত পোষন করেন। (-২ থেকে +২ এর স্কেলে মূল্যায়ন করুন যেখানে **২=সম্পূর্ণ একমত, -২=সম্পুর্ণ দ্বিমত**)

১	ঢাকা শহরে বাসের ভাড়া তুলনামূলকভাবে কম।	-২	-১	০	১	২
২	অনেক পর পর বাস ছাড়ে তাই আমি বাসে যাতায়াত করি না।	-২	-১	০	১	২
৩	মহিলাদের জন্য বাসে সংরক্ষিত আসন রাখার দরকার নাই।	-২	-১	০	১	২
৪	গাদাগাদি করে বাসে যাতায়াত করতে তেমন অসুবিধা হয় না।	-২	-১	০	১	২
৫	যে বাসের চালক দক্ষ না আমি সেই বাসে ভ্রমন করব না।	-২	-১	০	১	২
৬	টিকেট মাস্টার/হেলপারের আচরণ নিয়ে আমি মাথা ঘামাই না।	-২	-১	০	১	২
৭	অপরিচ্ছন্ন বাসে যাতায়াত করতে খুব অসহ্য লাগে।	-২	-১	০	১	২
৮	বাসে যাতায়াতের জন্য অনেক সময় অপচয় হয়।	-২	-১	০	১	২
৯	বাসের জন্য অপেক্ষা করা খুব বিরক্তিকর।	-২	-১	০	১	২
১০	বাসস্টপে যাত্রী ছাউনী না থাকায় যাত্রীদের ভোগান্তি হয়।	-২	-১	০	১	২
১১	বাসের সিড়ির ধাপগুলো খাড়া হওয়ায় ওঠানামার অসুবিধা হয়।	-২	-১	০	১	২
১২	নির্দিষ্ট স্থানে সুন্দরভাবে বাস থামিয়ে যাত্রী উঠানো/নামানো উচিৎ।	-২	-১	০	১	২
১৩	এয়ারকন্ডিশন না থাকায় অনেকে বাসে যাতায়াত করে না।	-২	-১	০	১	২

প্রশ্ন ঃ ৩১ প্রশ্নপত্র সম্পর্কে আপনার কোন মতামত, যেমন প্রশ্নপত্র পূরণে কোন অসুবিধা, বা কোন প্রশ্ন সম্পর্কে কোন মতামত অথবা যে কোন মন্তব্য ?

মার্চ ২০১৩

প্রিয়, উত্তরদাতা,

আমি মোঃ আব্দুল্লাহ আল মামুন, গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের সড়ক ও জনপথ অধিদপ্তরের একজন নির্বাহী প্রকৌশলী, পাশাপাশি যুক্তরাজ্যের Loughborough University - তে School of Civil and Building Engineering এর অধীন Transport Studies Group - এ পিএইচডি কোর্সের একজন গবেষক। ঢাকা শহরের বাস সার্ভিসের যাত্রীসেবার মানোন্নয়নের জন্য একটি নীতিমালা প্রণয়নই আমার গবেষণার মূল বিষয়বস্তু। এই গবেষনার অংশ হিসেবে উত্তরা থেকে সাতরাস্তা, রমনা হয়ে সদরঘাট পর্যন্ত রাস্তার দুই পাশের এলাকার অধিবাসী যারা সাধারণভাবে এই রাস্তা ব্যবহার করেন তাদের উপর এই জরিপটি পরিচালনা করতে চাই।

একদল জরিপকারী আমার পক্ষে এই জরিপকাজ আমার তত্ত্বাবধানে পরিচালনা করবেন। এই জরিপে আপনার মতামত ও অভিজ্ঞতা এই গবেষণার জন্য খুবই গুরুত্বপূর্ণ কারন এই গবেষণার ফলাফল সরকারের যথাযথ কর্তৃপক্ষ এবং পরিবহণ সংশ্লিষ্ট সকলকে জানানো হবে। আপনাকে নিশ্চিত করছি যে এই জরিপে আপনার প্রদত্ব যে কোন মতামত ও তথ্যাদি সর্বোচ্চ গোপনীয়তা রক্ষা করে ব্যবহার করা হবে। প্রশ্নপত্রটি পূরণ করতে ৪০ থেকে ৪৫ মিনিট সময় লাগবে।

প্রশ্নপত্র পূরণে সহযোগীতা করার জন্য আপনাকে আগাম ধন্যবাদ।

মোঃ আব্দুলাহ আল মামুন

গবেষক
ও
নির্বাহী প্রকৌশলী
(প্রধান প্রকৌশলীর দপ্তর সংলগ্ন ছুটি, প্রেষণ ও প্রশিক্ষনজনিত সংরক্ষিত সিভিল পদ)
সড়ক ভবন, রমনা, ঢাকা ১০০০
সড়ক ও জনপথ অধিদপ্তর

এই গবেষণা বা জরিপ সংক্রান্ত যে কোন যোগাযোগঃ
মোঃ আব্দুল্লাহ আল মামুন
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Loughborough University

ঢাকা নগর পরিবহন জরিপ '২০১৩'

অংশ 'ক' আপনার দৈনন্দিন ভ্রমন সংক্রান্ত তথ্যাদি ঃ-

উত্তরা-সদরঘাট রাস্তায় (করিডোরে) আপনার দৈনন্দিন ভ্রমন সর্ম্পকে জানতে চাই

প্রশ্ন ১ ঃ উত্তরা-বনানী-মহাখালী-রমনা-সদরঘাট সড়কে (করিডোরে) যেকোন ভ্রমনের জন্য নিম্নলিখিত মাধ্যমগুলো আপনি কি হারে ব্যবহার করেন ?

এই প্রশ্নের উত্তরের জন্য আজ থেকে গত এক বছরের ভ্রমণ বিবেচনা করুন, এবং উল্লেখ্য যে, উত্তরা থেকে সদরঘাট পর্যন্ত পুরো করিডোর ভ্রমনের দরকার নেই। এই করিডোরের যে কোন অংশে ভ্রমন করলেই চলবে। অনুগ্রহ করে প্রত্যেক মাধ্যমের জন্য একটি করে বক্সে টিক চিহ্ন দিন।

	সপ্তাহের অধিকাংশ দিন (৩ ও ৩ দিনের অধিক)	সপ্তাহে এক-দুই দিন	মাসে এক থেকে তিন দিন	বছরে দুই-একবার (বছরে ১২ দিনের কম)	কখনওনা
১। দ্বিতল বাস	৫	৪	৩	২	১
২। বড় বাস	৫	৪	৩	২	১
৩। মিনি বাস	৫	৪	৩	২	১
৪। হিউম্যান হলার*	৫	৪	৩	২	১
৫। মাইক্রোবাস	৫	৪	৩	২	১
৬। ট্যাক্সিক্যাব	৫	৪	৩	২	১
৭। সিএনজি	৫	৪	৩	২	১
৮। রিক্সা	৫	৪	৩	২	১
৯। প্রাইভেট কার**	৫	৪	৩	২	১
১০। ভাড়ায় প্রাইভেট কার***	৫	৪	৩	২	১
১১। মটরসাইকেল	৫	৪	৩	২	১
১২। বাইসাইকেল	৫	৪	৩	২	১
১৩। পায়েহাটা	৫	৪	৩	২	১

*হিউম্যান হলার মানে ম্যাক্সি, রাইডার, দুরন্ত, লেগুনা ইত্যাদি। ** প্রাইভেট কার মানে কার সহ সকল পাজেরো, নিশান ও অন্যান্য প্রাইভেট গাড়ি। *** ভাড়ায় প্রাইভেট কার মানে অন্যের প্রাইভেট কারে টাকা দিয়ে ভ্রমন

উপরের ছকে সর্বাধিক ব্যবহৃত গণমাধ্যমটি চিহ্নিত করুন এবং এখানে লিখুন ----------
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আপনার সর্বাধিক ব্যবহৃত গণপরিবহনের সর্বশেষ ট্রিপ সম্পর্কে বিস্তারিত জানতে চাই। (আপনি যদি গত ১ বছরে কখনোও গণপরিবহন ব্যবহার না করেন তাহলে সরাসরি প্রশ্ন ৩১ এ চলে যান। না হলে নিম্নেবর্ণিত প্রশ্নগুলোর উত্তর দিন।)

প্রশ্ন ২ ঃ উক্ত ভ্রমনের উদ্দেশ্য কি ছিল ? অনুগ্রহ করে টিক দিন।

১	কাজে যাওয়া	৪	কেনাকাটা	৭	অন্যান্য
২	স্কুল/কলেজ	৫	বিনোদন*	ব্যাখ্যা করুনঃ --------	
৩	বেড়াতে যাওয়া	৬	সাথে যাওয়া**	--------------------	

*যে কোন বিনোদনের জন্য ভ্রমন, ** স্কুল/কলেজগামী ছাত্রদের স্কুল/কলেজে আনা-নেয়া বা রোগীর সংগে ডাক্তারের কাছে বা হাসপাতালে যাওয়া-আসা ইত্যাদি

প্রশ্ন ৩ ঃ উক্ত ভ্রমনের জন্য বাস/টেম্পু বদল করেছেন কি না?

১	হ্যাঁ	২	না

প্রশ্ন ৪ ঃ হ্যাঁ হলে কতবার?

১	১ বার	২	২ বার	৩	>২বার

প্রশ্ন ৫ ঃ উক্ত ভ্রমন কোথা থেকে শুরু করেছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৬ ঃ অনুগ্রহ করে বলবেন কি আপনি কোথায় গিয়েছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৭ ঃ যাত্রা শুরুর বাসস্টপের নামঃ --

প্রশ্ন ৮ ঃ বাসস্টপে/টেম্পু স্টপে কিভাবে গিয়েছিলেন?

১	পায়ে হেঁটে	২	রিক্সা	৩	প্রাইভেট কার	৪	অন্যান্য

অন্যান্য (৪)ঃ ব্যাখ্যা করুনঃ --

প্রশ্ন ৯ ঃ বাস/টেম্পু স্টপে যেতে কতক্ষণ সময় লেগেছিল? -----------------মিঃ

প্রশ্ন ১০ ঃ রিক্সা হলে ভাড়া কত ছিল ? ----------------------------------টাকা

প্রশ্ন ১১ ঃ বাস/টেম্পুর জন্য কতক্ষণ অপেক্ষা করেছিলেন? -----------------মিঃ

প্রশ্ন ১২ ঃ বাসে/টেম্পুতে কতক্ষণ সময় লেগেছিল? -----------------------মিঃ

প্রশ্ন ১৩ ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-------------------------------টাকা

(বাস/টেম্পু ১ম পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৪ঃ যে স্টপে ১ম বার বাস বদল করেছেন তার নামঃ ---------------------

প্রশ্ন ১৫ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? -------------------মিনিট

প্রশ্ন ১৬ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? -----------------------------মিনিট

প্রশ্ন ১৭ঃ বাস/টেম্পুর ভাড়া কত ছিল ?--------------------------------টাকা

(বাস/টেম্পু ২য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৮ঃ যে স্টপে ২য় বার বাস বদল করেছেন তার নামঃ ------------------------

প্রশ্ন ১৯ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ২০ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল ? ----------------------------মিনিট

প্রশ্ন ২১ঃ বাস/টেম্পুর ভাড়া কত ছিল ?---------------------------------টাকা

(বাস/টেম্পু ৩য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ২২ঃ যে স্টপে ৩য় বার বাস বদল করেছেন তার নামঃ -----------------------

প্রশ্ন ২৩ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ২৪ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? -------------------------------মিনিট

প্রশ্ন ২৫ঃ বাস/টেম্পুর ভাড়া কত ছিল ?---------------------------------টাকা

প্রশ্ন ২৬ঃ গন্তব্য বাসস্টপের নামঃ --

প্রশ্ন ২৭ ঃ বাস/টেম্পুস্টপ থেকে গন্তব্যে গিয়েছিলেন কিভাবে ?

১	পায়ে হেঁটে	২	রিক্সা	৩	কার	৪	অন্যান্য

অন্যান্য ঃ (৪) ব্যাখ্যা করুন --

প্রশ্ন ২৮ ঃ রিক্সা হলে ভাড়া কত ছিল ? -----------------------------------টাকা

প্রশ্ন ২৯ ঃ গন্তব্যে যেতে কতক্ষণ সময় লেগেছিল ? ------------------------মিঃ

প্রশ্ন ৩০ ঃ যে কারনে আপনি বাস/টেম্পুতে ভ্রমন করেছিলেন? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাস সবচেয়ে সস্তা	৩	কোন বিকল্প নেই	৫	অন্যান্যঃ
২	বাস সবচেয়ে নিরাপদ	৪	প্রাইভেট কারের চেয়ে পরিবেশ বান্ধব	(৫) লিখুনঃ---------------	

প্রশ্ন৩১ ঃ যে কারনে আপনি বাসে ভ্রমন করেন নাই? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাসের ভাড়া বেশী	৩	সার্ভিস ভাল নয়	৫	নিজের প্রাইভেট কার আছে
২	বাস নিরাপদ নয়	৪	বাসে অনেক সময় লাগে	৬	অন্যান্যঃ (লিখুন)----------- --------------------------- ---------------------------

অংশ 'খ' ঃ যেমন বাস সার্ভিস আপনার পছন্দঃ

ঢাকা শহরের বাসসার্ভিস এর মানোন্নয়নের লক্ষ্যে বাস সার্ভিসের বিভিন্ন বৈশিষ্ট্য সর্ম্পকে আমরা আপনার মতামত জানতে চাই।

প্রশ্ন ৩২ ঃ গুরুত্বের মূল্যায়ন ঃ- আপনি কোনো বাস ভ্রমনের পূর্বে কোনো বাস সার্ভিসের নিন্মলিখিত বৈশিষ্ট্যগুলো কেমন গুরুত্বের সাথে বিবেচনা করেন ? সাত সংখ্যার স্কেলে মূল্যায়র করুন। যেখানে **৭= সর্বাধিক গুরুত্বপুর্ন ১=সর্বনিন্ম গুরুত্বপুর্ন** ।

বৈশিষ্ট্য	গুরুত্ব						
১ বাসের ভাড়া	১	২	৩	৪	৫	৬	৭
২ দুইটি বাস ছাড়ার মধ্যের সময়	১	২	৩	৪	৫	৬	৭
৩ মহিলাদের জন্য সংরক্ষিত আসন	১	২	৩	৪	৫	৬	৭
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	১	২	৩	৪	৫	৬	৭
৫ বাস চালানোর ধরণ	১	২	৩	৪	৫	৬	৭
৬ চালক ও হেলপারের ব্যবহার	১	২	৩	৪	৫	৬	৭
৭ বাসের ভিতরের পরিচ্ছন্নতা	১	২	৩	৪	৫	৬	৭
৮ ভ্রমনের সময়	১	২	৩	৪	৫	৬	৭
৯ অপেক্ষার সময়	১	২	৩	৪	৫	৬	৭
১০ বাসস্টপের সুবিধাসমূহ	১	২	৩	৪	৫	৬	৭
১১ যাত্রী উঠানো ও নামানোর ধরণ	১	২	৩	৪	৫	৬	৭
১২ হেলপার/টিকেট মাস্টারের আচরন	১	২	৩	৪	৫	৬	৭
১৩ এয়ার কন্ডিশনের ব্যবস্থা	১	২	৩	৪	৫	৬	৭

প্রশ্ন ৩৩ ঃ সন্তুষ্টির মূল্যায়ন ঃ ঢাকা শহরে বাস ভ্রমনের অভিজ্ঞতা/ধারনা থেকে কোন বাস সার্ভিসের নিলিখিত বৈশিষ্ট্য সম্পর্কে আপনার সন্তুষ্টি ৭ (সাত) সংখ্যার স্কেলের মূল্যায়ন করুন। (**-৩= মোটেও সন্তুষ্ট না +৩= খুবই সন্তুষ্ট**)

বৈশিষ্ট্য	সন্তুষ্টি						
১ বাসের ভাড়া	-৩	-২	-১	০	১	২	৩
২ দুইটি বাস ছাড়ার মধ্যের সময়	-৩	-২	-১	০	১	২	৩
৩ মহিলাদের জন্য সংরক্ষিত আসন	-৩	-২	-১	০	১	২	৩
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	-৩	-২	-১	০	১	২	৩
৫ বাস চালানোর ধরণ	-৩	-২	-১	০	১	২	৩
৬ চালক ও হেলপারের ব্যবহার	-৩	-২	-১	০	১	২	৩
৭ বাসের ভিতরের পরিচ্ছন্নতা	-৩	-২	-১	০	১	২	৩
৮ ভ্রমনের সময়	-৩	-২	-১	০	১	২	৩
৯ অপেক্ষার সময়	-৩	-২	-১	০	১	২	৩
১০ বাসস্টপের সুবিধাসমূহ	-৩	-২	-১	০	১	২	৩
১১ যাত্রী উঠানো ও নামানোর ধরণ	-৩	-২	-১	০	১	২	৩
১২ হেলপার/টিকেট মাস্টারের আচরন	-৩	-২	-১	০	১	২	৩
১৩ এয়ার কন্ডিশনের ব্যবস্থা	-৩	-২	-১	০	১	২	৩

সেকশন.গ ঃ আপনার এবং আপনার পরিবার সংক্রান্ত তথ্যাদি

অনুগ্রহ করে আপনার সম্পর্কে কিছু বলুন।

প্রশ্ন ৩৪ ঃ আপনি ?

১	পুরুষ	২	মহিলা

প্রশ্ন ৩৫ ঃ আপনার বয়স (বছর)

১	১৬-২০বঃ	৩	৩১-৪০বঃ	৫	৫১-৬০বঃ	৭	>৭০বঃ
২	২১-৩০বঃ	৪	৪১-৫০বঃ	৬	৬১-৭০বঃ		

প্রশ্ন ৩৬ ঃ আপনার মোট পারিবারিক আয় (টাকা)?

১	>৫০০০	৪	২৫০০০-৩৫০০০	৭	৫৫০০১-৬৫০০০
২	৫০০১-১৫০০০	৫	৩৫০০১-৪৫০০০	৮	৬৫০০১-৭৫০০০
৩	১৫০০১-২৫০০০	৬	৪৫০০১-৫৫০০০	৯	<৭৫০০০

প্রশ্ন ৩৭ ঃ পারিবারিক মালিকানাধীন মোটর গাড়ীর সংখ্যা ?

প্রাইভেট কার	০	নাই	১	১টি	২	২টি	৩	>২টি
মোটর সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি
বাই-সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি

প্রশ্ন ৩৮ ঃ আপনার পেশা ?

