

Reviving the Railway for Sustainable and Safe Travel
A Study of the Dhaka- Narayanganj Railway Route

MD. MOINUL ISLAM
Roll No: 040515013F

MAY 2013



Urban and Regional Planning Department
Bangladesh University of Engineering and Technology, Dhaka
Bangladesh

**REVIVING THE RAILWAY FOR SUSTAINABLE
AND SAFE TRAVEL**

A STUDY OF THE DHAKA- NARAYANGANJ RAILWAY ROUTE

**BY
MD. MOINUL ISLAM**

MASTER OF URBAN AND REGIONAL PLANNING

**DEPARTMENT OF URBAN AND REGIONAL PLANNING
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY**

MAY 2013

REVIVING THE RAILWAY FOR SUSTAINABLE AND SAFE TRAVEL

A STUDY OF THE DHAKA- NARAYANGANJ RAILWAY ROUTE

**BY
MD. MOINUL ISLAM**

A thesis submitted to the Department of Urban and Regional Planning in
partial fulfillment for the degree of Master of Urban and Regional Planning

**DEPARTMENT OF URBAN AND REGIONAL PLANNING
BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY**

MAY 2013

THESIS ACCEPTANCE FORM

REVIVING THE RAILWAY FOR SUSTAINABLE AND SAFE TRAVEL

A STUDY OF THE DHAKA- NARAYANGANJ RAILWAY ROUTE

BY
MD. MOINUL ISLAM

Thesis Approved as to style and content by

Dr. Roxana Hafiz
Professor
Department of Urban and Regional Planning
BUET, Dhaka

Chairman

Dr. Sarwar Jahan
Professor and Head
Department of Urban and Regional Planning
BUET, Dhaka

Member
(Ex-Officio)

Dr. Md. Shakil Akther
Associate Professor
Department of Urban and Regional Planning
BUET, Dhaka

Member

Md. Zakaria (MBA)
Divisional Signal and Telecom Engineer/Telecom
Bangladesh Railway, Kamlapur, Dhaka

Member(External)

Candidate's Declaration

I hereby declare that this thesis has been prepared in partial fulfillment of the requirement for the degree of Master of Urban and Regional Planning at the Bangladesh University of Engineering and Technology, Dhaka and has not been submitted anywhere else for any other degree.

Md. Moinul Islam

Student No. 040515013 F

Department of Urban and Regional Planning

BUET, Dhaka

**To
My Parents**

For Their Support and Endless Love

Reviving the Railway for sustainable and Safe Travel

A Case Study of Dhaka-Narayanganj Railway Route

Table of Contents	Page
Acknowledgement	I
Abstract	II
Table of Contents	III
List of Tables	III
List of Figures	III
List of Maps	V
Operational Definitions	VI
Acronyms and Abbreviations	VII
Chapter 01 : Introduction	
1.1. Background and Present State of the Problem	1
1.2. Objectives and possible outcome	4
1.3. Rationale/significance of the study	4
1.4. Scope of the Study	5
1.5. Limitations of the Study	5
1.6 Organisation of the Research	5
Chapter 02 : Literature Review	
2.1. Introduction	7
2.2. History of Railway in Bangladesh	7
2.3. Scenario of Railway in Contemporary World.	11
2.4 Historical Background of Bus Transport	12
2.5 Declining Trend of the Railway Services and Development	15
2.6 The Meaning of Sustainability for Railway	16
Chapter 03: Methodology	
3.1. Introduction	25
3.2. Literature Review	26
3.3. Process of Conceptualization	26
3.4. Topic Selection	26
3.5. Formulation of goals & objectives	26
3.6. Data Collection	27
3.6.1. Primary Data Collection	
3.6.2 Secondary Data Collection	28
3.7. Data processing and Assembling	29
3.8. Data Interpretation and presentation	30
3.9. Formulation & Submission of Draft Dissertation	30
3.10. Review Presentation of Draft Dissertation	30
3.11. Final Dissertation Presentation	30
3.12. Conceptual Framework of the Research	30

Chapter 04 : An Overview of the Study Area	
4.1. Introduction	32
4.2. Selection of the location of study area	32
4.2.1. Location of the study site	33
4.2.2. Reasons for selecting this specific study area	35
Chapter 05 : Comparative Analysis of these two Specified Routes (Bus and Train)	
5.1. Introduction	37
5.2. Comparative Study Based on Secondary Information	37
5.2.1 Bus Services Information	38
5.2.2 Train Services Information	38
5.2.3 Distance	38
5.2.4 Travel Time	39
5.2.5 Fare	39
5.2.6 Fuel Consumption	40
5.2.7 Right of Way	40
5.2.8 Accident	41
5.2.9 Manpower	42
5.2.10 Speed	42
5.3. Comparative Study Based on Primary Data Analysis	43
5.3.1 General Information of the Passengers	43
5.3.2 Living Place of the Respondents	49
5.3.3 Travel Pattern	49
5.3.4 Frequency of Travel	50
5.3.5 Level of Satisfaction for different Factors and Overall Service	50
5.3.6 Maximum Payment for Travel	57
5.3.7 Model Shift	57
5.3.8 Problems of Bus and Train	58
5.4. Comparative Analysis Based upon Case Study	60
5.4.1 Loco Master	60
5.4.2 Station Master	61
5.4.3 Bus Driver	62
5.4.4 Rail Higher Official	62
5.4.5 Rail Higher Official	63
5.4.6 Regular Train Passenger	63
Chapter 06 : Conclusion	
6.1. Introduction	65
6.2. Summary of the Findings	65
6.3 Recommendations	67
6.4 Conclusion	69
References	
Appendices	

Acknowledgement

All praises belong to Almighty Allah, most Merciful, most Kind and Generous to man and his actions. All the progress, achievements and success throughout my life are His blessings. First of all, I convey my gratefulness to Him, the most Beneficent for giving me the ability to complete the thesis.

I would like to show my gratitude to the Committee for Advanced Studies and Research, Bangladesh University of Engineering and Technology for providing me necessary fund for conducting this thesis.

I wish to express my profound gratitude and acknowledge to my supervisor Dr. Roxana Hafiz, Professor, Department of Urban and Regional Planning, BUET, Dhaka for her constant guidance, continual encouragement and patience since the inception of the study. I am also expressing my gratitude to my respected teachers, especially Prof. Dr. Sarwar Jahan and Dr.Md. Shakil Akther of the Department of Urban and Regional Planning, BUET, Dhaka for their valuable suggestions during research work.

I am highly grateful to my parents, elder brother Mr. Md. Monirul Islam and younger brother Mr.Md. Mujibul Islam for their support and encouragement. I also grateful to my beloved wife Ms. Asmaul Husna Kusum for her continuous encouragement and mental support to conduct the thesis. I would like to express my especial thanks to my father- in - law Mr. Md. Habibur Rahaman Shaikh.

I wish to convey my sincere thanks to all of my well wishers for their constant sympathetic co-operation and mental support at all stages of my thesis work. I also want to give thanks to Planner Mr. N.S.M Asad (KU graduate) for his cordial help in different stages of the thesis.

Md. Moinul Islam

May 2013

Abstract

Narayanganj is an industrial and a commercial hub of Bangladesh. It is a rapidly growing urban centre. People's concentration is increasing due to its being one of the most industrialized zones and having better communication with Dhaka. The transport system of Bangladesh consists of roads, railways, waterways and aviations and the two most dominant land transport modes are Railway and Bus. Narayanganj-Dhaka route is very important for trade, commerce and industry. In this route bus service is more prominent. But bus service has a lot of shortcomings in Dhaka. Too many buses on the street create traffic jam, pollution, accident and so on. The railway has been a very popular mode in the past, but its popularity declined or was made to decline due to various reasons. Railway, as a mass transport mode, has increased all over the world; the opposite seems to be true in the case of Bangladesh, especially Dhaka. And, this calls for an investigation as to why this is so. Thus, the specific aims of this research were (i) to investigate into the problems that has rendered the railway inefficient and unreliable over time and (ii) how this can be reversed and to investigate why passengers traveling from Dhaka to Narayanganj or vice versa ride buses and whether they will travel by railway if reliability and efficiency of this services are ensured. This study revealed that train service is much better than bus service and also more reliable. The research also has pointed out comparative benefits and problems of train service. In addition, a set of recommendation has been suggested to popularize the train service. The policy recommendations that are provided in this thesis can be taken into consideration for preparing future development plan in this regard.

List of Tables

Table No. 2.1: Present Status of Railway traffic.

Table No. 2.2: Number of Registered Vehicles in Bangladesh

Table No. 2.3: Declining Trend of the Railway Services and Development

Table No. 3.1: Sample Distribution by passengers

Table No. 5.1 : Bus Service Capacity for Passengers

Table No. 5.2 : Transport Strength of Rail Service

Table No. 5.3: Bus Casualties in Bangladesh

Table No. 5.4: The accident Status of the Railway Transport.

List of Figures

Figure 01: Age Composition of the Respondents from Road Transport.

Figure 02: Age Composition of the Respondents from Railway.

Figure 03: Gender Issue in Travel Pattern of Bus

Figure 04: Gender Issue in Travel Pattern of Train

Figure 05: Occupation of the Respondents Travelled by Train

Figure 06: Occupation of the Respondents Travelled by Bus

Figure 07: Education Status of the Train Passengers

Figure 08: Education Status of the Bus Passengers

Figure 09 : Income Status of the Train Passengers

Figure 10 : Income Status of the Bus Passengers

Figure 11: Living Place of the Respondents

Figure 12: Purpose of Travel of the Respondents

Figure 13 : Frequency of Travel of the Passengers

List of Graphs

Graph 01: Satisfaction Level: Extremely Dissatisfied

Graph 02: Satisfaction Level: Dissatisfied

Graph 03: Satisfaction Level: Neutral

Graph 04: Satisfaction Level: Satisfied

Graph 05: Satisfaction Level: very Satisfied

Graph 06: Satisfaction Level of Respondents about Various Services

Graph 07: Overall Service

Graph 08: Maximum Payment for Travel

Graph 09: Modal Shift of the Passengers

Graph 10: Problems of bus service

Graph 11: Problems of Train Service

List of Maps and Plates

Map 01: Railway Network Map

Map 02 : Map of the Study Area.

Plate No. 01 : The Railway land is occupied by (i) small vendors, slums and (ii) building

Plate No. 02 : Fence along the rail track to attain maximum speed.

Plate No. 03 : Same level platform and train door in Singapore

Plate No. 04 : Standing Space within Train Compartment in Singapore

Plate No. 05 : Time Schedule of Train

Plate No. 06 : Travel Fare of Train

Plate No. 07: Low and shanty Platform

Plate No. 08: Traffic Jam at Jatrabari

Operational Definitions

Broad Gauge: Broad gauge railways uses rail gauge (distance between the rails) about 5.5 ft. The difference between Broad gauge and Meter gauge are distance between the rail. Broad gauge is more spacious rail than meter gauge. Generally broad gauge rail line is used in plain land and Meter gauge is used in hilly regions.

Locomotive: A locomotive is a railway vehicle that provides the motive power for a train. The word originates from the Latin loco-“from a place”, ablative of locus, “place” + Medieval Latin motives, “causing motion”, and is a short form of the term locomotive engine.

Mass Transport: The transport which carries bulk of passengers at a time from one place to another place. Mass transport plays important role in city transport planning system.

Meter Gauge: Meter gauge refers to one meter distance between the rails.

Modal Share and shift : Modal share or Modal split, is a traffic/ transport term that describes the percentage of travelers using a particular type of transportation. For example if 60% of all travelers use cars to get from A to B, while 30% use the train 10% use the bus, then the public transport modal share would be 40% (bus+train), while the motor vehicle modal share would be 70% (car+bus). Modal shift is change in modal share of different modes.

Rolling Stock: Rolling Stock includes locomotive engines, tenders, carriages, wagons, trucks and trolleys of all kinds.

Acronyms and Abbreviations

ARI	Accident Research Institute
BBS	Bangladesh Bureau of Statistics
BER	Beyond Economic Repair
BG	Broad Gauge
BRTA	Bangladesh Road Transport Authority
BRTC	Bangladesh Road Transport Corporation
BR	Bangladesh Railway
BUET	Bangladesh University of Engineering and Technology
GDP	Gross Domestic Product
GIS	Geographic Information System
IR	Indian Railway
MG	Meter Gauge
MRT	Mass Rapid Transit
RHD	Roads and Highways Department
SPSS	Statistical Packages for Social Science
URP	Urban and Regional Planning
USA	United States of America
WMI	Weighted Mean Index

CHAPTER 1

INTRODUCTION

1.1. Background and Present State of the Problem

Passengers travelling to different destinations want a Railway that is reliable, safe, economical, comfortable, accessible and easy to use. The public wants a railway that contributes to economic growth; and, the recent demand has been to meet the environmental challenges. The Railway can only meet these goals if it has the capacity to carry the passengers who want to use it. But Railway in Bangladesh has not kept pace with such demand as the number of passengers using this mode has declined in the recent years. Rather buses, private cars and trucks were given preference over the Railway for moving people and goods. The result is that overcrowding in the roadway, costly mobility and degradation of the environment.

Railway was a very popular and efficient mode of transport in the past in Bangladesh. It carried a good bulk of passengers and commodities with efficiency, safety and standard services. Delivering an efficient railway, with the customers, cost, capacity and safety, was always in mind. The railway service was a public sector concern for planning, development and operation. But inefficient planning, corruption, nepotism, political influence, misappropriation, etc. over time made the railway industry incompetent and a losing concern for the government incurring huge losses; in addition, bus service was given increasing priorities in the private sector over the years. Tycoons and political elites of the society are owners of the bus fleet service. Driven by personal profit, they indirectly compelled passengers to use the bus by increasingly making the railway service slow, unreliable, irregular, inefficient and costly through high political and financial influences to the flexibility of private cars, buses and trucks.

Narayanganj is an industrial and commercial hub of Bangladesh. It is a rapidly growing area. People's concentration is increasing due to its being one of the most industrialized zones and having better communication with Dhaka. Recently a study estimated that at

least 2100 motorized vehicles of different categories ply between Dhaka to Narayanganj and vice versa carrying at least 1,70,000 people daily following two routes, one through Biswa Road and another through Pagla¹. Frequency of bus services are at 5 minutes to 10 minute intervals and render services throughout the day starting from 6.30 in the morning till midnight². It is stated that the numbers of buses and private cars are increasing day by day as more and more people are becoming dependent on them rather than the Railway³.

Although buses, instead of the Railway, are now carrying the bulk of passengers to and from Dhaka and Narayanganj and the volume of buses and private cars plying on this route creates traffic congestion at different locations, such as Shonir Akhra, Jatrabari, Saidabad and Banga Bhaban (Shown in Map 02). Traffic congestion increases travel time. The expected travel time is about 1 hour to 1 hour 20 minutes, but the traffic jam adds at least 20 to 30 minutes more to the expected travel time. Sometimes this may lead to several hours. The duration of travel accompanied with congestion, noise, heat, etc. makes travel frustrating. This consequently, results in loss of time, money, working efficiency, etc. which remain unaccounted for.

In the Dhaka-Narayanganj route people also have the choice of traveling by Railway. Railway carries about 500 passengers in a single trip compared to a large bus carrying about 50 passengers in a single trip. So, it is clear the railway carries 10 times higher passengers than the bus. Railway intersects the city traffic at 18 points and street users are interrupted at only one or two points. So, it can be safely said that the Railway network in Dhaka city is not creating problems for road users. The fare for travelling by Railway is also cheap. Railway ticket fare is only 6 taka for Dhaka-Narayanganj route; whereas, bus fare is 22 taka which is almost 4 times higher. So, Railway fare is also less and cost effective. In the bargain, Railway passengers enjoy safe, comfortable, and inexpensive transportation and the Bangladesh Railway can earn about 20% more revenue, contributing to the economic strength of the country⁴. Energy-wise the Railway is more efficient than buses as one single train will need only 2.13 liters (800 passengers) of fuel

¹ Asia Energy Corporation (2005), Feasibility Study for Improvement and Rehabilitation of Branch lines of Dhaka-Narayanganj-Dhaka

² Ibid

³ Ibid

⁴ Ibid

and bus will need 4 liters (50 passengers) of fuel to make a single travel. Since Railway uses less fuel than the bus; this, consequently saves expensive fuel and valuable foreign currency. In addition, less fuel consumption leads to an improved environment. Railway also ensures comparatively more safe travel for the passengers. There were about 524 bus accidents in 2003, whereas railway accidents were significantly less, which were about 133⁵. These accidents occurred mostly due to errors in signaling, ignoring signals, failure of closing of gates at crossing points, parking of buses on railway-tracks, etc. Buses also require more land to operate than railway. The width of Dhaka-Narayanganj Highway Road is about 280 ft. but the width of rail line is only about 30 ft. only. So, it is clear that Railway is also land use efficient.

In spite of all the advantages described above the Railway depicts a gloomy and dismaying picture as its share of passenger traffic is only 5.5% of the total volume in Dhaka-Narayanganj route. The Railway over time has become inefficient and unreliable due to all the stated reasons and these will be discussed in detail with the progress of this thesis. Thus it is evident that people have no choice but to travel by bus. Incidentally, the Dhaka-Narayanganj section is part of the Chord Line and on commissioning of the Chord Line it will be possible to run 32 pairs of commuter trains with 30 minute frequency from both Dhaka and Narayanganj daily and increase the possibility of carrying 64,000 passengers daily and the modal share increasing to a handsome 32%.

The efficiency of the Railway in carrying passengers and goods in bulk and with safety is undisputable. Thus, how the Railway over time has lagged behind other means of transport requires an in-depth investigation. This research, thus, intends to investigate how the Railway has become inefficient over time and how this situation can be reversed. This research also intends to investigate why people ride buses and whether they will travel by Railway if reliability and efficiency of this mode is ensured. In view of present crisis in road transport sector and the unbearable congestion experienced daily, it has become imperative to find other alternatives to ease this situation. Thus the main purpose of this research is to find out how the Railway can indeed be a reliable, people-friendly as

⁵ Accident Research Institute (2010), Accident Information Book, Bangladesh University of Engineering and Technology, Dhaka

well as environment-friendly transport for passengers traveling through the Dhaka-Narayanganj route.

