



Role of Nippon Signal Co., Ltd. in Developing Metro Rail in Dhaka City, Bangladesh: A Case Study on Uttara to Mirpur

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Abstract

The article focused on the role of Nippon Signal Co., Ltd. in developing metro rail in Dhaka City: a case study from Uttara to Mirpur. The article aims to highlight the practical knowledge and experience gained during the internship period, with a particular focus on the management fields of transportation infrastructure and urban development. It examines the contributions of Nippon Signal Co., Ltd. to the development of the metro rail system in Dhaka and provides insights into their contributions, expertise, and technological advancements.

This case study focuses on the role of Nippon Signal Co., Ltd., a renowned Japanese company specializing in railway signaling systems and transportation infrastructure, in the implementation of the Uttara to Mirpur line. Nippon Signal Co., Ltd. brought its extensive experience and cutting-edge technology to the implementation of the Uttara to Mirpur metro rail line, including the design, installation, and maintenance of advanced signaling systems, train control systems, and communications infrastructure.

Making the article a community need, the authors required making an effort to use the metro rail, concentrate on students and job holders, and use the lessons learned throughout the internship. The article was on transportation infrastructure and urban growth. In the process of compiling this article, the office received invaluable support from their office colleague and accessed relevant records from Nippon Signal Co., Ltd. This article aims to provide readers with an in-depth analysis of the role played by Nippon Signal Co., Ltd. in the development of metro rail systems. Authors commented that Bangladesh is progressing in her economy by introducing this metro rail and hopes that in the future from Cumilla to Dhaka direct metro rail system and station and also an airport at Cumilla city will be introduced.

Key Words: Metro Rail System, Dhaka City, Bangladesh, Economic Development, Cutting-Edge Technology, Technological Change.

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1. INTRODUCTION

The rapid urbanization and population growth in many cities around the world have led to increased demand for efficient and sustainable transportation systems. Dhaka, the capital city of Bangladesh, is no exception. With its burgeoning population and escalating traffic congestion, the need for a reliable and efficient mass transit system became paramount. In response to this pressing need, the government of Bangladesh embarked on an ambitious plan to develop a modern metro rail network in Dhaka.

The Dhaka Metro Rail is an upcoming fast transportation network planned for Dhaka, Bangladesh, to offer a contemporary, dependable, and effective transportation system to accommodate the city's expanding population.

One crucial player in the development of the metro rail system in Dhaka is Nippon Signal Co., Ltd., a renowned Japanese company specializing in railway signaling systems and transportation infrastructure. With its expertise and technological advancements, Nippon Signal Co., Ltd. has played a pivotal role in the implementation of the metro rail project, particularly on the Uttara to Mirpur line.

The case study on the Uttara to Mirpur line serves as a prime example of Nippon Signal Co., Ltd.'s contributions to the development of the metro rail in Dhaka. This section of the metro rail network, spanning approximately 20 kilometers, connects two significant residential and commercial areas of the city, easing the daily commute for thousands of passengers.

Nippon Signal Co., Ltd. brought its extensive experience and cutting-edge technology to the table, ensuring the smooth functioning and safety of the Uttara to Mirpur metro rail line. Their involvement encompassed various aspects, including the design, installation, and maintenance of advanced signaling systems, train control systems, and communications infrastructure. These vital components are instrumental in ensuring efficient train operations, maintaining safe distances between trains, preventing collisions, and managing the flow of passengers.

Additionally, Nippon Signal Co., Ltd. played a crucial role in providing comprehensive training and support to the local workforce involved in operating and maintaining the metro rail system. By transferring knowledge and skills to local personnel, the company has contributed to the development of a skilled workforce capable of managing and expanding the metro rail network in the future. The impact of Nippon Signal Co., Ltd.'s involvement in the development of the metro rail in Dhaka goes beyond the Uttara to Mirpur line. It sets a precedent for future metro rail projects in the city and serves as a testament to the successful collaboration between international expertise and local initiatives.

In other words, the role of Nippon Signal Co., Ltd. in developing the metro rail in Dhaka, specifically the Uttara to Mirpur line, has been instrumental in transforming the city's transportation and scape. Through their expertise and state-of-the-art technology, they have contributed to the development of a modern and efficient metro rail system, enhancing the quality of life for the residents of Dhaka and setting the stage for future expansion of the network. Rouf (2022) argued that the metro rail will improve transportation connectivity and spur the growth of several privately run businesses near the stations in Bangladesh.