১	ছাত্র/ছাত্রী	৩	সাংসারিক কাজ	৫	বেকার	৭	অন্যান্য
২	ব্যবসায়ী	৪	চাকুরিজীবী	৬	রিটায়ার্ড		-------------

সেকশন ঘ ঃ চয়েস পরীক্ষণ

প্রশ্ন ৩৯ ঃ তুলনামুলক চিত্রের মাধ্যমে দুইটি বাস সার্ভিস উপস্থাপন করা হল (বাসসার্ভিস-১ এবং বাসসার্ভিস-২) সার্ভিস দুইটি সাতটি নির্দিষ্ট বৈশিষ্টের বিচারে আলাদা কিন্তু অন্যান্য বৈশিষ্ট্যগুলো একই।। আপনার নিজের সার্বিক অবস্থার (অর্থনৈতিক, সামাজিক, পরিপ্রেক্ষিত) বিচারে একটি বাস বার্ভিস পছন্দ করতে বললে আপনি কোনটি পছন্দ করবেন যার ফলে আপনি সর্বোচ্চ লাভবান হয়েছেন বলে মনে করবেন? আপনার পছন্দের সার্ভিসটির জন্য নির্দিষ্ট বক্সে টিক চিহ্ন দিন ।

চিত্র- ১১	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করতে পারে	হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১২	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসে ২০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসে ২০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৩	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপূর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পাওে
বাসের মেঝে ও আসনগুলো অপরিষ্কার হবে	বাসের মেঝে ও আসনগুলো অপরিষ্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৪	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৫	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ১৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপূর্ণ ভ্রমণ হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপূর্ণ ভ্রমণ হবে
এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৬	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপূর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপূর্ণ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৭	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপূর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৮	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ১৯	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসে হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২০	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২০ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসে হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পাওে
এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসে মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

প্রশ্ন ঃ ৪০ উপরোক্ত চয়েস কার্ড সমুহ পূরণ করার সময় বর্নিত কোন বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন কিনা?

যদি হ্যাঁ হয় ঃ যে বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন তার পাশে টিক চিহ্ন দিন।

১	বাসের ভাড়া	৪	বাসের মধ্যে ভিড়	৭	বাসের পরিচ্ছন্নতা
২	বাস ছাড়ার হার	৫	বাস চালানোর ধরণ		
৩	মহিলা আসন	৬	হেলপার/টিকেট মস্টারের ব্যবহার		

অংশ 'ঙ'ঃ ঢাকা শহরের বাস সার্ভিসের বৈশিষ্ট্য

ঢাকা শহরের বাস সার্ভিসের বিভিন্ন বৈশিষ্ট এবং সার্বিকভাবে বাস সার্ভিসের গুনগত মান সম্পর্কে আপনার অনুভূতি জানতে আগ্রহী।

প্রশ্ন ৪১ ঃ নিম্নবর্ণিত কথার সাথে আপনি কি পরিমান একমত/দ্বিমত পোষন করেন। (-২ থেকে +২ এর স্কেলে মূল্যায়ন করুন যেখানে **২=সম্পূর্ণ একমত, -২=সম্পুর্ণ দ্বিমত**)

১	ঢাকা শহরে বাসের ভাড়া তুলনামূলকভাবে কম।	-২	-১	০	১	২
২	অনেক পর পর বাস ছাড়ে তাই আমি বাসে যাতায়াত করি না।	-২	-১	০	১	২
৩	মহিলাদের জন্য বাসে সংরক্ষিত আসন রাখার দরকার নাই।	-২	-১	০	১	২
৪	গাদাগাদি করে বাসে যাতায়াত করতে তেমন অসুবিধা হয় না।	-২	-১	০	১	২
৫	যে বাসের চালক দক্ষ না আমি সেই বাসে ভ্রমন করব না।	-২	-১	০	১	২
৬	টিকেট মাস্টার/হেলপারের আচরণ নিয়ে আমি মাথা ঘামাই না।	-২	-১	০	১	২
৭	অপরিচ্ছন্ন বাসে যাতায়াত করতে খুব অসহ্য লাগে।	-২	-১	০	১	২
৮	বাসে যাতায়াতের জন্য অনেক সময় অপচয় হয়।	-২	-১	০	১	২
৯	বাসের জন্য অপেক্ষা করা খুব বিরক্তিকর।	-২	-১	০	১	২
১০	বাসস্টপে যাত্রী ছাউনী না থাকায় যাত্রীদের ভোগান্তি হয়।	-২	-১	০	১	২
১১	বাসের সিড়ির ধাপগুলো খাড়া হওয়ায় ওঠানামার অসুবিধা হয়।	-২	-১	০	১	২
১২	নির্দিষ্ট স্থানে সুন্দরভাবে বাস থামিয়ে যাত্রী উঠানো/নামানো উচিৎ।	-২	-১	০	১	২
১৩	এয়ারকন্ডিশন না থাকায় অনেকে বাসে যাতায়াত করে না।	-২	-১	০	১	২

প্রশ্ন ঃ ৩১ প্রশ্নপত্র সম্পর্কে আপনার কোন মতামত, যেমন প্রশ্নপত্র পূরণে কোন অসুবিধা, বা কোন প্রশ্ন সম্পর্কে কোন মতামত অথবা যে কোন মন্তব্য ?

মার্চ ২০১৩

প্রিয়, উত্তরদাতা,

আমি মোঃ আব্দুল্লাহ আল মামুন, গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের সড়ক ও জনপথ অধিদপ্তরের একজন নির্বাহী প্রকৌশলী, পাশাপাশি যুক্তরাজ্যের Loughborough University - তে School of Civil and Building Engineering এর অধীন Transport Studies Group - এ পিএইচডি কোর্সের একজন গবেষক। ঢাকা শহরের বাস সার্ভিসের যাত্রীসেবার মানোন্নয়নের জন্য একটি নীতিমালা প্রণয়নই আমার গবেষণার মূল বিষয়বস্তু। এই গবেষনার অংশ হিসেবে উত্তরা থেকে সাতরাস্তা, রমনা হয়ে সদরঘাট পর্যন্ত রাস্তার দুই পাশের এলাকার অধিবাসী যারা সাধারণভাবে এই রাস্তা ব্যবহার করেন তাদের উপর এই জরিপটি পরিচালনা করতে চাই।

একদল জরিপকারী আমার পক্ষে এই জরিপকাজ আমার তত্ত্বাবধানে পরিচালনা করবেন। এই জরিপে আপনার মতামত ও অভিজ্ঞতা এই গবেষণার জন্য খুবই গুরুত্বপূর্ণ কারন এই গবেষণার ফলাফল সরকারের যথাযথ কর্তৃপক্ষ এবং পরিবহণ সংশ্লিষ্ট সকলকে জানানো হবে। আপনাকে নিশ্চিত করছি যে এই জরিপে আপনার প্রদত্ব যে কোন মতামত ও তথ্যাদি সর্বোচ্চ গোপনীয়তা রক্ষা করে ব্যবহার করা হবে। প্রশ্নপত্রটি পূরণ করতে ৪০ থেকে ৪৫ মিনিট সময় লাগবে।

প্রশ্নপত্র পূরণে সহযোগীতা করার জন্য আপনাকে আগাম ধন্যবাদ।

মোঃ আব্দুল্লাহ আল মামুন

গবেষক
ও
নির্বাহী প্রকৌশলী
(প্রধান প্রকৌশলীর দপ্তর সংলগ্ন ছুটি, প্রেষণ ও প্রশিক্ষনজনিত সংরক্ষিত সিভিল পদ)
সড়ক ভবন, রমনা, ঢাকা ১০০০
সড়ক ও জনপথ অধিদপ্তর

এই গবেষণা বা জরিপ সংক্রান্ত যে কোন যোগাযোগঃ
মোঃ আব্দুল্লাহ আল মামুন
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Loughborough University

ঢাকা নগর পরিবহন জরিপ '২০১৩'

অংশ 'ক' আপনার দৈনন্দিন ভ্রমন সংক্রান্ত তথ্যাদি ঃ-

উত্তরা-সদরঘাট রাস্তায় (করিডোরে) আপনার দৈনন্দিন ভ্রমন সর্ম্পকে জানতে চাই

প্রশ্ন ১ ঃ উত্তরা-বনানী-মহাখালী-রমনা-সদরঘাট সড়কে (করিডোরে) যেকোন ভ্রমনের জন্য নিম্নলিখিত মাধ্যমগুলো আপনি কি হারে ব্যবহার করেন ?
এই প্রশ্নের উত্তরের জন্য আজ থেকে গত এক বছরের ভ্রমণ বিবেচনা করুন, এবং উল্লেখ্য যে, উত্তরা থেকে সদরঘাট পর্যন্ত পুরো করিডোর ভ্রমনের দরকার নেই। এই করিডোরের যে কোন অংশে ভ্রমন করলেই চলবে। অনুগ্রহ করে প্রত্যেক মাধ্যমের জন্য একটি করে বক্সে টিক চিহ্ন দিন।

	সপ্তাহের অধিকাংশ দিন (৩ ও ৩ দিনের অধিক)	সপ্তাহে এক-দুই দিন	মাসে এক থেকে তিন দিন	বছরে দুই-একবার (বছরে ১২ দিনের কম)	কখনওনা
১। দ্বিতল বাস	৫	৪	৩	২	১
২। বড় বাস	৫	৪	৩	২	১
৩। মিনি বাস	৫	৪	৩	২	১
৪। হিউম্যান হলার*	৫	৪	৩	২	১
৫। মাইক্রোবাস	৫	৪	৩	২	১
৬। ট্যাক্সিক্যাব	৫	৪	৩	২	১
৭। সিএনজি	৫	৪	৩	২	১
৮। রিক্সা	৫	৪	৩	২	১
৯। প্রাইভেট কার**	৫	৪	৩	২	১
১০। ভাড়ায় প্রাইভেট কার***	৫	৪	৩	২	১
১১। মটরসাইকেল	৫	৪	৩	২	১
১২। বাইসাইকেল	৫	৪	৩	২	১
১৩। পায়েহাটা	৫	৪	৩	২	১

*হিউম্যান হলার মানে ম্যাক্সি, রাইডার, দুরন্ত, লেগুনা ইত্যাদি। ** প্রাইভেট কার মানে কার সহ সকল পাজেরো, নিশান ও অন্যান্য প্রাইভেট গাড়ি। *** ভাড়ায় প্রাইভেট কার মানে অন্যের প্রাইভেট কারে টাকা দিয়ে ভ্রমন
উপরের ছকে সর্বাধিক ব্যবহৃত গণমাধ্যমটি চিহ্নিত করুন এবং এখানে লিখুন ----------
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আপনার সর্বাধিক ব্যবহৃত গণপরিবহনের সর্বশেষ ট্রিপ সম্পর্কে বিস্তারিত জানতে চাই। (আপনি যদি গত ১ বছরে কখনোও গণপরিবহন ব্যবহার না করেন তাহলে সরাসরি প্রশ্ন ৩১ এ চলে যান। না হলে নিম্নেবর্ণিত প্রশ্নগুলোর উত্তর দিন।)

প্রশ্ন ২ ঃ উক্ত ভ্রমনের উদ্দেশ্য কি ছিল ? অনুগ্রহ করে টিক দিন।

১	কাজে যাওয়া	৪	কেনাকাটা	৭	অন্যান্য
২	স্কুল/কলেজ	৫	বিনোদন*	ব্যাখ্যা করুনঃ --------	
৩	বেড়াতে যাওয়া	৬	সাথে যাওয়া**	-------------------- --------------------	

*যে কোন বিনোদনের জন্য ভ্রমন, ** স্কুল/কলেজগামী ছাত্রদের স্কুল/কলেজে আনা-নেয়া বা রোগীর সংগে ডাক্তারের কাছে বা হাসপাতালে যাওয়া-আসা ইত্যাদি

প্রশ্ন ৩ ঃ উক্ত ভ্রমনের জন্য বাস/টেম্পু বদল করেছেন কি না?

১	হ্যাঁ	২	না

প্রশ্ন ৪ ঃ হাঁ হলে কতবার?

১	১ বার	২	২ বার	৩	>২বার

প্রশ্ন ৫ ঃ উক্ত ভ্রমন কোথা থেকে শুরু করেছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৬ ঃ অনুগ্রহ করে বলবেন কি আপনি কোথায় গিয়েছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৭ ঃ যাত্রা শুরুর বাসস্টপের নামঃ --

প্রশ্ন ৮ ঃ বাসস্টপে/টেম্পু স্টপে কিভাবে গিয়েছিলেন?

১	পায়ে হেঁটে	২	রিক্সা	৩	প্রাইভেট কার	৪	অন্যান্য

অন্যান্য (৪)ঃ ব্যাখ্যা করুনঃ --

প্রশ্ন ৯ ঃ বাস/টেম্পু স্টপে যেতে কতক্ষণ সময় লেগেছিল? ------------------মিঃ
প্রশ্ন ১০ ঃ রিক্সা হলে ভাড়া কত ছিল ? ------------------------------------টাকা
প্রশ্ন ১১ ঃ বাস/টেম্পুর জন্য কতক্ষণ অপেক্ষা করেছিলেন? -----------------মিঃ
প্রশ্ন ১২ ঃ বাসে/টেম্পুতে কতক্ষণ সময় লেগেছিল? -----------------------মিঃ
প্রশ্ন ১৩ ঃ বাস/টেম্পুর ভাড়া কত ছিল ?--------------------------------টাকা

(বাস/টেম্পু ১ম পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।
প্রশ্ন ১৪ঃ যে স্টপে ১ম বার বাস বদল করেছেন তার নামঃ ----------------------
প্রশ্ন ১৫ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট
প্রশ্ন ১৬ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? ------------------------------মিনিট
প্রশ্ন ১৭ঃ বাস/টেম্পুর ভাড়া কত ছিল ?---------------------------------টাকা

(বাস/টেম্পু ২য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।
প্রশ্ন ১৮ঃ যে স্টপে ২য় বার বাস বদল করেছেন তার নামঃ -------------------------
প্রশ্ন ১৯ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? ---------------------মিনিট
প্রশ্ন ২০ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল ? -------------------------------মিনিট
প্রশ্ন ২১ঃ বাস/টেম্পুর ভাড়া কত ছিল ?------------------------------------টাকা

(বাস/টেম্পু ৩য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।
প্রশ্ন ২২ঃ যে স্টপে ৩য় বার বাস বদল করেছেন তার নামঃ ------------------------
প্রশ্ন ২৩ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? ---------------------মিনিট
প্রশ্ন ২৪ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? ---------------------------------মিনিট
প্রশ্ন ২৫ঃ বাস/টেম্পুর ভাড়া কত ছিল ?------------------------------------টাকা
প্রশ্ন ২৬ঃ গন্তব্য বাসস্টপের নামঃ ---
প্রশ্ন ২৭ ঃ বাস/টেম্পুস্টপ থেকে গন্তব্যে গিয়েছিলেন কিভাবে ?

১	পায়ে হেঁটে	২	রিক্সা	৩	কার	৪	অন্যান্য

অন্যান্য ঃ (৪) ব্যাখ্যা করুন --

প্রশ্ন ২৮ ঃ রিক্সা হলে ভাড়া কত ছিল ? ---------------------------------টাকা
প্রশ্ন ২৯ ঃ গন্তব্যে যেতে কতক্ষণ সময় লেগেছিল ? -------------------------মিঃ
প্রশ্ন ৩০ ঃ যে কারনে আপনি বাস/টেম্পুতে ভ্রমন করেছিলেন? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাস সবচেয়ে সস্তা	৩	কোন বিকল্প নেই	৫	অন্যান্যঃ
২	বাস সবচেয়ে নিরাপদ	৪	প্রাইভেট কারের চেয়ে পরিবেশ বান্ধব	(৫) লিখুনঃ--------------- ------------------------ ------------------------	

প্রশ্ন৩১ ঃ যে কারনে আপনি বাসে ভ্রমন করেন নাই? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাসের ভাড়া বেশী	৩	সার্ভিস ভাল নয়	৫	নিজের প্রাইভেট কার আছে
২	বাস নিরাপদ নয়	৪	বাসে অনেক সময় লাগে	৬	অন্যান্যঃ (লিখুন)----------- ---------------------------- ----------------------------

অংশ ‘খ’ ঃ যেমন বাস সার্ভিস আপনার পছন্দঃ

ঢাকা শহরের বাসসার্ভিস এর মানোন্নয়নের লক্ষ্যে বাস সার্ভিসের বিভিন্ন বৈশিষ্ট্য সর্ম্পকে আমরা আপনার মতামত জানতে চাই।

প্রশ্ন ৩২ ঃ গুরুত্বের মূল্যায়ন ঃ- আপনি কোনো বাস ভ্রমনের পূর্বে কোনো বাস সার্ভিসের নিম্নলিখিত বৈশিষ্ট্যগুলো কেমন গুরুত্বের সাথে বিবেচনা করেন ? সাত সংখ্যার স্কেলে মূল্যায়র করুন। যেখানে ৭= সর্বাধিক গুরুত্বপূর্ন ১=সর্বনিম্ন গুরুত্বপূর্ন ।

বৈশিষ্ট্য	গুরুত্ব						
১ বাসের ভাড়া	১	২	৩	৪	৫	৬	৭
২ দুইটি বাস ছাড়ার মধ্যের সময়	১	২	৩	৪	৫	৬	৭
৩ মহিলাদের জন্য সংরক্ষিত আসন	১	২	৩	৪	৫	৬	৭
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	১	২	৩	৪	৫	৬	৭
৫ বাস চালানোর ধরণ	১	২	৩	৪	৫	৬	৭
৬ চালক ও হেলপারের ব্যবহার	১	২	৩	৪	৫	৬	৭
৭ বাসের ভিতরের পরিচ্ছন্নতা	১	২	৩	৪	৫	৬	৭
৮ ভ্রমনের সময়	১	২	৩	৪	৫	৬	৭
৯ অপেক্ষার সময়	১	২	৩	৪	৫	৬	৭
১০ বাসস্টপের সুবিধাসমূহ	১	২	৩	৪	৫	৬	৭
১১ যাত্রী উঠানো ও নামানোর ধরণ	১	২	৩	৪	৫	৬	৭
১২ হেলপার/টিকেট মাস্টারের আচরন	১	২	৩	৪	৫	৬	৭
১৩ এয়ার কন্ডিশনের ব্যবস্থা	১	২	৩	৪	৫	৬	৭

প্রশ্ন ৩৩ ঃ সন্তুষ্টির মূল্যায়ন ঃ ঢাকা শহরে বাস ভ্রমনের অভিজ্ঞতা/ধারনা থেকে কোন বাস সার্ভিসের নিলিখিত বৈশিষ্ট্য সম্পর্কে আপনার সন্তুষ্টি ৭ (সাত) সংখ্যার স্কেলের মূল্যায়ন করুন। **(-৩= মোটেও সন্তুষ্ট না ৩= খুবই সন্তুষ্ট)**

বৈশিষ্ট্য	সন্তুষ্টি						
১ বাসের ভাড়া	-৩	-২	-১	০	১	২	৩
২ দুইটি বাস ছাড়ার মধ্যের সময়	-৩	-২	-১	০	১	২	৩
৩ মহিলাদের জন্য সংরক্ষিত আসন	-৩	-২	-১	০	১	২	৩
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	-৩	-২	-১	০	১	২	৩
৫ বাস চালানোর ধরণ	-৩	-২	-১	০	১	২	৩
৬ চালক ও হেলপারের ব্যবহার	-৩	-২	-১	০	১	২	৩
৭ বাসের ভিতরের পরিচ্ছন্নতা	-৩	-২	-১	০	১	২	৩
৮ ভ্রমনের সময়	-৩	-২	-১	০	১	২	৩
৯ অপেক্ষার সময়	-৩	-২	-১	০	১	২	৩
১০ বাসস্টপের সুবিধাসমূহ	-৩	-২	-১	০	১	২	৩
১১ যাত্রী উঠানো ও নামানোর ধরণ	-৩	-২	-১	০	১	২	৩
১২ হেলপার/টিকেট মাস্টারের আচরন	-৩	-২	-১	০	১	২	৩
১৩ এয়ার কন্ডিশনের ব্যবস্থা	-৩	-২	-১	০	১	২	৩

সেকশন.গ ঃ আপনার এবং আপনার পরিবার সংক্রান্ত তথ্যাদি

অনুগ্রহ করে আপনার সম্পর্কে কিছু বলুন।

প্রশ্ন ৩৪ ঃ আপনি ?

