Investigating Mega Infrastructure Project Delays on MRT Line-6 of Dhaka City

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Exam Roll: Nagar 180978
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Submitted in the fulfilment of the requirements for the degree of Bachelor of Urban and Regional Planning

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CERTIFICATE OF APPROVAL

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Declaration

I confirm that this BURP thesis titled "Investigating Mega Infrastructure Project Delays on MRT Line-6 of Dhaka City" is my original work and any other materials used in this thesis have been acknowledged in the text. The length of this thesis, including tables, figures, references, and appendices is not more than 150 pages.

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Abstract

Projects are short-term initiative that aims to produce a distinctive advantage, service or outcome, and infrastructure refers to the physical features that use the operation of a company, region, or nation, frequently involving the generation of public goods or the execution of production procedures. A large-scale infrastructure project is called a mega infrastructure project, which costs at least 1 billion. Mega infrastructure projects are a haphazardly organized collection of unconnected components with various uncertainty and unknown challenges. These various uncertainties and unknown challenges cause mega infrastructure project delays. Project delay increases the cost of the project and causes economic loss. Bangladesh is currently running some mega infrastructure projects and facing project delays. As a result, the government is facing financial loss. MRT Line 6 project was selected as a study case that faced delay in completion. This study tries to identify the factors causing delays in completing MRT Line-6 and investigate the institutional complexity while executing MRT Line-6 in Dhaka city to answer the question of what the complexity and factors are responsible for delays in MRT Line-6. This study follows a qualitative research approach through a deductive approach. Content analysis was used to explore the factors through In Vivo Coding in the first cycle of coding and Pattern Coding in the second cycle of coding. Issues of the Contractors, lack of knowledge and skills, design changes, low quality of planning and management, material collection, political issues, land acquisition, covid 19, safety and security concerns of foreign workers, traffic pressure in the city, institutional issues are the factors explored in this study that causes the delay of MRT Line 6. Among these institutional issues, design changes and lack of knowledge and skills are the key factors of delay. The study can contribute to understanding delay factors and applying knowledge for future infrastructure projects in developing countries and provides valuable insights for policymakers to make better infrastructure decisions and ensure successful project completion. This research does not show reasons for delays when the funding agency changes. While the research identifies reasons for delays, it does not recommend ways to reduce delays.

Keywords

MRT Line 6

Mega Infrastructure Project

Mega Infrastructure Project Complexities

Project

Project Delay

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List of Abbreviations

DMTCL - Dhaka Mass Rapid Transit Company Limited

DNCC- Dhaka North City Corporation

DTCA - Dhaka Transport Coordination Authority

DSCC - Dhaka South City Corporation

DMP - Dhaka Metropolitan Police

JICA - Japan International Cooperation Agency

KII - Key Informant Interview

RAJUK - Rajdhani Unnayan Katripakkha

RSTP - Revised Strategic Transport Plan

UNDP - The United Nations Development Programme

UNCED - The United Nations Conference on Environment and Development

Chapter-1: Introduction

1.1 Background

Projects are efforts to achieve a specific goal through a distinct set of linked activities and the effective use of resources. To complete a project, several non-repetitive activities must be completed in a specific order to achieve the project's goal. A project's activities are carried out with the assistance of various resources. Resources like diverse people, organizations, tools, materials, and infrastructure. A project must have a specific timetable or end date to succeed. To meet the deadline, the goal must be started and completed by a specific date and time. A project can be a one-time or recurring activity, depending on its scope. Donner is required for any given project. Donner contributes funds to the project's completion. The number of people or organizations that can form a joint venture is not limited. As a result, every project involves some level of risk. An outline is created using a variety of assumptions and estimates to get a project off the ground. Assumptions are essential for developing the project scope, schedule, and budget, which should be documented. A project's foundation includes assumptions about what resources are available and how long each activity should take, as well as estimates about the costs associated with those resources. The fact that the project's stated goal is based on several speculative assumptions and estimates creates uncertainty (Jack Gido, Jim Clements, 2018).