2. BACKGROUND

The city of Dhaka, the capital of Bangladesh, has experienced rapid urbanization and population growth, resulting in escalating traffic congestion and transportation challenges. To address these issues and provide a sustainable and efficient transportation system, the government of Bangladesh embarked on an ambitious plan to develop a modern metro rail network in Dhaka.

One crucial player in the development of the metro rail system in Dhaka is Nippon Signal Co., Ltd., a renowned Japanese company specializing in railway signaling systems and transportation infrastructure. With a rich history of expertise and innovative solutions, Nippon Signal Co., Ltd. has been at the forefront of revolutionizing transportation systems worldwide. Their contributions to the development of metro rail projects globally have positioned them as a reliable and trusted partner in urban transportation infrastructure development.

In the specific case study of the Uttara to Mirpur line in Dhaka, Nippon Signal Co., Ltd. played a pivotal role in ensuring the success and effectiveness of the metro rail system. This section of the metro rail network spans approximately 20 kilometers and connects two significant residential and commercial areas in Dhaka. By facilitating a seamless and efficient commute for thousands of passengers, the Uttara to Mirpur line has alleviated the burden of traffic congestion and improved overall transportation accessibility in the city.

Nippon Signal Co., Ltd.'s involvement in the development of the metro rail system encompasses various critical aspects. Their expertise lies in the design, installation, and maintenance of advanced signaling systems, train control systems, and communications infrastructure. These components are fundamental to ensuring the safe and reliable operation of the metro rail system, managing train movements, optimizing train schedules, and enhancing overall passenger safety. To further strengthen the metro rail system in Dhaka, Nippon Signal Co., Ltd. has also focused on providing comprehensive training and support to the local workforce. By imparting knowledge and skills to the personnel responsible for operating and maintaining the metro rail system, the company has contributed to the development of a skilled workforce capable of sustaining and expanding the network in the future.

To gain a deeper understanding of Nippon Signal Co., Ltd.'s expertise and contributions to metro rail projects, their official website provides valuable insights into their cutting-edge technologies and advanced automated fare collection (AFC) systems additionally.

Against this backdrop, this case study aims to delve into the specific role of Nippon Signal Co., Ltd. in the development of the metro rail system in Dhaka, focusing on the Uttara to Mirpur line. By analyzing their contributions, expertise, and technological advancements, this study aims to provide a comprehensive understanding of the transformative impact of Nippon Signal Co., Ltd. on revolutionizing Dhaka's transportation and setting the stage for future advancements in urban transportation infrastructure.

3. RESEARCH QUESTION

The article was made based on a question by the authors : "How has the role of Nippon Signal Co., Ltd. in developing the metro rail in Dhaka City, specifically in the Uttara to Mirpur line, contributed to the efficiency, safety, time management, and overall success of the transportation system?"



4. SCOPE OF THE STUDY

Nippon Signal Co., Ltd. is a renowned Japanese company that works extensively in Bangladesh and many other countries around the world. During the internship period at the Uttara (Diyabari) Project Office, the article was created based on the observations and studies. According to the study, the article will concentrate on the background of the company, the developing sector, communications infrastructure, transportation infrastructure globally, etc., improving the developing sector, which helps general people become more productive, saving time, and making growth in the economic sector, considering my subjects.

5. OBJECTIVES OF THE STUDY

We all know Bangladesh is a poor country, and most of the people in urban areas are also poor or middle-class. The objective of this paper is to explore how lower- and middle-class people can take relief from the traffic system, save lives and time, and grow economically. Especially for the students, women, and children who get a lot of support from this metro rail project. This also acts like an engine for the economic growth of our country. Assess the effectiveness of Nippon Signal Co., Ltd.'s initiatives in providing training and knowledge transfer to the local workforce involved in operating and maintaining the metro rail system. Evaluate the long-term impact of these initiatives on building a skilled workforce and contributing to the sustainability and expansion of the metro rail network.