১	পুরুষ	২	মহিলা

প্রশ্ন ৩৫ ঃ আপনার বয়স (বছর)

১	১৬-২০বঃ	৩	৩১-৪০বঃ	৫	৫১-৬০বঃ	৭	>৭০বঃ
২	২১-৩০বঃ	৪	৪১-৫০বঃ	৬	৬১-৭০বঃ		

প্রশ্ন ৩৬ ঃ আপনার মোট পারিবারিক আয় (টাকা)?

১	>৫০০০	৪	২৫০০০-৩৫০০০	৭	৫৫০০১-৬৫০০০
২	৫০০১-১৫০০০	৫	৩৫০০১-৪৫০০০	৮	৬৫০০১-৭৫০০০
৩	১৫০০১-২৫০০০	৬	৪৫০০১-৫৫০০০	৯	<৭৫০০০

প্রশ্ন ৩৭ ঃ পারিবারিক মালিকানাধীন মোটর গাড়ীর সংখ্যা ?

প্রাইভেট কার	০	নাই	১	১টি	২	২টি	৩	>২টি
মোটর সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি
বাই-সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি

প্রশ্ন ৩৮ ঃ আপনার পেশা ?

১	ছাত্র/ছাত্রী	৩	সাংসারিক কাজ	৫	বেকার	৭	অন্যান্য
২	ব্যবসায়ী	৪	চাকুরিজীবী	৬	রিটায়ার্ড		-------------

সেকশন ঘ ঃ চয়েস পরীক্ষণ

প্রশ্ন ৩৯ ঃ তুলনামুলক চিত্রের মাধ্যমে দুইটি বাস সার্ভিস উপস্থাপন করা হল বাসসার্ভিস-১ এবং বাসসার্ভিস-১) সার্ভিস দুইটি সাতটি নির্দিষ্ট বৈশিষ্টের বিচারে আলাদা কিন্তু অন্যান্য বৈশিষ্ট্যগুলো একই।। আপনার নিজের সার্বিক অবস্থার (অর্থনৈতিক, সামাজিক, পরিপ্রেক্ষিত) বিচারে একটি বাস বার্ভিস পছন্দ করতে বললে আপনি কোনটি পছন্দ করবেন যার ফলে আপনি সর্বোচ্চ লাভবান হয়েছেন বলে মনে করবেন? আপনার পছন্দের সার্ভিসটির জন্য নির্দিষ্ট বক্সে টিক চিহ্ন দিন ।

চিত্র- ২১	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ২০ মিনিট পর পর বাস পাওয়া যাবে	প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসেরহেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২২	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান বাস ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসে ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসে ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৩	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ১৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত কিন্তু নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৪	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমণ হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমণ হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৫	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ১০ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমণ হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমণ হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৬	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৭	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৮	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ সিটে বসে যেতে পারবেন
এই ভ্রমনটি ঝাকুনিযুক্ত ও ঝুকিপুর্ণ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে	এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ২৯	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ২০ শতাংশ কম হবে
এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই বাসের এই ভ্রমনটি ঝাকুনিবিহীন ও নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পাও
এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো অপরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র- ৩০	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই সার্ভিসে প্রতি ৫ মিনিট পর পর বাস পাওয়া যাবে	এই সার্ভিসে প্রতি ২৫ মিনিট পর পর বাস পাওয়া যাবে
এই সার্ভিসের ১০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে	এই সার্ভিসের ৩০ শতাংশ আসন মহিলাদের জন্য সংরক্ষিত থাকবে
এই বাসে পুরোটা পথ দাঁড়িয়ে যেতে হবে তবে গাদাগাদি/ঠাসাঠসি করে নয়	এই বাসে পুরোটা পথ গাদাগাদি/ঠাসাঠসি করে দাঁড়িয়ে যেতে হবে
এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে	এই ভ্রমনটি ঝাকুনিযুক্ত তবে নিরাপদ ভ্রমন হবে
এই বাসের হেলপার/টিকেট মাস্টার ভদ্র ও মার্জিত ব্যবহার করবে	এই বাসের হেলপার/টিকেট মাস্টার অভদ্র ও অমার্জিত ব্যবহার করতে পারে
এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে	এই বাসের মেঝে ও আসনগুলো পরিস্কার হবে
আমার পছন্দঃ	আমার পছন্দঃ

প্রশ্ন ঃ ৪০ উপরোক্ত চয়েস কার্ড সমুহ পূরণ করার সময় বর্নিত কোন বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন কিনা?

যদি হ্যাঁ হয় ঃ যে বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন তার পাশে টিক চিহ্ন দিন।

১	বাসের ভাড়া	৪	বাসের মধ্যে ভিড়	৭	বাসের পরিচ্ছন্নতা
২	বাস ছাড়ার হার	৫	বাস চালানোর ধরণ		
৩	মহিলা আসন	৬	হেলপার/টিকেট মস্টারের ব্যবহার		

অংশ 'ঙ'ঃ ঢাকা শহরের বাস সার্ভিসের বৈশিষ্ট্য

ঢাকা শহরের বাস সার্ভিসের বিভিন্ন বৈশিষ্ট এবং সার্বিকভাবে বাস সার্ভিসের গুনগত মান সম্পর্কে আপনার অনুভূতি জানতে আগ্রহী।

প্রশ্ন ৪১ ঃ নিম্নবর্ণিত কথার সাথে আপনি কি পরিমান একমত/দ্বিমত পোষন করেন। (-২ থেকে ২ এর স্কেলে মূল্যায়ন করুন যেখানে **২=সম্পূর্ণ একমত, -২=সম্পূর্ণ দ্বিমত**)

১	ঢাকা শহরে বাসের ভাড়া তুলনামূলকভাবে কম।	-২	-১	০	১	২
২	অনেক পর পর বাস ছাড়ে তাই আমি বাসে যাতায়াত করি না।	-২	-১	০	১	২
৩	মহিলাদের জন্য বাসে সংরক্ষিত আসন রাখার দরকার নাই।	-২	-১	০	১	২
৪	গাদাগাদি করে বাসে যাতায়াত করতে তেমন অসুবিধা হয় না।	-২	-১	০	১	২
৫	যে বাসের চালক দক্ষ না আমি সেই বাসে ভ্রমন করব না।	-২	-১	০	১	২
৬	টিকেট মাস্টার/হেলপারের আচরণ নিয়ে আমি মাথা ঘামাই না ।	-২	-১	০	১	২
৭	অপরিচ্ছন্ন বাসে যাতায়াত করতে খুব অসহ্য লাগে।	-২	-১	০	১	২
৮	বাসে যাতায়াতের জন্য অনেক সময় অপচয় হয়।	-২	-১	০	১	২
৯	বাসের জন্য অপেক্ষা করা খুব বিরক্তিকর।	-২	-১	০	১	২
১০	বাসস্টপে যাত্রী ছাউনী না থাকায় যাত্রীদের ভোগান্তি হয়।	-২	-১	০	১	২
১১	বাসের সিড়ির ধাপগুলো খাড়া হওয়ায় ওঠানামার অসুবিধা হয়।	-২	-১	০	১	২
১২	নির্দিষ্ট স্থানে সুন্দরভাবে বাস থামিয়ে যাত্রী উঠানো/নামানো উচিৎ।	-২	-১	০	১	২
১৩	এয়ারকন্ডিশন না থাকায় অনেকে বাসে যাতায়াত করে না।	-২	-১	০	১	২

প্রশ্ন ঃ ৩১ প্রশ্নপত্র সম্পর্কে আপনার কোন মতামত, যেমন প্রশ্নপত্র পূরণে কোন অসুবিধা, বা কোন প্রশ্ন সম্পর্কে কোন মতামত অথবা যে কোন মন্তব্য ?

মার্চ ২০১৩

প্রিয়, উত্তরদাতা,

আমি মোঃ আব্দুল্লাহ আল মামুন, গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের সড়ক ও জনপথ অধিদপ্তরের একজন নির্বাহী প্রকৌশলী, পাশাপাশি যুক্তরাজ্যের Loughborough University - তে অধীন Transport Studies Group - এ পিএইচডি কোর্সের একজন গবেষক। ঢাকা শহরের বাস সার্ভিসের যাত্রীসেবার মানোন্নয়নের জন্য একটি নীতিমালা প্রণয়নই আমার গবেষণার মূল বিষয়বস্তু। এই গবেষনার অংশ হিসেবে উত্তরা থেকে সাতরাস্তা, রমনা হয়ে সদরঘাট পর্যন্ত রাস্তার দুই পাশের এলাকার অধিবাসী যারা সাধারণভাবে এই রাস্তা ব্যবহার করেন তাদের উপর এই জরিপটি পরিচালনা করতে চাই।

একদল জরিপকারী আমার পক্ষে এই জরিপকাজ আমার তত্ত্বাবধানে পরিচালনা করবেন। এই জরিপে আপনার মতামত ও অভিজ্ঞতা এই গবেষণার জন্য খুবই গুরুত্বপূর্ণ কারন এই গবেষণার ফলাফল সরকারের যথাযথ কর্তৃপক্ষ এবং পরিবহণ সংশ্লিষ্ট সকলকে জানানো হবে। আপনাকে নিশ্চিত করছি যে এই জরিপে আপনার প্রদত্ব যে কোন মতামত ও তথ্যাদি সর্বোচ্চ গোপনীয়তা রক্ষা করে ব্যবহার করা হবে। প্রশ্নপত্রটি পূরণ করতে ৪০ থেকে ৪৫ মিনিট সময় লাগবে।

প্রশ্নপত্র পূরণে সহযোগীতা করার জন্য আপনাকে আগাম ধন্যবাদ।

মোঃ আব্দুল্লাহ আল মামুন

গবেষক
ও
নির্বাহী প্রকৌশলী
(প্রধান প্রকৌশলীর দপ্তর সংলগ্ন ছুটি, প্রেষণ ও প্রশিক্ষনজনিত সংরক্ষিত সিভিল পদ)
সড়ক ভবন, রমনা, ঢাকা ১০০০
সড়ক ও জনপথ অধিদপ্তর

এই গবেষণা বা জরিপ সংক্রান্ত যে কোন যোগাযোগঃ
মোঃ আব্দুল্লাহ আল মামুন
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Loughborough University

ঢাকা নগর পরিবহন জরিপ '২০১৩'

অংশ 'ক' আপনার দৈনন্দিন ভ্রমন সংক্রান্ত তথ্যাদি ঃ-

উত্তরা-সদরঘাট রাস্তায় (করিডোরে) আপনার দৈনন্দিন ভ্রমন সর্ম্পকে জানতে চাই

প্রশ্ন ১ ঃ উত্তরা-বনানী-মহাখালী-রমনা-সদরঘাট সড়কে (করিডোরে) যেকোন ভ্রমনের জন্য নিম্নলিখিত মাধ্যমগুলো আপনি কি হারে ব্যবহার করেন ?
এই প্রশ্নের উত্তরের জন্য আজ থেকে গত এক বছরের ভ্রমণ বিবেচনা করুন, এবং উল্লেখ্য যে, উত্তরা থেকে সদরঘাট পর্যন্ত পুরো করিডোর ভ্রমনের দরকার নেই। এই করিডোরের যে কোন অংশে ভ্রমন করলেই চলবে। অনুগ্রহ করে প্রত্যেক মাধ্যমের জন্য একটি করে বক্সে টিক চিহ্ন দিন।

	সপ্তাহের অধিকাংশ দিন (৩ ও ৩ দিনের অধিক)	সপ্তাহে এক-দুই দিন	মাসে এক থেকে তিন দিন	বছরে দুই-একবার (বছরে ১২ দিনের কম)	কখনওনা
১। দ্বিতল বাস	৫	৪	৩	২	১
২। বড় বাস	৫	৪	৩	২	১
৩। মিনি বাস	৫	৪	৩	২	১
৪। হিউম্যান হলার*	৫	৪	৩	২	১
৫। মাইক্রোবাস	৫	৪	৩	২	১
৬। ট্যাক্সিক্যাব	৫	৪	৩	২	১
৭। সিএনজি	৫	৪	৩	২	১
৮। রিক্সা	৫	৪	৩	২	১
৯। প্রাইভেট কার**	৫	৪	৩	২	১
১০। ভাড়ায় প্রাইভেট কার***	৫	৪	৩	২	১
১১। মটরসাইকেল	৫	৪	৩	২	১
১২। বাইসাইকেল	৫	৪	৩	২	১
১৩। পায়েহাটা	৫	৪	৩	২	১

*হিউম্যান হলার মানে ম্যাক্সি, রাইডার, দুরন্ত, লেগুনা ইত্যাদি। ** প্রাইভেট কার মানে কার সহ সকল পাজেরো, নিশান ও অন্যান্য প্রাইভেট গাড়ি। *** ভাড়ায় প্রাইভেট কার মানে অন্যের প্রাইভেট কারে টাকা দিয়ে ভ্রমন
উপরের ছকে সর্বাধিক ব্যবহৃত গণমাধ্যমটি চিহ্নিত করুন এবং এখানে লিখুন ----------
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আপনার সর্বাধিক ব্যবহৃত গণপরিবহনের সর্বশেষ ট্রিপ সম্পর্কে বিস্তারিত জানতে চাই। (আপনি যদি গত ১ বছরে কখনোও গণপরিবহন ব্যবহার না করেন তাহলে সরাসরি প্রশ্ন ৩১ এ চলে যান। না হলে নিম্নেবর্ণিত প্রশ্নগুলোর উত্তর দিন।)

প্রশ্ন ২ ঃ উক্ত ভ্রমনের উদ্দেশ্য কি ছিল ? অনুগ্রহ করে টিক দিন।

১	কাজে যাওয়া	৪	কেনাকাটা	৭	অন্যান্য
২	স্কুল/কলেজ	৫	বিনোদন*	ব্যাখ্যা করুনঃ --------	
৩	বেড়াতে যাওয়া	৬	সাথে যাওয়া**	-------------------- --------------------	

*যে কোন বিনোদনের জন্য ভ্রমন, ** স্কুল/কলেজগামী ছাত্রদের স্কুল/কলেজে আনা-নেয়া বা রোগীর সংগে ডাক্তারের কাছে বা হাসপাতালে যাওয়া-আসা ইত্যাদি

প্রশ্ন ৩ ঃ উক্ত ভ্রমনের জন্য বাস/টেম্পু বদল করেছেন কি না?

১	হাঁ	২	না

প্রশ্ন ৪ ঃ হাঁ হলে কতবার?

১	১ বার	২	২ বার	৩	>২বার

প্রশ্ন ৫ ঃ উক্ত ভ্রমন কোথা থেকে শুরু করেছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৬ ঃ অনুগ্রহ করে বলবেন কি আপনি কোথায় গিয়েছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৭ ঃ যাত্রা শুরুর বাসস্টপের নামঃ --

প্রশ্ন ৮ ঃ বাসস্টপে/টেম্পু স্টপে কিভাবে গিয়েছিলেন?

১	পায়ে হেঁটে	২	রিক্সা	৩	প্রাইভেট কার	৪	অন্যান্য

অন্যান্য (৪)ঃ ব্যাখ্যা করুনঃ --

প্রশ্ন ৯ ঃ বাস/টেম্পু স্টপে যেতে কতক্ষণ সময় লেগেছিল? ------------------মিঃ
প্রশ্ন ১০ ঃ রিক্সা হলে ভাড়া কত ছিল ? -----------------------------------টাকা
প্রশ্ন ১১ ঃ বাস/টেম্পুর জন্য কতক্ষণ অপেক্ষা করেছিলেন? -----------------মিঃ
প্রশ্ন ১২ ঃ বাসে/টেম্পুতে কতক্ষণ সময় লেগেছিল? -----------------------মিঃ
প্রশ্ন ১৩ ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-------------------------------টাকা

(বাস/টেম্পু ১ম পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।
প্রশ্ন ১৪ঃ যে স্টপে ১ম বার বাস বদল করেছেন তার নামঃ ---------------------
প্রশ্ন ১৫ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট
প্রশ্ন ১৬ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? ------------------------------মিনিট
প্রশ্ন ১৭ঃ বাস/টেম্পুর ভাড়া কত ছিল ?---------------------------------টাকা

(বাস/টেম্পু ২য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।
প্রশ্ন ১৮ঃ যে স্টপে ২য় বার বাস বদল করেছেন তার নামঃ -------------------------
প্রশ্ন ১৯ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? ---------------------মিনিট
প্রশ্ন ২০ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল ? -------------------------------মিনিট
প্রশ্ন ২১ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-----------------------------------টাকা

(বাস/টেম্পু ৩য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।
প্রশ্ন ২২ঃ যে স্টপে ৩য় বার বাস বদল করেছেন তার নামঃ ------------------------
প্রশ্ন ২৩ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? ---------------------মিনিট
প্রশ্ন ২৪ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? ---------------------------------মিনিট
প্রশ্ন ২৫ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-----------------------------------টাকা
প্রশ্ন ২৬ঃ গন্তব্য বাসস্টপের নামঃ ---
প্রশ্ন ২৭ ঃ বাস/টেম্পুস্টপ থেকে গন্তব্যে গিয়েছিলেন কিভাবে ?