Infrastructure projects are a form of public good and government policy plays a significant role in shaping the project's impact on the economy and society. With that, the growth of a society and its economy depend on the infrastructure that supports them (World Bank, 1994). The term "infrastructure" refers to both public works and utilities, including things like roads, urban transport, railways, dam, and canal works, ports and waterways, and airports, along with public utilities like electricity, telecommunications, water and piped gas supply, sanitation and sewerage, waste collection and disposal (World Bank, 1994). Services, facilities, and systems are the main targets of infrastructure projects, which are also responsible for their creation and upkeep. Individual businesses, government agencies, or a public-private partnership could support these. Whether it's a municipality, state, or

country, private investment can aid in planning and controlling economic growth. There are mainly nine distinct categories of infrastructure projects. These include airports, bridges, communications, power plants, energy distribution networks, roads, water systems, waste management, and hazardous waste disposal infrastructure projects ("9 Types of Infrastructure Construction Projects in 2020 | BigRentz," n.d.).

Knowledge with skills, equipment, and techniques are applied to the project activities to meet the project's desires. Managing an infrastructure project includes several steps, the most important of which are project planning, implementation, and evaluation. It is necessary to find and document the project's requirements and the demands of all stakeholders to effectively manage the project (Adrienne Watt, 2014).

A report from the Asian Development Bank shows that infrastructure investments required in the Asia-Pacific region from 2016–2030 total 26,166 billion USD. Infrastructure includes road, rail, air, maritime, logistics, trade facilitation, energy, ICT, and others. It is a matter of concern that the expected amount of infrastructure investment in South Asia is also large, at $6,347 billion (Asian Development Bank, 2017). According to a report published in 2022, there are currently 6,344 active infrastructure projects globally with a total value of over $25 million. The value of the $24.04 trillion in new infrastructure construction projects in the pipeline as of the beginning of 2022 (World Construction Network, n.d.).

Large-scale endeavors involving many public and private organizations are known as mega infrastructure projects. Generally, they cost billions, impact the lives of thousands or even large numbers, and significantly impact the world (DATABD.CO, 2020). Sponsors, funders, governments, and key suppliers form a coalition around the front-end definition of a mega infrastructure project, which is continually rearranged until a workable project concept is established and gains enough momentum to move forward with implementation (Winch, 2017). Project has several stakeholders: the client and its owners; the project team; financiers; national and international governments; environmentalists; interested parties and contractors; local residents; media; regulatory agencies; suppliers; and professional associations; as well as clients (Littau et al., 2015).

1.2 Problem Statement

Study was done to explore the mega infrastructure projects in Bangladesh (Esposito et al., 2021). Researchers were also tried to find the causes of the inability to meet in construction projects in Bangladesh (Islam et al., 2015). It also investigated the core reasons for schedule delays in construction projects (Mizanur et al., 2014). In the international context, researchers also tried to explore the importance of project management in a particular section of the planning phase of transport infrastructure projects (Germany) (Sözüer & Spang, 2014), the complexity of the project management process in developing countries (Yanwen, 2012), and the challenges faced when construction mega infrastructure projects in developing countries also explored (Ezzat Othman, 2013). Researchers also built a conceptual model for how to overcome the challenges of mega infrastructure projects in developing countries (Othman, 2014). It also tried to find ways to manage mega projects through Institutional Theory (Biesenthal et al., 2018). The institutional theory is also used to analyze complexity in global projects (Mahalingam & Levitt, 2007), and it is also proven that institutions can regulate mega projects well (the case of the Lyon-Turin high-speed railway) (Esposito et al., 2021). But there is comparatively less study conducted in the context of Bangladesh on the way to reduce delays in mega infrastructure projects. Besides, the complexity among the stakeholders of this type of project aren't studied yet. So, there is a scope for relating institutional theory to analyze the complexity among institutions and explore the factors of project delays in the mega construction projects.