1.2 Objectives and possible outcome

The railway was very popular and efficient mode in the past and it is assumed that it can be made so again in the present. The broad aim of this thesis is to show that the Railway can indeed be a better alternative to ease the present traffic situation for passengers traveling from Narayanganj to Dhaka or vice versa.

The specific aims of this research are:

1. To investigate into the problems that has rendered the Railway inefficient and unreliable over time and how this can be reversed.
2. To investigate why passengers traveling from Dhaka to Narayanganj or vice versa ride buses and whether they will travel by Railway if reliability and efficiency of this service is ensured.

It is expected that this study will bring to light the conditions prevailing in the Railway that creates barriers to a safe, cheap, reliable and environment-friendly transport. It is expected that the findings of this study will help to remove those barriers and help to formulate strategies for reviving the Railway as a passenger-friendly transportation for those travelling from Dhaka to Narayanganj and vice versa. The findings from this study can be applied in other routes in Bangladesh.

1.3 Rationale of the Study

Studies have indicated that the Railway is, without doubt, an efficient, cheap and reliable means of transport to transfer passengers and goods in large volumes. Road transport is more costly and hazardous than the Railway. For rapid industrial and commercial growth requires consequent improvement of the Railway; as the Railway provide services to levels and volumes which no other road transports can offer. Thus, this thesis intends to reveal and justify the necessity of the Railway services for safe, sustainable and cost efficient transport for passengers traveling through the Dhaka-Narayanganj route.

1.4. Scope of the Study

This thesis is associated with services and sustainability of both mode of transports such as the Railway and the bus. This research investigated the overall benefits of the Railway by comparing the two modes. This study is confined within the service aspects of the routes. In addition, the study has pointed out some benefits of the Railway such as fare, speed, travel time, environment and accident rate etc. This research did not include the technical aspects of the transport modes.

1.5. Limitations of the Study

During the research some problems were encountered as discussed below

1. The problem of the Railway involves politics, corruption, bribe, greed and moral ethics of the people involved in the two sectors - who were thus reluctant to discuss matters candidly with the researcher.
2. Some officials of concerned departments were reluctant to provide necessary information related to the research and some were purposely misleading.
3. It was sometimes very difficult to conduct survey due to the rains.

1.6 Organization of the Research

Depending on the objectives of this research the thesis has been organized into six chapters and which are discussed below.

Chapter 1 describes the introductory information regarding the research. This chapter explored the research issues and type of problems in the context of Dhaka and to some aspect in the context of Bangladesh.

Chapter 2 depicts literature review which is important for gathering essential knowledge and guideline of the thesis. This chapter helped to point out the research gap and find out further research space for future researchers.

Chapter 3 discusses the methodology of the study that was addressed the procedures how the study has been conducted. A suitable methodology has been developed to conduct the thesis.

Chapter 4 illustrates the study area which is Narayanganj to Dhaka Rail and bus routes. It includes all the information related to the study. It also describes the reasons why this route has been selected for this research purpose.

Chapter 5 demonstrates the comparative study of the two modes in term of travel time, fare, comfort, accident and so on and so forth. The findings of this research were extracted from the questionnaire survey of 399 respondents, secondary information, and case study.

Finally, Chapter 6 is the concluding episode of the study. It comprises a set of policy recommendations and conclusion of the study for future development guidelines.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In order to begin this research an historical discussion of the evolution of the Railway in Bangladesh deemed necessary. An extensive literature survey also helped to refine ideas regarding the Railway service for the Dhaka and Narayanganj route and the prevailing problems that has overwhelmed it. This has also helped to grasp the dimension of the problem and the intent to solve it.

2.2. History of Railway in Bangladesh

Railway communication plays an important role for socio-economic development in our country. Railway is one of the oldest and vital institutions in Bangladesh. Railway started its journey on 15 November in 1862. A 53 kilometers railway line was installed from Darshana (in Chuadanga District) to Jagati (in Kushtia District). The British Colonial administration constructed rail line to enhance colonial operation and to open up specific hinterlands of the colonized countries for exploitation of resources to serve industries set up in their home country. Since, mass transportation and communication was not their agenda; only specific areas were connected to enhance exploitation of resources, while rest of the country remained unconnected. But after freedom from the British colonial administration the Railway became the prime communication network for the region of East Pakistan and then later Bangladesh.

Bangladesh Railway, a principle transportation agency of the country, is a Government – owned and Government–managed organization. It covers a length of 2,855 route kilometers employing a total of 34,168 regular employees⁶. As railway is a very important mode of inland transport, linking the entire length and breadth of the country, it also contributes to the socio-economic development of the country.

⁶ Railway Information Book 2008, Rail Bhaban, Ministry of Railway and Communication, Govt. of Bangladesh, Dhaka

Till June 2, 1982, the management and development of Railway was vested with a Railway Board, comprising of one Chairman and four Members. But, for administrative convenience and operational reason the Railway Board was abolished with effect from June 3, 1982 and the function of the Railway Board was vested with the Railway Division of the Ministry of Communications with the Secretary of the Division working as the Director General of the Bangladesh Railway. For the same purpose the Railway was bifurcated into two zones, East and West, under the administrative control of two General Managers, who are accountable to the Director General of the Bangladesh Railway. Subsequently on August 12, 1995 the day to day operation of the Railway was separated from the Ministry and entrusted with Director General drawn from the Railway professionals. For policy guidance, a team of nine member Bangladesh Railway authority (BRA) was formed with the Minister, Ministry of Communications as its Chairman. The Director General is assisted by Additional Director General and Joint Director General in all administrative and policy making jobs.

The General Managers of the two zones are assisted by various specialized departments who are responsible for operation, maintenance and financial management. Each zone is again divided in two divisions, which are the basic unit of operation. The division is headed by a Divisional Railway Manager, who is assisted by Divisional Officers of various specialized Departments such as Personnel, Transportation, Commercial, Finance Mechanical, Way and Works Signaling and Telecommunication, Electrical, Medical, Nirapatta Bahini (Security Force) etc. Besides there are two workshop Divisions, one in each zone, located at Pahartoli in Chittagong and Syedpur in Nilphamari, each being headed by a Divisional Superintendent. Further there is a locomotive workshop headed by the Chief Executive at Parbatipur in Nilphamari for general overhauling of both broad Gauge (BG) and Meter Gauge (MG) locomotives.

The Bangladesh Railway also has a Railway Training Academy headed by a Rector, a Planning Cell headed by a Chief Planning Officer, Stores Department headed by a Chief Controller of Stores and Accounts Department headed by an Additional Director General/Finance for coordinating and advising accounting and financial management activities of the two zones.

To ensure safety of Railway transportation Government has set up a separate Directorate under the Ministry of Communications to inspect different works of Bangladesh Railway related with the train operation. To provide safe, reliable, cost effective and time efficient rail transport service in the country through modernization, expansion and maintenance of the rail system in a manner which supports government strategies for economic, social and environmental development. In addition, Railway can play vital role to boost up national economic growth and bring prosperity to the country through dedicated transport service.

In this regard, the missions of the Railway are as stated below.

1. Develop and maintain railway tracks and station infrastructures throughout the country.
2. Maintain and upgrade locomotives, coaches and other rolling stocks.
3. Maintain and modernize signaling and interlocking system and Telecom system of Bangladesh Railway.
4. Ensure safe, speedy and efficient train operation.
5. Implement Government transport policy in the railway sector.
6. Procure modern technology related rolling stocks, track materials and signaling systems suitable for the development of the Bangladesh Railway.
7. Manage land asset of the Bangladesh Railway.
8. Ensure optimum utilization of Development Budget and Revenue Budget of Bangladesh Railway.

In the British colonial era, Dhaka State Railway considering the importance of the Narayanganj River Port established a rail link from Narayanganj to Mymensingh via Dhaka. The Narayanganj-Dhaka section of this line was operational from 1 January 1885. There are 5 stations in the section including Dhaka and Narayanganj and other stations are Chasara, Fatullah and Gandaria (shown in Map 02). All these 5 stations belongs to B class category having loop lines and crossing facilities. Dhaka-Chittagong train service is the most popular railway transport corridor in Bangladesh. The railway is well connected with metropolitan cities like Khulna, Sylhet, Rajshahi and other important cities such as Chapainababganj, Dinajpur, Nilphamari, Moulovibazar, etc.

Though the Railway is one of the oldest transport modes and has perhaps the greatest carrying capacity, but after the emergence of Bangladesh no major track extension has been made to the existing network. Rather, the shift in priority to motorized transport mode (e.g. buses and trucks) led to neglect of the Railway. The neglect of the Railway similarly by the people is consequent to its ability to improve its operational efficiency and quality of service over time making buses even more attractive to commuters and long distance travelers. There are enough evidences around the world to support the profound impact of the Railway on socio-economic development and transformation of a nation.

The Railway has an advantage over modes in terms of environment friendliness and can attain a zero-environmental pollution status. It makes use of minimum land space and can provide cheapest travel cost for commuters. The Railway can improve livability standards far beyond any other means of transport. It can be used as an intra-city transport to mitigate the current chaos associated with rapid urbanization and mega-city growth. A modernized Railway may be able to discourage migration to the large cities as it may be more reasonable for people to stay where they are since they will be able to travel in short time with minimum cost without recourse to change of residence. It may encourage out-migration from congested areas to areas that are less pressurized from social and economic points. A modernized railway can ensure the search for better homes beyond the present territory and thereby encourage and enhance decentralization. The implication of this effort aimed at attaining sustainability is obvious, not to speak of better balance of agglomeration and spread over the country.

Rahman (2005) in his research stated that Bangladesh Railway is facing several major threats to its long term survival: the progressive withdrawal of the government funding, the reluctance to improve and develop the Railway and the relentless increase in competition from other transport modes, especially from road transport. The research similarly focuses on analyzing issues related to re-orientation of Bangladesh through physical and structural as well as institutional reforms which is absolutely necessary to make Bangladesh Railway a profit-driven and market-oriented commercial cum public

organization. This brings up the issue how the Railway is faring in various countries of the contemporary world. A discussion provided below shows the development of the Railway in many parts of the world; but such efforts are lacking in Bangladesh.

2.3. Scenario of Railway in Contemporary World

British Engineer George Stephenson (9 June 1781–12 August 1848) invented the Railway in 1825. Rail transport started its journey from Stockton to Darlington in England on 27 September 1825. Railway added a new dimension in the transport sector. Railway is very popular mode of transport all over the world. In USA, Railway has the longest rail network (160000 km) in the world. In Asia, India, China and Japan have the biggest rail network. Table 2.1 shows the current status of Railway traffic in countries around the world including Bangladesh.

Table No 2.1: Present Status of Railway traffic.

Country	Route Length (km)	No. of Passengers carried (100 million)	Passengers kilometers (100 million)	Passenger traffic density (passenger km/route length per day)
France	32008	8.75	715	6120
Germany	35987	17.14	740	5541
UK	16652		391	6450
Italy	16178	4.7	467	7909
Spain	12310	4.7	191.9	4271
Sweden	11827	0.3	34.8	1269
USA	160000	0.23	88	652
Japan	20051	86.7	2407	32889
EU	149823	56.5	3018	5518

Source: smorichi@planner.t.u-tokyo.ac.jp, 2010

The Indian Railway achieved tremendous success in the transport industry. India has 64,015 km of railway network all over the country. It has the world's fourth railway network. Indian Railway carries 20 million passengers and 2 million tons of freight daily. Indian Railway owns over 200,000 (freight) wagons, 50,000 coaches and 8,000 locomotives. In addition, it has funicular railway network as well.

2.4 Historical Background of Bus Transport in Bangladesh and Dhaka-Narayanganj Route

The Roads and Highways Department (RHD) was created in 1962 when the old Department of 'Construction and Building' (C & B) organization was split into 2 separate bodies (the other being Public Works Department). RHD is responsible for the construction and the maintenance of the major road and bridge network of Bangladesh. Since the Department was established the size of the major road network in Bangladesh has grown from 2,500 kilometers to the present network of 20,866.36 kilometers. The departmental goal is that "The Roads and Highways Department is able to provide the people of Bangladesh with a safe, cost effective and well maintained road network". The purpose of the RHD is stated as follows: "The Roads and Highways Department has a sustainable capacity to plan, manage and deliver its full range of responsibilities in respect of the main road and bridge network and to be accountable for these duties".

The Assets of Roads and Highways Department have been conservatively estimated at Taka 46,000 crore (US\$8,000 million) of which by far the largest proportion is the value of the 20,878 kms of road and the 18,258 bridges. These assets are probably the greatest asset of any organization in Bangladesh and maintaining their value is vital to the economy. This places a great responsibility on the Roads and Highways Department.

In Bangladesh, among the various modes of transport, road transport system in recent years has been playing a significant role in transporting passengers and goods. According to data released by Bangladesh Bureau of Statistics (BBS), in FY 2008-09 the share of transportation sector in GDP at constant price is 6.36 percent (Bangladesh Economic Review 2009).

Government started public bus transport service in 1961. Bangladesh Road Transport Corporation (BRTC) was established to provide road transport among the citizens. Now BRTC has a fleet of 972 buses and trucks (BRTC, 2010). Out of which 795 vehicles are in running condition. Older buses beyond economic repair (BER) with average 15 years old life are declared condemned and sold-out following government rules and new vehicles are included in the fleet.

Bus Transport became popular in Bangladesh from the 1980s onward. Presently 1343719 vehicles (BRTA, 2010) are plying around Bangladesh in the private sector. Bus service is mainly operated by private entrepreneurs except BRTC service. Day by day bus transport expanded their wing to smooth traffic movement all over the country. According to the BRTA statistics (Table No. 2.2) depicts that number of vehicles are increasing sharply. Actually bigwigs of the government are involved in bus transport business. They lobby to the government for bus transport instead of rail service. They have systematically calculated to outplay and degrade the Railway over the years. So the Railway lost its glorious heydays eventually.

Dhaka-Narayanganj Road network was established in 1980s to promote road sector development. Narayanganj is situated 21 km away from the capital city of Dhaka by road communication. It takes one hour journey by bus. A good number of bus services are carrying significant passengers from Narayanganj to Dhaka and vice versa.

The following table shows the statistics of registered vehicles in Bangladesh.

SI No.	Type of Vehicles	upto 2003	2004	2005	2006	2007	2008	2009	Total
1	Motor Car	116196	5410	6431	8447	11941	16927	21461	186813
2	Jeep	49364	2514	3963	5540	5650	6537	9027	82595
3	Taxi	10932	540	515	275	15	9	12	12298
4	Bus	30617	857	783	1020	1368	1342	1184	37171
5	Mini Bus	33364	622	361	241	382	307	320	35597
6	Truck	51375	2583	2791	3065	2521	2609	6561	71505
7	Auto Rickshaw	98479	8974	4877	6898	10530	19071	14902	163731
8	Motor Cycle	321347	24941	43226	51106	85131	93541	85142	704434
9	Others	25726	2761	2931	3713	3734	4076	6634	49575
10	Total Grand	737400	49202	65878	80305	121272	144419	145243	1343719

Table No. 2.2: Number of Registered Vehicles in Bangladesh

Source: www.brta.gov.bd, 2010

2.5 Declining Trend of the Railway Services and Development

Railway service was dominant transport in the colonial period. The significant railway infrastructures were developed to transport goods and passengers in 1970s. The following table illustrates the changes over the time in railway sector in the last 40 years.

Table No. 2.3: Declining Trend of the Railway Services and Development

Year	Locomotives	Coaches	Stations	Passengers(thousands)
1969-1970	486	1165	470	72,885
1996-1997	284	1249	451	37494
1997-1998	275	1264	455	38300
1998-1999	279	1287	454	36239
1999-2000	268	1282	454	38634
2000-2001	277	1275	454	41212
2001-2002	277	1272	454	38716
2002-2003	275	1273	454	39162
2003-2004	273	1347	454	43435
2004-2005	286	1344	454	42254
2005-2006	285	1341	454	44520
2006-2007	285	1385	440	
2007-2008	283	1435	440	53816
2008-2009	286	1435	440	65029
2009-2010	286	1472	440	65627

Source: Bangladesh Railway, 2010 (The data is not available from 1971-1995)

The table shows that locomotives were reduced over the time till 1997-1998 then the figure increased slightly upto 2010. The same situation is prevailing for coaches and about 30 stations were stopped last four decades. To sum up, there is no significant development happened to attract passengers in railway transport. In addition, it is seen from the above table that the Railway never adopted any steps to enhance it or to make it sustainable or reduce environmental degradation

The Table 2.2 and Table 2.3 shows the imbalances in the two modes of transports; while the road transport shows increase in the number of various motorized vehicles, the Railway on the other hand shows a declining trend.

Reports and studies around the world suggest increasing improvement of the railway to make it more people and environment friendly and sustainable transport. Sustainability has been one of the prime factors in the development of the Railway. Sustainability has not remained a lip-service, rather it has been spelled out in details and carried out accordingly. The following sections discuss the meaning of sustainability and what meaning it holds for the Railway service.

2.6 The Meaning of Sustainability for Railway

The Rail Safety and Standards Boards, UK (2009) states that, ‘A sustainable railway is customer-driven- where customers are at the very heart of the railway and where they are able to make optimal travel and logistics choice. It is an inclusive, affordable and accessible transport system and which work together with other transport modes to provide an integrated and accessible transport system. It respects, encourages and develops a diverse workforce, supports its well-being and actively considers and addresses the challenges of the future market. It operates and improves businesses in a way that minimizes the negative impacts and maximizes the benefits of the railway to the environment. It pursues initiatives to achieve long term reductions in carbon emissions through improved energy efficiency, new technology and lower carbon power sources and facilitates modal shifts, helping others to make more carbon efficient journeys. It tries to improve energy efficiency and boost productivity and competitiveness at the national and regional level through provision of efficient passenger and freight services and by facilitating agglomeration and catalyzing economic regeneration. A sustainable railway will maximize its capability and build on its own to deliver a transport system that is efficient and offers good value for money. It tries to promote a culture of open and accountable decision-making and measure, monitor and report publicly on its progress towards sustainability.