6. METHODOLOGY

This study has to focus on both primary and secondary resources. Both primary and secondary sources are equally important for this article. The study has been conducted using qualitative research methods to explore the obstacles and challenges facing general people, students, senior citizens, women, and children in Bangladesh. This is exploratory research conducted through case-oriented qualitative research strategies. We were glad that the authors had a great experience. For primary resources, this paper discusses with Nippon Signal Co., Ltd. representatives, government officials, and relevant personnel involved in the metro rail project the advantages of metro trains and their activity in modern urbanization. Before entering the Nippon Signal Co., Ltd. Office, we also gathered experience from general people, senior citizens, students, women, etc. We also gathered secondary data from various reliable sources, including official records, articles, and publications. The study incorporates secondary data from Nippon Signal Co., Ltd.'s official website, particularly from every department, to understand their expertise and technology in transportation infrastructure. Other secondary sources, such as research articles, industry articles, and government publications, are consulted to gain a broader perspective on the metro rail system in Dhaka City in Bangladesh and its economic impacts. The period of the study is from May 2023 to September 2023.

7. CASE STUDY

7.1 Case Study: 1

We wanted to gather some practical experience on a metro rail train journey. For this reason, on the first day of the opening of the metro rail, I also reached the station in Uttara in the morning. There I met Rina Rahman, a mid-aged job holder from Uttara (her home), and her little daughter,

who were coming to experience their first journey on metro rail. Because Rina is a jobless woman and her husband lives out of the country, she and her child live alone and take care of every responsibility on their own. As they live alone, Rina's main responsibility is to drop off and pickup her daughter from school from time to time. As her job is in Agargaon, it's a little bit tough to manage the time for her daughter. After opening the metro rail, they are like the happiest person among the people in line for the ticket. After two hours of waiting, Rina and her girl boarded the train of their dreams after getting dressed up and joining the line at Diabari Station. The metro compartments were full of seats, but Rina and the child were too delighted to stand by. If not dancing, they were cheering. Though they did not get the chance to sit down and grab grips that just appeared to make them happier. Within 20 minutes, we were in the Agargaon area without traffic jams or sunburn. The ticket price is 60tk (BDT) from Uttara to Agargaon. It is the cheapest price that can be affordable for middle-class people. It is also the most secure and time-saving dream for all to come true in reality.

7.2 Case Study: 2

Because of our practical experience, we visited the station a second time. This time, we stood by the station for an hour and watched passengers closely. During this time, we kept my eyes on senior citizens. Among them, we introduced a senior citizen named Mr. Anisul Haque. He worked for the government we noticed that after taking a step in the queue, some volunteers came to him and took him directly to the ticket counter. Because he is a senior citizen, he can take his ticket in at any time. He does not need to take any steps in the queue.

After seeing that scenario, I was a little bit interested to know about him. As a result of my thinking, we went to him and tried to talk with him. I told him about my internship. After getting my introduction, we learned about him. As he was a government employee, he was getting his pension now. Because he receives a pension, he is required to visit the office regularly for documentation purposes. Though he goes with his son or grandchild most of the time, now that the metro train is open, he can go on his own. He also said that he does not need to stand in the queue. He can go directly to the ticket counter. He also said that the metro rail is coming to him as a blessing. For the metro, he does not need to bother his son or granddaughter. Though his son and granddaughter are very caring about him, he does not want to bother them. All of his life, he did not depend on anyone. Because he was getting older, he needed to depend on other people sometimes. But after the metro rail opens, he can travel independently again without taking any risks or thinking. His face was full of joy and satisfaction.

Nakayama, a Japanese man, was smilingly recording the joyous procession on his phone. We realized from the dress and ID card that he works on the metro rail project at Nippon Signal Co., Ltd. I asked him how he felt. Nakayama responded in broken English that he was very happy to see the joyous reaction of the people. "It is beautiful to see how people are happy," Nakayama told us.

8. ADVANTAGES OF THE DHAKA METRO RAIL

The Dhaka Metro Rail is a revolutionary new system that is poised to transform the way people travel in Dhaka, Bangladesh. It will be able to reach speeds of up to 100 km/h, making it significantly faster than traditional buses and rickshaws. It will also offer a more comfortable and



convenient experience for commuters, with air conditioning, Wi-Fi, and a capacity of up to 60,000 passengers per hour. It will also be more environmentally friendly than other modes of transport, as it will run on electricity and emit no green house gases or other harmful pollutants. This will help to improve air quality in the city and contribute to the overall sustainability of the transportation system.