1.3 Rationale or justification of the study

The contractors and consultants lost their reputations in consulting services, the consultants also lost the opportunity to work with the company again and increased uncertainty among investors are the result of the project delays. Investors' confidence in the industry and the country can be eroded by delays, which cost them money. Clients are also affected by mega infrastructure project delays. Countries' slow growth is a reason for project delays. However, the added cost is a key factor, and the project output is not impacted much.

Examples of global mega-infrastructure projects that experienced budget overruns due to missed deadlines include: India's Navi Mumbai International Airport took longer to build than planned and cost an extra $1.5 billion and four years. Germany's rail project Stuttgart 21 was delayed for six years, and its final price tag was $6.8 billion higher than expected. Construction at Hinkley Point C, United Kingdom, cost an additional $6.65 billion and took six more months. The French nuclear reactor Flamanville 3 was 11 years late for completion, costing $11 billion extra. It took five years longer and up to $11 billion more than expected to build the Gulf Railway Line in the Persian Gulf countries. The construction of the Vogtle Electric Generating Plant in the United States was six years late and $14.5 billion over budget. The California High-Speed Rail Project in the US took four years longer and cost $65 billion more than expected to finish. HS2, UK, was seven years late and up to $66 billion over budget (*Over Budget, Delayed Megaprojects around the World | Lovemoney.Com*, n.d.).

Bangladesh, one of the emerging developing countries, is currently running some mega-construction projects. The mega construction projects are Padma Multipurpose Bridge, Dhaka Elevated Expressway, Purbachal Residential Model Town, Legacy Tower, Sheikh Hasina International Cricket Stadium, Bangabandhu Sheikh Mujibur Rahman Tunnel, Matarbari Port, Rooppur Nuclear Power Plant, Third Terminal of the Hazrat Shahjalal International Airport, Dhaka Metro Rail, Rampal Power Plant, Chittagong-Cox's Bazar Railway, Dhaka Subway (Yeasin, 2021), Padma Rail Link, Moheshkhali LNG Terminal, Payra Deep Sea Port (DATABD.CO, 2020), Bangabandhu Railway Bridge (*Bangladesh Starts Construction on Bangabandhu Sheikh Mujib Bridge*, n.d.), Chittagong Elevated Expressway (Dhaka Tribune, 2018), Payra Power Plant (*Payra Power Plant Coal-Fired Bangladesh 1,320MW*, 2021). Since deciding to embark on mega projects, the country has had to contend with a new reality regarding project management and execution. There have been many problems, and new lessons are constantly being learned. Delays on all the major projects have resulted in massive cost overruns. When the costs of a project are allowed to rise uncontrolled, it has a significant negative impact on the positive outcomes. For a long time, people have been inconvenienced and without services as a result of construction. As a result, the government's reputation suffers, and there are now doubts about the government's ability to carry out these initiatives (N. Ahmed, 2021).

1.4 Research Question

What complexity and factors are responsible for delays in MRT Line-6?

1.5 Research Objectives

- To identify the factors causing delays in completing MRT Line-6.
- To investigate the institutional complexity while executing MRT Line-6 in Dhaka city.

1.6 Scope of the Study

This study focuses on the mega infrastructure project and its overall activity when implementing it. The main goal of this study is to explore the complexity and determine the major factors responsible for mega construction project delays. The study selected the transport infrastructure mega project as a case study because Bangladesh has run some mega construction projects in the transport sector (Yeasin, 2021). The study's findings will help the authority and decision-makers establish proper guidelines to reduce project delays and protect the state's economic loss.

1.7 Summary

The basic requirements required to execute a mega infrastructure project are discussed in this chapter. The current state of national and international mega infrastructure projects is also discussed. The problem statement part is about the knowledge gap and is made up of other written works by different authors that show where new research needs to be done. In this part of the study, the rationale or justification of the study is explained, some examples of delayed mega infrastructure projects are given, and their delayed time with cost overruns is also mentioned. This chapter also discussed the research question and the objectives, both essential parts of a research project. The scope of the study consists of further use of this research. This chapter is mostly about helping readers figure out what this study is about and providing guides to understanding the next chapter of this study.