১	পায়ে হেঁটে	২	রিক্সা	৩	কার	৪	অন্যান্য

অন্যান্য ঃ (৪) ব্যাখ্যা করুন --

প্রশ্ন ২৮ ঃ রিক্সা হলে ভাড়া কত ছিল ? ---------------------------------টাকা
প্রশ্ন ২৯ ঃ গন্তব্যে যেতে কতক্ষণ সময় লেগেছিল ? ------------------------মিঃ
প্রশ্ন ৩০ ঃ যে কারনে আপনি বাস/টেম্পুতে ভ্রমন করেছিলেন? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাস সবচেয়ে সস্তা	৩	কোন বিকল্প নেই	৫	অন্যান্যঃ
২	বাস সবচেয়ে নিরাপদ	৪	প্রাইভেট কারের চেয়ে পরিবেশ বান্ধব	(৫) লিখুনঃ--------------- ------------------------ ------------------------	

প্রশ্ন৩১ ঃ যে কারনে আপনি বাসে ভ্রমন করেন নাই? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাসের ভাড়া বেশী	৩	সার্ভিস ভাল নয়	৫	নিজের প্রাইভেট কার আছে
২	বাস নিরাপদ নয়	৪	বাসে অনেক সময় লাগে	৬	অন্যান্যঃ (লিখুন)---------- -------------------------- --------------------------

অংশ 'খ' ঃ যেমন বাস সার্ভিস আপনার পছন্দঃ

ঢাকা শহরের বাসসার্ভিস এর মানোন্নয়নের লক্ষ্যে বাস সার্ভিসের বিভিন্ন বৈশিষ্ট্য সর্ম্পকে আমরা আপনার মতামত জানতে চাই।

প্রশ্ন ৩২ ঃ গুরুত্বের মূল্যায়ন ঃ- আপনি কোনো বাস ভ্রমনের পূর্বে কোনো বাস সার্ভিসের নিন্মলিখিত বৈশিষ্ট্যগুলো কেমন গুরুত্বের সাথে বিবেচনা করেন ? সাত সংখ্যার স্কেলে মূল্যায়র করুন। যেখানে **৭= সর্বাধিক গুরুত্বপূর্ন ১=সর্বনিন্ম গুরুত্বপূর্ন** ।

বৈশিষ্ট্য	গুরুত্ব						
১ বাসের ভাড়া	১	২	৩	৪	৫	৬	৭
২ দুইটি বাস ছাড়ার মধ্যের সময়	১	২	৩	৪	৫	৬	৭
৩ মহিলাদের জন্য সংরক্ষিত আসন	১	২	৩	৪	৫	৬	৭
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	১	২	৩	৪	৫	৬	৭
৫ বাস চালানোর ধরণ	১	২	৩	৪	৫	৬	৭
৬ চালক ও হেলপারের ব্যবহার	১	২	৩	৪	৫	৬	৭
৭ বাসের ভিতরের পরিচ্ছন্নতা	১	২	৩	৪	৫	৬	৭
৮ ভ্রমনের সময়	১	২	৩	৪	৫	৬	৭
৯ অপেক্ষার সময়	১	২	৩	৪	৫	৬	৭
১০ বাসস্টপের সুবিধাসমূহ	১	২	৩	৪	৫	৬	৭
১১ যাত্রী উঠানো ও নামানোর ধরণ	১	২	৩	৪	৫	৬	৭
১২ হেলপার/টিকেট মাস্টারের আচরন	১	২	৩	৪	৫	৬	৭
১৩ এয়ার কন্ডিশনের ব্যবস্থা	১	২	৩	৪	৫	৬	৭

প্রশ্ন ৩৩ ঃ সন্তুষ্টির মূল্যায়ন ঃ ঢাকা শহরে বাস ভ্রমনের অভিজ্ঞতা/ধারনা থেকে কোন বাস সার্ভিসের নিলিখিত বৈশিষ্ট্য সম্পর্কে আপনার সন্তুষ্টি ৭ (সাত) সংখ্যার স্কেলের মূল্যায়ন করুন। (**-৩= মোটেও সন্তুষ্ট না ৩= খুবই সন্তুষ্ট**)

বৈশিষ্ট্য	সন্তুষ্টি						
১ বাসের ভাড়া	-৩	-২	-১	০	১	২	৩
২ দুইটি বাস ছাড়ার মধ্যের সময়	-৩	-২	-১	০	১	২	৩
৩ মহিলাদের জন্য সংরক্ষিত আসন	-৩	-২	-১	০	১	২	৩
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	-৩	-২	-১	০	১	২	৩
৫ বাস চালানোর ধরণ	-৩	-২	-১	০	১	২	৩
৬ চালক ও হেলপারের ব্যবহার	-৩	-২	-১	০	১	২	৩
৭ বাসের ভিতরের পরিচ্ছন্নতা	-৩	-২	-১	০	১	২	৩
৮ ভ্রমনের সময়	-৩	-২	-১	০	১	২	৩
৯ অপেক্ষার সময়	-৩	-২	-১	০	১	২	৩
১০ বাসস্টপের সুবিধাসমূহ	-৩	-২	-১	০	১	২	৩
১১ যাত্রী উঠানো ও নামানোর ধরণ	-৩	-২	-১	০	১	২	৩
১২ হেলপার/টিকেট মাস্টারের আচরন	-৩	-২	-১	০	১	২	৩
১৩ এয়ার কন্ডিশনের ব্যবস্থা	-৩	-২	-১	০	১	২	৩

সেকশন.গ ঃ আপনার এবং আপনার পরিবার সংক্রান্ত তথ্যাদি

অনুগ্রহ করে আপনার সম্পর্কে কিছু বলুন।

প্রশ্ন ৩৪ ঃ আপনি ?

১	পুরুষ	২	মহিলা

প্রশ্ন ৩৫ ঃ আপনার বয়স (বছর)

১	১৬-২০বঃ	৩	৩১-৪০বঃ	৫	৫১-৬০বঃ	৭	>৭০বঃ
২	২১-৩০বঃ	৪	৪১-৫০বঃ	৬	৬১-৭০বঃ		

প্রশ্ন ৩৬ ঃ আপনার মোট পারিবারিক আয় (টাকা)?

১	>৫০০০	৪	২৫০০০-৩৫০০০	৭	৫৫০০১-৬৫০০০
২	৫০০১-১৫০০০	৫	৩৫০০১-৪৫০০০	৮	৬৫০০১-৭৫০০০
৩	১৫০০১-২৫০০০	৬	৪৫০০১-৫৫০০০	৯	<৭৫০০০

প্রশ্ন ৩৭ ঃ পারিবারিক মালিকানাধীন মোটর গাড়ীর সংখ্যা ?

প্রাইভেট কার	০	নাই	১	১টি	২	২টি	৩	>২টি
মোটর সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি
বাই-সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি

প্রশ্ন ৩৮ ঃ আপনার পেশা ?

১	ছাত্র/ছাত্রী	৩	সাংসারিক কাজ	৫	বেকার	৭	অন্যান্য
২	ব্যবসায়ী	৪	চাকুরিজীবী	৬	রিটায়ার্ড	-------------	

সেকশন ঘ ঃ চয়েস পরীক্ষণ

প্রশ্ন ৩৯ ঃ তুলনামুলক চিত্রের মাধ্যমে দুইটি বাস সার্ভিস উপস্থাপন করা হল (বাসসার্ভিস-১ এবং বাসসার্ভিস-২) সার্ভিস দুইটি সাতটি নির্দিষ্ট বৈশিষ্ট্যের বিচারে আলাদা কিন্তু অন্যান্য বৈশিষ্ট্যগুলো একই।। আপনার নিজের সার্বিক অবস্থার (অর্থনৈতিক, সামাজিক, পরিপ্রেক্ষিত) বিচারে একটি বাস বার্ভিস পছন্দ করতে বললে আপনি কোনটি পছন্দ করবেন যার ফলে আপনি সর্বোচ্চ লাভবান হয়েছেন বলে মনে করবেন? আপনার পছন্দের সার্ভিসটির জন্য নির্দিষ্ট বক্সে টিক চিহ্ন দিন ।

চিত্র-১	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যহস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যহস্থাসহ ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৩	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে	এই বাসের ভাড়া বর্তমান ভাড়ার সমান হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের সমান সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই	এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৪	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৫	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ২০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৬	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৭	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র ৮	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৯	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১০	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এয়ারকন্ডিশনের ব্যবস্থা থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

প্রশ্ন ঃ ৪০ উপরোক্ত চয়েস কার্ড সমুহ পূরণ করার সময় বর্নিত কোন বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন কিনা?

যদি হ্যাঁ হয় ঃ যে বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন তার পাশে টিক চিহ্ন দিন।

	১	বাসের ভাড়া	৪	উাসস্টপের সুবিধা	৭	এয়ার কন্ডিশন
	২	ভ্রমনের সময়	৫	বাসে উঠার সিঁড়ির ধরণ		
	৩	অপেক্ষার সময়	৬	বাসে যাত্রী উঠানোর ধরন		

অংশ 'ঙ'ঃ ঢাকা শহরের বাস সার্ভিসের বৈশিষ্ট্য

ঢাকা শহরের বাস সার্ভিসের বিভিন্ন বৈশিষ্ট এবং সার্বিকভাবে বাস সার্ভিসের গুনগত মান সম্পর্কে আপনার অনুভূতি জানতে আগ্রহী।

প্রশ্ন ৪১ ঃ নিন্মবর্ণিত কথার সাথে আপনি কি পরিমান একমত/দ্বিমত পোষন করেন। (-২ থেকে ২ এর স্কেলে মূল্যায়ন করুন যেখানে **২=সম্পুর্ণ একমত, -২=সম্পুর্ণ দ্বিমত**)

১	ঢাকা শহরে বাসের ভাড়া তুলনামূলকভাবে কম।	-২	-১	০	১	২
২	অনেক পর পর বাস ছাড়ে তাই আমি বাসে যাতায়াত করি না।	-২	-১	০	১	২
৩	মহিলাদের জন্য বাসে সংরক্ষিত আসন রাখার দরকার নাই।	-২	-১	০	১	২
৪	গাদাগাদি করে বাসে যাতায়াত করতে তেমন অসুবিধা হয় না।	-২	-১	০	১	২
৫	যে বাসের চালক দক্ষ না আমি সেই বাসে ভ্রমন করব না।	-২	-১	০	১	২
৬	টিকেট মাস্টার/হেলপারের আচরণ নিয়ে আমি মাথা ঘামাই না।	-২	-১	০	১	২
৭	অপরিচ্ছন্ন বাসে যাতায়াত করতে খুব অসহ্য লাগে।	-২	-১	০	১	২
৮	বাসে যাতায়াতের জন্য অনেক সময় অপচয় হয়।	-২	-১	০	১	২
৯	বাসের জন্য অপেক্ষা করা খুব বিরক্তিকর।	-২	-১	০	১	২
১০	বাসস্টপে যাত্রী ছাউনী না থাকায় যাত্রীদের ভোগান্তি হয়।	-২	-১	০	১	২
১১	বাসের সিড়ির ধাপগুলো খাড়া হওয়ায় ওঠানামার অসুবিধা হয়।	-২	-১	০	১	২
১২	নির্দিষ্ট স্থানে সুন্দরভাবে বাস থামিয়ে যাত্রী উঠানো/নামানো উচিৎ।	-২	-১	০	১	২
১৩	এয়ারকন্ডিশন না থাকায় অনেকে বাসে যাতায়াত করে না।	-২	-১	০	১	২

প্রশ্ন ঃ ৩১ প্রশ্নপত্র সম্পর্কে আপনার কোন মতামত, যেমন প্রশ্নপত্র পূরণে কোন অসুবিধা, বা কোন প্রশ্ন সম্পর্কে কোন মতামত অথবা যে কোন মন্তব্য ?

মার্চ ২০১৩

প্রিয়, উত্তরদাতা,

আমি মোঃ আব্দুলাহ আল মামুন, গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের সড়ক ও জনপথ অধিদপ্তরের একজন নির্বাহী প্রকৌশলী, পাশাপাশি যুক্তরাজ্যের Loughborough University - তে School of Civil and Building Engineering এর অধীন Transport Studies Group - এ পিএইচডি কোর্সের একজন গবেষক। ঢাকা শহরের বাস সার্ভিসের যাত্রীসেবার মানোন্নয়নের জন্য একটি নীতিমালা প্রণয়নই আমার গবেষণার মূল বিষয়বস্তু। এই গবেষনার অংশ হিসেবে উত্তরা থেকে সাতরাস্তা, রমনা হয়ে সদরঘাট পর্যন্ত রাস্তার দুই পাশের এলাকার অধিবাসী যারা সাধারণভাবে এই রাস্তা ব্যবহার করেন তাদের উপর এই জরিপটি পরিচালনা করতে চাই।

একদল জরিপকারী আমার পক্ষে এই জরিপকাজ আমার তত্ত্বাবধানে পরিচালনা করবেন। এই জরিপে আপনার মতামত ও অভিজ্ঞতা এই গবেষণার জন্য খুবই গুরুত্বপূর্ণ কারন এই গবেষণার ফলাফল সরকারের যথাযথ কর্তৃপক্ষ এবং পরিবহণ সংশিষ্ট সকলকে জানানো হবে। আপনাকে নিশ্চিত করছি যে এই জরিপে আপনার প্রদত্ব যে কোন মতামত ও তথ্যাদি সর্বোচ্চ গোপনীয়তা রক্ষা করে ব্যবহার করা হবে। প্রশ্নপত্রটি পূরণ করতে ৪০ থেকে ৪৫ মিনিট সময় লাগবে।

প্রশ্নপত্র পূরণে সহযোগীতা করার জন্য আপনাকে আগাম ধন্যবাদ।

মোঃ আব্দুলাহ আল মামুন

গবেষক
ও
নির্বাহী প্রকৌশলী
(প্রধান প্রকৌশলীর দপ্তর সংলগ্ন ছুটি, প্রেষণ ও প্রশিক্ষনজনিত সংরক্ষিত সিভিল পদ)
সড়ক ভবন, রমনা, ঢাকা ১০০০
সড়ক ও জনপথ অধিদপ্তর

এই গবেষণা বা জরিপ সংক্রান্ত যে কোন যোগাযোগঃ
মোঃ আব্দুলাহ আল মামুন
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Loughborough University

ঢাকা নগর পরিবহন জরিপ '২০১৩'

অংশ 'ক' আপনার দৈনন্দিন ভ্রমন সংক্রান্ত তথ্যাদি ঃ-

উত্তরা-সদরঘাট রাস্তায় (করিডোরে) আপনার দৈনন্দিন ভ্রমন সর্ম্পকে জানতে চাই

প্রশ্ন ১ ঃ উত্তরা-বনানী-মহাখালী-রমনা-সদরঘাট সড়কে (করিডোরে) যেকোন ভ্রমনের জন্য নিম্নলিখিত মাধ্যমগুলো আপনি কি হারে ব্যবহার করেন ?

এই প্রশ্নের উত্তরের জন্য আজ থেকে গত এক বছরের ভ্রমণ বিবেচনা করুন, এবং উল্লেখ্য যে, উত্তরা থেকে সদরঘাট পর্যন্ত পুরো করিডোর ভ্রমনের দরকার নেই। এই করিডোরের যে কোন অংশে ভ্রমন করলেই চলবে। অনুগ্রহ করে প্রত্যেক মাধ্যমের জন্য একটি করে বক্সে টিক চিহ্ন দিন।

	সপ্তাহের অধিকাংশ দিন (৩ ও ৩ দিনের অধিক)	সপ্তাহে এক-দুই দিন	মাসে এক থেকে তিন দিন	বছরে দুই-একবার (বছরে ১২ দিনের কম)	কখনওনা
১। দ্বিতল বাস	৫	৪	৩	২	১
২। বড় বাস	৫	৪	৩	২	১
৩। মিনি বাস	৫	৪	৩	২	১
৪। হিউম্যান হলার*	৫	৪	৩	২	১
৫। মাইক্রোবাস	৫	৪	৩	২	১
৬। ট্যাক্সিক্যাব	৫	৪	৩	২	১
৭। সিএনজি	৫	৪	৩	২	১
৮। রিক্সা	৫	৪	৩	২	১
৯। প্রাইভেট কার**	৫	৪	৩	২	১
১০। ভাড়ায় প্রাইভেট কার***	৫	৪	৩	২	১
১১। মটরসাইকেল	৫	৪	৩	২	১
১২। বাইসাইকেল	৫	৪	৩	২	১
১৩। পায়েহাটা	৫	৪	৩	২	১

*হিউম্যান হলার মানে ম্যাক্সি, রাইডার, দুরন্ত, লেগুনা ইত্যাদি। ** প্রাইভেট কার মানে কার সহ সকল পাজেরো, নিশান ও অন্যান্য প্রাইভেট গাড়ি। *** ভাড়ায় প্রাইভেট কার মানে অন্যের প্রাইভেট কারে টাকা দিয়ে ভ্রমন

উপরের ছকে সর্বাধিক ব্যবহৃত গণমাধ্যমটি চিহ্নিত করুন এবং এখানে লিখুন ----------
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আপনার সর্বাধিক ব্যবহৃত গণপরিবহনের সর্বশেষ ট্রিপ সম্পর্কে বিস্তারিত জানতে চাই। (আপনি যদি গত ১ বছরে কখনোও গণপরিবহন ব্যবহার না করেন তাহলে সরাসরি প্রশ্ন ৩১ এ চলে যান। না হলে নিম্নেবর্ণিত প্রশ্নগুলোর উত্তর দিন।)

প্রশ্ন ২ ঃ উক্ত ভ্রমনের উদ্দেশ্য কি ছিল ? অনুগ্রহ করে টিক দিন।

১	কাজে যাওয়া	৪	কেনাকাটা	৭	অন্যান্য
২	স্কুল/কলেজ	৫	বিনোদন*	ব্যাখ্যা করুনঃ --------	
৩	বেড়াতে যাওয়া	৬	সাথে যাওয়া**	----------------------	

*যে কোন বিনোদনের জন্য ভ্রমন, ** স্কুল/কলেজগামী ছাত্রদের স্কুল/কলেজে আনা-নেয়া বা রোগীর সংগে ডাক্তারের কাছে বা হাসপাতালে যাওয়া-আসা ইত্যাদি

প্রশ্ন ৩ ঃ উক্ত ভ্রমনের জন্য বাস/টেম্পু বদল করেছেন কি না?

১	হাঁ	২	না

প্রশ্ন ৪ ঃ হাঁ হলে কতবার?

১	১ বার	২	২ বার	৩	>২বার

প্রশ্ন ৫ ঃ উক্ত ভ্রমন কোথা থেকে শুরু করেছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৬ ঃ অনুগ্রহ করে বলবেন কি আপনি কোথায় গিয়েছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৭ ঃ যাত্রা শুরুর বাসস্টপের নামঃ --

প্রশ্ন ৮ ঃ বাসস্টপে/টেম্পু স্টপে কিভাবে গিয়েছিলেন?