The Dhaka Metro Rail is set to change the city's public transport system for good, providing a fast, comfortable, and convenient option for commuters. However, there are concerns that the metro rail lines could lead to further disruption and congestion as many of the key stations are not properly planned. Nippon Signal Co., Ltd. brought its extensive experience and cutting-edge technology to the implementation of the Uttara to Mirpur metro rail line, including the design, installation, and maintenance of advanced signaling systems, train control systems, and communications infrastructure. Additionally, Nippon Signal Co., Ltd. played a vital role in imparting comprehensive training and support to the commuters.

9. IMPORTANT OUTPUTS OF METRO RAIL

- (a) A more advanced transportation system.
- (b) Reducing the amount of time, it takes to get from one place to another.
- (c) Special transportation service for college and school kids.
- (d) Low-cost transportation.
- (e) Enables the simultaneous movement of 60,000 passengers.
- (f) Routes and stops between Uttara and Mirpur will be beneficial.
- (g) There will be more new career opportunities.
- (h) Transportation on the road without hassles

10. Main activities of Nippon Signal

- (a) To update the current transportation system, do a need assessment analysis.
- (b) A\$ 2 billion project with an open call for bids to develop a 32.5-kilometer elevated highway is being done for the building of a metro rail.
- (c) Civil engineer and transportation specialist training and workshop
- (d) Campaign to educate the general public and students on the advantages of using the new metro rail system.

11. LIMITATIONS OF THE STUDY

The data from Nippon Signal Co., Ltd. is confidential for outsiders in the department of commercial. Also, the article has a time limitation. Due to the limitations of time constraints during the research period, the study may not be able to cover all aspects or conduct a long-term assessment of the impact and sustainability of Nippon Signal Co., Ltd.'s contributions. For all of these reasons, this paper has completed the internship article without limitation.

12. IMPACT OF METRO RAIL

12.1 Escape from Traffic Congestion

Nippon Signal Co., Ltd. has contributed to the development of a reliable and efficient metro rail system in Dhaka City, particularly the Uttara to Mirpur line. This project aims to alleviate traffic

congestion and reduce economic losses caused by gridlock. By implementing state-of-the-art technologies in metro rail signaling systems, Nippon Signal Co., Ltd. ensures the smooth operation of the metro rail network. Advanced auto mated fare collection (AFC) systems enable seamless and efficient passenger flow, reducing ticketing delays and congestion at stations. This escape from traffic congestion has the potential to revolutionize daily life for the residents of Dhaka and create a positive impact on the national economy.

The AFC systems contribute to revenue generation, making the metro rail system financially sustainable and less dependent on government subsidies. The metro rail project, spearheaded by Nippon Signal Co., Ltd., offers a sustainable solution for reducing the reliance on private vehicles, resulting in reduced traffic volumes and improved air quality. This escape from traffic congestion also enhances the overall quality of life for the residents of Dhaka City by providing them with are liable, time-saving, and comfortable mode of transportation. Through their expertise and advanced technology, Nippon Signal Co., Ltd. has played a pivotal role in facilitating an escape from traffic congestion and creating a positive impact on Dhaka City's economy and daily life.

12.2 Employment

The development of the metro rail system in Dhaka City, with the significant contribution of Nippon Signal Co., Ltd., has created a substantial number of employment opportunities in Bangladesh. The project involves the construction and operation of numerous stations along the Uttara to Mirpur line, which will require a dedicated work force to manage various functions.

Additionally, the establishment of operating rooms, ticket counters, lounges, waste management facilities, prayer places, fire extinguishing systems, escalators, and lift sat every station will create a multitude of job opportunities for individuals with diverse skills and backgrounds. Additionally, the commercial hubs located around the stations will contribute to job creation, ranging from sales and customer service personnel to managerial and administrative staff. The presence of commercial activities enclose proximity to the metro rail stations will not only facilitate convenience for commuters but also foster economic growth by generating employment and stimulating financial activity.

This influx of job opportunities will contribute to the development of a skilled workforce and provide avenues for professional growth and career advancement. The increase in employment and economic activity resulting from the metro rail project will have a positive impact on the national economy. The availability of reliable and efficient transportation provided by the metro rail system will enhance accessibility to job opportunities, facilitate labor mobility, and improve overall workforce productivity. Nippon Signal Co., Ltd. has played a significant role in fostering employment and enhancing socio-economic development in Dhaka City through their expertise and technological advancements.