Ten principles were developed within the Sustainable Rail Programme to promote the Railway beyond its present capacity. The principles, as stated below, will form a key platform for the work of the Sustainable Rail Programme, in helping the industry to embed sustainable practices in culture, policy, process and decision-making (The Rail

Industry Sustainable Development Principles, Rail Safety and Standard Board, UK, 2009: sustainablerailprogramme@rssb.co.uk).

1. Customer-driven

Embed a culture where dialogue with customers puts them at the very heart of the railway, and where they are able to make optimal travel and logistics choices.

All customers, whether freight or passenger, have two basic preconditions to using rail - reliability and safety. Beyond this, key passenger requirements are:

- Service frequency and speed
- Punctuality
- Journey quality and comfort
- Value for money and simplified fare structure
- Dealing with service disruption well
- Security
- Connectivity with other modes

Freight users' requirements centre around:

- Cost and connectivity
- Speed
- Distance
- Flexibility around volume, weight and aggregation

2. Putting rail in reach of people

Position rail as an inclusive, affordable and accessible transport system through the provision of information and accessible facilities.

The railway forms a key means of accessing employment, health services and leisure activities for many people and should be accessible to all. This refers to the accessibility of the network for everyone and in particular in terms of:

- Physical accessibility for the less able, elderly and those with children and luggage.
- The availability of information on services and connections before and during travel.
- The affordability of travel by rail.

3. Providing an end to end journey

Work together with all transport modes to provide an integrated, accessible transport system.

4. Being an employer of choice

Respect, encourage and develop a diverse workforce support its wellbeing and actively consider and address the challenges of the future global labour market.

5. Reducing our environmental impact

Operate and improve the business in a way that minimises the negative impacts and maximises the benefits of the railway to the environment.

Whilst the railway can claim to be the most sustainable form of motorised transport in Great Britain for many journeys, the industry recognises that there are still many ways in which it can reduce its impact. Environmental impacts have been reviewed and priority areas identified for action at an industry level and by individual companies including:

- Climate change (including energy use)
- Noise and vibration
- Waste and pollution
- Sustainable consumption and production
- Air pollutant emissions
- Biodiversity and the natural environment
- Land take

6. Carbon smart

Pursue initiatives to achieve long term reductions in carbon emissions through improved energy efficiency, new technology and lower carbon power sources and facilitate modal shift, helping others make more carbon efficient journeys

7. Energy wise

Maximise rail's energy efficiency for traction and non-traction use.

8. Supporting the economy

Boost the productivity and competitiveness of the UK, at a national and regional level, through the provision of efficient passenger and freight services and by facilitating agglomeration and catalysing economic regeneration.

9. Optimising the railway

Maximise the rail system's capability and build on its strengths to deliver a transport system that is efficient and offers good value for money.

10. Being transparent

Promote a culture of open and accountable decision making and measure, monitor and report publicly on our progress toward sustainability.

(sustainableprogrammerail@rspb.co.uk)

In a similar vein the International Union of Railways (2011) state that **Rail is a low carbon transport mode, where**

- Magnitude of CO2 emissions per person
- (in a 600 km trip):
 - 80 kg if travelling by plane
 - 13 kg if travelling by high speed train

- **Comparison of Carbon Emissions**
- (the weight of the passenger)
- (the weight of his/her suitcase)

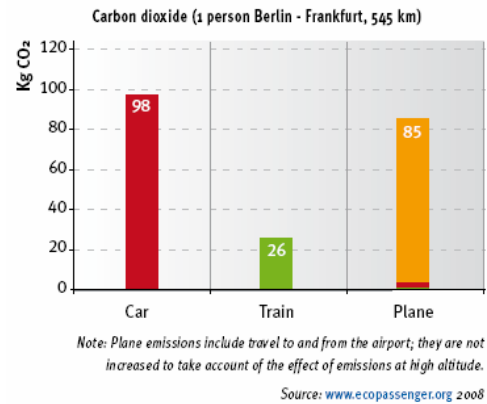
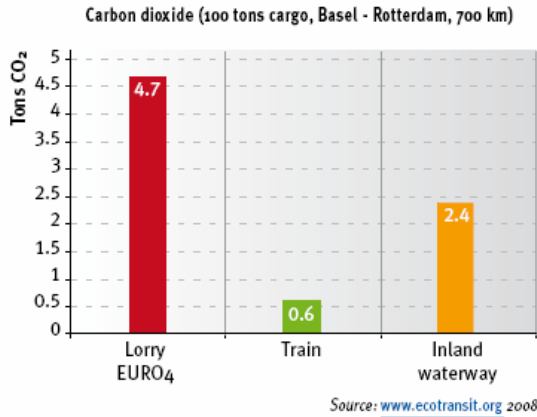


Chart No. 01: Carbon Emissions of different modes of Transport

Railways are continuing to improve

50% reduction of specific CO₂ emissions from train operation*

40% reduction in total exhaust emissions of Nox and PM₁₀**

Vision 2050: European railways will strive towards

Carbon-free train operation and

Zero emissions of Nox and PM₁₀ from non electric trains

Noise and vibration levels are socially and economically acceptable

*Base year 1990: measured per passenger-km and gross tonne-km

**Base year 2005

The basic philosophy of Japan Railway (JR) is to work together, to diligently strive to reconcile environmental protection with its business activities (Social and Environmental Report 2001, East Japan Railway Company). More specifically it means-

1. Customer Comes First

We will provide heartfelt and refreshing services.

2. Ensuring Safety and Quality

We will commit ourselves to providing safe and punctual transportation and high quality products.

3. Group Development

In the spirit of self-discipline and partnership and in the spirit of challenge, with the participation of all employees, we will work towards creating a corporate group worthy of the confidence and trust of the public.

Primary objectives are to promote –

1. Providing Safe, Comfortable and Convenient Transportation Services, and the Creation of New Services (Spatial and Temporal Designs)
2. Achieving Steady Growth and Returns
3. Driving Force in Technological Innovation, and Integration of Advanced Technologies
4. Social Responsibility and Partnership with Local Communities

It also aims for –

1. Creating Customer Value and Pursuing Customer Satisfaction
 - Building a corporate group for providing customers with “trust,” “comfort,” and “excitement.”
2. Innovation of Business through the Creation of Technologies
 - Building a corporate group for the integration of advanced technologies.
3. Harmony with Society and Coexistence with the Environment
 - Building a corporate group which harmonizes with society and gains the respect of global community.
4. Creating Motivation and Vitality
 - Building a corporate group offering a working motivation and a sense of accomplishment through a free and liberal approach to work.
5. Raising Shareholder Values
 - Building a corporate group meeting shareholder expectations through the improvement of consolidated performance.

Its environmental conservation activities include-

1. Environmental conservation activities along railway lines (pollution prevention)
 - Noise reduction measures along Shinkansen and conventional lines

(construction of sound barriers, introduction of PC sleepers and continuous welded rails, etc.)

- Reduction of environmental pollutants from company-run Kawasaki

Thermoelectric Power Plant

- Renovation of large-size incinerators; elimination of small-size incinerators
- Appropriate management and treatment of organic solvents etc., based on PRTR regulations

2. Global environmental conservation activities

- Introduction of energy-saving rail cars
- Energy conservation at stations and office buildings (introduction of cogeneration, solar power generation)
- Promotion of intermodal transportation (Park & Ride, Rail & Rent-a-Car, etc.)

3. Resource-recycling activities (zero emissions program)

- Reduction and recycling of waste generated at stations and on trains (categorized collection, establishment of recycling centers, etc.)
- Recycling of train tickets and passes
- Recycling of waste generated at rolling stock workshops and in construction projects
- Recycling of newsprint collected at stations, and introduction of recycled office paper, etc.

4. Environmental management

- Implementation of environmental management by Committees on Ecology at JR East Head Office and branch offices
- Acquisition of ISO14001 certification for Kawasaki Thermoelectric Power Plant, Oi Workshop, and Niigata Mechanical Technology Center

5. Research and development of environment-related technologies

- Development of next-generation AC Train commuter trains (energy savings and recycling)

- Development of technologies for noise reduction
- Development of measures to eliminate engine idling for diesel railcars

6. Social activities

- Implementation of ecology campaigns
- Publication of environmental reports
- Environmental advertisements

In global arena where there has been marked efforts to improve the Railway, as stated in the literature review that the present status of the railway and bus services are not passengers' satisfactory level in Bangladesh. All the aspects of bus and train services such as Journey Time, Fare, Ticketing System, Access to Service, Time Schedule, Waiting Area, Comfort, Reliability, Safety, Luggage Capacity, Attendant Service are not satisfactory up to the passengers' desire. Once upon time railway was popular transport in Bangladesh for efficient management and services. But in course of time railway became unpopular transport because of irregularities, corruption, mismanagement and lack of government policy and development budget.

According to a report of a national daily, "Bangladesh Railway is in the stranglehold of corruption, inefficiency and negligence, which is continuously gnawing away at it and destroying this popular and vital mass transport system. There is disdain and insouciance on the part of the officials and it seems no one wants to improve and save it before it gets worse and eventually out of hand and the situation becomes seriously irreversible. Corruption is the Achilles heel of this sector and one of the most notorious reasons for failing to make profit. Everyone is aware of its plight and hoping for a turnaround soon" (The Daily Sun, 12 February 2011).

The budget to the railway sub-sector in respect to the total allocation of transport sector was 23.9% in the First Five Year Plan, 32.13% in the Second Five Year Plan, 27.84% in the Third Five Year Plan, 13.1% in the Fourth Five Year Plan and 13% in the Fifth Five

Year Plan. The figures clearly demonstrate the shrinking scenario of the railway sector over the time from 1973 to 2010. The budgets only meet the need of rehabilitation/replacement and repair expenses. As a result no significant improvement or up-gradation took place and some railway sections and stations had to be closed down. On the other hand, huge public investment in road sub-sector resulted in high road density of 69.2 km per 100 sq. km. of total land in Bangladesh (Sixth Five Year Plan, 2010).

On the other hand, bus service is mainly private owned transport. The transport businessmen influence the government decision in favor of their own interest. So, Bus service has become widespread and train service has become shrinking.

Railway sector is neglected from government national policy as well as research work for formulation of guidelines. No direct research has been conducted yet to address the railway service and problems. So, this study will reveal the passengers' satisfaction level about the railway service and how to improve the service level for the passengers. This thesis will also try to compare the bus and train services in terms of passengers' satisfactions.

CHAPTER 3 METHODOLOGY

3.1 Introduction

The railway was very popular and efficient mode in the past and it is assumed that it can be made so again in the present. The broad aim of this thesis is to show that the Railway can indeed be a better alternative to ease the present traffic situation for passengers traveling from Narayanganj to Dhaka or vice versa.

The specific aims of this research are:

1. To investigate into the problems that has rendered the Railway inefficient and unreliable over time and how this can be reversed.
2. To investigate why passengers traveling from Dhaka to Narayanganj or vice versa ride buses and whether they will travel by Railway if reliability and efficiency of this service is ensured.

It is expected that this study will bring to light the conditions prevailing in the Railway that creates barriers to a safe, cheap, reliable and environment-friendly transport. It is expected that the findings of this study will help to remove those barriers and help to formulate strategies for reviving the Railway as a passenger-friendly transportation for those travelling from Dhaka to Narayanganj and vice versa. The findings from this study can be applied in other routes in Bangladesh.

This thesis is associated with services and sustainability of both mode of transports such as the Railway and the bus. This research investigated the overall benefits of the Railway by comparing the two modes. This study is confined within the service aspects of the routes. In addition, the study has pointed out some benefits of the Railway such as fare, speed, travel time, environment and accident rate etc. This research did not include the technical aspects of the transport modes. This chapter describes the methodology how the thesis is conducted to address the objectives which are mentioned aforesaid.

Methodology is very essential for conducting a thesis. A suitable methodology is foremost need for completion the thesis. A set of steps have been adopted for concluding the dissertation. The methodology has been determined keeping harmony with the goals and objectives of the research.

3.2. Literature Review and Brain Storming

An extensive literature survey and brain storming helped to refine ideas regarding the railway service for the Dhaka and Narayanganj route and the prevailing problems that has overwhelmed it. This has also helped to grasp the dimension of the problem and the intent to solve it.

3.3. Process of Conceptualization

To conduct the research, all the aspects of bus and train services such as Journey Time, Fare, Ticketing System, Access to Service, Time Schedule, Waiting Area, Comfort, Reliability, Safety, Luggage Capacity, Attendant Service etc was conceptualized. Then the research title was selected.

3.4. Topic Selection

Narayanganj has great potential as a commercial and industrial hub as well as a developing sub-urban industrial town. Its close proximity to Dhaka has increased its importance to a great degree. Narayanganj has a direct access to Dhaka by road, but the railway has fallen into despair recently. Thus connecting Narayanganj to Dhaka by railway is a primary aim of this study and hence the selection of the Dhaka-Narayanganj route as the area of study.

3.5. Formulation of Goals & Objectives

A set of objectives are formulated to achieve the specific goals. Objectives help to reach the destination. The specific aim of this research are to investigate into the problems that has rendered the railway inefficient and unreliable over time and how this can be reversed

and to investigate why passengers traveling from Dhaka to Narayanganj or vice versa ride buses and whether they will travel by railway if reliability and efficiency of this services are ensured.

3.6. Data Collection

In order to attain the objectives of this research both secondary and primary data have been required. Data has been collected from the following sources:

3.6.1. Primary Data Collection

Primary data was required in order to know why people travel by bus instead of railway and what problems exist in the railway that prevents them from using this mode.

3.6.1.1. Field Survey and Sample Size

A questionnaire survey conducted among present bus passengers was helped to gather information regarding their rationale for traveling by bus and their justification of avoiding the railway. Questionnaire was included questions regarding journey time, fare, ticketing system, judgment of services, time schedule, waiting area, comfort, reliability, safety, overall services, etc. of both modes.

Sample size was determined through statistical method. Approximately 1,70,000 passengers travel daily by bus from Narayanganj to Dhaka and vice versa. The railway on the other hand carries about 5.5 % of the total passengers, which is 9350. A systematic random sampling method will be used to ensure high degree of validity.

To determine the sample size, the following formula was used for a sound and good representation.

$$n = \frac{N}{1+N(e)^2}$$

using the standard sampling method at a 95 percent confidence level and 5 percent level of precision, the sample size stood at 399 with a sample fraction of 0.00234706. Details of the sample distribution based on the passengers' number of each routes is shown in table 2.3

$$\text{Sample Fraction (SF)} = \frac{n}{N}$$

Table 3.1: Sample Distribution by passengers

Serial No.	Name of the Route	Population Size	Sample Size
1	Bus	160650	377
2	Train	9350	22
		Total Sample Size	399

3.6.1.2. Focus Group Discussion (Case Study) and Observations

Interview was conducted on the people to get their views, suggestions for improvement of the railway service. This interview was taken individually and was conducted as a case study. The persons to be interviewed were of the following broad groups such as railway official, drivers/loco masters, Station Master etc.

Observations of passengers, the study area, and the services quality of the two modes was given a firsthand impression of the problems faced by the passengers. This was supported by necessary photographs.

3.6.2 Secondary Data Collection

Secondary data such as map of the study area, different information of bus and train services such as distance of the two modes, fare, Right of Way, Travel time, fuel consumption, accident rate, manpower and transport speed are collected from concerned departments.

3.7. Data Processing and Assembling

The collected data are categorized, grouped and arranged in data analysis, descriptive statistics (frequency, mean, standard deviation, cross tab) and multiple response frequency were used to have both quantitative and qualitative data presentation. After that all the data are processed with the help of statistical packages to meet the relevant objectives. The following software like MS word, MS Excel, SPSS 16, Arc/Info and ArcView are required for graphical form.

3.8. Data Interpretation and Presentation

The data are analyzed to get specific objectives. Different graphs, pie charts, cross tables are produced to present the situation. The passengers' perceptions about the services were measured using Weighted Mean Index (WMI).

$$WMI = \frac{(W_1f_1+w_2f_2+w_3f_3+\dots+w_nf_n)}{(f_1+f_2+f_3+\dots+f_n)} = \frac{\sum W_i f_i}{\sum f_i}$$

Where, w_i is the assigned weight for a particular class under benefit and usefulness scale and f_i is the corresponding frequency of that class. In this research under the degree of satisfaction, a five-point scale was used such as very satisfied, satisfied, neutral, dissatisfied and extremely dissatisfied and the corresponding weights are 1.0; 0.80; 0.60; 0.40 and 0.20.

A five-point Likert's scale allowed the recording of positive as well as negative responses indicating satisfaction and dissatisfaction respectively. The assigned values for particular responses were as follows.

Extremely Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
-2.0	-1.0	0.0	+1.0	+2.0

3.9. Formulation & Submission of Draft Dissertation

Draft dissertation presentations were prepared in the light of analytical data in accordance with the objectives. Statistical analysis was assembled to represent the facts and findings.