Chapter-2: Theoretical Framework

2.1 Introduction

Nowadays, the world is focused on global mega infrastructure projects. For financial and physical purposes, these projects are very large. For this reason, many stakeholders are interested to engage in this type of project. So, considerable research is being done on this topic, and various types of literature have been developed. This work attempts to reveal the developed literature on projects; mega infrastructure projects and their relation to project management; project delays; challenges for implementing mega infrastructure projects; and institutional theory and its relation to the mega construction project.

2.2 Diagram of Theoretical Framework

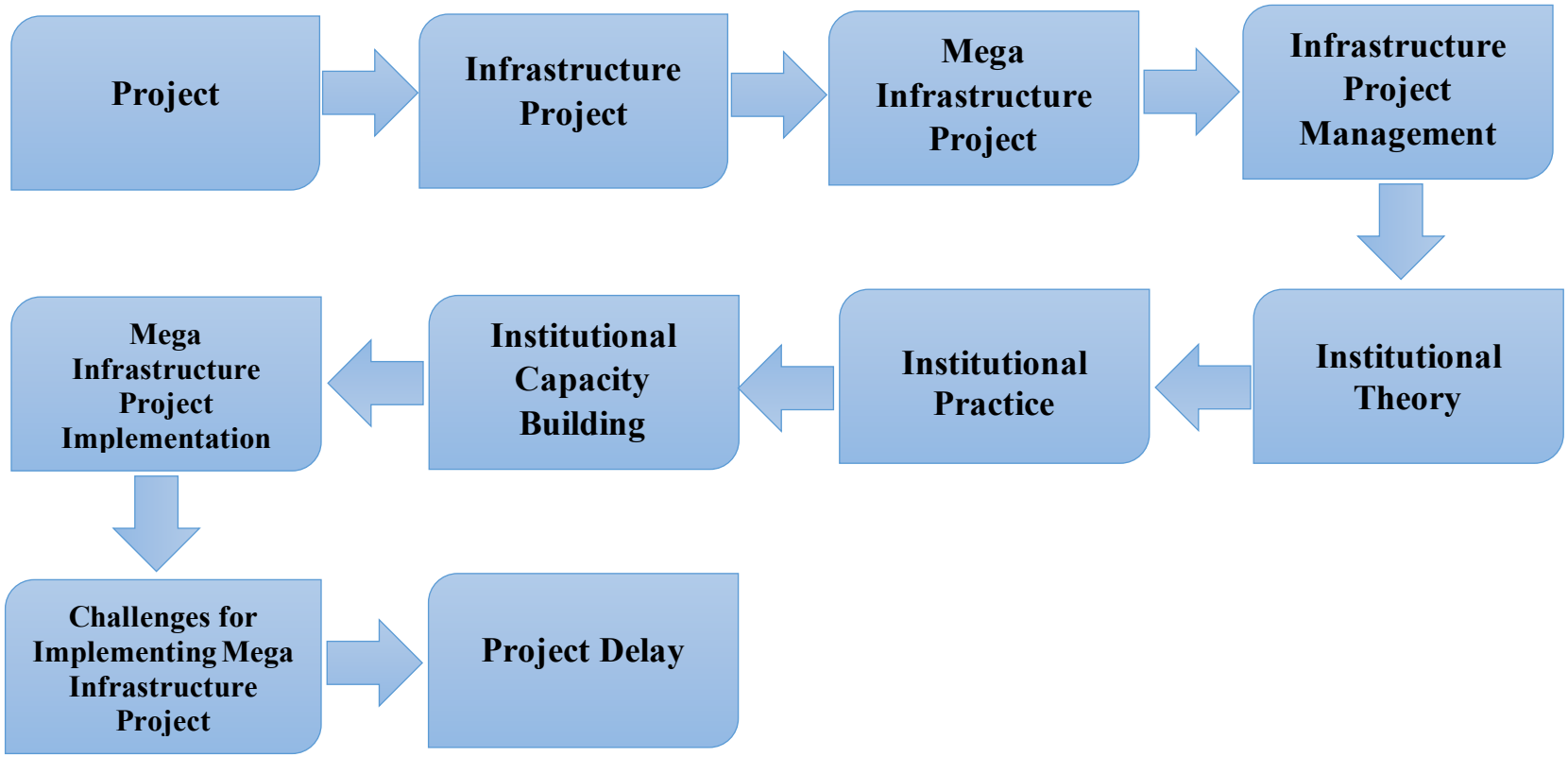


Figure 1: Theoretical Framework

2.3 Project

According to Rahimi (2015), A project is a short-term initiative that aims to produce a distinct advantage, service, or outcome. It has a defined objective, seems short-lived, requires resources from multiple sources, has a basic consumer or financial backer, and is characterized by uncertainty (Rahimi, 2015).

2.4 Infrastructure Project

According to Investopedia, "infrastructure" refers to the physical systems that are essential to the operation of a company, region, or nation, frequently involving the generation of public goods or the execution of production procedures. Most large-scale infrastructure projects are undertaken by the government and paid for with tax dollars. Often, private companies or even local governments can produce necessary infrastructure on a smaller scale. Both types of infrastructure—soft and hard—are essential to a country's economy and citizens' standard of living. "Hard infrastructure" refers to the concrete, physical network of transportation facilities, energy distribution, and large physical structure. To meet a population's economic, health, and social requirements, soft infrastructure must be in place (The Investopedia Team, 2023).

2.5 Mega Infrastructure Project and Infrastructure Project Management

Mega infrastructure projects differ in terms of goals, period, complexity, and stakeholder engagement (Flyvbjerg, 2014). It is a large-scale and complex venture that costs at least USD 1 billion, requires many years to complete, includes various public and private stakeholders, affects the lives of millions of people, and has a long-term impact on the economy and society (Flyvbjerg, 2014). It is a temporary initiative in which various actors play a role in finding the best outcome by utilizing resources from different sites, institutions, cultures, and geographies depending on the structural, sequential, and network-based models of all institutions related to the project (Scott, 2017). Understanding,