12.3 Technological Advancement

The development of the metro rail system in Dhaka City, with the active involvement of Nippon Signal Co., Ltd., ushers in a new era of technological advancement and innovation in the country. One significant aspect of technological advancement is the implementation of an integrated payment system in the metro rail network, which provides commuters with a convenient and efficient means of fare payment. This system has already been developed for the metro rail,



providing commuters with a convenient and efficient means of fare payment. Additionally, the successful implementation of an integrated payment system in the metro rail system sets a precedent for the gradual extension of similar technological solutions to other forms of public transportation in the country. The introduction of advanced technologies in the metro rail system in Dhaka City contributes to the digitization of the country's transportation infrastructure.

With the integration of digital systems, passengers can access real-time information about train schedules, arrivals, and departures, ensuring a more informed and efficient travel experience. Additionally, the utilization of smart technologies can enable predictive maintenance, enhancing the reliability and safety of the metro rail network. Nippon Signal Co., Ltd.'s role in developing the metro rail in Dhaka City brings forth significant technological advancements, such as the integration of an integrated payment system, the extension of digital solutions to other forms of transportation, and the gradual transition towards a cashless economy. By leveraging advanced technologies and digital systems, the metro rail project spearheaded by Nippon Signal Co., Ltd. sets the stage for a more efficient, connected, and technologically advanced transportation infrastructure, benefiting the population of Bangladesh and supporting the nation's journey towards development.

12.4 Decentralization of the Urban Population

The metro rail system in Dhaka City, particularly the Uttara to Mirpur line, offers individuals the opportunity to reside in less congested areas while still easily accessing the main city. This expansion opens up new possibilities for people currently residing in these locations to join the work force of the central city without having to relocate. The decentralization of the population has several implications for urban development, such as increased demand and higher rental rates for commercial facilities in those areas. The role of Nippon Signal Co., Ltd. in developing the metro rail in Dhaka City holds the potential for decentralization of the urban population. By providing a reliable transportation system that connects the central city with surrounding areas, the metro rail project offers individuals the opportunity to reside in less congested areas while maintaining convenient access to employment and other amenities. This can lead to a more balanced distribution of the population, reduce pressure on the central city, spur economic development in peripheral regions, and contribute to the overall sustainability and livability of Dhaka City.

12.5 Impact on the Environment

The development of the metro rail system in Dhaka City, with the involvement of Nippon Signal Co., Ltd., brings significant benefits in terms of reducing environmental pollution and mitigating the negative impacts of transportation on the city's ecosystem. The metro rail operates on electricity, which significantly reduces the reliance on fossil fuels and the associated emissions. Additionally, the implementation of Mass Spring System (MSS) technology in the metro rail project demonstrates a commitment to minimizing negative environmental impacts. The combination of electric-powered operation and advanced technologies to minimize noise and vibration demonstrates the commitment to environmental sustainability in the development of the metro rail system. The positive impact on the environment not only benefits the residents of Dhaka City but also serves as a model for other cities facing similar environmental challenges.

13. FINDINGS

The Metro Rail project in Dhaka City, particularly the Uttara to Mirpur line, has been instrumental in addressing the transportation challenges faced by the city's residents. While commercial profitability is not the primary focus of government-initiated projects, Metro Rail aims to provide an affordable and efficient transportation system. The fare-fixing process is currently underway, with proposals suggesting a fare of BDT 2.4 per kilometer and a total fare of BDT 51 for the 21.26-kilometer route. However, the final fare is yet to be determined, considering factors such as investment, operational costs, and capacity.

The financial viability of the Metro Rail project poses challenges, as the proposed fares may not cover all the operational expenses, including electricity bills, salaries, maintenance, foreign debt, and government investment returns. To mitigate this, the Dhaka Mass Transit Company Limited (DMTCL) plans to generate at least 30% of the revenue from non-fare sources. Transit-oriented development (TOD) initiatives, including station plazas and commercial facilities, are being planned near the stations to create additional revenue streams. The development of TOD hubs near stations, such as the one in Uttara, which includes world-class amenities and commercial establishments like amusement parks, hotels, daily commodity markets, and shopping malls, aims to attract more businesses and contribute to the project's financial sustainability.