3.10. Review Presentation of Draft Dissertation

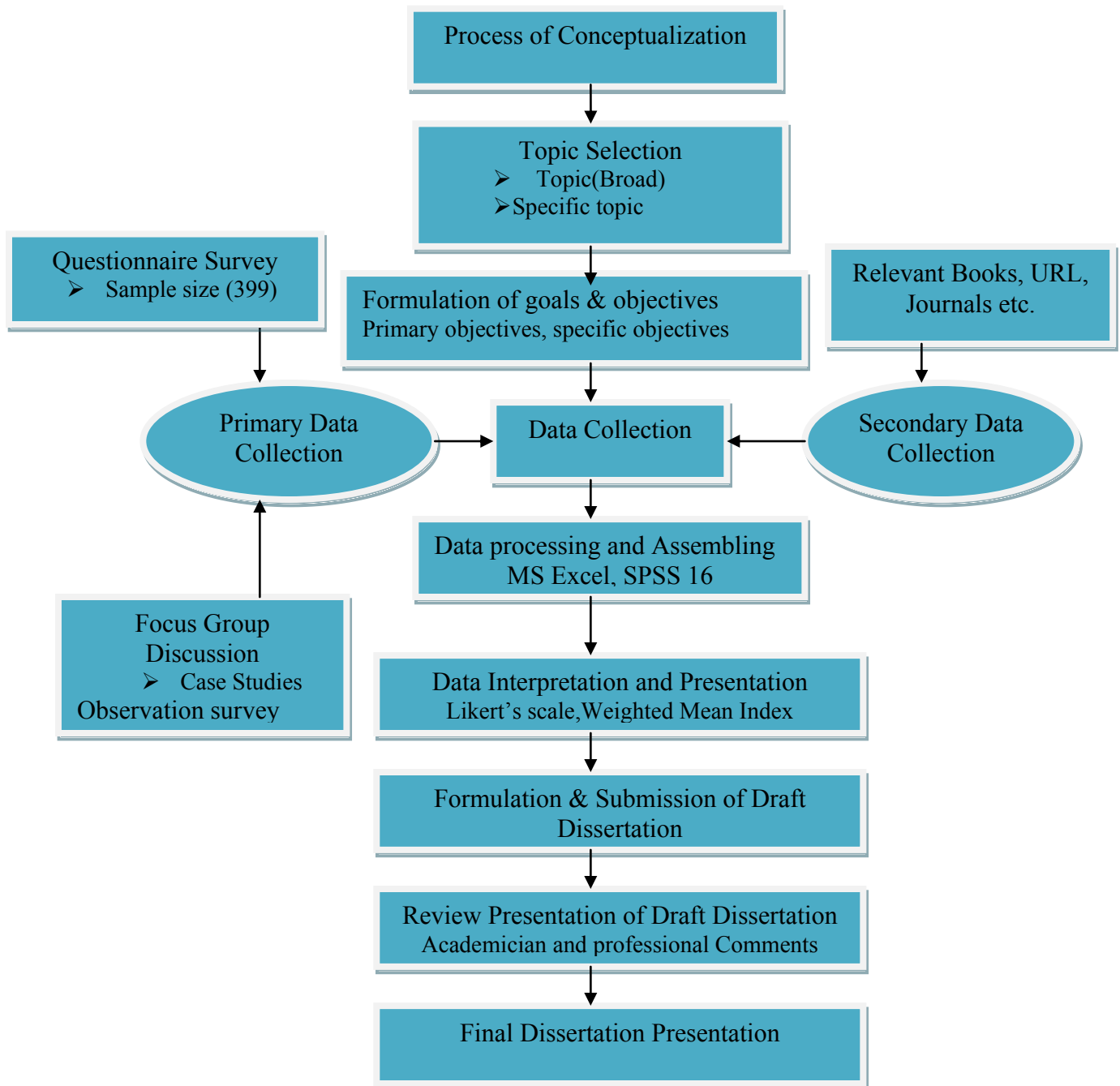
Draft dissertation presentations were reviewed by the concerned department and related professional experts, Academicians and professionals put their valuable suggestions for refining this thesis.

3.11 Final Dissertation Presentation

Finally, dissertation was presented by incorporating all the valuable comments and suggestions of the concerned department and related professional experts.

3.12 Conceptual Framework of the Research

A conceptual framework was developed to complete the research. The following framework is shown in a flow chart.



Source: Author, 2003

CHAPTER 04

AN OVERVIEW OF THE STUDY AREAS DHAKA AND NARAYANGANJ

4.1. Introduction

Dhaka is capital city of having 15 million populations in 590 sq. miles. Dhaka is situated by the bank of Buriganga River. Ruler Subadar Islam Khan commissioned the city in 1608 AD. Narayanganj is about 21 km away by road from Dhaka. Everyday a good number of people travel Dhaka for different purposes such as business, official, health and education.

Narayanganj has a good range of large and small scale manufacturing and service enterprises such as jute, textile and cotton mills, knitting garments, dying industries, cement, ship building, flour mills and salt industries. Narayanganj acts as a wholesale food grain market, others are concerned with the construction, furniture making industries, working in flour mill, electrical metal with mechanical repairs, even now-a-days number of international standard. Recently Bangladesh government already decided to construct a container port by the bank of river Shitalakhaya.

Narayanganj's proximity to Capital city, good communication and availability of comparatively flood free land have resulted a number of government facilities being located here. Nearness to capital city is a great advantage for the growth of Narayanganj as a planned residential area. Narayanganj will continue to offer locational advantages to most industries with better services, labour forces and large market. It will also continue to attract migration and will create pressure for employment and residential accommodation.

4.2. Selection of the Location of Study Area

Narayanganj has great potential as a commercial hub as well as a developing sub-urban industrial town. Its close proximity to Dhaka has increased its importance to a great degree. Narayanganj has a direct access to Dhaka by road, but the railway has fallen into despair recently. Thus connecting Narayanganj to Dhaka by railway is a primary aim of this study and hence the selection of the Dhaka-Narayanganj route as the area of study

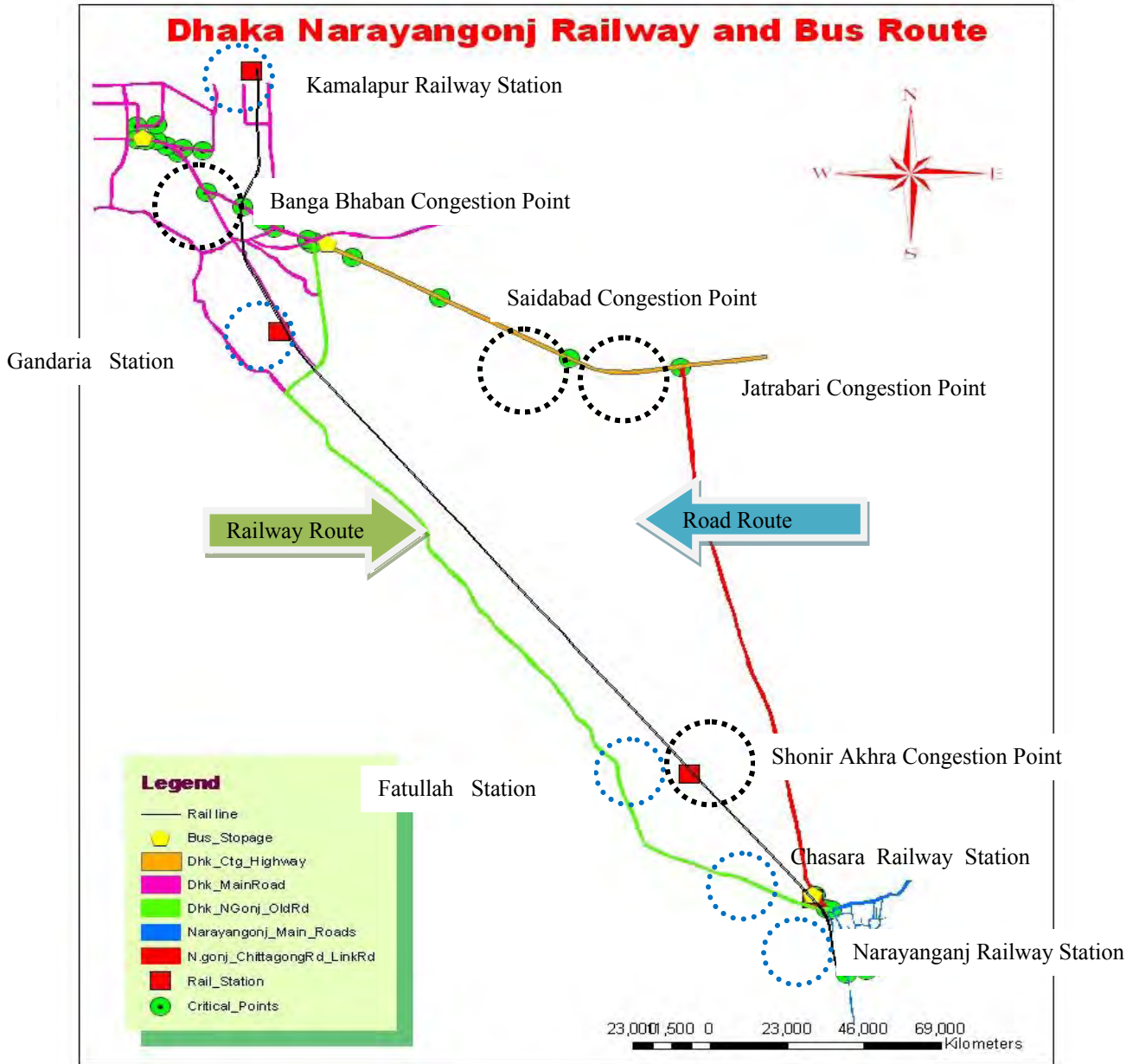
4.2.1. Location of the Study Site

The following map represents the overall Railway Network of Bangladesh. It also shows different railway gauge and international connections. The circle shows the Dhaka-Narayanganj Rail track.



Map01: Railway Network in Bangladesh (Source: Bangladesh Railway 2008)

Narayanganj is situated 21 km away from the capital city Dhaka. It takes one hour journey by bus. Narayanganj is also well connected by rail work. Dhaka is about 14 km distance by railway.



Map 02 : Map of the Study Area

The above map shows the Railway and road network of the study area. It also shows the road traffic congestion points such as Shonir Akhra, Jatrabari, Saidabad and Banga Bhaban which increase the travel time and make the journey tedious. On the other hand, Railway network has five Railway stations such as Narayanganj, Chasara, Fatullah, Gendaria and Kamalapur.

4.2.2. Reasons for Selecting this Specific Study Area

Narayanganj is an industrial and commercial hub in Bangladesh. Narayanganj river port is famous for business communication. It is very rapidly growing area. People's concentration is increasing due to being one of the most industrial zones and better communication system with the capital. Railway transport mode was famous for carrying passengers and goods. People were very much depended on railway service for easy, reasonable fare and environment friendly. But corruption and mismanagement destroyed the glory of the railway service. So railway service should revive for the greater interest of mass people.

Map 03: Image of the Study Area.



Source : Google Maps, 2010

Dhaka is capital city of Bangladesh and main focal point of all business and trade. On the other hand, Narayanganj plays important role for trade, business and industry. Everyday about 1,70,000 people (AEC, 2005) come Dhaka for different purpose such as business, study, shopping, treatment and recreation etc.

To transport the bulk number of passengers from Narayanganj to Dhaka, it is urgent need to arrange fast, regular, safe and reliable transport system. But presently bus transport carries 94.5% passengers and train carries rest of the passengers. Bus service occupies road and creates traffic jam, pollution. If train service can be revived at satisfactory level of the passengers, then passengers will travel by train for safe, reliable and environmental friendly transport. That is why Narayanganj–Dhaka route is selected to find out the problems and provide policy guidelines for reviving the railway. A comprehensive Railway Network can play vital role for socio-economic development of the region and all over the country.

CHAPTER 5

COMPARATIVE ANALYSIS OF THESE TWO SPECIFIED ROUTES (BUS AND TRAIN)

5.1. Introduction

In the previous chapter an overview of the study areas (Dhaka and Narayanganj) was given. This chapter intends to provide a comparative analysis of the two routes, so that the present condition existing in the both sector can be envisaged and comprehend. Then Information regarding the passengers using both modes is given. Demographic, socio-economic and other necessary information about the passengers were gathered. A questionnaire survey was conducted in order to know their choices and preferences and preferable conditions in the railway that will make substantial number of passengers to shift to the railway mode from the road traffic . This chapter starts by discussing first about the basic information about the two modes

Narayanganj is well connected with Dhaka by bus and railway transport. Now bus transport is carrying major portion of passengers. But Railway is cheap, safe, environmental-friendly compare to bus service. In 1980s railway was much more popular for carrying passengers. Presently railway has lost his glorious past for mismanagement, corruption misappropriation and lack of government attention on railway. The level of services journey time, fare, ticketing system, access to service, time schedule, waiting time, comfort, reliability, safety, luggage capacity, attendant service and overall service of the two modes are comparatively analyzed in this chapter. This research has revealed the comparative benefits of the railway.

5.2. Comparative Study Based on Secondary Information

A good number of information has been collected from secondary information such as railway department, bus owners' association of Narayanganj, published documents, newspapers and different websites etc.

5.2.1 Bus Services Information

The following table shows the clear information regarding bus service.

Table No. 5.1: Bus Service Capacity for Passengers (Dhaka-Narayanganj Route)

Id No.	Name of the Bus Service	No. of Seats	No. of buses	No. of Trip
1	Bhadhan	42	46	6
2	Ullas	42	31	6
3	Utsab	55	30	5
4	Akata	30	17	5
5	Ananda	52	30	6
6	Setu	30	15	6
7	Asiyan AC	40	20	5
8	Phurti AC	20	36	6

Source: Field survey, March 2010

5.2.2 Train Services Information

The figure mentions the total strength of the train service.

Table No. 5.2 : Transport Strength of Rail Service

Id. No.	Name of items	No. of items
1	Engine (Locomotive)	2
2	Coach (Passengers' Train)	5
3	Wagon (Cargo Train)	5

Source: Field survey, March 2010

5.2.3 Distance

Narayanganj is 21 km away by road from the capital city Dhaka. On other hand, distance between Narayanganj and Dhaka is about 16.10 km (shown in Map 02). It is clear that railway has closer distance. Since 2100 motor vehicles ply between Dhaka and Narayanganj and carry about 1,70,000 daily, it creates jam at different along the route (shown in Map 02), whereas the railway intersects at only two points with the road way. It can be said that motor vehicles itself is creating all sort of problems for itself.

5.2.4 Travel Time

Bus carries the bulk of passengers, but creates traffic congestion at different locations, such as Shonir Akhra, Jatrabari, Saidabad and Banga Bhaban. The traffic congestion increases the travel time. The expected travel time is about one hour to one hour 20 minutes, but the traffic jam adds at least 20 to 30 minutes more to the expected travel time. Sometimes this may lead to several hours. On the other hand, railway takes 50 minutes to travel from Narayanganj to Dhaka without creating or experiencing traffic jam. The time taken to reach Dhaka may seem to be a little longer compared to travel by bus. But as trains have to travel through congested areas of the city, it has to travel slowly in order to avoid unwanted mishaps. Informal poor settlements and bazaars (see photos below) have developed beside railway tracks, thus slowing down the speed of trains.

5.2.5 Fare

Railway ticket fare is only Taka 6 for Dhaka-Narayanganj route and the time taken to reach either of the destination is about 50 minutes. Whereas, bus fare is Taka 22 taka which is 4 times higher. So, railway fare is also less and cost effective. Passengers enjoy the reasonable fare in railway. Also journey by railway is most pleasing and by far the safest. People can also carry a greater volume of luggage and goods when they travel by rail. Comparing the services, pace of journey, tension-free relaxed way of travelling, satisfaction level of passengers, etc. railway tops all modes of transportation and fare will seem negligible.

5.2.5 Fuel Consumption

Railway uses less fuel than the bus; this consequently saves expensive fuel and valuable foreign currency. In addition, less fuel consumption leads to an improved environment. Bus services need approximately 4 liter fuel for carrying average 50 passengers for a distance of 21 km. In reverse, railway needs 2.13 liter fuel for transporting almost 800 passengers from Narayanganj to Dhaka. Railway ensures comparatively more safe travel

for the passengers. It is seen that Bus services need about 360 liters oil per day and railway consumes only around 20 liters. The carbon emission from vehicles is much higher than the railway (See chart No. 01 in Chapter 2). So, railway is fuel and environmental friendly transport.

5.2.7 Right of Way

Road transport needs more land for traffic movement smoothly. Bus requires more land than railway .The width of Dhaka-Narayanganj Road is about 280 ft. But the width of rail line is only about 45 ft average. So, it is clear that railway is also land efficient.

Now the railway land along the railway track is occupied by different markets, slums and high rise buildings which hamper the smooth movement of the trains. The pictures show the present situation of the study area.



Plate No. 01: Railway land is occupied by (i) wayside bazaars, small vendors, slums and (ii) buildings leaving very little space beside the tracks for safe movement of trains. (Narayanganj)
Source: Author

The above two photos show the condition of spaces beside the tracks, which is unimaginable in developed country. Lack of awareness and leniency of law-enforcing agencies to prevent hazardous occupation of spaces for the safe movement of trains causes many accidents which are laid at the railway's door. But it is not the trains that are

responsible for these accidents, reasons already stated; whereas buses itself causes many accidents and newspapers report them daily.

5.2.8 Accident Information

Accidents may occur from any transport services. But accidents seem to be common phenomena with bus transport and the ever-increasing number of accidents arising from bus causes enormous losses and casualties to passengers. The following statistics depicts the overall bus casualties in Bangladesh.

Table No. 5.3: Bus Casualties in Bangladesh

Year	No. of Accident	No. of Death	No. of Injured	Affected Persons
2000	4357	3430	1911	5341
2001	4091	3109	3127	6236
2002	4918	3398	3772	7170
2003	4749	3289	3818	7107
2004	3917	2968	2752	5620
2005	3955	3187	2755	5942
2006	3794	3193	2409	5602
2007	4869	3749	3273	7022
2008	4426	3768	3284	7048
2009	3381	2958	2686	5644
Total from 2000 - 2009	42457	33045	29787	62732

Source: ARI BUET, 2010

On the other hand, accident record of railway is comparatively lower than bus transport.

The following table shows the accident status of the Railway Transport.

Table No. 5.4: Number of Accidents in the Railway Transport.