expertise, tools, and methods in project management are used to carry out specific tasks in terms of meeting project goals and objectives. The focus must not only be to meet the specific requirements of projects in terms of scope, period, expense, and quality. Still, it must also facilitate the entire process to serve the users' needs and requirements directly or indirectly through project activities (Rahimi, 2015). Mega-infrastructure projects are usually a haphazardly organized collection of unconnected components presented together as a whole. Also, mega infrastructure projects expand upon preexisting conditions; they don't begin with anything. Especially in densely populated areas, there is already a substantial amount of infrastructure. In most cases, the primary goal of new projects is to merely reorganize existing infrastructure or build upon preexisting connections (Salet et al., 2013).

2.6 Institutional Theory

An institution's arguments are not based on aggregations of individuals' activities or patterns of activities between individuals but rather on institutions that perform structured action (Clemens & Cook, 1999) with the knowledge that political and historical institutions have both formal and informal procedures, practices, standards, and conventions in organizational structure, while for sociological institutions it is a set of moral standard, symbolic systems, and cognitive scripts (Ramsey, 2009). Regulative, normative, and cultural-cognitive principles can be used to classify institutions and their behavior, and international project management literature tends to focus on the regulatory aspects of the discipline because of its whole focus on economics; project management research has often overlooked normative and cognitive-cultural aspects (Javernick-Will & Scott, 2011). Regulative knowledge encompasses government processes and procedures, design and construction standards, operation laws, and approval processes. Work practices and relationships, expectations and local preferences, logistics, industry organizations, market knowledge, resources, and productivity are normative knowledge. Local cultural beliefs, concepts, and languages play a role in cultural-cognitive norms (Javernick-Will & Scott, 2011).