The Metro Rail project offers significant time savings compared to buses, with travel time from Uttara to Moti jheel estimated to be reduced from 3-5 hours to just 40 minutes. This time efficiency is expected to encourage more people to use the Metro Rail system, leading to an increase in the overall transit system and benefiting numerous businesses located near the stations and along the routes. The enhanced transportation infrastructure will provide opportunities for existing businesses to flourish and new firms to establish themselves, thereby contributing significantly to the country's GDP.

Moreover, Metro Rail addresses the challenges faced by women in using existing public transport, such as long waiting times, harassment, seat shortages, safety concerns, and the need for suitable transport options. By providing air-conditioned coaches, abundant passenger capacity, and frequent train intervals, the Metro Rail system offers a more convenient and comfortable mode of transportation for women. This is expected to enhance women's participation in the workforce by improving their commuting experience.

In the development of the Metro Rail system, Nippon Signal Co., Ltd. has played a crucial role. As a provider of advanced technologies and solutions, including the Automated Fare Collection (AFC) systems mentioned in the provided link, Nippon Signal has contributed to the overall efficiency, safety, and management of the Metro Rail project. Their expertise in implementing AFC systems ensures seamless fare collection processes and enhances the overall passenger experience.

Overall, the Metro Rail project, with Nippon Signal's involvement, has the potential to transform Dhaka City's transportation landscape by providing an affordable, efficient, and convenient mode of travel. It addresses the existing challenges faced by the public, stimulates economic growth, and promotes inclusivity, especially for women in the workforce.

13.1 Types of People’s Reactions

Data were collected from primary sources as well as secondary sources (Nippon Signal & others website)

Table: Types of People’s Reactions

Q No.	Dimension	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
1	Adequate Bus service	5%	37.5%	35%	22.5%	0
2	Bus availability satisfaction	17.5%	50%	30%	0	5%
3	Metro rail routes	2.5%	2.5%	32.5%	57.5%	5%
4	Metro rail construction make suffer	0	5%	0	47.5%	47.5%
5	Satisfaction with route station	7.5%	10%	40%	37.5%	5%
6	Metro rail will reduce time of journey	0	0	20%	55%	25%
7	Service at night (metro rail)	0	0	5%	37.5%	57.5%
8	Metro rail is economical	0	2.5%	20%	60%	17.5%
9	Economic growth	0	2.5%	5%	52.5%	40%

(Source: Authors Preparation)

14. ANALYSIS OF THE FINDINGS

According to the chart, the majority of people are dissatisfied with the existing bus services and the number of buses available. Only 22.5% of respondents are satisfied with the current bus service. Regarding the Metro rail routes, residents of the Dhanmondi and Mohammadpur are as are generally not in favor of the proposed route, while those living near the Metro rail, such as Uttara,

Mirpur, Agargaon, Farmgate, and Motijheel, are more satisfied with the route. The majority (57.5%) agree with the proposed route, while 5% strongly agree. When it comes to the inconvenience caused by the Metro rail construction, 95% of respondents agree that they are facing difficulties due to the ongoing construction.

Regarding the station map, 37.5% of respondents agree, while 5% are strongly satisfied with it. The majority (55%) believe that the Metro rail will reduce journey times, while 25% strongly agree with this statement. There is also a positive response to the availability of Metro rail service at night, with 57.5% strongly agreeing and 37.5% agreeing. In terms of the economic impact, 60% of respondents believe that the Metro rail is economical, and 17.5% strongly agree. Furthermore, the majority (92.5%) agree that the Metro rail will contribute to economic growth.

In summary, the chart indicates dissatisfaction with existing bus services, varying opinions on the Metro rail routes based on location, acknowledgment of inconveniences during construction, positive views on reduced journey times and night services, and a belief in the economic benefits of the Metro rail system.

15. RECOMMENDATION

15.1 Customer Satisfaction

The government and the organizations involved in the development of Metro Rail should prioritize customer satisfaction. This can be achieved by providing air-conditioned trains, ensuring the best security measures, and offering separate coaches for women and senior citizens. CCTV cameras should be installed for enhanced security, and smart card facilities and ATM booths should be made available to make daily commuting easier for passengers. Additionally, providing information staff and lost and found services at metro stations will further improve the customer experience.

15.2 Fuel Consumption and Environmental Impact

To reduce fuel consumption and minimize the environmental impact, the organization should actively encourage people to use Metro Rail. By promoting Metro Rail as a reliable and efficient mode of transportation, the demand for other public and private transport can be reduced, leading to decreased fuel consumption and lower emissions.