১	পায়ে হেঁটে	২	রিক্সা	৩	প্রাইভেট কার	৪	অন্যান্য

অন্যান্য (৪)ঃ ব্যাখ্যা করুনঃ ---

প্রশ্ন ৯ ঃ বাস/টেম্পু স্টপে যেতে কতক্ষণ সময় লেগেছিল? ------------------মিঃ

প্রশ্ন ১০ ঃ রিক্সা হলে ভাড়া কত ছিল ? -----------------------------------টাকা

প্রশ্ন ১১ ঃ বাস/টেম্পুর জন্য কতক্ষণ অপেক্ষা করেছিলেন? -----------------মিঃ

প্রশ্ন ১২ ঃ বাসে/টেম্পুতে কতক্ষণ সময় লেগেছিল? -----------------------মিঃ

প্রশ্ন ১৩ ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-------------------------------টাকা

(বাস/টেম্পু ১ম পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৪ঃ যে স্টপে ১ম বার বাস বদল করেছেন তার নামঃ ----------------------

প্রশ্ন ১৫ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ১৬ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? ------------------------------মিনিট

প্রশ্ন ১৭ঃ বাস/টেম্পুর ভাড়া কত ছিল ?---------------------------------টাকা

(বাস/টেম্পু ২য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৮ঃ যে স্টপে ২য় বার বাস বদল করেছেন তার নামঃ -------------------------

প্রশ্ন ১৯ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? ---------------------মিনিট

প্রশ্ন ২০ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল ? ------------------------------মিনিট

প্রশ্ন ২১ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-----------------------------------টাকা

(বাস/টেম্পু ৩য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ২২ঃ যে স্টপে ৩য় বার বাস বদল করেছেন তার নামঃ ------------------------

প্রশ্ন ২৩ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? ---------------------মিনিট

প্রশ্ন ২৪ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? --------------------------------মিনিট

প্রশ্ন ২৫ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-----------------------------------টাকা

প্রশ্ন ২৬ঃ গন্তব্য বাসস্টপের নামঃ --

প্রশ্ন ২৭ ঃ বাস/টেম্পুস্টপ থেকে গন্তব্যে গিয়েছিলেন কিভাবে ?

১	পায়ে হেঁটে	২	রিক্সা	৩	কার	৪	অন্যান্য

অন্যান্য ঃ (৪) ব্যাখ্যা করুন ---

প্রশ্ন ২৮ ঃ রিক্সা হলে ভাড়া কত ছিল ? ---------------------------------টাকা

প্রশ্ন ২৯ ঃ গন্তব্যে যেতে কতক্ষণ সময় লেগেছিল ? ------------------------মিঃ

প্রশ্ন ৩০ ঃ যে কারনে আপনি বাস/টেম্পুতে ভ্রমন করেছিলেন? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাস সবচেয়ে সস্তা	৩	কোন বিকল্প নেই	৫	অন্যান্যঃ
২	বাস সবচেয়ে নিরাপদ	৪	প্রাইভেট কারের চেয়ে পরিবেশ বান্ধব	(৫) লিখুনঃ---------------	

প্রশ্ন৩১ ঃ যে কারনে আপনি বাসে ভ্রমন করেন নাই? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাসের ভাড়া বেশী	৩	সার্ভিস ভাল নয়	৫	নিজের প্রাইভেট কার আছে
২	বাস নিরাপদ নয়	৪	বাসে অনেক সময় লাগে	৬	অন্যান্যঃ (লিখুন)-----------

অংশ 'খ' ঃ যেমন বাস সার্ভিস আপনার পছন্দঃ

ঢাকা শহরের বাসসার্ভিস এর মানোন্নয়নের লক্ষ্যে বাস সার্ভিসের বিভিন্ন বৈশিষ্ট্য সর্ম্পকে আমরা আপনার মতামত জানতে চাই।

প্রশ্ন ৩২ ঃ গুরুত্বের মূল্যায়ন ঃ- আপনি কোনো বাস ভ্রমনের পূর্বে কোনো বাস সার্ভিসের নিন্মলিখিত বৈশিষ্ট্যগুলো কেমন গুরুত্বের সাথে বিবেচনা করেন ? সাত সংখ্যার স্কেলে মূল্যায়র করুন। **যেখানে ৭= সর্বাধিক গুরুত্বপুর্ন ১=সর্বনিন্ম গুরুত্বপুর্ন** ।

বৈশিষ্ট্য	গুরুত্ব						
১ বাসের ভাড়া	১	২	৩	৪	৫	৬	৭
২ দুইটি বাস ছাড়ার মধ্যের সময়	১	২	৩	৪	৫	৬	৭
৩ মহিলাদের জন্য সংরক্ষিত আসন	১	২	৩	৪	৫	৬	৭
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	১	২	৩	৪	৫	৬	৭
৫ বাস চালানোর ধরণ	১	২	৩	৪	৫	৬	৭
৬ চালক ও হেলপারের ব্যবহার	১	২	৩	৪	৫	৬	৭
৭ বাসের ভিতরের পরিচ্ছন্নতা	১	২	৩	৪	৫	৬	৭
৮ ভ্রমনের সময়	১	২	৩	৪	৫	৬	৭
৯ অপেক্ষার সময়	১	২	৩	৪	৫	৬	৭
১০ বাসস্টপের সুবিধাসমূহ	১	২	৩	৪	৫	৬	৭
১১ যাত্রী উঠানো ও নামানোর ধরণ	১	২	৩	৪	৫	৬	৭
১২ হেলপার/টিকেট মাস্টারের আচরন	১	২	৩	৪	৫	৬	৭
১৩ এয়ার কন্ডিশনের ব্যবস্থা	১	২	৩	৪	৫	৬	৭

প্রশ্ন ৩৩ ঃ সন্তুষ্টির মূল্যায়ন ঃ ঢাকা শহরে বাস ভ্রমনের অভিজ্ঞতা/ধারনা থেকে কোন বাস সার্ভিসের নিলিখিত বৈশিষ্ট্য সম্পর্কে আপনার সন্তুষ্টি ৭ (সাত) সংখ্যার স্কেলের মূল্যায়ন করুন। **(-৩= মোটেও সন্তুষ্ট না ৩= খুবই সন্তুষ্ট)**

বৈশিষ্ট্য	সন্তুষ্টি						
১ বাসের ভাড়া	-৩	-২	-১	০	১	২	৩
২ দুইটি বাস ছাড়ার মধ্যের সময়	-৩	-২	-১	০	১	২	৩
৩ মহিলাদের জন্য সংরক্ষিত আসন	-৩	-২	-১	০	১	২	৩
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	-৩	-২	-১	০	১	২	৩
৫ বাস চালানোর ধরণ	-৩	-২	-১	০	১	২	৩
৬ চালক ও হেলপারের ব্যবহার	-৩	-২	-১	০	১	২	৩
৭ বাসের ভিতরের পরিচ্ছন্নতা	-৩	-২	-১	০	১	২	৩
৮ ভ্রমনের সময়	-৩	-২	-১	০	১	২	৩
৯ অপেক্ষার সময়	-৩	-২	-১	০	১	২	৩
১০ বাসস্টপের সুবিধাসমূহ	-৩	-২	-১	০	১	২	৩
১১ যাত্রী উঠানো ও নামানোর ধরণ	-৩	-২	-১	০	১	২	৩
১২ হেলপার/টিকেট মাস্টারের আচরন	-৩	-২	-১	০	১	২	৩
১৩ এয়ার কন্ডিশনের ব্যবস্থা	-৩	-২	-১	০	১	২	৩

সেকশন.গ ঃ আপনার এবং আপনার পরিবার সংক্রান্ত তথ্যাদি

অনুগ্রহ করে আপনার সম্পর্কে কিছু বলুন।

প্রশ্ন ৩৪ ঃ আপনি ?

১	পুরুষ	২	মহিলা

প্রশ্ন ৩৫ ঃ আপনার বয়স (বছর)

১	১৬-২০বঃ	৩	৩১-৪০বঃ	৫	৫১-৬০বঃ	৭	>৭০বঃ
২	২১-৩০বঃ	৪	৪১-৫০বঃ	৬	৬১-৭০বঃ		

প্রশ্ন ৩৬ ঃ আপনার মোট পারিবারিক আয় (টাকা)?

১	>৫০০০	৪	২৫০০০-৩৫০০০	৭	৫৫০০১-৬৫০০০
২	৫০০১-১৫০০০	৫	৩৫০০১-৪৫০০০	৮	৬৫০০১-৭৫০০০
৩	১৫০০১-২৫০০০	৬	৪৫০০১-৫৫০০০	৯	<৭৫০০০

প্রশ্ন ৩৭ ঃ পারিবারিক মালিকানাধীন মোটর গাড়ীর সংখ্যা ?

প্রাইভেট কার	০	নাই	১	১টি	২	২টি	৩	>২টি
মোটর সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি
বাই-সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি

প্রশ্ন ৩৮ ঃ আপনার পেশা ?

১	ছাত্র/ছাত্রী	৩	সাংসারিক কাজ	৫	বেকার	৭	অন্যান্য
২	ব্যবসায়ী	৪	চাকুরিজীবী	৬	রিটায়ার্ড		-------------

সেকশন ঘ ঃ চয়েস পরীক্ষণ

প্রশ্ন ৩৯ ঃ তুলনামুলক চিত্রের মাধ্যমে দুইটি বাস সার্ভিস উপস্থাপন করা হল (বাসসার্ভিস-১ এবং বাসসার্ভিস-২) সার্ভিস দুইটি সাতটি নির্দিষ্ট বৈশিষ্টের বিচারে আলাদা কিন্তু অন্যান্য বৈশিষ্ট্যগুলো একই।। আপনার নিজের সার্বিক অবস্থার (অর্থনৈতিক, সামাজিক, পরিপ্রেক্ষিত) বিচারে একটি বাস বার্ভিস পছন্দ করতে বললে আপনি কোনটি পছন্দ করবেন যার ফলে আপনি সর্বোচ্চ লাভবান হয়েছেন বলে মনে করবেন? আপনার পছন্দের সার্ভিসটির জন্য নির্দিষ্ট বক্সে টিক চিহ্ন দিন ।

চিত্র-১১	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১২	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
চলন্ত বাসে যাত্রী উঠানো ও নামানো হবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৩	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৪	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৫	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৬	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৭	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ২০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে কোন ছাউনী নেই
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৮	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-১৯	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২০	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

প্রশ্ন ঃ ৪০ উপরোক্ত চয়েস কার্ড সমুহ পূরণ করার সময় বর্নিত কোন বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন কিনা?

যদি হ্যাঁ হয় ঃ যে বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন তার পাশে টিক চিহ্ন দিন।

১	বাসের ভাড়া	৪	ষ্টাসস্টপের সুবিধা	৭	এয়ার কন্ডিশন
২	ভ্রমনের সময়	৫	বাসে উঠার সিঁড়ির ধরণ		
৩	অপেক্ষার সময়	৬	বাসে যাত্রী উঠানোর ধরন		

অংশ 'ঙ'ঃ ঢাকা শহরের বাস সার্ভিসের বৈশিষ্ট্য

ঢাকা শহরের বাস সার্ভিসের বিভিন্ন বৈশিষ্ট এবং সার্বিকভাবে বাস সার্ভিসের গুনগত মান সম্পর্কে আপনার অনুভূতি জানতে আগ্রহী।

প্রশ্ন ৪১ ঃ নিম্নবর্ণিত কথার সাথে আপনি কি পরিমান একমত/দ্বিমত পোষন করেন। (-২ থেকে ২ এর স্কেলে মূল্যায়ন করুন যেখানে **২=সম্পূর্ণ একমত, -২=সম্পূর্ণ দ্বিমত**)

১	ঢাকা শহরে বাসের ভাড়া তুলনামূলকভাবে কম।	-২	-১	০	১	২
২	অনেক পর পর বাস ছাড়ে তাই আমি বাসে যাতায়াত করি না।	-২	-১	০	১	২
৩	মহিলাদের জন্য বাসে সংরক্ষিত আসন রাখার দরকার নাই।	-২	-১	০	১	২
৪	গাদাগাদি করে বাসে যাতায়াত করতে তেমন অসুবিধা হয় না।	-২	-১	০	১	২
৫	যে বাসের চালক দক্ষ না আমি সেই বাসে ভ্রমন করব না।	-২	-১	০	১	২
৬	টিকেট মাস্টার/হেলপারের আচরণ নিয়ে আমি মাথা ঘামাই না ।	-২	-১	০	১	২
৭	অপরিচ্ছন্ন বাসে যাতায়াত করতে খুব অসহ্য লাগে।	-২	-১	০	১	২
৮	বাসে যাতায়াতের জন্য অনেক সময় অপচয় হয়।	-২	-১	০	১	২
৯	বাসের জন্য অপেক্ষা করা খুব বিরক্তিকর।	-২	-১	০	১	২
১০	বাসস্টপে যাত্রী ছাউনী না থাকায় যাত্রীদের ভোগান্তি হয়।	-২	-১	০	১	২
১১	বাসের সিড়ির ধাপগুলো খাড়া হওয়ায় ওঠানামার অসুবিধা হয়।	-২	-১	০	১	২
১২	নির্দিষ্ট স্থানে সুন্দরভাবে বাস থামিয়ে যাত্রী উঠানো/নামানো উচিৎ।	-২	-১	০	১	২
১৩	এয়ারকন্ডিশন না থাকায় অনেকে বাসে যাতায়াত করে না।	-২	-১	০	১	২

প্রশ্ন ঃ ৩১ প্রশ্নপত্র সম্পর্কে আপনার কোন মতামত, যেমন প্রশ্নপত্র পূরণে কোন অসুবিধা, বা কোন প্রশ্ন সম্পর্কে কোন মতামত অথবা যে কোন মন্তব্য ?

মার্চ ২০১৩

প্রিয়, উত্তরদাতা,

আমি মোঃ আব্দুলাহ আল মামুন, গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের সড়ক ও জনপথ অধিদপ্তরের একজন নির্বাহী প্রকৌশলী, পাশাপাশি যুক্তরাজ্যের Loughborough University - তে School of Civil and Building Engineering এর অধীন Transport Studies Group - এ পিএইচডি কোর্সের একজন গবেষক। ঢাকা শহরের বাস সার্ভিসের যাত্রীসেবার মানোন্নয়নের জন্য একটি নীতিমালা প্রণয়নই আমার গবেষণার মূল বিষয়বস্তু। এই গবেষনার অংশ হিসেবে উত্তরা থেকে সাতরাস্তা, রমনা হয়ে সদরঘাট পর্যন্ত রাস্তার দুই পাশের এলাকার অধিবাসী যারা সাধারণভাবে এই রাস্তা ব্যবহার করেন তাদের উপর এই জরিপটি পরিচালনা করতে চাই।

একদল জরিপকারী আমার পক্ষে এই জরিপকাজ আমার তত্ত্বাবধানে পরিচালনা করবেন। এই জরিপে আপনার মতামত ও অভিজ্ঞতা এই গবেষণার জন্য খুবই গুরুত্বপূর্ণ কারন এই গবেষণার ফলাফল সরকারের যথাযথ কর্তৃপক্ষ এবং পরিবহণ সংশিষ্ট সকলকে জানানো হবে। আপনাকে নিশ্চিত করছি যে এই জরিপে আপনার প্রদত্ব যে কোন মতামত ও তথ্যাদি সর্বোচ্চ গোপনীয়তা রক্ষা করে ব্যবহার করা হবে। প্রশ্নপত্রটি পূরণ করতে ৪০ থেকে ৪৫ মিনিট সময় লাগবে।

প্রশ্নপত্র পূরণে সহযোগীতা করার জন্য আপনাকে আগাম ধন্যবাদ।

মোঃ আব্দুলাহ আল মামুন

গবেষক
ও
নির্বাহী প্রকৌশলী
(প্রধান প্রকৌশলীর দপ্তর সংলগ্ন ছুটি, প্রেষণ ও প্রশিক্ষনজনিত সংরক্ষিত সিভিল পদ)
সড়ক ভবন, রমনা, ঢাকা ১০০০
সড়ক ও জনপথ অধিদপ্তর

এই গবেষণা বা জরিপ সংক্রান্ত যে কোন যোগাযোগঃ
মোঃ আব্দুলাহ আল মামুন
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Loughborough University

ঢাকা নগর পরিবহন জরিপ '২০১৩'

অংশ 'ক' আপনার দৈনন্দিন ভ্রমন সংক্রান্ত তথ্যাদি ঃ-

উত্তরা-সদরঘাট রাস্তায় (করিডোরে) আপনার দৈনন্দিন ভ্রমন সর্ম্পকে জানতে চাই

প্রশ্ন ১ ঃ উত্তরা-বনানী-মহাখালী-রমনা-সদরঘাট সড়কে (করিডোরে) যেকোন ভ্রমনের জন্য নিম্নলিখিত মাধ্যমগুলো আপনি কি হারে ব্যবহার করেন ?

এই প্রশ্নের উত্তরের জন্য আজ থেকে গত এক বছরের ভ্রমণ বিবেচনা করুন, এবং উল্লেখ্য যে, উত্তরা থেকে সদরঘাট পর্যন্ত পুরো করিডোর ভ্রমনের দরকার নেই। এই করিডোরের যে কোন অংশে ভ্রমন করলেই চলবে। অনুগ্রহ করে প্রত্যেক মাধ্যমের জন্য একটি করে বক্সে টিক চিহ্ন দিন।

	সপ্তাহের অধিকাংশ দিন (৩ ও ৩ দিনের অধিক)	সপ্তাহে এক-দুই দিন	মাসে এক থেকে তিন দিন	বছরে দুই-একবার (বছরে ১২ দিনের কম)	কখনওনা
১। দ্বিতল বাস	৫	৪	৩	২	১
২। বড় বাস	৫	৪	৩	২	১
৩। মিনি বাস	৫	৪	৩	২	১
৪। হিউম্যান হলার*	৫	৪	৩	২	১
৫। মাইক্রোবাস	৫	৪	৩	২	১
৬। ট্যাক্সিক্যাব	৫	৪	৩	২	১
৭। সিএনজি	৫	৪	৩	২	১
৮। রিক্সা	৫	৪	৩	২	১
৯। প্রাইভেট কার**	৫	৪	৩	২	১
১০। ভাড়ায় প্রাইভেট কার***	৫	৪	৩	২	১
১১। মটরসাইকেল	৫	৪	৩	২	১
১২। বাইসাইকেল	৫	৪	৩	২	১
১৩। পায়েহাটা	৫	৪	৩	২	১

*হিউম্যান হলার মানে ম্যাক্সি, রাইডার, দুরন্ত, লেগুনা ইত্যাদি। ** প্রাইভেট কার মানে কার সহ সকল পাজেরো, নিশান ও অন্যান্য প্রাইভেট গাড়ি। *** ভাড়ায় প্রাইভেট কার মানে অন্যের প্রাইভেট কারে টাকা দিয়ে ভ্রমন

উপরের ছকে সর্বাধিক ব্যবহৃত গণমাধ্যমটি চিহ্নিত করুন এবং এখানে লিখুন ----------
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আপনার সর্বাধিক ব্যবহৃত গণপরিবহনের সর্বশেষ ট্রিপ সম্পর্কে বিস্তারিত জানতে চাই।
(আপনি যদি গত ১ বছরে কখনোও গণপরিবহন ব্যবহার না করেন তাহলে সরাসরি প্রশ্ন ৩১ এ চলে যান। না হলে নিম্নেবর্ণিত প্রশ্নগুলোর উত্তর দিন।)

প্রশ্ন ২ ঃ উক্ত ভ্রমনের উদ্দেশ্য কি ছিল ? অনুগ্রহ করে টিক দিন।

১	কাজে যাওয়া	৪	কেনাকাটা	৭	অন্যান্য
২	স্কুল/কলেজ	৫	বিনোদন*	ব্যাখ্যা করুনঃ --------	
৩	বেড়াতে যাওয়া	৬	সাথে যাওয়া**	--------------------	

*যে কোন বিনোদনের জন্য ভ্রমন, ** স্কুল/কলেজগামী ছাত্রদের স্কুল/কলেজে আনা-নেয়া বা রোগীর সংগে ডাক্তারের কাছে বা হাসপাতালে যাওয়া-আসা ইত্যাদি

প্রশ্ন ৩ ঃ উক্ত ভ্রমনের জন্য বাস/টেম্পু বদল করেছেন কি না?