2.7 Institutional Capacity Building

The term "capacity building" has broad applications and originates in institutional and organizational development. It benefits the people who decide on specific programs and grant strategies. The United Nations Development Programme (UNDP) defines capacity building as "the creation of an enabling environment with appropriate policy and legal frameworks, institution development, community participation, human resources development, and strengthening managerial systems." UNCED acknowledges that the fundamental goal of capacity building is to improve stakeholders' abilities to evaluate and address crucial questions related to policy choices and different options for development (R.Krishnaveni & R.Sujatha, 2013). According to (Straussman, 2007) experts in international development, foreign governments, and charitable organizations all use the term "capacity building" to refer to their various initiatives to aid developing and transitioning nations in strengthening their administrative structures. The ability of individuals, communities, and societies to recognize and respond to development challenges is continuously developed through this process. However, a unified definition of capacity building has yet to emerge. Depending on the scope of their studies, researchers have applied the concept in various ways. Capacity building is performed on three levels: the individual, the organization, and the institution/government (Straussman, 2007).

To this end, one of the most important capacity-building initiatives is strengthening institutions. It's the method of making a group more efficient at what it does to better fulfil its mission (Tadele & Manyena, 2009). To strengthen institutions, it's essential to look beyond just educating and training professionals. There is overlap and complementarity between the various facets of an institution's capacity, including political, technical, fiscal, and administrative capacities. To accomplish its goals, a government must create consistent, convincing policies open to public input (Zafarullah & Rahman, 2008). The primary goal of institutional capacity building is strengthening the ability of governments, NGOs, and communities to plan and manage efficiently and effectively for the benefit of their constituents and citizens. Because of this, capacity building needs to be dealt with methodically and long-term. Leadership development, public education, and the expansion

of the organization's base of support are all essential elements in making progress on institutional reform. Improve the "goodness of fit" between the policy contexts for sustainable development and the enactment of public and private institutions through capacity-building initiatives that center on institutional strengthening, such as the design of new organizational structures. Organizations in this category span the range from schools and universities to government agencies and think tanks to nonprofits and community groups. If educational institutions, non-governmental organizations, research institutes, public and private extension services, and others can forge strong ties with one another, the result will be a multiplier effect. The method considers the need for enhanced institutional network capacity (Crowder, 1996).

2.8 Institutional Practice and Mega Infrastructure Project Implementation

The wide range of institutional practices of different stakeholders, including international, national, and local that can be used to outline megaprojects, either to develop, operate, or disrupt them, is incredibly large. Defining, embedding, routinizing, enabling, policing, and disconnecting rewards are some practices that can be used. Everyone necessitates interaction with various hierarchical, institutional, administrative, and legal frameworks. Mega infrastructure project practitioners must create an overarching institutional relationship for mega infrastructure projects to be successful (Esposito et al., 2021).

The complexity or complexity that arise in the mega project are regulative complexity or complexity (Qiu et al., 2019), which include building codes and permits (Esposito et al., 2021; Mahalingam & Levitt, 2007), taking ownership of state-owned lands, court rulings, administrative sanctions (Esposito et al., 2021), political instability, lack of decision making by the government (Ezzat Othman, 2013), laws and regulations of home and host countries and regions, legal agreement with the financing farms, institutional hierarchies (Scott, 2017), another complexity is cultural complexity or complexity (Qiu et al., 2019), which includes visualization (Mahalingam & Levitt, 2007), various religious ideologies, ethnicities and languages (Scott, 2017), diverse organizations (Qiu et al., 2019), and