Year	No. of Death	No. of Injured	Total Casualties
2000-01	25	230	255
2001-02	34	249	283
2002-03	28	144	172
2003-04	38	149	187
2004-05	17	111	128
2005-06	20	228	248
2006-07	35	327	362
2007-08	33	133	166
2008-09	22	99	121

Source: www.railway.gov.bd, 2010

The above tables depict the comparative picture of casualties of bus and rail transport. It is clear that Railway is more safe in term of casualties.

It can be mentioned that Dhaka-Narayanganj bus and train casualties information are not available. So, overall comparison has been shown to grasp the accident situation.

5.2.9 Manpower

About 1000 people are working in bus service (Field Survey 2010). On the other hand approximately 35 employees are engaged in train service (Field Survey 2010). The statistics show the manpower efficiency of the railway.

5.2.10 Speed

The speed of bus service is higher than train service. Average speed of bus service is 25/30 kilometer per hour. The train speed is about 15 kilometer per hour. But speed of train service cannot be attained for illegal development along the rail track.

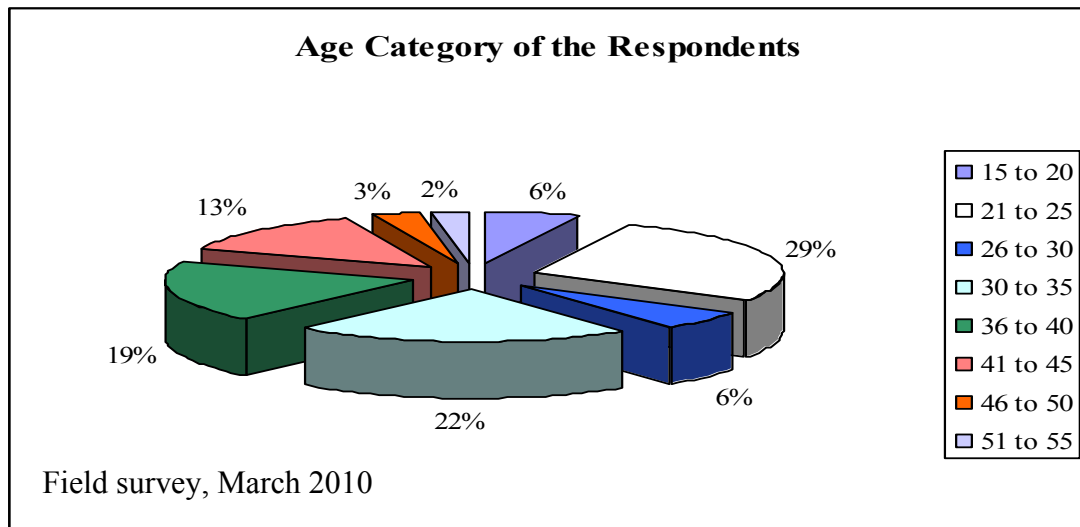
5.3.1 General Information of the Passengers of two modes

Some information of the passengers of the two modes was collected through questionnaire survey. These are described below.

5.3.1.1 Age Category of the Passengers

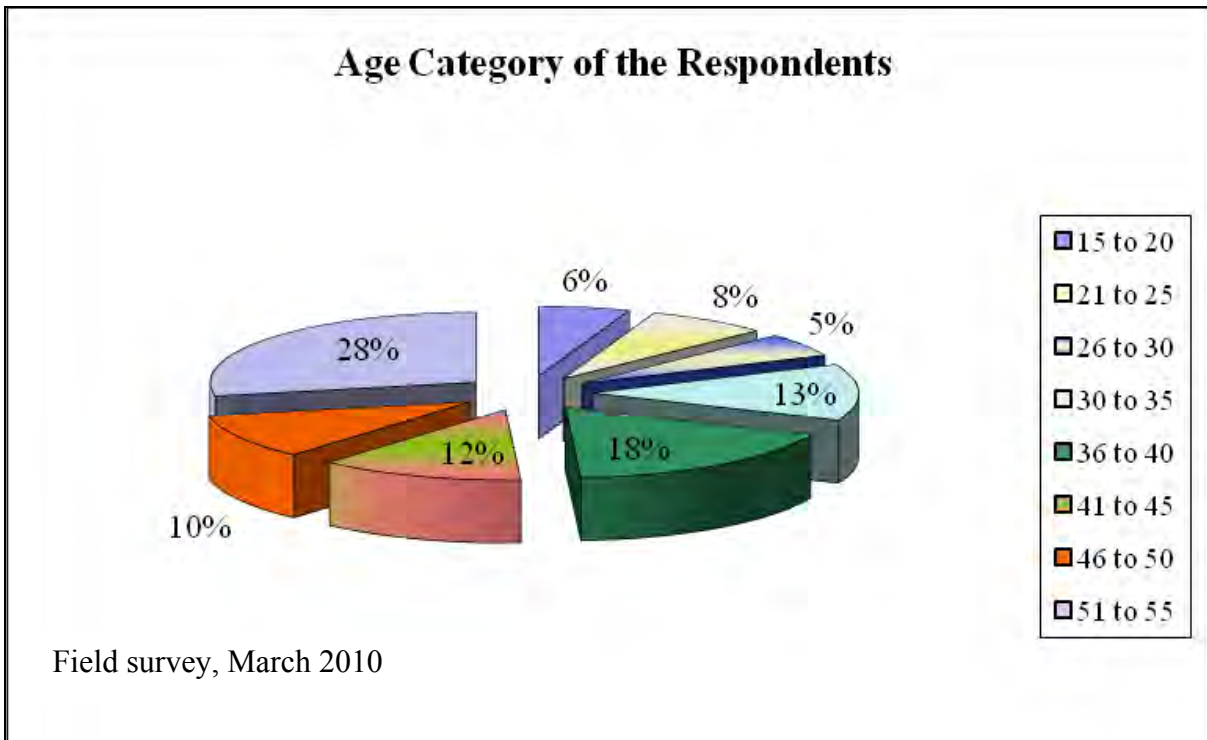
The pie chart below shows the age composition of bus users (respondents from road transport). Among the different age group, 21 to 25 age group people travel in highest number which is 29 %. 30 to 35 age group and 35 to 40 age group are lying in second and third position which is 22% and 19 % respectively. On the other hand, 50 to 55 age group people travel less which is 2%. The age from 31 to 40, people travel in a significant manner.

Figure 01: Age Composition of the Respondents from Road Transport.



The figure shows the age composition of the respondents from railway passengers. Among the different age group, 51 to 55 age group people travel in highest number which is 28 %. 36 to 40 age group are lying in second and third position which is 18% .On the other hand, 26 to 30 age group people travel less which is 5%. The age from 51 to 55, mainly aged people travel in a significant manner in railway.

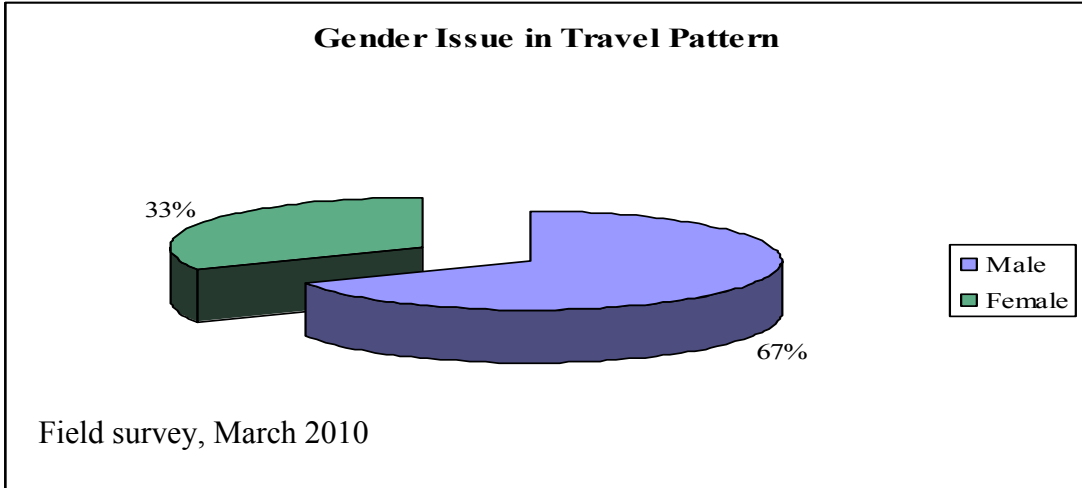
Figure 02: Age Composition of the Respondents from Railway.



5.3.1.2 Gender Issue of the Passengers

The figure represents the gender information of the study area. About 67% male population travels from Narayanganj to Dhaka by bus. In reverse, 33% female travels in the same route. The chart illustrates that bus transport is dominant by male passengers.

Figure 03: Gender Issue in Travel Pattern of Bus



The diagram implies the gender information of the railway passengers. About 87% male population travels from Narayanganj to Dhaka by train. On the other hand, only 13% female travels in the same route. It is clear that female passengers are reluctant to travel by train in this route by railway.

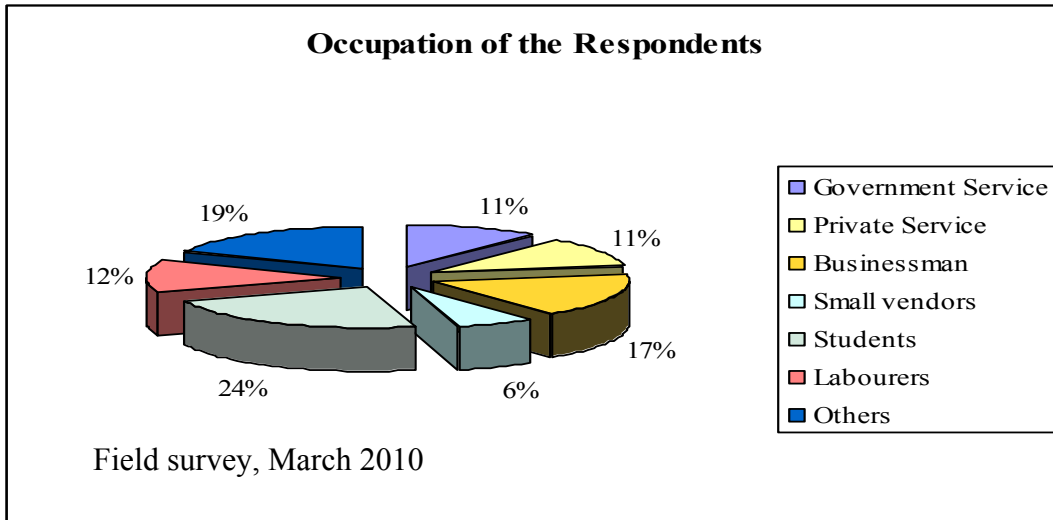
Figure 04: Gender Issue in Travel Pattern of Train



5.3.1.3 Occupation of the Respondents

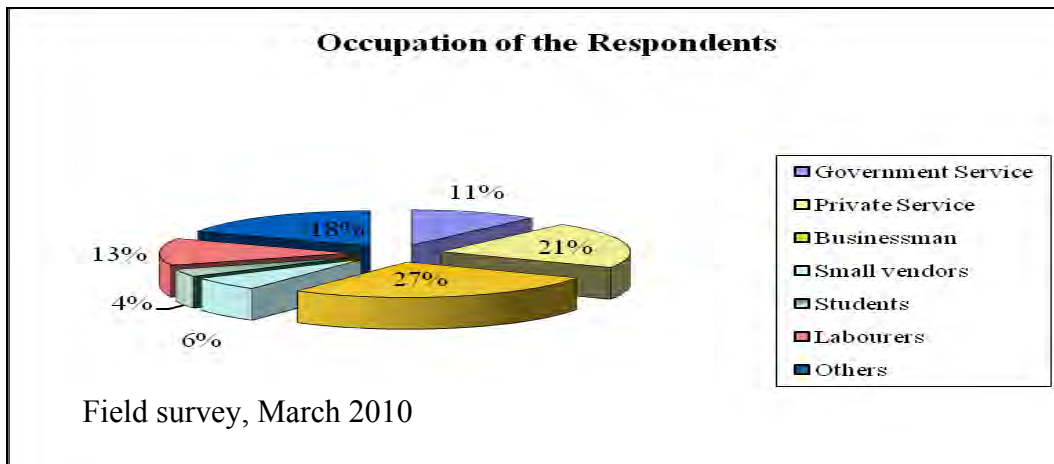
The chart points out the different occupations of the respondents travelled by train. Students are the highest in number which is 24%. Government service and Businessman are 19% and 17 % respectively. Students like to travel by train for cheap fare.

Figure 05: Occupation of the Respondents Travelled by Train



The chart describes the different occupations of the respondents travelled by bus. Businessmen are the highest in number which is 27%. Private service and others are 21% and 18% respectively. Small vendors are in lowest percent that means 4%.

Figure 06: Occupation of the Respondents Travelled by Bus

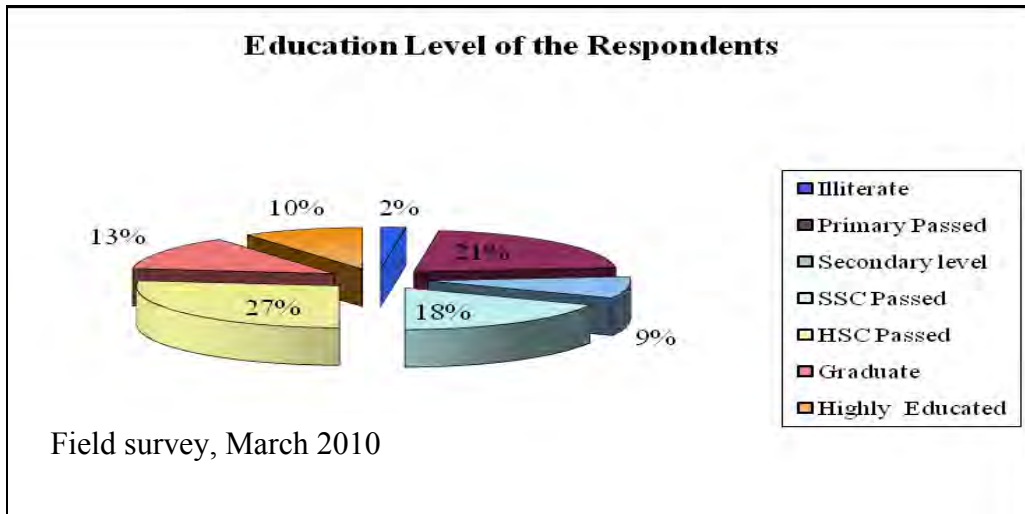


5.3.1.4 Education Level of the Passengers

The data indicates the Educational status of the train passengers. Most of the passengers have education upto HSC level and their percentage is 27 percent. Second highest is 21

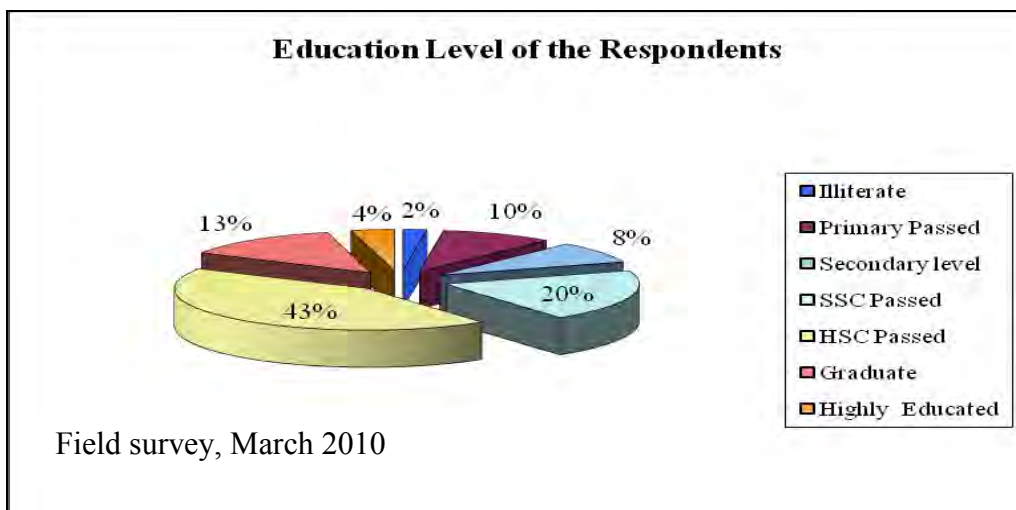
percent which is primary passed. People without having any institutional education are about 2%. About 10% of the passengers are graduate level.

Figure 07: Education Status of the Train Passengers



The chart indicates the Educational status of the bus passengers. Most of the passengers are HSC passed which is 43 percent. Second highest is 20 percent which is SSC passed. Lowest 2% passengers are illiterate. About 13% of the passengers are graduate level among the respondents.