১	হ্যাঁ	২	না

প্রশ্ন ৪ ঃ হ্যাঁ হলে কতবার?

১	১ বার	২	২ বার	৩	>২বার

প্রশ্ন ৫ ঃ উক্ত ভ্রমন কোথা থেকে শুরু করেছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৬ ঃ অনুগ্রহ করে বলবেন কি আপনি কোথায় গিয়েছিলেন (ঠিকানা) ?

বাড়ী নং		রোড নং	
এলাকা		পোস্ট কোড	

প্রশ্ন ৭ ঃ যাত্রা শুরুর বাসস্টপের নামঃ --

প্রশ্ন ৮ ঃ বাসস্টপে/টেম্পু স্টপে কিভাবে গিয়েছিলেন?

১	পায়ে হেঁটে	২	রিক্সা	৩	প্রাইভেট কার	৪	অন্যান্য

অন্যান্য (৪)ঃ ব্যাখ্যা করুনঃ --

প্রশ্ন ৯ ঃ বাস/টেম্পু স্টপে যেতে কতক্ষণ সময় লেগেছিল? ------------------মিঃ

প্রশ্ন ১০ ঃ রিক্সা হলে ভাড়া কত ছিল ? -----------------------------------টাকা

প্রশ্ন ১১ ঃ বাস/টেম্পুর জন্য কতক্ষণ অপেক্ষা করেছিলেন? -----------------মিঃ

প্রশ্ন ১২ ঃ বাসে/টেম্পুতে কতক্ষণ সময় লেগেছিল? -----------------------মিঃ

প্রশ্ন ১৩ ঃ বাস/টেম্পুর ভাড়া কত ছিল ?--------------------------------টাকা

(বাস/টেম্পু ১ম পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৪ঃ যে স্টপে ১ম বার বাস বদল করেছেন তার নামঃ ----------------------

প্রশ্ন ১৫ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? -------------------মিনিট

প্রশ্ন ১৬ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? ------------------------------মিনিট

প্রশ্ন ১৭ঃ বাস/টেম্পুর ভাড়া কত ছিল ?---------------------------------টাকা

(বাস/টেম্পু ২য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ১৮ঃ যে স্টপে ২য় বার বাস বদল করেছেন তার নামঃ -------------------------

প্রশ্ন ১৯ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ২০ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল ? ------------------------------মিনিট

প্রশ্ন ২১ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-----------------------------------টাকা

(বাস/টেম্পু ৩য় পরিবর্তনের জন্য প্রযোজ্য) নইলে প্রশ্ন ২৬ এ যান।

প্রশ্ন ২২ঃ যে স্টপে ৩য় বার বাস বদল করেছেন তার নামঃ ------------------------

প্রশ্ন ২৩ঃ বাস/টেম্পুর জন্য কতক্ষন অপেক্ষা করেছেন? --------------------মিনিট

প্রশ্ন ২৪ঃ বাসে/টেম্পুতে কতক্ষন লেগেছিল? --------------------------------মিনিট

প্রশ্ন ২৫ঃ বাস/টেম্পুর ভাড়া কত ছিল ?-----------------------------------টাকা

প্রশ্ন ২৬ঃ গন্তব্য বাসস্টপের নামঃ --

প্রশ্ন ২৭ ঃ বাস/টেম্পুস্টপ থেকে গন্তব্যে গিয়েছিলেন কিভাবে ?

১	পায়ে হেঁটে	২	রিক্সা	৩	কার	৪	অন্যান্য

অন্যান্য ঃ (৪) ব্যাখ্যা করুন ---

প্রশ্ন ২৮ ঃ রিক্সা হলে ভাড়া কত ছিল ? ------------------------------------টাকা

প্রশ্ন ২৯ ঃ গন্তব্যে যেতে কতক্ষণ সময় লেগেছিল ? -------------------------মিঃ

প্রশ্ন ৩০ ঃ যে কারনে আপনি বাস/টেম্পুতে ভ্রমন করেছিলেন? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাস সবচেয়ে সস্তা	৩	কোন বিকল্প নেই	৫	অন্যান্যঃ
২	বাস সবচেয়ে নিরাপদ	৪	প্রাইভেট কারের চেয়ে পরিবেশ বান্ধব	(৫) লিখুনঃ---------------	

প্রশ্ন৩১ ঃ যে কারনে আপনি বাসে ভ্রমন করেন নাই? অনুগ্রহ করে টিক দিন। (একাধিক বক্সে টিক দিতে পারেন)

১	বাসের ভাড়া বেশী	৩	সার্ভিস ভাল নয়	৫	নিজের প্রাইভেট কার আছে
২	বাস নিরাপদ নয়	৪	বাসে অনেক সময় লাগে	৬	অন্যান্যঃ (লিখুন)----------- -------------------------- --------------------------

অংশ 'খ' ঃ যেমন বাস সার্ভিস আপনার পছন্দঃ

ঢাকা শহরের বাসসার্ভিস এর মানোন্নয়নের লক্ষ্যে বাস সার্ভিসের বিভিন্ন বৈশিষ্ট্য সম্পর্কে আমরা আপনার মতামত জানতে চাই।

প্রশ্ন ৩২ ঃ গুরুত্বের মূল্যায়ন ঃ- আপনি কোনো বাস ভ্রমনের পূর্বে কোনো বাস সার্ভিসের নিন্মলিখিত বৈশিষ্ট্যগুলো কেমন গুরুত্বের সাথে বিবেচনা করেন ? সাত সংখ্যার স্কেলে মূল্যায়র করুন। যেখানে **৭= সর্বাধিক গুরুত্বপুর্ন ১=সর্বনিন্ম গুরুত্বপুর্ন** ।

বৈশিষ্ট্য	গুরুত্ব						
১ বাসের ভাড়া	১	২	৩	৪	৫	৬	৭
২ দুইটি বাস ছাড়ার মধ্যের সময়	১	২	৩	৪	৫	৬	৭
৩ মহিলাদের জন্য সংরক্ষিত আসন	১	২	৩	৪	৫	৬	৭
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	১	২	৩	৪	৫	৬	৭
৫ বাস চালানোর ধরণ	১	২	৩	৪	৫	৬	৭
৬ চালক ও হেলপারের ব্যবহার	১	২	৩	৪	৫	৬	৭
৭ বাসের ভিতরের পরিচ্ছন্নতা	১	২	৩	৪	৫	৬	৭
৮ ভ্রমনের সময়	১	২	৩	৪	৫	৬	৭
৯ অপেক্ষার সময়	১	২	৩	৪	৫	৬	৭
১০ বাসস্টপের সুবিধাসমূহ	১	২	৩	৪	৫	৬	৭
১১ যাত্রী উঠানো ও নামানোর ধরণ	১	২	৩	৪	৫	৬	৭
১২ হেলপার/টিকেট মাস্টারের আচরন	১	২	৩	৪	৫	৬	৭
১৩ এয়ার কন্ডিশনের ব্যবস্থা	১	২	৩	৪	৫	৬	৭

প্রশ্ন ৩৩ ঃ সন্তুষ্টির মূল্যায়ন ঃ ঢাকা শহরে বাস ভ্রমনের অভিজ্ঞতা/ধারনা থেকে কোন বাস সার্ভিসের নিলিখিত বৈশিষ্ট্য সম্পর্কে আপনার সন্তুষ্টি ৭ (সাত) সংখ্যার স্কেলের মূল্যায়ন করুন। **(-৩= মোটেও সন্তুষ্ট না ৩= খুবই সন্তুষ্ট)**

বৈশিষ্ট্য	সন্তুষ্টি						
১ বাসের ভাড়া	-৩	-২	-১	০	১	২	৩
২ দুইটি বাস ছাড়ার মধ্যের সময়	-৩	-২	-১	০	১	২	৩
৩ মহিলাদের জন্য সংরক্ষিত আসন	-৩	-২	-১	০	১	২	৩
৪ বাসের ভিতর গাদাগাদি/ঠাসাঠসি	-৩	-২	-১	০	১	২	৩
৫ বাস চালানোর ধরণ	-৩	-২	-১	০	১	২	৩
৬ চালক ও হেলপারের ব্যবহার	-৩	-২	-১	০	১	২	৩
৭ বাসের ভিতরের পরিচ্ছন্নতা	-৩	-২	-১	০	১	২	৩
৮ ভ্রমনের সময়	-৩	-২	-১	০	১	২	৩
৯ অপেক্ষার সময়	-৩	-২	-১	০	১	২	৩
১০ বাসস্টপের সুবিধাসমূহ	-৩	-২	-১	০	১	২	৩
১১ যাত্রী উঠানো ও নামানোর ধরণ	-৩	-২	-১	০	১	২	৩
১২ হেলপার/টিকেট মাস্টারের আচরন	-৩	-২	-১	০	১	২	৩
১৩ এয়ার কন্ডিশনের ব্যবস্থা	-৩	-২	-১	০	১	২	৩

সেকশন.গ ঃ আপনার এবং আপনার পরিবার সংক্রান্ত তথ্যাদি

অনুগ্রহ করে আপনার সম্পর্কে কিছু বলুন।

প্রশ্ন ৩৪ ঃ আপনি ?

১	পুরুষ	২	মহিলা

প্রশ্ন ৩৫ ঃ আপনার বয়স (বছর)

১	১৬-২০বঃ	৩	৩১-৪০বঃ	৫	৫১-৬০বঃ	৭	>৭০বঃ
২	২১-৩০বঃ	৪	৪১-৫০বঃ	৬	৬১-৭০বঃ		

প্রশ্ন ৩৬ ঃ আপনার মোট পারিবারিক আয় (টাকা)?

১	>৫০০০	৪	২৫০০০-৩৫০০০	৭	৫৫০০১-৬৫০০০
২	৫০০১-১৫০০০	৫	৩৫০০১-৪৫০০০	৮	৬৫০০১-৭৫০০০
৩	১৫০০১-২৫০০০	৬	৪৫০০১-৫৫০০০	৯	<৭৫০০০

প্রশ্ন ৩৭ ঃ পারিবারিক মালিকানাধীন মোটর গাড়ীর সংখ্যা ?

প্রাইভেট কার	০	নাই	১	১টি	২	২টি	৩	>২টি
মোটর সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি
বাই-সাইকেল	০	নাই	১	১টি	২	২টি	৩	>২টি

প্রশ্ন ৩৮ ঃ আপনার পেশা ?

১	ছাত্র/ছাত্রী	৩	সাংসারিক কাজ	৫	বেকার	৭	অন্যান্য
২	ব্যবসায়ী	৪	চাকুরিজীবী	৬	রিটায়ার্ড		-------------

সেকশন ঘ ঃ চয়েস পরীক্ষণ

প্রশ্ন ৩৯ ঃ তুলনামুলক চিত্রের মাধ্যমে দুইটি বাস সার্ভিস উপস্থাপন করা হল (বাসসার্ভিস-১ এবং বাসসার্ভিস-২) সার্ভিস দুইটি সাতটি নির্দিষ্ট বৈশিষ্ট্যের বিচারে আলাদা কিন্তু অন্যান্য বৈশিষ্ট্যগুলো একই।। আপনার নিজের সার্বিক অবস্থার (অর্থনৈতিক, সামাজিক, পরিপ্রেক্ষিত) বিচারে একটি বাস বার্ভিস পছন্দ করতে বললে আপনি কোনটি পছন্দ করবেন যার ফলে আপনি সর্বোচ্চ লাভবান হয়েছেন বলে মনে করবেন? আপনার পছন্দের সার্ভিসটির জন্য নির্দিষ্ট বক্সে টিক চিহ্ন দিন ।

চিত্র-২১	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
যাত্রী উঠানো ও নামানোর জন্য নির্দিষ্ট জায়গায় সুন্দরভাবে বাস থামবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২২	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ২০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৩	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৪	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে না
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৫	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ২০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৬	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৭	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
যাত্রী উঠানো ও নামানোর জন্য নির্দ্দিষ্ট জায়গায় সুন্দরভাবে বাস থামবে	যাত্রী উঠানো ও নামানোর জন্য নির্দ্দিষ্ট জায়গায় সুন্দরভাবে বাস থামবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৮	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ বেশী সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ৩০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে কোনো ছাউনী নেই	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া	নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-২৯	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ বেশী হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ৪০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থা নেই তবে ছাউনী আছে
এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ নিচু	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসে চলন্ত বাসে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে না	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

চিত্র-৩০	
বাসসার্ভিস-১	বাসসার্ভিস-২
এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে	এই বাসের ভাড়া বর্তমান ভাড়ার চেয়ে ৪০ শতাংশ কম হবে
এই বাসে বর্তমান সময়ের চেয়ে ২০ শতাংশ বেশী সময় লাগবে	এই বাসে বর্তমান সময়ের চেয়ে ২০ শতাংশ কম সময় লাগবে
বাসের জন্য আপনাকে ২০ মিনিট অপেক্ষা করতে হবে	বাসের জন্য আপনাকে ১০ মিনিট অপেক্ষা করতে হবে
এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে	এই সার্ভিসের বাসস্টপে বসার ব্যাবস্থাসহ ছাউনী আছে
নিচু ডেকের বাস ফলে দরজায় কোনো ধাপই নেই	এই বাসের উঠা-নামার দরজার ধাপগুলো বেশ খাড়া
এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে	এই সার্ভিসের বাসগুলো সুন্দরভাবে নির্দিষ্ট যায়গায় থেমে যাত্রী উঠা-নামা করাবে
এই সার্ভিসের বাসগুলোতে এসি থাকবে	এই সার্ভিসের বাসগুলোতে এসি থাকবে
আমার পছন্দঃ	আমার পছন্দঃ

প্রশ্ন ঃ ৪০ উপরোক্ত চয়েস কার্ড সমুহ পূরণ করার সময় বর্নিত কোন বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন কিনা?

যদি হ্যাঁ হয় ঃ যে বৈশিষ্ট্য সমুহ বিবেচনা থেকে বাদ দিয়েছিলেন তার পাশে টিক চিহ্ন দিন।

	১	বাসের ভাড়া	৪	উাসস্টপের সুবিধা	৭	এয়ার কন্ডিশন	
	২	ভ্রমনের সময়	৫	বাসে উঠার সিঁড়ির ধরণ			
	৩	অপেক্ষার সময়	৬	বাসে যাত্রী উঠানোর ধরন			

অংশ 'ঙ'ঃ ঢাকা শহরের বাস সার্ভিসের বৈশিষ্ট্য

ঢাকা শহরের বাস সার্ভিসের বিভিন্ন বৈশিষ্ট এবং সার্বিকভাবে বাস সার্ভিসের গুনগত মান সম্পর্কে আপনার অনুভূতি জানতে আগ্রহী।

প্রশ্ন ৪১ ঃ নিন্মবর্ণিত কথার সাথে আপনি কি পরিমান একমত/দ্বিমত পোষন করেন। (-২ থেকে ২ এর স্কেলে মূল্যায়ন করুন যেখানে **২=সম্পুর্ণ একমত, -২=সম্পুর্ণ দ্বিমত**)

১	ঢাকা শহরে বাসের ভাড়া তুলনামূলকভাবে কম।	-২	-১	০	১	২
২	অনেক পর পর বাস ছাড়ে তাই আমি বাসে যাতায়াত করি না।	-২	-১	০	১	২
৩	মহিলাদের জন্য বাসে সংরক্ষিত আসন রাখার দরকার নাই।	-২	-১	০	১	২
৪	গাদাগাদি করে বাসে যাতায়াত করতে তেমন অসুবিধা হয় না।	-২	-১	০	১	২
৫	যে বাসের চালক দক্ষ না আমি সেই বাসে ভ্রমন করব না।	-২	-১	০	১	২
৬	টিকেট মাস্টার/হেলপারের আচরণ নিয়ে আমি মাথা ঘামাই না।	-২	-১	০	১	২
৭	অপরিচ্ছন্ন বাসে যাতায়াত করতে খুব অসহ্য লাগে।	-২	-১	০	১	২
৮	বাসে যাতায়াতের জন্য অনেক সময় অপচয় হয়।	-২	-১	০	১	২
৯	বাসের জন্য অপেক্ষা করা খুব বিরক্তিকর।	-২	-১	০	১	২
১০	বাসস্টপে যাত্রী ছাউনী না থাকায় যাত্রীদের ভোগান্তি হয়।	-২	-১	০	১	২
১১	বাসের সিড়ির ধাপগুলো খাড়া হওয়ায় ওঠানামার অসুবিধা হয়।	-২	-১	০	১	২
১২	নির্দিষ্ট স্থানে সুন্দরভাবে বাস থামিয়ে যাত্রী উঠানো/নামানো উচিৎ।	-২	-১	০	১	২
১৩	এয়ারকন্ডিশন না থাকায় অনেকে বাসে যাতায়াত করে না।	-২	-১	০	১	২

প্রশ্ন ঃ ৩১ প্রশ্নপত্র সম্পর্কে আপনার কোন মতামত, যেমন প্রশ্নপত্র পূরণে কোন অসুবিধা, বা কোন প্রশ্ন সম্পর্কে কোন মতামত অথবা যে কোন মন্তব্য ?