15.3 Time Schedule

Ensuring adherence to the schedule is crucial to preventing inconvenience for passengers. The Metro Rail system should strive to operate on time, providing reliable and efficient transportation services to the people of Dhaka City.

15.4 Safety and Security Measures

Implementing safety measures is essential to creating a secure environment for passengers. This includes maintaining clean workspaces, ensuring proper pedestrian and vehicle access around construction areas, and employing visible signage and traffic directional controls. Additionally, having a dedicated surveillance and monitoring system, as well as a grievance redress mechanism for project-affected persons, will help address any concerns or issues that may arise during the construction phase.

15.5 Environmental Impact Mitigation

The organization should employ an Environmental Management Plan (EMP) to minimize the impact of the Metro Rail project on the environment. This includes measures to control dust, maintain drainage systems, and ensure the proper repair and maintenance of roads and work spaces. The EMP should also focus on resource conservation and follow a systematic approach for surveillance, monitoring, and articling of environmental impacts. By considering these recommendations, Nippon Signal Co., Ltd. can play a crucial role in developing Metro Rail in Dhaka City, particularly in the Uttara-Mirpur corridor. These measures will help create a more efficient, customer-oriented, and environmentally sustainable Metro Rail system, benefiting the people of Dhaka City.

16. CONCLUSION

Metro Rail plays a vital role in addressing the traffic congestion and economic growth challenges in Dhaka City, which is the capital of Bangladesh. The high demand for Metro Rail reflects the need for a convenient and efficient transportation system that can improve the quality of life for

its citizens. As a highly competitive market, Metro Rail in Dhaka City offers significant economic opportunities for both the government and the organization involved.

The focus should be on customer satisfaction and meeting the demands of the customers, who are eagerly waiting for the implementation of the Dhaka Metro Rail project. By reducing traffic congestion and improving transportation services, the Metro Rail system can contribute to the economy of Bangladesh and bring relief and peace to the citizens by creating a healthy environment free from noise and pollution.

Nippon Signal Co., Ltd. has an important role to play in the development of Metro Rail in Dhaka City, particularly in the Uttara-Mirpur corridor. By leveraging their expertise and solutions in Automatic Fare Collection (AFC) systems, Nippon Signal can contribute to creating a seamless and efficient ticketing and fare collection process for Metro Rail passengers. This will enhance the overall customer experience and ensure smooth operations of the Metro Rail system.

In conclusion, the implementation of Metro Rail in Dhaka City, with the support of Nippon Signal Co., Ltd., is a crucial step towards addressing traffic congestion, promoting economic growth, and improving the quality of life for the citizens. By focusing on long-term planning, customer satisfaction, and creating a healthy environment, the Metro Rail project can play a significant role in shaping the future of Dhaka City and contributing to the overall development of Bangladesh.

Nippon Signal Co., Ltd. has played a pivotal role in the development of the Uttara-Mirpur line in Dhaka, transforming the city's transportation landscape. With their expertise and state-of-the-art technology, they have contributed to the creation of a modern and efficient metro rail system, improving the quality of life for residents and setting the stage for future expansion. The Uttara to Mirpur lines spans approximately 20 kilometers and involves the design, installation, and maintenance of advanced signaling systems, train control systems, and communications infrastructure. These components ensure efficient train operations, safe distances between trains, preventing collisions, and managing passenger flow.

Nippon Signal Co., Ltd. also provided comprehensive training and support to the local work force involved in operating and maintaining the metro rail system, transferring knowledge and skills to the personnel. This has contributed to the development of a skilled work force capable of managing and expanding the metro rail network in the future.

The impact of Nippon Signal Co., Ltd.'s involvement extends beyond the Uttara-Mirpur line, setting a precedent for future metro rail projects in Dhaka and demonstrating successful collaboration between international expertise and local initiatives. In conclusion, Nippon Signal Co., Ltd.'s involvement in the Uttara to Mirpur line has significantly impacted the city's transportation landscape and paved the way for future advancements in urban transportation infrastructure.

The authors are happy that Bangladesh is progressing in her economy by introducing this metro rail and hope that in the future from Cumilla to Dhaka direct metro rail system and stations will be set up for around 90 kilometers under another mega project and also an airport at Cumilla City will be introduced. This will help the connectivity system within the country and the regional integration process in the Indian subcontinent.

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