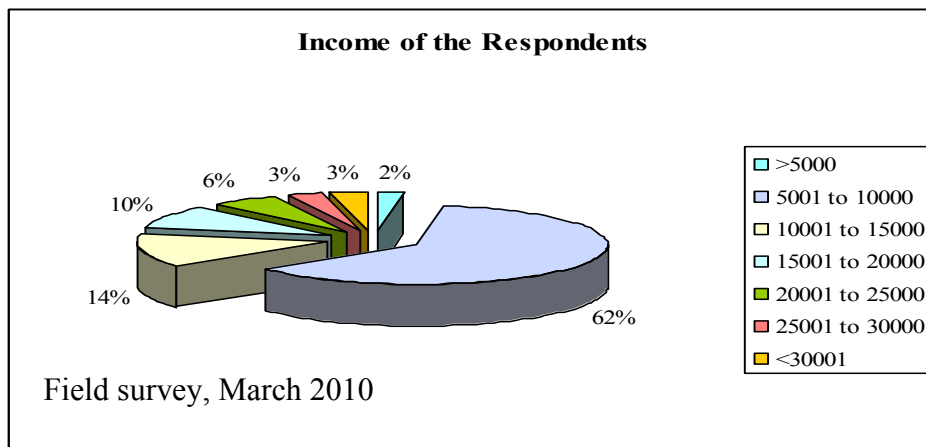
Figure 08: Education Status of the Bus Passengers



5.3.1.5 Income Status of the Passengers

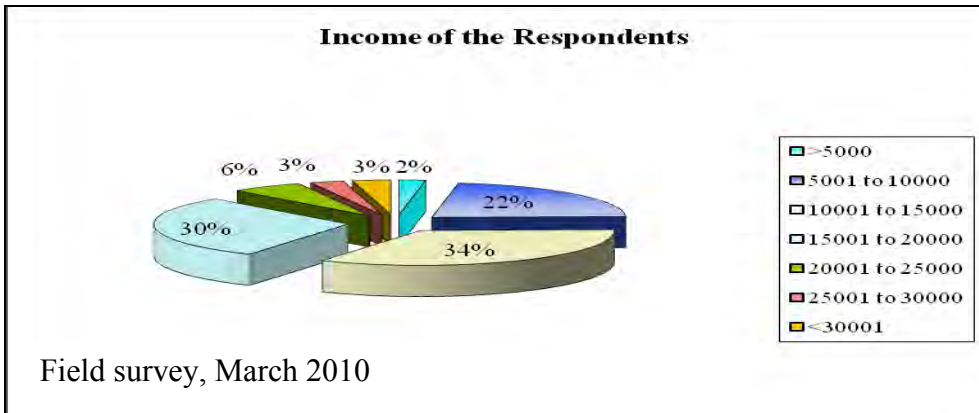
The chart gives information on income status of the respondents of train passengers. Monthly income of the passengers varies from below Tk 5000 upto Tk 30000. Generally 62 percent passengers earn Tk 5001 to Tk 10000 which represent the highest number. On the other hand, 2% passengers earn only Tk. 5000. It is summarized that lower middle income people prefer railway as a mode of transport.

Figure 09 : Income Status of the Train Passengers



The chart gives information on income status of the respondents of bus passengers. Monthly income of the passengers varies from below Tk 5000 upto Tk 30000. Generally 34 percent passengers earn Tk. 10001 to Tk. 15000 which represent the highest number . 30 percent and 22% earn 15001 to 20000 and 5001 to 10000 respectively. On the other hand, 2% passengers earn over Tk. 30000. It is observed that middle income people like bus service .

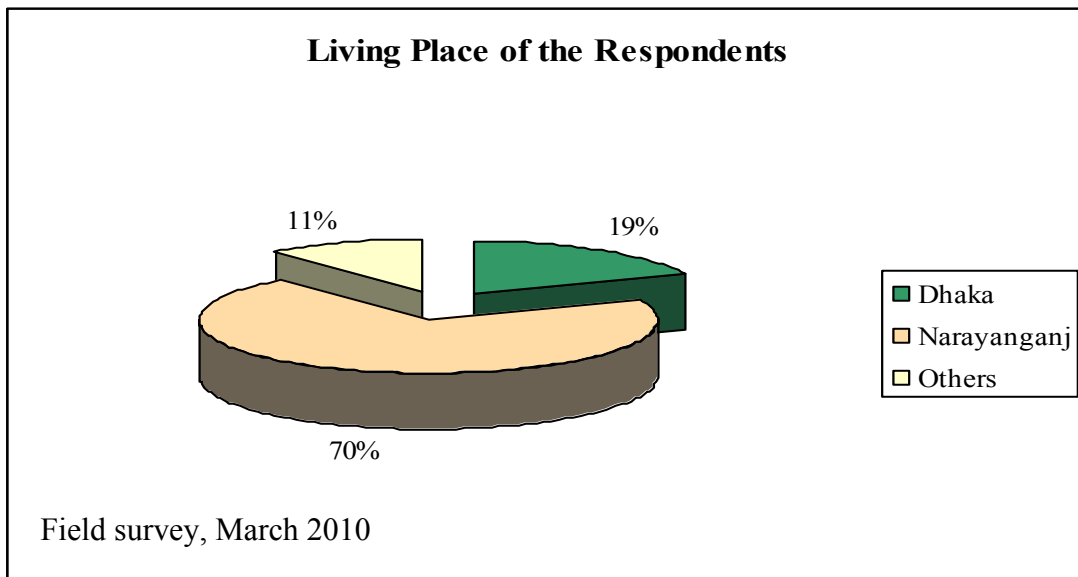
Figure 10 : Income Status of the Bus Passengers



5.3.2 Living Place of the Respondents

The data shows the living information of the travelers. About 70 % travelers travel from Narayanganj. Approximately 19% passengers come from Dhaka. The chart describes that most of the passengers travel from Narayanganj to Dhaka.

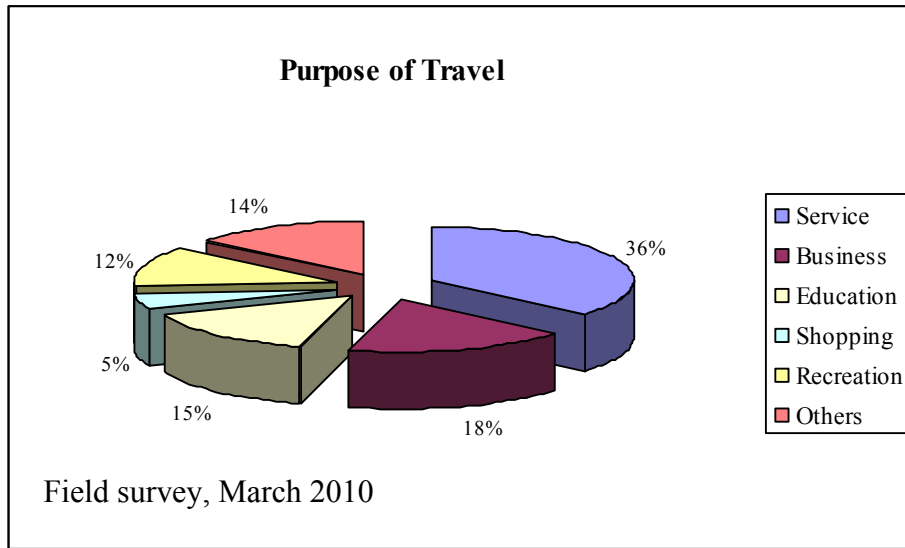
Figure 06: Living Place of the Respondents



5.3.3 Travel Pattern

The following pie chart shows the purpose of travel of the travelers. Nearly 36% people generate trip for service. About 18 % people generate trip for business purpose. People also travel for shopping purpose which is 5 % of the total number.

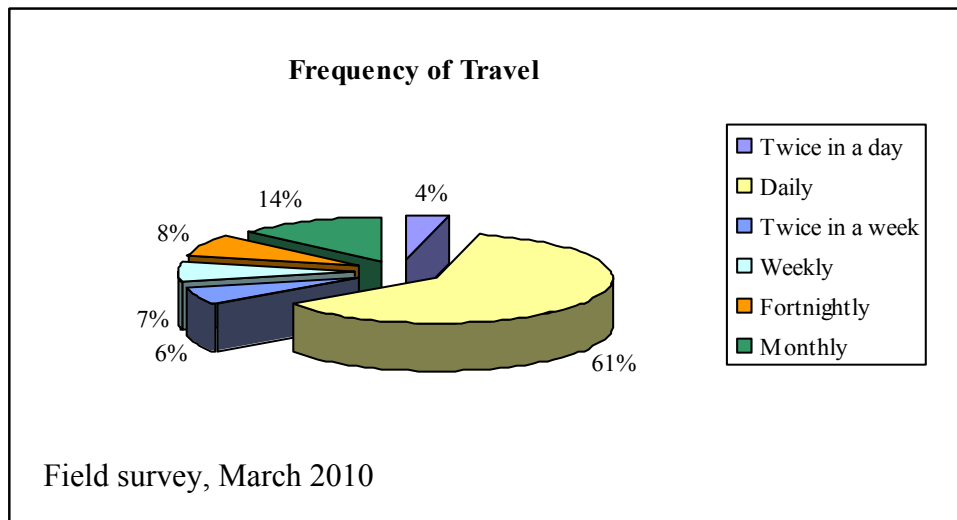
Figure 07: Purpose of Travel of the Respondents



5.3.4 Frequency of Travel

The statistical data indicates the frequency of the travelers. Mainly 61 % of the passengers travel daily. On the contrary, 14% travel twice in week. Lowest number of travelers generate trip twice in a day that is 4 percent .

Figure 08 : Frequency of Travel of the Passengers



5.3.5 Level of Satisfaction for different Factors and Overall Service

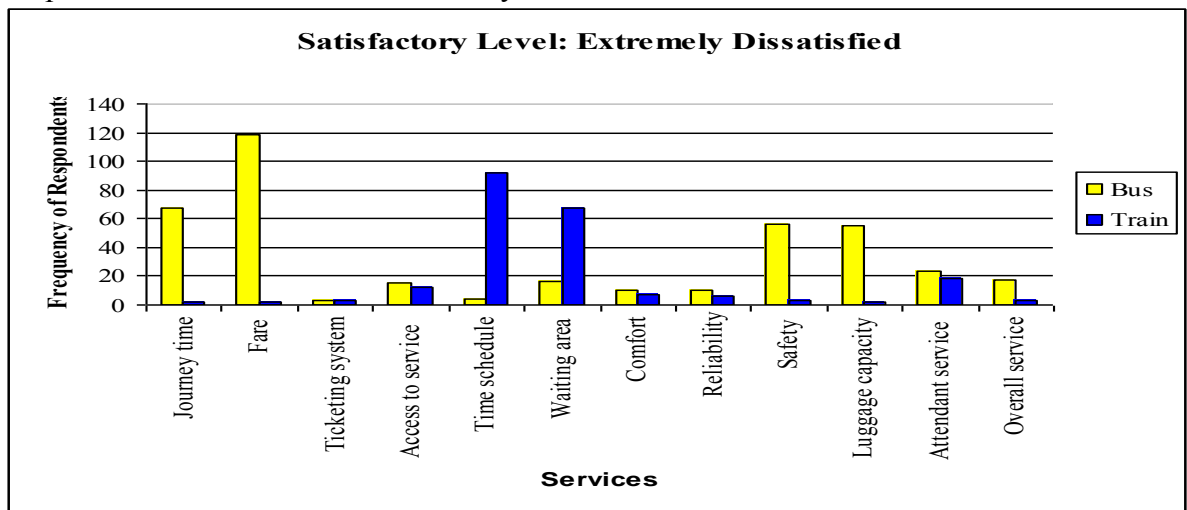
Respondents have different satisfaction level for the individual services of both bus and train. The following factors are mentioned below.

1. Journey Time;
2. Fare;
3. Ticketing System;
4. Access to Service;
5. Time schedule;
6. Waiting Area;
7. Comfort;
8. Reliability;
9. Safety;
10. Luggage capacity;
11. Attendant Service;
12. Overall service

The frequency of respondents for various satisfaction levels about bus and train service are classified as extremely dissatisfied, dissatisfied, neutral, satisfied and very satisfied.

The graph indicates the passengers extremely dissatisfaction on the following factors.

Graph 01: Satisfaction Level: Extremely Dissatisfied

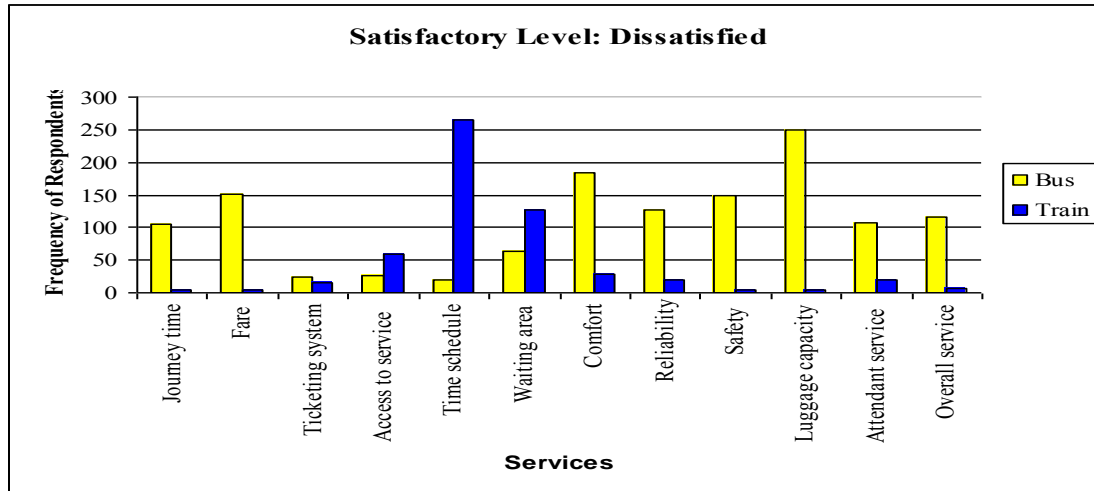


Source : Field Survey, March 2010

Passengers are extremely dissatisfied mostly on journey time and fare for bus service. On the other hand, travelers are extremely dissatisfied on time schedule and waiting area for train service.

The graph shows the dissatisfaction on the following factors.

Graph 02: Satisfaction Level: Dissatisfied

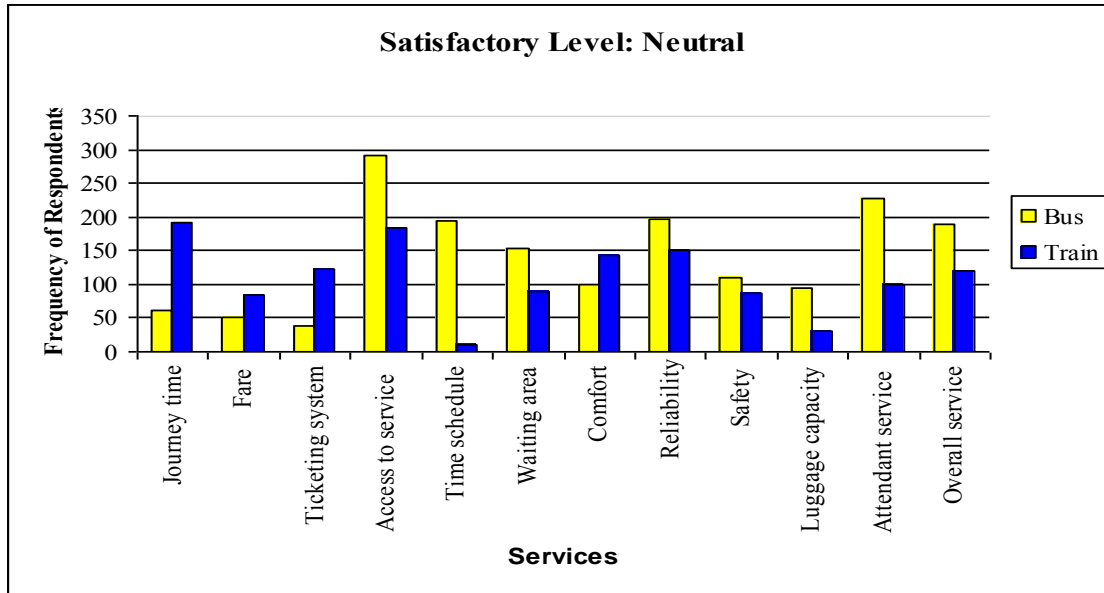


Source: Field Survey, March 2010

Passengers are dissatisfied mostly regarding luggage capacity, comfort safety and fare for bus service. On the other hand, travelers are dissatisfied on time schedule and waiting area for train service.

The graph shows the neutral comment on the following factors.

Graph 03: Satisfaction Level: Neutral

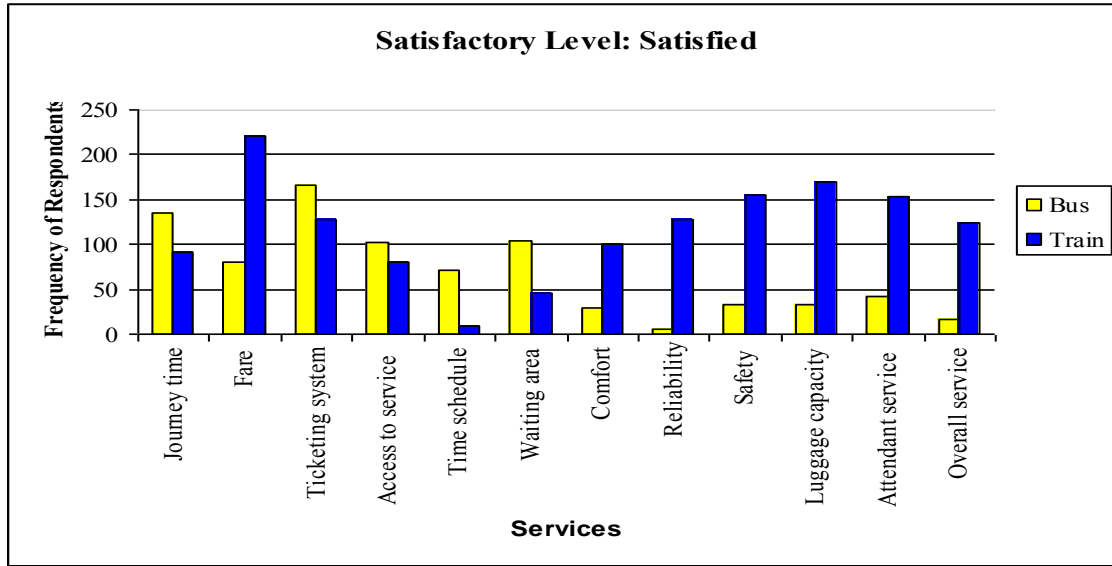


Source: Field Survey, March 2010

Some Passengers have neutral view mainly on access to information, time schedule, reliability and attendant service for bus service. Because they didn't know what to expect. On the other hand, travelers are neutral mainly on Journey time, access to information and reliability for train service.