মার্চ ২০১৩

প্রিয়, উত্তরদাতা,

আমি মোঃ আব্দুল্লাহ আল মামুন, গণপ্রজাতন্ত্রী বাংলাদেশ সরকারের সড়ক ও জনপথ অধিদপ্তরের একজন নির্বাহী প্রকৌশলী, পাশাপাশি যুক্তরাজ্যের Loughborough University - তে School of Civil and Building Engineering এর অধীন Transport Studies Group - এ পিএইচডি কোর্সের একজন গবেষক। ঢাকা শহরের বাস সার্ভিসের যাত্রীসেবার মানোন্নয়নের জন্য একটি নীতিমালা প্রণয়নই আমার গবেষণার মূল বিষয়বস্তু। এই গবেষনার অংশ হিসেবে উত্তরা থেকে সাতরাস্তা, রমনা হয়ে সদরঘাট পর্যন্ত রাস্তার দুই পাশের এলাকার অধিবাসী যারা সাধারণভাবে এই রাস্তা ব্যবহার করেন তাদের উপর এই জরিপটি পরিচালনা করতে চাই।

একদল জরিপকারী আমার পক্ষে এই জরিপকাজ আমার তত্ত্বাবধানে পরিচালনা করবেন। এই জরিপে আপনার মতামত ও অভিজ্ঞতা এই গবেষণার জন্য খুবই গুরুত্বপূর্ণ কারন এই গবেষণার ফলাফল সরকারের যথাযথ কর্তৃপক্ষ এবং পরিবহণ সংশ্লিষ্ট সকলকে জানানো হবে। আপনাকে নিশ্চিত করছি যে এই জরিপে আপনার প্রদত্ব যে কোন মতামত ও তথ্যাদি সর্বোচ্চ গোপনীয়তা রক্ষা করে ব্যবহার করা হবে। প্রশ্নপত্রটি পূরণ করতে ৪০ থেকে ৪৫ মিনিট সময় লাগবে।

প্রশ্নপত্র পূরণে সহযোগীতা করার জন্য আপনাকে আগাম ধন্যবাদ।

মোঃ আব্দুল্লাহ আল মামুন

গবেষক
ও
নির্বাহী প্রকৌশলী
(প্রধান প্রকৌশলীর দপ্তর সংলগ্ন ছুটি, প্রেষণ ও প্রশিক্ষনজনিত সংরক্ষিত সিভিল পদ)
সড়ক ভবন, রমনা, ঢাকা ১০০০
সড়ক ও জনপথ অধিদপ্তর

এই গবেষণা বা জরিপ সংক্রান্ত যে কোন যোগাযোগঃ
মোঃ আব্দুল্লাহ আল মামুন
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Appendix B:

List of Publications

UTSG (2014)

Mamun, M. A. A. (2014) The valuation of bus attributes to determine users preference in respect to service quality, in Dhaka, Bangladesh.

UTSG (2009)

Mamun, M. A. A., Ryley, T. J. & Bristow, A. L. (2009) The importance of public transport attributes in mode choice behaviour in Dhaka.

Conference on Sustainable Transport for Developing Countries: Concerns, Issues and Options at Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

Mamun, M. A. A., Bristow, A. L. & Ryley, T. J. (2008) Exploring influences on the demand for public transport in Dhaka.

THE VALUATION OF BUS ATTRIBUTES TO DETERMINE USERS PREFERENCE IN RESPECT OF SERVICE QUALITY IN DHAKA, BANGLADESH

Mr Md Abdullah Al Mamun

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Abstract

With a population of around 18 million, Dhaka, the capital of Bangladesh, is regarded as a city where buses are a slow form of transport due to chronic traffic congestion. Transport in Dhaka is dominated by walking, rickshaw and bus with a relatively low share of private car. It is not that sustainable modes of transport are attractive in Dhaka but, that the poor economic condition and suppressed transport demand are the two underlying causes of this favourable modal share. With rising national income and reductions in car prices the modal share of private car will grow. Improvements of buses can be an effective means to fight unrestrained car adoption in many developing cities around the world and in Dhaka. A number of factors determine the perceived quality of bus services and the objective of this paper is the valuation of bus attributes to obtain an insight into travellers' preference with respect to different aspects of service quality.

Qualitative attributes are becoming more important given the need to compete with more flexible individualized private transport modes. Thirteen bus attributes, of which nine were qualitative attributes, are examined: travel cost, travel time, waiting time, headway, bus stop facilities, ease of boarding and alighting, picking up and dropping off passengers, priority seats for women, crowding inside the bus, driving quality, driver and crew behaviour, cleanliness inside the bus and air conditioning are evaluated by using two separate discrete choice models. All the attributes except bus stop facilities were statistically significant and the estimated values are plausible. The values of travel time and waiting time are Bangladesh Taka (BDT) 27.60 and BDT 46.20 per hour respectively. Of the qualitative attributes crowding inside bus is the most highly valued at BDT 31.08 per trip for seating all the way compared with standing in a crush. The value of qualitative attributes seems high but acceptable, and reflects the very poor quality of bus operation in Dhaka.

1. Introduction

In 2008, 3.3 billion people, half of the globe's total population were living in urban areas and this is predicted to be 4.9 billion in 2030. Within the same time period the urban population of Asia and Africa is expected to double (United Nation Population Fund 2010). This enormous growth of urban population will put additional pressure on urban transport infrastructure. The inadequate transport system in Dhaka is regarded as a major impediment to the socioeconomic development of Bangladesh (Andaleeb et al. 2007). About 20 million trips are generated in Dhaka every day of which about 60% are made by non-motorized modes rickshaw and walking. Rickshaw has the highest share of 38.4% followed by bus with 28.3%, walk with 20.0% and the private car with 5.2% in Dhaka (DHUTS, 2010). It can be believed that economic growth, lower car prices and improvements in fuel efficiency may contribute towards a higher modal share of car in the future.

This paper aims to contribute to soft attribute valuation for the bus service in the context where quality of service is yet to achieve minimum acceptable levels and there is a need for development of services. As a result focus groups were conducted to identify soft attributes and the way they affect the service quality to develop a complete set of soft attributes and their level in developing country. Finally discrete choice models were developed for the valuation of these attributes to explain user preference.

The paper is structured as follows. Section 2 outlines the bus system in Dhaka. Section 3 briefly reviews evidence on the value of bus attributes. Section 4 outlines the methodology Section 5 and 6 addresses the experimental design and the implementation of survey. Section 7 presents the results of the models. Finally conclusions are drawn on the findings of the study and the future research directions.

2. Bus service quality in Dhaka

Service quality is one of the most important determinants of bus preference which has a direct and powerful influence on patronage (Balcombe et al, 2004). As a result bus service operators have to pay attention to the service quality in order to maintain market share and increase profitability in a deregulated and privatised market. Bus service quality is related to the regulatory arrangements, quantity of service supplied, operational arrangement and the characteristics of infrastructure and vehicle fleet. So, to develop an understanding of bus attributes in Dhaka those issues needed to be discussed as a number of bus attributes emanates from those issues.

The Dhaka Regional Transportation Committee (RTC) carries out public transport regulatory functions for Dhaka metropolitan area. Its responsibilities include route planning and deciding the maximum number of buses per route, issuing route permits and monitoring the service quality. They issues route permit to individual buses for three years rather than to the fleet of any operator. The process of defining bus routes and issuing route permits are not scientific in the absence of institutional capacity to handle this issue that affects the service quality. Apart from issuing and renewal of route permits regulatory enforcement is virtually non-existent for monitoring and compliance of service quality.

Bus fares are reviewed periodically in a negotiating process with operators, and are officially gazetted by the government for fixed route urban and intercity bus services. This review is not generally based on systematic or regular evaluation of operating costs, as the structure of regulation means the government is not equipped with detailed information about bus operations. At present the maximum bus fare between stops less than a kilometre apart is BDT 5.00 and then BDT 1.55 per additional kilometre as fixed by government. Though the bus fare is regulated, in the absence of regulatory oversight the public transport market is practically deregulated and there exists a fierce competition among operators.

The road network hierarchy in Dhaka is poorly defined with arterial roads serving both long haul motorised and short haul non-motorised modes including rickshaw and pedestrians that share carriageways. Sharing carriageways by motorised and non-motorised modes with varying operating speeds is an underlying cause of operational disorder and traffic congestion in Dhaka (STP, 2005). Although the bus system is not well managed, with a 28.30% modal share bus is the main motorised public transport mode in Dhaka. There is no mass transit system in Dhaka but a wide mixture of road based public transport and para-transit modes offer a range of choices to travellers.

In Dhaka three types of buses including human haulers, minibuses and large buses are in operation. Human haulers, a type of para-transit mode, evolved to serve poorly connected neighbourhoods where a large bus service is not technically possible due to physical constraints such as poor road geometry and to fill the transport gap created when 55,000 two stroke auto rickshaws were taken off the streets on environmental grounds and replaced with only 11,000 compressed natural gas (CNG) powered auto rickshaws in 2004. This classification is based on vehicle size and capacity. Human haulers can carry 9-15 passengers, minibuses not more than 32 and a large bus has seat capacity over 32. The large bus fleet in Dhaka includes single, double deck and recently introduced articulated buses. Though there is a wide difference in capacity of these three types of buses they are so classified because they follow defined routes allocated to them. Total number of permits issued till 2007 was 6,339 of which 4,807 were for buses and minibuses and 1,592 for the smaller human haulers (Bhuyan, 2007). STP (2005) estimated that 1,600 buses operate on different routes without valid route permits. So there are a large number of buses in a relatively small road length of 170 km. Intercity buses also serve travellers within the city augmenting public transport supply but the city transport operators have complained about it.

Route length indicates the area covered by bus service and an important proxy for quality of service. Higher the route length, wider the area covered and better the bus accessibility. In the bus service, quality is a function of quantity supplied that means a greater supply of vehicle-km over a given route network implies, in general, a more frequent service and lower waiting time (Polat, 2012). Bus service delivery on a specific route can be measured in number of ways such as total vehicle-km or hours, frequency, headway/service interval, wait time and schedule delay. The only available data for the bus supply in Dhaka is in the form of number of routes, road length under bus operation and frequency of service.

In Dhaka only 170 km road network serves 141 bus routes of which 103 are bus / minibus routes and 38 are human hauler routes (Bhuyan, 2007). In the peak hours routes vary significantly in terms of headway from less than 5 minutes in high frequency routes, more than 10 minutes in medium frequency routes and some others are not operated at all (Fjellstrom, 2004). More frequent routes are generally minibus and human hauler routes and such small vehicles at very high frequencies provide advantages in waiting time savings for passengers, but is inefficient in use of road space and the benefit of waiting time savings can be offset by longer journey time due to congestion. Fjellstrom, (2004) reported that in 2004 bus operating speed in peak hours was about 10km per hour and off peak speed is 30% higher and the situation did not improve if not deteriorated.

Both public and private operators provide bus service in Dhaka. The Bangladesh Road Transport Corporation (BRTC) is the biggest public sector operator. Depending on the working arrangements of driver and other staff bus operations in Dhaka are divided into two distinct categories. In first category, drivers and crew either own the bus individually or rent it on a daily or monthly basis and operate at their own revenue risk, requiring enough passengers per day to repay the bus rental fee, cover fuel and basic maintenance costs, and make a profit. This structure of incentives has many negative consequences such as reckless driving, blocking the buses behind, overloading at departure points, picking up and dropping off passengers while moving and extended waits at terminal points to fill up. This category applies to the majority of the bus fleet: some large buses, most minibuses, and all human haulers.

The second category operators run the service professionally. In this arrangement drivers, crew and other staff 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. On top of drivers and conductors, these bus operators employ administrative and managerial staff, maintenance staff, ticket booth operators, and marketing and sales staff. These operators are distinguished by the fact that they maintain ticket booths in order to collect fare payments. This allows drivers to concentrate on driving, rather than continually seeking to chase additional passengers. It gives better service experience compared to first category.

Considering the disadvantages of one bus one operator system, the consolidation of bus operation is being encouraged through policy interventions. Policy interventions are also being taken to replace small buses with high capacity and clean fuel buses. In response to this all individual operators on a particular route form a company for obtaining route permit and continuing the individual operation by paying the so called company for maintaining permits. As a result in many routes *"one company in one route system"* has been established without further improvement of the operation standard. In general terms de facto route franchise has taken place without any competitive bidding or any contractual obligation of the franchisee with the regulators on service provision and maintaining minimum quality of service.

To minimise the acquisition cost of the bus fleet, buses are locally manufactured on imported chassis totally undermining the standard for safety and comfort. A number of large buses, maximum number of minibuses and all the human haulers are locally manufactured that adversely affect the service quality such as difficult to boarding and alighting and draws attention for the investigation of attributes related to the characteristics of vehicle fleet. At the same time off the vehicle infrastructure such as bus stop facilities are almost nonexistent in Dhaka.

3. Evidence on the value of bus attributes

Empirical evidence suggests that a range of bus attributes determine the quality of the bus service and influences demand. It is natural that some attributes may be more important than others and there may be contextual dimension to this. Most empirical studies focus on a limited number of attributes mostly of a quantitative type, such as cost and time spent in different legs of a bus journey. Bristow and Davison (2007) defined quantitative attributes also known as hard interventions as objectively measurable aspects of time and money or generally the finite resources needed to accomplish a journey and qualitative attributes often referred as soft interventions are those that impact on the journey experience and perceived time cost and finally reduce the disutility of journey time. So hard factors are the cost of a journey but the soft factors reflect the quality aspects of a journey that interact with the hard factors to determine the disutility of a journey. Soft factors sometimes interact within themselves and affect the individual valuations depending on the type of interactions.

It is a formidable task to combine all these attributes together and evaluate them in monetary terms. To organize and present the attributes in a more structured way they are divided in two groups as quantitative and qualitative attributes. Measures / attributes that impact on the disutility of journey time were grouped in six classes and identified as soft impacts by Bristow and Davison (2007). They are (i) quality of in-vehicle experience, (ii) increased awareness of service availability (off-bus information), (iii) improved knowledge while travelling (on-bus information availability), (iv) ease of use, (v) quality of waiting and walking experience and (vi) safety and security. The quality attributes or soft factors can also be grouped as on-bus and off-bus factors or sometimes grouped in the order of a journey progression from planning to the end of a journey.

Here we draw primarily on earlier review evidence including two studies for the UK Department for Transport Faber Maunsell (2004) and Bristow and Davison (2007) and comprehensive valuation studies by AECOM (2009). Hensher and Prioni (2002) provides good evidence for soft attribute valuation in Australian context. The limited evidence from developing countries is also considered including the studies in the context of India by Phanikumar et al (2004) and Phanikumar & Maitra (2006 and 2007). So the valuation of soft attributes in developing country is quite new.

Faber Maunsell (2004) reviews the value of bus stop and onboard attributes from different studies and identifies important bus stop attributes as real time information, condition of seat and shelter, presence of heating, toilet facilities, lighting at the bus stop, cleanliness and staff presence. Cleanliness is valued at 11.80 pence followed by real time information at 9.0 pence in 1995 price. Lowest value for the bus stop attributes was 0.4 pence for staff presence in 1991 prices. Important onboard attributes noise level (very quiet compared with very noisy), ride quality (smooth ride compared with jerking) onboard safety (very unsafe compared with very safe), general comfort (very comfortable compared with very uncomfortable), availability of seat (ample seats compared with stand for whole journey). Availability of seat was valued at 4.0 pence followed by onboard safety at 3.1 pence, general comfort at 1.5 pence noise levels at 1.5 pence and ride quality at 1.2 pence per trip. So the attributes related to availability of information, safety and security on and off board, comfort and inside crowding, noise levels are important bus attributes.

Including in-vehicle time Hensher and Prioni (2002) estimated nine attributes for an Australian bus service and the most important attribute being driver attitude valued at AUS$ 0.88 for very friendly compared with very unfriendly followed by safety on board at AUS$ 0.74 for very smooth, no sudden braking compared with the ride is jerky, sudden breaking occurs often. Other attributes are cleanliness, information at bus stops, waiting safety, air conditioning with surcharge, bus stop facilities are valued at AUS $ 0.43, 0.41, 0.39, 0.36 and 0.19 respectively. Finally the in-vehicle time was valued at AUS$ 4.02 per hour. This is an important study for soft factor valuation that gives the comprehensive sets of qualitative attributes that influence travellers' journey experience and the users preference.

AECOM (2009) valued different soft attributes in ten different cities in UK giving clear insight into both the value of the attributes and their variation with location. It is clear from this study that the value of same attribute varies in different places and different contexts. The attributes are low floor bus, trained driver, audio announcement, climate control, CCTV at bus stops, new bus shelter and real time passenger information (RTPI). The highest value was 2.91 pence per trip for CCTV at bus stop and the lowest value was 1.08 pence per trip for new bus shelter in 2008 price. This study also checked for the presence of so called package effect and the finding is opposite to the conventional understanding that sum of the values of individual attributes is more than the value of the package of improvement comprising of those individual attributes.

There is little research on qualitative attribute valuation in the context of developing country. Phanikumar & Maitra (2006) evaluated qualitative attributes of bus service using stated choice modelling approach in Kolkata, the capital of West Bengal, India. Though the number of quality attributes examined is limited, this provides good evidence on the valuation of soft attributes in the context of a developing country which is geographically and culturally quite similar to Dhaka, Bangladesh. Phanikumar and Maitra (2006) examined six attributes of urban bus service and both MNL and RPL models were developed to evaluate the attributes. The values of in-vehicle time and waiting time are 7.35 paise/min and 3.07 paise/min respectively. The qualitative attribute comfortable seating is valued at 15.66 paise/km followed by get a seat en-route at 13.89 paise/km and finally comfortable standing is valued at 4.76 paise per km. The noise level is valued at 26.34 paise/km for very low noise followed by low noise is valued at 24.84 paise/km and finally high noise is valued at 2.35 paise/km relative to very high noise levels. Finally good appearance is 8.99 paise/km for urban bus in Kolkata. 100 paise equals to one Indian rupee and 44 Indian rupee equals to1 US$ in 2004.

From the review of valuation of qualitative bus attributes it can be concluded that there is a growing recognition of the ability of soft factors / attributes to act positively towards the expected behaviour change in the context of personal travel behaviour and bus service provisions. Many studies have examined the quantitative attributes of bus travel sometimes referred to as “hard factors” such as time and cost for a bus trip. However, studies that have sought to value the qualitative attributes sometimes referred to as “soft factors” are far more limited in number. There is a lack of understanding in the area of the valuation of qualitative attributes and their influence in determining user preference. So the valuation of qualitative attributes in a city of a developing country is contextually novel and gives new insight in the area of travel behaviour analysis.

4. Methodology

Focus groups and discrete choice modelling techniques were used for the PhD research, combining qualitative and quantitative approaches.