The data point out the satisfaction on the following factors.

Graph 04: Satisfaction Level: Satisfied

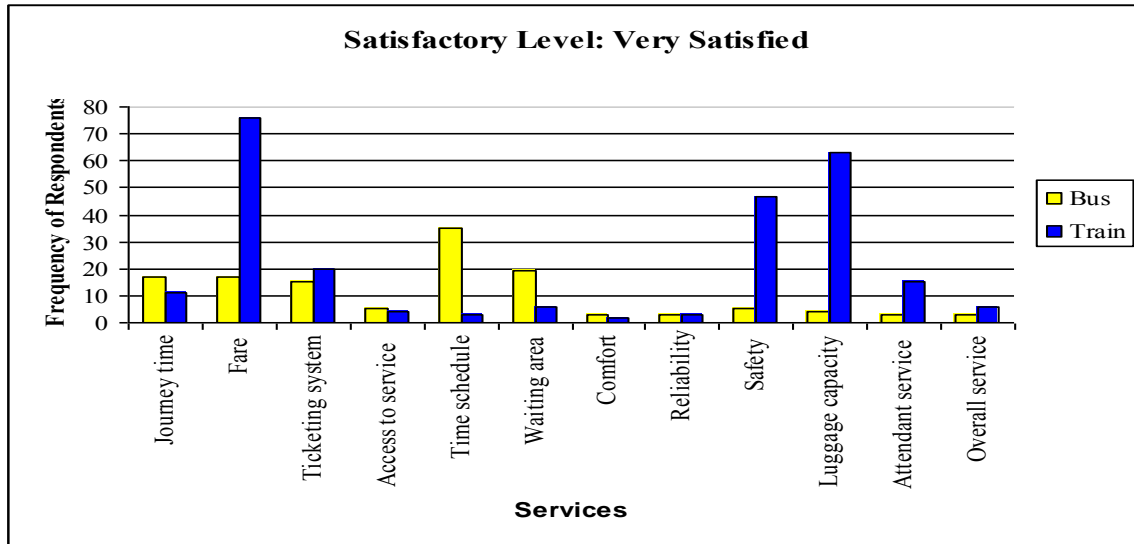


Source: Field Survey, March 2010

Passengers are satisfied in their comments mainly on ticketing system, Journey time, waiting area for bus service. On the other hand, travelers are satisfied mainly on fare, luggage capacity, safety and reliability for train service.

The data point out the satisfaction on the following factors.

Graph 05: Satisfaction Level: very Satisfied



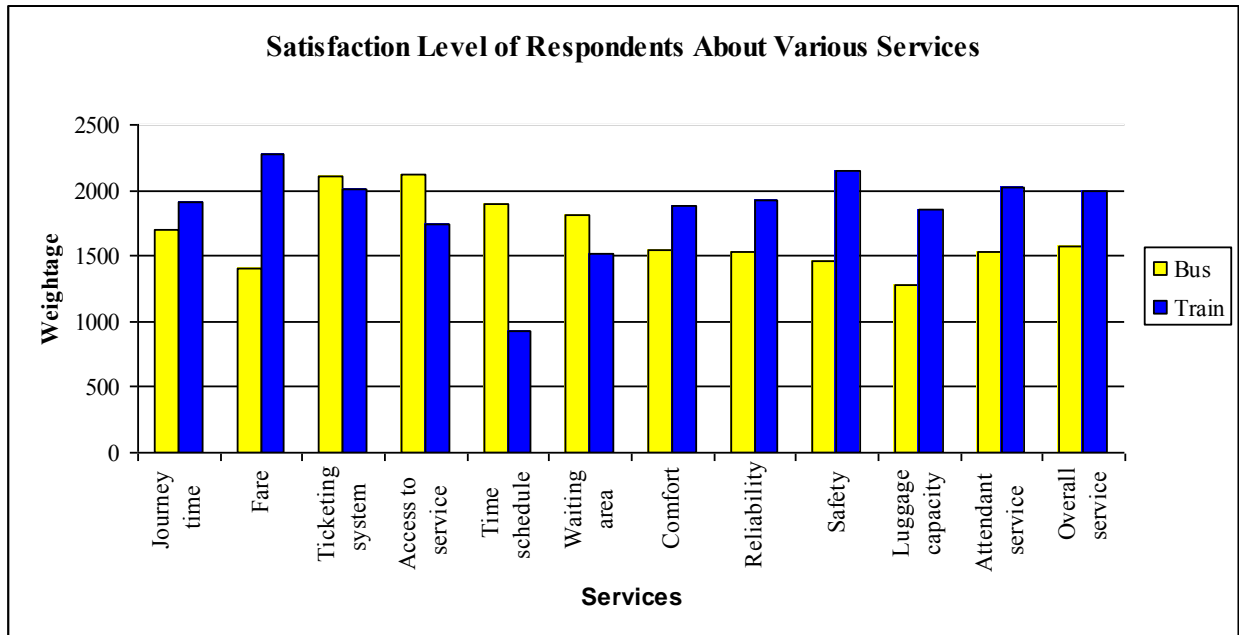
Source: Field Survey, March 2010

Passengers are very satisfied in their comments mainly on time schedule for bus service. But they were dissatisfied for luggage capacity, seating space safety. On the other hand, travelers are very satisfied mainly on fare, luggage capacity and safety for train service. The above variables are ranked by the respondents. The ranks are described as 1. Extremely Dissatisfied -2; Dissatisfied -1; Neutral 0; Satisfied +1 and Very Satisfied +2. The variables are weighted according to their ranks. The weights of ranks are given below.

Rank	weight
1. Extremely Dissatisfied	-2
2. Dissatisfied	-1
3. Neutral	0
5. Satisfied	+1
6. Very Satisfied	+2

The weighted variables are shown in the figure.

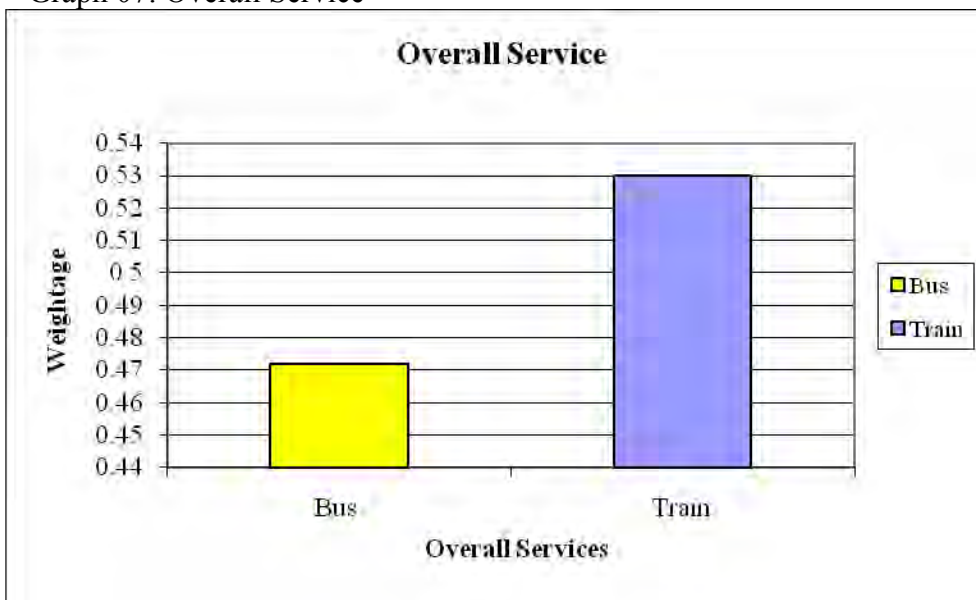
Graph 06: Satisfaction Level of Respondents about Various Services



Source: Field Survey, March 2010

The weighted overall service of bus and train are given below

Graph 07: Overall Service



Source: Field Survey, March 2010

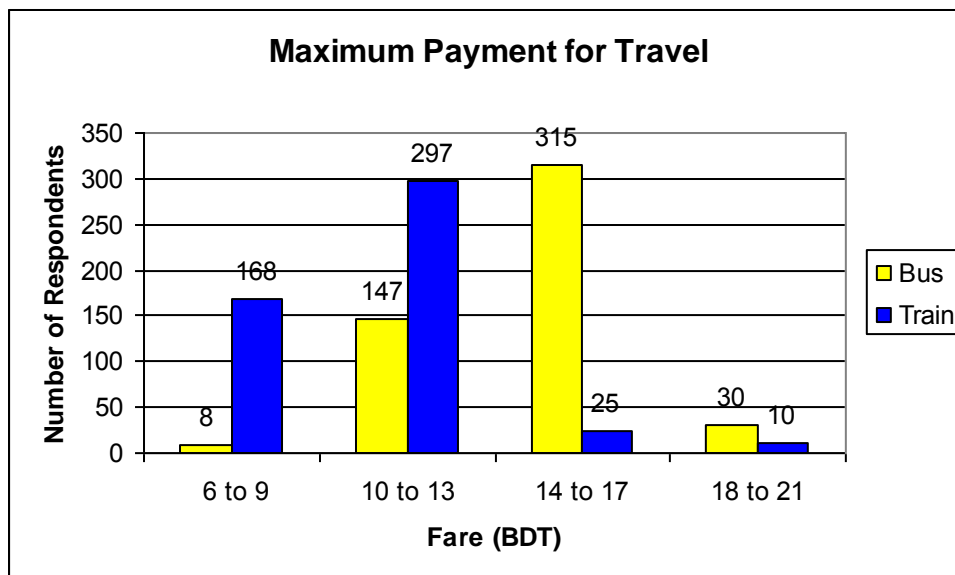
Here it is presented that service of train is better than bus. Among the 12 factors such as Journey Time, Fare, Ticketing System, Access to Service, Time schedule, Waiting Area, Comfort, Reliability, Safety; Luggage capacity; Attendant Service and Overall service, bus has got priority in 4 factors (Ticketing System, Access to Service, Time schedule, Waiting Area).on the contrary, train has got priority in 8 factors (Journey Time, Comfort, Reliability, Safety; Luggage capacity; Attendant Service and Overall service) .

The weightage of the train service (shown in graph 07) is 0.53 which clearly indicates preference for train over buses. The following figure proves that if railway service is improved, it can be more mode of transport among the passengers.

5.3.6 Maximum Payment for Travel

Travel pattern depends on fare. So how much passengers are willing to pay is important factor in the comparison of travel demand of various modes. The following chart shows that for bus service 63 percent passengers are ready to pay Tk.14 to 17. On the other hand, 59.4% passengers are ready to pay Tk.10 to 13 for train service.

Graph 08: Maximum Payment for Travel



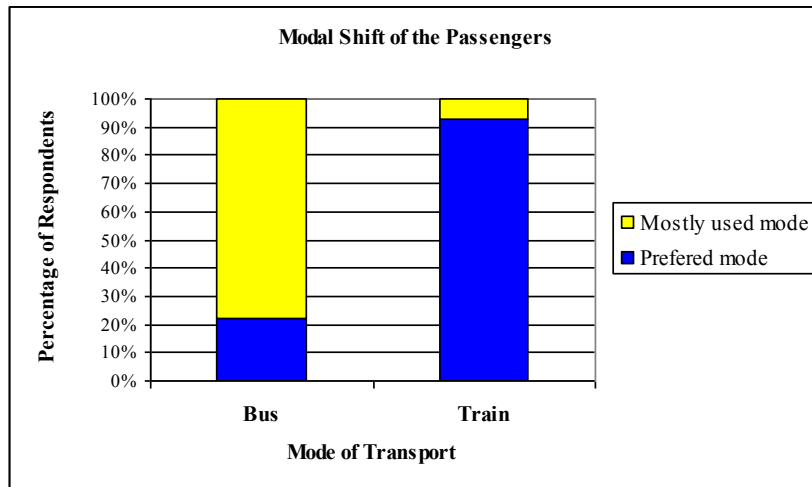
Source: Field Survey, March 2010

Actually passengers are willing to pay less amount of money compare to bus service because railway is state owned organization. People have a tendency to get service in fair price from government.

5.3.7 Model Shift

Modal choice depends on various factors which helps a person to compare between alternatives modes by their performances .Mainly two factors such as Time schedule and Fare are fixed to observe the willingness of modal shift of respondents and to understand the influence of other factors (comfort, safety etc.) on modal shift.

Graph 09: Modal Shift of the Passengers



Source: Field Survey, March 2010

The mode mostly used by respondents influenced by fare and schedule. So keeping these two variables constant; the willingness of the respondents to shift to a particular mode are analyzed here with a chart. This represents the comparison of bus-train ratio between mostly used by respondents and willing to use by them if fare and schedule is same.

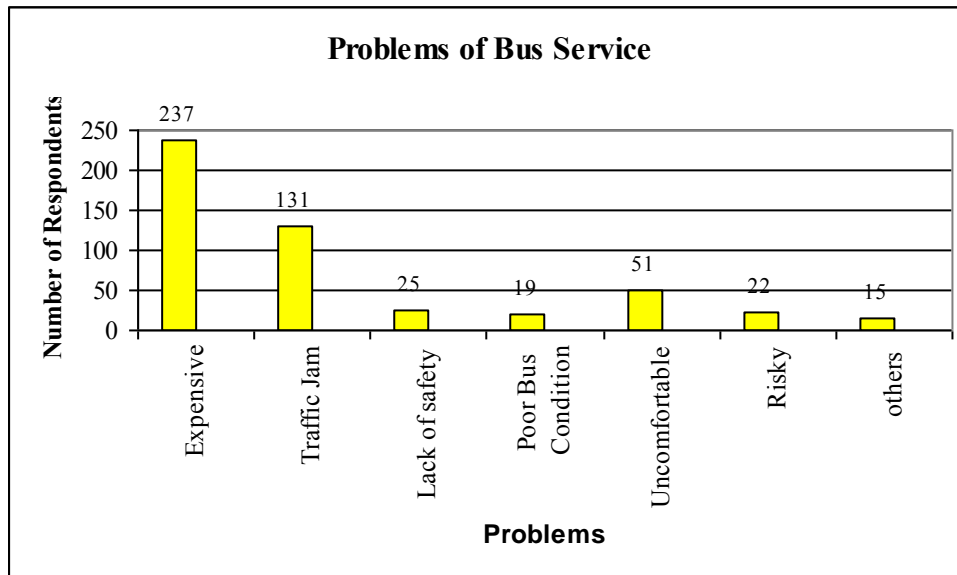
Presently preferred mode of travel is 94.5% for bus service and 5.5 % for train service. Here, from the chart a significance change in mode choice can be seen in mode choice. About 70 % bus passengers are willing to shift to train if fare and schedule is same. From this phenomenon, it can be said that schedule influences mode choice a great deal, as

train fare is lower than bus fare. Now there are some other factors for which the respondents choose particular mode having fare and schedule same.

5.3.8 Problems of Bus and Train

The following data describes that major problems of bus service. The main problems of bus service are expensive, traffic jam and uncomfortable.

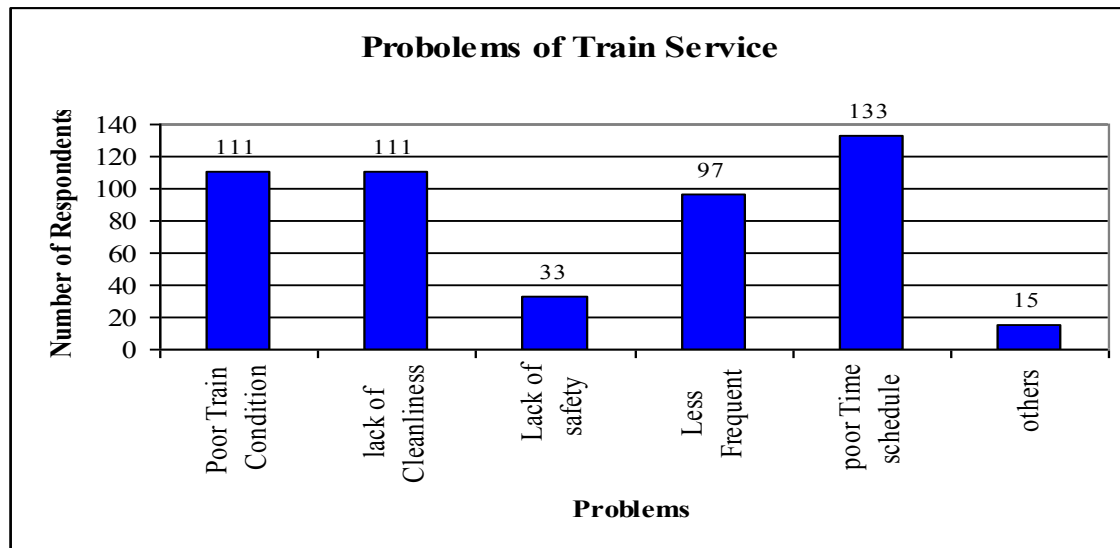
Graph 10: Problems of bus service



Source: Field Survey, March 2010

The following data reflects major problems of train service. The main problems of train service are poor train condition, poor time schedule, less frequent and lack of cleanliness. and traffic jam .

Graph 11: Problems of Train Service



Source: Field Survey, March 2010

5.4. Comparative Analysis Based upon Case Study

Different shareholders are selected for case study. Mainly some staff of railway and bus service was interviewed for case study.

5.4.1 Loco Master

Alamgir (32) is working in railway as Lomo Master. His main responsibility is to operate/ drive train engine with some coaches. presently he operates train in Narayanganj- Dhaka Route.

Comments: Rail slipper and rail track must improve to attract passengers. Because strongly embedded rail slipper and rail can help to gain smooth movement of the rolling stocks. Moreover, Temporary shops, and slums along the rail track hamper to attain maximum speed of the train. The picture shows how to attain the maximum speed through providing fence along the rail track.



The modern Railway track with fence was constructed in Singapore to carry many passengers in a single coach which can be example for our country. It is noted that the wall on the left protecting the residential areas.

Plate 02: Fence along the rail track to attain maximum speed and public safety.

5.4.2 Station Master

Jabber (40) is working in railway as Station Master. His main responsibility is to provide line clearance for train. Presently he works in Narayanganj Rail Station.

Comments: Train service should be upgraded with modern coach facilities. Train frequency must be increased to attract passengers. Management is also important for providing better service. Train platform is very low. Passengers have to face problems for ups and downs. Pregnant woman, children and aged passengers are main sufferer. Train door is less wide .So passengers take more time for getting on and off. The picture shows the same level platform and train. In addition, the width of the door is about 4 feet which helps passengers to leave and board from train.



The modern railway coach has 4 feet width door and same level platform and train door which is especially helpful for aged, pregnant woman children and the physically challenged.

Plate 03: Same level platform and train door in singapore

5.4.3 Bus Driver

Rahaman (45) is working as Bus Driver. Presently he drives Bus in Narayanganj. He has 10 years experience in this route.

Comments: Actually bus is expensive and traffic jam makes journey boring. Bus is also risky. Road transport pollutes air in significant manner which creates respiratory diseases.

5.4.4 Rail Higher Official

Ariful Islam (40) is working in railway as Commercial officer. Presently he works in Kamlapur Rail Station. He has 15 years experience in Bangladesh Railway commercial service.

Comments: Narayanganj–Dhaka rail track should be double track for providing better train service. Railway budget should be increased to give better services. Rail study can be incorporated with planning and engineering discipline.

5.4.5 Rail Higher Official

Mr. Reza (43) is working in railway as technical official. presently he works in Rail Bhaban.

Comments : Shuttle train must be introduced with limited sitting arrangements because more open space in train can carry more passengers. Presently train door is less wide (3 feet) which creates problem to down from the train. For example, in Singapore, sitting arrangement is limited in MRT services. Because more passengers can be accommodated in MRT. Door must be widened to down the passengers in stipulated time. In addition, Integrated Multimodal Transport System should be introduced for smooth traffic movement.



The modern Railway coach can carry bulk passengers from one place to another place within shortest possible time.

Plate 04: Standing Space within Train Compartment in Singapore

5.4.6 Regular Train passengers

Mr. Zaman is government service holder. He lives in Dhaka and he works in Narayanganj. Every day he travels by train.

Comments: Train time table is not harmonized with office hour. As a result passengers are reluctant to travel by train. In addition, the frequency of train service is not adequate for the threshold passengers. Now 10 pair's trains are operated every day. But more train services such as after each 20 minutes interval are required to meet the demand.

The case studies describe the different observations on train service by the stakeholders. The following improvement is necessary to revive the railway as sustainable transport which are mentioned below.

- Rail slipper and rail track must improve to attract passengers;
- Fence along the rail track is required to attain maximum speed and public safety.
- Train service should be upgraded with modern coach facilities. Train frequency must be increased to attract passengers. Management is also important for providing better service. Train platform is very low. Passengers have to face problems for ups and downs. Pregnant woman, children and aged passengers are main sufferer. Train door is less wide. So passengers take more time for getting in and off.
- Narayanganj–Dhaka rail track should be double track for providing better train service. Railway budget should be increased to give better services. Rail study can be incorporated with planning and engineering discipline.
- Shuttle train must be introduced with limited sitting arrangements because more open space in train can carry more passengers.
- Train time table is not harmonized with office hour. As a result passengers are reluctant to travel by train. In addition, the frequency of train service is not adequate for the threshold passengers. Now 10 pair's trains are operated every day. But more train services such as after each 20 minutes interval are required to meet the demand.

CHAPTER 6

CONCLUSION

6.1. Introduction

Railway communication plays an important role for socio-economic development in our country. Railway is one of the oldest and vital institutions in Bangladesh. Railway started its journey on 15 November in 1862. About 53 kilometers railway line was installed from Darshna (in Chuadnga District) to Jagati. The British Colonial administration constructed rail line for their own benefit to boost up their business. Ultimately, the railway became the prime communication network for the region of Bangladesh. But over the time railway became unpopular transport service for various reasons.

6.2. Summary of the Findings

Railway was very popular and efficient mode of transport in the past time in Bangladesh. It carried a good number of passengers and goods over time with efficiency, safety, reasonable fare and standard services. Other services like bus, streamers were not so popular due to service and safety reason. The railway service was in public sector for planning, development and operation. But the misappropriation, corruption, nepotism, political influence over time made the railway industry inefficient and a losing concern for the government incurring loss. The budget to the railway sub-sector in respect to the total allocation of transport sector was 23.9% in the First Five Year Plan , 32.13% in the Second Five Year Plan, 27.84% in the Third Five Year Plan, 13.1% in the Fourth Five Year Plan and 13% in the Fifth Five Year Plan. The figures clearly demonstrate the shrinking scenario of the railway sector over the time from 1973 to 2010. The budgets only meet the need of rehabilitation/replacement and repair expenses. As a result no significant improvement or up-gradation took place and some railway sections and stations had to be closed down. On the other hand, huge public investment in road sub-

sector resulted in high road density of 69.2 km per 100 sq. km. of total land in Bangladesh (Sixth Five Year Plan, 2010). In addition, bus service has developed in the private sector over the years. The tycoons and political elites of the society are the owner of the fleet bus service. They compelled passengers to use bus service by making the railway service inefficient through political and financial influence.

This thesis is associated with services of both mode of transport such as the railway and the bus. This research has investigated the overall benefits of the railway comparing the two modes. This study is confined within the service aspects of the routes. In addition, the study has pointed out some benefits of the railway such as fare, speed, travel time, environment and accident rate etc. This research did not discuss the technical aspects of the transport modes.

The thesis explores the comparative analysis of the two modes of different aspects such as distance, travel time, fare, fuel consumption, right of way, causalities and travel speed. Train service is more viable option on ground of the following aspects. The passengers are keen to travel by train service to consider the following issues.

The study also illustrates the general information of the passengers of the two modes. Age, gender, occupation, education status, income, living place, travel pattern, frequency of travel are analyzed to find the passengers' behavior on the following modes.

The research also defines the level of satisfaction of the following modes for different factors such as journey time, fare, ticketing system, access to service, time schedule, waiting area, comfort, reliability, safety, luggage capacity, attendant service and overall service. In addition, maximum payment for payment and modal shift are discussed in this thesis. The study addresses problems of bus service such as expensive, traffic jam and uncomfortable are obvious. On the other hand, poor train condition, lack of cleanliness, less frequent and poor time schedule are major constraints for train service.

Some case studies are conducted of the concerned stakeholders to get their opinions and suggestions to improve the train service which are incorporated in the recommendations. Finally, this thesis explored the existing loopholes of the railway service and prepared a set of recommendations for future railway planning and development.

6.3. Recommendation

The present study will help to revive the Railway for Sustainable and Safe Travel in Dhaka- Narayanganj Railway Route. From the study the following recommendation are given.

1. Train time schedule should be rescheduling to keep harmony with office and business hours. Train time rescheduling will catch the attention of new passengers.
2. Frequency of train trip must be increased to attract more passengers. Now 10 pair's trains are operated from Narayanganj to Dhaka. The number of train services can be increased after each 20 minutes interval.
3. Passengers are ready to pay more money for fare if time schedule, frequency and services are improved. According to analysis, passengers are willing to pay Tk. 10 to Tk.13, if time schedule and frequency is improved.
4. Presently preferred mode of travel is 94.5% for bus service and 5.5 % for train service. Here, from the chart a significance change in mode choice can be seen in mode choice. About 70 % bus passengers are willing to shift to train if fare and schedule is same. From this phenomenon, it can be said that schedule influences mode choice a great deal, as train fare is lower than bus fare. Now there are some other factors for which the respondents choose particular mode having fare and schedule same.

5. Narayanganj-Dhaka Railway Track should be made double line for carrying more passengers. In addition, rail slipper must be improved to make train speedier. Fence along the rail track is necessary to control the illegal occupancy and operate the train in maximum speed.
6. Train height from rail line and platform height must be harmonized for pregnant woman, children and aged passengers. It also helps the disable persons to travel with comfort.
7. Present condition of train service is poor and lack of cleanliness. According to analysis, About 26 percent passengers claim poor time schedule of the railway and about 22 % travelers feel that poor condition and lack of cleanliness are major reason for becoming unpopular to the passengers. So it is important to purchase coach with modern facilities to attract more passengers. In addition, maintenance can be improved for providing better service to passengers.
8. All over the world, train service act as a public transport for all class people. Passengers of all strata of society always try to get train service in fair price. So, Government should not allow private sector in this regard.
9. Railway Ministry can be introduced for better management and quick decision making. Moreover rail budget should be increased to give better services for the citizens.
10. The total length of the railway track is 2855 km around the country and 34,168 regular employees are working in railway industry. So, Rail study can be incorporated with planning and engineering discipline to create technical manpower in this sector for boosting the railway.

11. Shuttle train must be introduced with limited sitting arrangements because more open space in train can carry more passengers in standing way.

12. Present train door is narrow which creates hassle to down and up the passengers within the short time. So, Door must be widened to down and up the passengers in stipulated time. Train door can be widened about 4 feet for leaving and boarding from train.

13. Railway network can be integrated with other mode of transport such as road and waterways to link passengers' movement. Integrated Multimodal Transport System should be introduced for smooth traffic movement.

6.4. Conclusion

The transport system of Bangladesh consists of roads, railways, waterways and aviations. Mainly two dominants land transport modes are Railway and Bus. Narayanganj-Dhaka route is very important for trade, commerce and industry. In this route bus service is more prominent. But bus service has lot of shortcomings. Bus service entertains traffic jam, pollution, accident so on and so forth.

This study has revealed that train service is much better than bus service. The research also has pointed out comparative benefits and problems of train service. In addition, a set of recommendation are prepared for popularizing the train service.

Government should pay proper attention to railway service for national interest. Furthermore, Railway can keep important role for socio-economic growth and stability of the country.

REFERENCES

1. Asia Energy Corporation (2005), Feasibility study for Improvement and Rehabilitation of Branch lines of Dhaka-Narayanganj, Dhaka
2. Bangladesh Road Transport Authority 2009, Ministry of Communication, Government of Bangladesh, Dhaka
3. Asia Energy Corporation (2005), Feasibility study for Improvement and Rehabilitation of Branch lines of Dhaka-Narayanganj, Dhaka
4. Railway Information Book 2008, Rail Bhaban, Ministry of Railway and Communication, Government of Bangladesh, Dhaka
5. Bangladesh Economic Review 2009, Ministry of Planning, Government of Bangladesh, Dhaka
6. Accident Research Institute (2010), Accident Information Book, Bangladesh University of Engineering and Technology, Dhaka
7. <http://www.brta.gov.bd>, 2001
8. <http://www.railway.gov.bd>, 2010
9. <http://www.brtc.gov.bd>, 2010
10. Cothari, C .R (2006), "Research Methodology, Method and Techniques, Second Edition, New Delhi
11. Planning Commission (2010), "Sixth Five year Plan 2011-2015, Part 02",
Government of People's Republic of Bangladesh, Dhaka
12. The Daily Sun (2011), "Bangladesh's railway: A vital sector", The Daily Sun,
12 February 2011

Annexure 01: Questionnaire

Bangladesh University of Engineering and Technology, Dhaka
Department of Urban and Regional Planning
(All the information will be used for research purpose only)

Questionnaire for
Reviving the Railway for Sustainable and Safe Travel:
A Case Study of the Dhaka -Narayanganj Railway Route

Date of the Interview:

1. ID. No.....
2. Name of the Respondent.....
3. Age
4. Sex: Male/Female
5. Educational Status:
a) Illiterate b) Primary attended c) Primary Passed d) Secondary Level
e) SSC Passed f) HSC Passed g) Graduate h) Higher Educated i) Others
6. Occupation:
a) Govt. Service b) Private Service c) Businessman d) Students e) Small vendors
f) Laborers g) Others
7. Family Income (Per Month) BDT
8. Living Place:
a) Dhaka b) Narayanganj c) Others
9. Purpose of Travel:
a) Service b) Business c) Education d) Health Service e) Shopping f) Recreation
g) Others
10. Frequency of Travel:
a) Twice in a day b) Daily c) Twice in a week d) weekly e) Fortnightly f) Monthly
g) Occasionally
11. Mode of Travel:
a) Bus b) Train

12. What are your satisfactory levels with regard to the following aspects?

1=Very Satisfied 2 = Satisfied 3= Moderately Satisfied 4=Neutral 5= Dissatisfied
6= Extremely Dissatisfied

(Please put the code number of most appropriate answer in the table)

Mode \ Service	Bus	Train
Journey Time		
Fare		
Ticketing System		
Access to Service		
Time Schedule		
Waiting Area		
Comfort		
Reliability		
Safety		
Luggage Capacity		
Attendant Service		
Overall Service		

13. What is the maximum amount of money are you want to pay for bus and train service?

Mode of Transport	Tk.
Bus	
Train	

14. Assume fare and Schedule are similar, and then which mode will you prefer?

a) Bus 2) Train

15. What are the problems of Bus Service?

a) Expensive b) Traffic Jam c) Bad Attendant d) Lack of Safety e) poor bus condition
f) poor time schedule g) Uncomfortable h) Risky i) Others

15. What are the problems of Train Service?

a) Cleanliness b) Less frequent c) Bad Attendant d) Lack of Safety e) poor bus
condition f) poor time schedule g) Uncomfortable h) Risky i) Others

Thank you for your kind information

Signature of the Surveyor

Annexure 02: Photographs

ঢাকা-নাগ (শনিবার- বুধঃ)						নাগ-ঢাকা (শনিবার- বুধঃ)					
সময়	ঢাকা	গোতা	পাগলা	ফুল্লা	চাষাড়া	সময়	নাগ	চাষাড়া	ফুল্লা	পাগলা	গোতা
সকাল	০৮.৫০	০৯.০৫	০৯.০৮	০৯.১৭	০৯.২৪	সকাল	০৯.৫৫	০৭.০৩	০৭.১০	০৭.১৩	০৭.২২
সকাল	০৯.৫০	০৭.০৫	০৭.০৮	০৭.১৭	০৭.২৪	সকাল	০৭.৫৫	০৮.০৩	০৮.১০	০৮.১৩	০৮.২২
সকাল	০৮.১০	০৮.২৯	০৮.৩৭	০৮.৪৫	০৮.৫২	সকাল	০৯.৩০	০৯.৩৮	০৯.৪৫	০৯.৪৮	১০.১২
সকাল	১০.০০	১০.১৯	১০.১৮	১০.২৭	১০.৩৪	সকাল	১২.০০	১২.০৮	১২.১৫	১২.১৮	১২.২২
দুপুর	১২.৩০	১২.৪৯	১২.৪৮	১২.৫৭	০৭.০৪	দুপুর	০২.১০	০২.১৮	০২.২৫	০২.২৮	০২.৩২
দুপুর	০২.৩০	০২.৪৯	০২.৪৮	০২.৫৭	০২.৬৪	দুপুর	০২.১০	০২.১৮	০২.২৫	০২.২৮	০২.৩২
বিকাল	০৩.৩০	০৩.৪৯	০৩.৪৮	০৩.৫৭	০৩.৬৪	বিকাল	০৩.৩০	০৩.৩৮	০৩.৪৫	০৩.৪৮	০৩.৫২
বিকাল	০৩.৩০	০৩.৪৯	০৩.৪৮	০৩.৫৭	০৩.৬৪	বিকাল	০৩.৩০	০৩.৩৮	০৩.৪৫	০৩.৪৮	০৩.৫২
সন্ধ্যা	০৭.৩০	০৭.৪৯	০৭.৪৮	০৭.৫৭	০৮.০৪	সন্ধ্যা	০৭.০০	০৭.০৮	০৭.১৫	০৭.১৮	০৭.২২
রাত	০৯.০০	০৯.১৯	০৯.১৮	০৯.২৭	০৯.৩৪	রাত	০৯.০৫	০৯.১৩	০৯.২০	০৯.২৩	০৯.২৪
শুক্রে ও সরকারী ছুটির দিন (শনিবার ব্যতিত)						শুক্রে ও সরকারী ছুটির দিন (শনিবার ব্যতিত)					
সময়	ঢাকা	গোতা	পাগলা	ফুল্লা	চাষাড়া	সময়	নাগ	চাষাড়া	ফুল্লা	পাগলা	গোতা
সকাল	০৮.০০	০৮.১৯	০৮.১৮	০৮.২৭	০৮.৩৪	সকাল	০৯.৩০	০৯.৩৮	০৯.৪৫	০৯.৪৮	১০.০২
দুপুর	১২.৩০	১২.৪৯	১২.৪৮	১২.৫৭	১২.৬৪	দুপুর	০২.৩০	০২.৩৮	০২.৪৫	০২.৪৮	০২.৫২
বিকাল	০৩.৩০	০৩.৪৯	০৩.৪৮	০৩.৫৭	০৩.৬৪	বিকাল	০৩.৩০	০৩.৩৮	০৩.৪৫	০৩.৪৮	০৩.৫২
সন্ধ্যা	০৭.৩০	০৭.৪৯	০৭.৪৮	০৭.৫৭	০৭.৬৪	সন্ধ্যা	০৭.০৫	০৭.১৩	০৭.২০	০৭.২৩	০৭.২৪

Plate 05: Time Schedule of Train

ঢাকা-নাগজ ডাডার তালিকা	
১/ চাষাড়া	- ৫.০০ টাকা
২/ ফুল্লা	- ৫.০০ টাকা
৩/ পাগলা	- ৬.০০ টাকা
৪/ গোতাঃ	- ৬.০০ টাকা
৫/ ঢাকা	- ৬.০০ টাকা

Plate 06: Chart Showing Travel Fare Per Passenger.



Plate 07: Low and shanty Platform of Narayanganj Railway Station.



Plate 08: Traffic Jam at Jatrabari