Mamun et al., (2008) identified qualitative attributes in the context that influence bus preference. Taking those attributes as starting point five focus groups were conducted in August 2008 and the findings of the focus groups were reported in Mamun et al (2009) adding some new insights through identifying bus attributes that influences user preference in Dhaka. Generally people attach higher importance to the attributes that they are highly dissatisfied with, representing that the present service provisions fall below minimum expected levels of service. Higher levels of dissatisfaction can be regarded as the proxy for the demand for improvement and possible policy bias might have played a role in this regard. Picking up and dropping off passengers, boarding and alighting, and priority seats for female were identified as new attributes in Dhaka and there is a clear difference of concern for those attributes between male and female.

Women are discouraged from boarding crowded buses, getting on and off the bus are more challenging for women and the picking up and dropping off the passengers on moving also discourages female passengers. As a result demand for priority seats for women in all buses and demand for female only buses were two key findings of the focus groups. The poor quality of these attributes sometimes acts as a barrier for female to use buses. From the findings of the focus groups and evidences from literature 13 key attributes were selected for the stated choice experiments in the main survey. The focus groups also helped in deciding the number of levels for each qualitative attribute and their definition.

The theory of discrete choice modelling is discussed here to present a methodology appropriate for the research to estimate the users’ willingness-to-pay (WTP) for urban bus attributes in Dhaka. WTP can be estimated by developing discrete choice models using the users’ preference from revealed choice or stated choice data. Discrete choice models are usually derived under an assumption of utility-maximizing behaviour of a decision maker.

Assuming utility-maximizing behaviour of decision maker discrete choice models are derived. The utility function is defined by Vnj = V(x_{nj}, s_n) $\forall$j and is called the representative utility where x_{nj} is the attribute of alternative and s_n is the characteristics of the decision maker. There are aspects of utility that the researcher can not observe, so utility is decomposed as $U_{nj} = V_{nj} + \varepsilon_{nj}$, where ε_{nj}, captures the unobserved part of utility. Assuming ε_{nj} as iid Gumbel distribution, the probability that an individual n chooses alternative i can be defined by the following model

$$P_{ni} = \frac{e^{Vin}}{\sum_{j \varepsilon jn} e^{Vin}}$$

which is the formula of standard logit model (Ben-Akiva & Larmen, 1985).

5. Design of experiments

The attributes for inclusion in the stated choice experiments are travel time, travel cost, waiting time, headways, bus stop facilities, driver and crew behaviour, cleanliness inside bus, ease of boarding and alighting, air conditioning, picking up and dropping off passengers, driving quality, crowding inside bus and priority seats for women. Table 1 shows the levels of all the 13 attributes used in two experiments.

Table 1: Bus attributes and their levels

Experiment 1		*Experiment 2*	
Attribute	levels	Attribute	levels
Travel cost (TC)	60% of current fare 80% of current fare Same as current fare 120% of current fare 140% of current fare	Travel cost (TC)	60% of current fare 80% of current fare Same as current fare 120% of current fare 140% of current fare
Travel time (TT)	60% of current time 80% of current time Same as current time 120% of current time 140% of current time	Headway (HWY)	Bus every 5 minutes Bus every 10 minutes Bus every 15 minutes Bus every 20 minutes Bus every 25 minutes
Waiting time (WT)	Wait for 10 minutes Wait for 20 minutes Wait for 30 minutes	Priority seats for women (PRS)	10% seats for women 20% seats for women 30% seats for women
Bus stop facilities (BSF)	Bus stop with adequate seats and shelter Bus stop with shelter but no adequate seats No shed and shelter at the bus stop	Crowding inside the bus (CWD)	Sitting all the way Standing comfortably Standing in a crush
Ease of boarding and alighting (BNA)	Low floor bus with no steps Wide door and mild steps to get in Narrow door and steep steps, difficult to get in	Driving quality (DQ)	Smooth and safe journey Jerky but safe Journey Jerky and unsafe journey
Picking & dropping passengers (PND)	Bus stops properly at designated places Picks and drops passengers on moving	Driver and crew behaviour (BVR)	Friendly and sober behaviour Unfriendly and rude behaviour
Air conditioning (AC)	With air conditioning Without air conditioning	Cleanliness inside the bus (CLN)	Deck and seats are clean and tidy Deck and seats are dirty and unclean

As the choice experiment would be totally new to the respondents it was necessary to keep the choice exercise simple. To avoid the response burden two separate choice experiments were designed with seven attributes in each experiment, the travel cost attribute common in both the experiments. In each experiment three of the attributes were quantitative and four of the attributes were qualitative. D-optimization technique was used to produce statistically efficient fractional factorial design using the SAS package. The fractional factorial design produced 30 choice scenarios for each of the experiment. By using grouping variable the 30 scenarios were randomly grouped in 3 sets for each experiment and each respondent evaluated 10 choice scenarios.

6. Implementation and data

A pilot study was conducted in October 2011 with 31 respondents to test the questionnaire, the experiment and the process of data collection. Following the result of pilot study some tweaks were made in the final version of the questionnaire in respect of rephrasing the definition of the levels of qualitative attributes. In the pilot version of the experiment the present fare and journey time were not defined as the midpoint of the levels but in the final version the present fare and time was used as the midpoint of the levels for the attributes as shown in Table 1. The experiment worked well as all the coefficients had expected signs, all the quantitative attributes were statistically significant and a number of qualitative attributes were statistically significant. The main survey took place between April and June 2013.

One km along each side (total two km) of 31 km Uttara-Sadarghat corridor was the catchment area for data collection and this area was defined by in GIS (Geographical Information System) map of Dhaka. For random selection of households, DWASA's (Dhaka Water and Sewage Authority) MS Access household pipeline connection database was used. The households falling within the catchment area were extracted from the DWASA database to define the population of the household for interview. The number of household that fell into the catchment area was 112,473. 800 households were randomly selected for interview and this list of household was supplied to the data collection team for interview.

Fourteen enumerators were given training on the questionnaire and the method of the execution of data collection. The enumerators collected data mostly in the weekends to maximise the availability of the randomly selected respondents during the visit.

For the development of models for important segments including gender, income and household car ownerships it was decided to obtain a minimum of 40 responses from each. As all the segments met the quota except households with a car so an additional 18 interviews were taken from the respondents of a household having at least one car.

432 interviews were successfully completed with a response rate of 82.92%. Table 2 summarizes the sample characteristics including age income and professional distribution of the sample of the household data.

Table 2: Age, income and professional distribution of sample

Age group		Income group		Professional distribution	
Age (Year)	Frequency	Income (BDT)	Frequency	Profession	frequency
16-20	64	>5,000	2	Student	101
21-30	112	5,001-15,000	84	Business	81
31-40	125	15,001-25,000	134	Looking after family	61
41-50	68	25,001-35.000	123	Employed (job)	146
51-60	43	35,001-45.000	42	Unemployed	25
61-70	20	45,001-55,000	18	Retired	14
<70	0	55,001-65,000	8	Other	4
	-	65,001-75,000	8	-	-
	-	<75,001	13	-	-
Total	432	Total	432	Total	432

58% of the sample was male. It seems that this is partly due to higher refusal rate for females on religious grounds and women were also busy with household chores during enumerators' visit to the household and could not spare time for interview. From the age distribution it can be seen that the sample has a high number of young people. It is not unusual in case of Dhaka as it is the major centre of employment for formal and informal jobs and also a centre for higher education. The number of people in the sample younger than 40 years of age is 70% that includes considerable number of students.

Nine pre defined income classes were used in the questionnaire with a class interval of BDT 10,000 for monthly income of household. 70% of the household fall in the three income groups of BDTY 15,001 – 45,000 and the monthly average income of the sample is BDT 27,390.00 which is less than the average income. This is expected as the corridor passes through some poor neighbourhoods and city centre and low income households live near the busy roads and town centre to reduce their transport cost. Household car ownership is 9% which is quite low.

From the professional profile it is found that including self-employed the number of employed people is 52.55% in the sample which is the highest followed by 23.38% students. 14.12% people look after family and 5.80% people are unemployed. The number of retired people is 3.24% which is quote low.

Average bus fare and average cost of journey were estimated from the survey and it is found that average one way bus fare is BDT 16.50 and average bus journey time is 31.5 minutes. It is mentioned earlier that the bus fares in Dhaka are regulated by the government and reviewed periodically. Taking the average journey time and the operating speed of the bus in the corridor it can be calculated that this fare is about 30% higher than regulated fare. Rickshaw fare is an important component of the total cost for one way bus journey in Dhaka. Average access and egress rickshaw fare is BDT 15.84 and BDT 15.00 respectively. So, average cost of a bus trip (door to door) is BDT 47.34 if rickshaw is used in both access and egress leg, it is BDT 32.34 if rickshaw is used only in access leg and BDT 31.50 if rickshaw is used only in egress leg of the bus trip. It would be more logical to compare willingness-to-pay (WTP) values with the total cost of a trip rather than that of just one way bus fare.

Two choice experiments were designed depending on two different sets of attributes accordingly there were two versions of questionnaire for the survey. Two versions of questionnaire were version "A" an "B". Total number of data was 432 where "A" set was 222 and "B" set was 210. "A" set attributes were for Experiment 2 and B Set attributes were for experiment 1. Total choice data for set "A" or model 2 was then 2220 and that for set "B" or model 1 was 2100. Each respondent evaluated 10 choice cards from subset A1, A2 and A3 for experiment 2 or from subset B1, B2 or B3 for experiment 1. Three respondents evaluated total 30 scenarios for each experiment.

7. Model estimation

Standard logit model was estimated for the valuation of the attributes. The choice situation was binary between two hypothetical buses and they were identical in quality. As a result it was not required to estimate alternative specific constants. So in the definition of the utility function alternative specific constant was not included. Linear in parameter multinomial logit models without alternative specific constant has been estimated by using freeware BIOGEME version 1.8. Two separate experiments were designed comprising 7 attributes each to keep the choice exercise simple and travel cost common in both the experiments.

The utility functions of both the models are

$$Utility_1 = TC * TC\_1 + TT * TT\_1 + WT * WT\_1 + BSF1 * BSF\_1 + BSF2 * BSF\_1 + BNA1 * BNA\_1 + BNA2 * BNA\_1 + PND * PND\_1 + AC * AC\_1 \quad (i)$$

$$Utility_2 = TC * TC\_1 + HWY * HWY\_1 + PRS * PRS\_1 + CWD1 * CWD1\_1 + CWD2 * CWD2\_1 + DQ1 * DQ1\_1 + DQ2 * DQ2\_1 + BVR * BVR\_1 + CLN * CLN\_1 \quad (ii)$$

Findings of the estimated models are presented in Table 3. The values of all the attributes were calculated dividing the respective coefficients by the coefficient of cost estimated by each of the models and are reported using the units in the model

Table 3: Estimated coefficients and value of the monetary value of attributes

Attribute / Dummy variable	Model 2		Model 1		
	Coefficient	Value (BDT)	Coefficient	Value (BDT)	Unit
Travelling cost (TC)	-0.0325(-5.76)		-0.029(-2.33)		
Headway (HWY)	-0.0461(10.9)	1.42			/ min
Priority seats for women (PRS)	0.0081(2.24)	0.25			/ %
Standing in a crush	Base				
Standing comfortably (CWD1)	*0.0280(0.69)*	*NS*			*/ trip*
Seating all the way (CWD2)	1.01(12.99)	31.08			/ trip
Jerky and unsafe journey	Base				
Jerky but safe journey (DQ1)	0.374(4.59)	11.51			/trip
Smooth and safe journey (DQ2)	0.629(7.29)	19.35			/ trip
Unfriendly and rude behaviour	Base				
Friendly and sober behaviour (BVR)	0.169(6.18)	5.20			/trip
Deck and seats are dirty and unclean	Base				
Deck and seats are clean and tidy (CLN)	0.223(3.66)	6.86			/trip
Travelling time (TT)			-0.0134(-2.18)	0.46	/ min
Waiting time (WT)			-0.0224(-6.30)	0.77	/ min
No shed and shelter at the bus stop			Base		
Bus stop with shelter but no adequate seats (BSF1)			-0.229(-2.60)	-7.9	/ trip
Bus stop with adequate seat and shelter (BSF2)			*0.0265(0.31)*	*NS*	*/ trip*
Narrow door & steep steps, difficult to get in			Base		
Wide door and mild steps to get in (BNA1)			0.495(6.31)	17.07	/ trip
Low floor bus with no steps (BNA2)			0.629(7.66)	21.69	/ trip
Picks and drops passengers on moving			Base		
Bus stops properly at designated places (PND)			0.262(3.72)	9.03	/ trip
Without air conditioning			Base		
Air conditioning (AC)			0.426(6.64)	14.69	/ trip
Final log-likelihood	-1258.314		-1354.335		
Adjusted rho-square	0.154		0.063		

In terms of overall model fit the adjusted rho-square for both the model is low but model 2 has higher value rho-square value than model 1. Coefficients of all of the attributes except the dummy variable “bus stop with shelter but no adequate seats (BSF1)” have the expected sign and all of the attributes except dummy variables “standing comfortably (CWD1)” and “bus stop with adequate seat and shelter (BSF2)” are statistically significant. The dummy variable “seating all the way (CWD2)” against the base level of “standing in a crush” is highly significant but “standing comfortably (CWD1)” is not statistically significant. This means that there is no significant difference between standing in a crush and standing comfortably in a bus trip. It is quite logical that passengers want to avoid standing in bus trips no matter if it is standing in a crush or standing comfortably.

The value of travel time saving, waiting time and headway as estimated by the models are BDT 27.60, BDT 46.20 and BDT 85.20 respectively. So, the value of travel time saving is 18.83% higher than the minimum wage rate for garment workers, 24.30% of the average hourly wage rate of the sample and 22.18% of the average hourly wage rate of Dhaka. It is perhaps at the lower end of expectations according to TRL advice (Balcombe et al, 2004) that recommends value of time saving is about 35% of average wage. The value of waiting time is 1.67 times higher than the value of travel time. UK value of time study suggests that the value of waiting time is generally between 1.50 to 2.00 times of the values of in-vehicle time.

The highest value for a qualitative attribute is BDT 31.08 per trip for seating all the way compared to standing in a crush. This is expected as the buses in Dhaka are always crowded due to the capacity constraints and also due to the revenue maximising behaviour of the operators to carry maximum number of passengers in absence of a mandatory time table. This issue was raised in the focus group discussion especially by the female participants as the bus drivers often refuse to take female passengers in a crowded bus. The next higher value of the qualitative attribute is BDT 21.69 per trip for low floor bus and BDT 17.07 for wide door and mild steps to get in compared to narrow door & steep steps, difficult to get in. Boarding and alighting is an issue due to nonstandard buses with narrow door and steep step and also crowding at the door make it difficult to get in and get off the bus especially by the female and passengers carrying bags and luggage.

Quality of driving is an important aspect of a journey but to minimise operating costs the bus operators in Dhaka often employ drivers without appropriate driving skills and sometimes without a valid driving licence. Qualitative attributes “smooth and safe journey” and “jerky but safe journey” compared to “jerky and unsafe journey” have been valued at BDT 19.35 and BDT 11.51 per trip respectively. Comparatively higher value for this attribute represents the poor driving quality and safety situation in Dhaka.

Getting on and off the bus in Dhaka require special skills as buses often pick up and drop off passengers while moving. In the focus groups this issue has been raised with huge concern as a result this attribute was included in the model for valuation. “Bus stops properly at designated places” to pick up and drop off passengers compared to “picking and dropping off passenger on moving” has been valued at BDT 9.03 per trip and “deck and seats are clean and tidy” compared to “deck and seats are dirty and unclean” has been valued at BDT 6.86. Value of “friendly and sober behaviour” of driver and crew compared to “unfriendly and rude behaviour” has been estimated at BDT 5.20 and “air conditioning” compared with “non air conditioning” bus has been valued at BDT 14.69 per trip.

In the focus group discussion priority seats for women and introduction of female only bus were given high importance by both male and female participants in the focus group, as a result the context specific attribute “priority seats for women” was considered for the valuation in this study. From the valuation study the each percent of priority seat for women was valued at BDT 0.25 per trip. So the value of 15% priority seats for women is BDT 3.75 per trips per passenger.

As there are no evidences of valuation of soft attributes in the context of Dhaka, the value of the soft attributes could not be compared. However, there is evidence of valuation of travel time savings for appraisal of road transport project in Dhaka. The earliest study was conducted in 1989 and the latest one was in 2010 by consultants. Some of the studies estimated value of time in national level and only a few estimated in the context of Dhaka. The method of estimation also varies significantly; most early studies are based on the income level and adjusted the value with GDP growth and inflations. Some studies estimated value of time by using discrete choice modelling technique. Table 4 presents value of time estimated by discrete choice models.

Table 4: comparison of hourly value of time in 2013 prices

Study	Overall value of time (BDT)	Low income (BDT)	Medium income (BDT)	High income (BDT)	comments
Halcrow Fox (1996)	56.10/hr	-	-	-	Intercity travel
Hoque (2005)	36.95/hr	-	-	-	Dhaka city
DHUTS (2010)	-	34.42/hr	81.67/hr	45.89/hr	Dhaka city
Current study	27.60/hr	-	-	-	Dhaka city

The value of time estimated by current study is the lowest among the available values for Dhaka. The Halcrow Fox (1996) values are for intercity travels so it is logical that the value would be higher than inner city values but it is more than the double of the value of current study. The value of time saving for medium income group as estimated by DHUTS (2010) study is exceptionally high and no acceptable explanation is provided for this. Though the value of current study is low but it is quite close to the value of time estimated by other studies in Dhaka.

8. Conclusion

The valuation of qualitative attributes of the bus system in Dhaka is contextually novel. It can explain the role of qualitative attributes to influence user preference in a context where bus service provision falls below the minimum acceptable level. All of the quantitative attributes and eight out of nine qualitative attributes are statistically significant with plausible values which indicate that qualitative attributes are also important. The value of travel time is BDT 27.60 per hour, waiting time is BDT 46.20 per hour and the headway is BDT 85.20 per hour. The values of travel time and waiting time are plausible and the values of waiting time and headway are the first estimates for Dhaka. Three new qualitative attributes were evaluated they are ease of boarding and alighting, picking up and dropping off passengers and priority seats for women, their values are BDT 21.69 per journey, BDT 9.03 per journey and BDT 0.25 per percent of reserved seats for women per journey respectively. The value of qualitative attributes seems high but acceptable, and reflects the very poor quality of bus operation in Dhaka. The highest value of the qualitative attributes is for seating all the way compared with standing in a crush is BDT 31.08 per journey and the lowest value is for friendly and sober behaviour of driver and crew is BDT 5.20 per journey compared with unfriendly and rude behaviour. This paper provides the first values for picking up and dropping off passengers, ease of boarding and alighting and priority seats for women. There is scope for further analysis including segmentation, looking at attribute interactions and random parameter variations.

Note: All the values are of 2013 prices and 1 GBP is equal to BDT 125.00

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