normative complexity (Scott, 2017) arises for gathering information, availability of building materials (Mahalingam & Levitt, 2007), professional standards, social requirements (Scott, 2017). In addition to these issues, developing countries have some complexity with a lack of design expertise, experience, and professional know-how that considers the most recent technological advancements. Lack of financial resources; lack of cost-control and venture capital; a poor regulatory framework; the management of highly qualified human resources; bureaucracy and corruption; all these factors combine to create an unfavorable environment. There is a lack of consideration for short-term and long-term goals and effective risk management in governance decisions. Without these insufficient steps for early-stage project identification and involvement of various stakeholder groups, insufficient communication at all levels, and poor coordination of interface management among project stakeholders, improper decision-making, and failure to consult with experts and other stakeholders before deciding. Organization's inappropriate behavior and the absence of a national policy for resettlement lacking environmental requirements, preserving historical landmarks as well as natural cases, poor project management, and a lack of cooperation between client and contractor organizations contributed to the failure of the project (Ezzat Othman, 2013).

2.9 Challenges of Implementing Mega Infrastructure Project

There are numerous challenges that owners and contractors in Bangladesh face when constructing normal structures, such as buildings, and this causes the project to be delayed. Many factors contribute to project delays, including inadequate experience, low bidder selection, funding scarcities, project location limitations, inappropriate planning and management, the contractor's heavy workloads and lack of proper monitoring, limitation of skilled manpower, contractor's cash flow at the project period, increasing prices of materials (Islam et al., 2015), political imbalance, poor communication among stakeholders, delay in decision making, long period for design, rework for errors for faulty construction, government and public interfere, equipment shortage, long time for getting legislative permission, and changing of subcontractors frequently (Mizanur et al., 2014).

The main factors that contribute to delays worldwide in the construction of a mega infrastructure project include land acquisition for the project; financial termination; lack of cash flow; changing client requirements; client issues; site management, and investigation by the authorities and contractor (Patil, 2013); material collection; unrealistic time estimation; legislation issues for approval and permits (Fallahnejad, 2013); design changes; physical obstacles; environmental problems and public counteraction; technical problems (Han et al., 2009); insufficiency of workers; poor construction planning and lack of understanding among stakeholders (Oyegoke & Kiyumi, 2008).

2.10 Project Delay

A project delay is something that causes the end date to be pushed back more than the number of days that were originally planned for the task in the contract. Because of this delay, the project won't be done by the date that was agreed upon in the contract, which is legally binding. A construction delay can be further defined as the process of finishing the project later than was originally anticipated (Assaf & Al-Hejji, 2006; Zack, 2003).

2.11 Summary

This chapter consists of some theories which is necessary to find out the research question and fulfil the objectives. A summary is constructed by relating all the above discussed theories together which help the reader the understand this chapter well.

Project is an initiative which has fixed objectives with limited resources and uncertainty to execute. Infrastructures have a physical existence; the example of infrastructure can be roads, railways, airports, power stations, hospitals, educational institutions, or any large physical structure. When constructing or executing a physical structure with a fixed goal is called an infrastructure project. When an infrastructure project's budget is USD 1 billion or more with the engagement of various stakeholders, much complexity, a long period to complete and major impacts on the economy and society is called a mega infrastructure

project. To manage the infrastructure project, the executing agencies have to face many challenges and most often, these challenges create delays in the project; project delays mean the project can't meet the deadline. Financial issues, client requirements and issues, design challenges with physical obstacles, environmental problems, inadequate and unskilled workers, materials, time distribution and lack of ability in project management are the main causes to create complexity in mega infrastructure projects. Institutions play an important role to the perfect implementations of the mega infrastructure projects and able to reduce the complexity and uncertainty when implementing a mega infrastructure project. Institutional theory is also used to manage mega infrastructure projects and which can fix the behavior of the institution that is classified into regulative, normative, and cognitive in the behavioral culture aspect. Institutional capacity building is also a necessary in the perspective of project management. To create a perfect working environment with appropriate policy and legal frameworks is the main perspective of institutional capacity building with that develop the administrative structure, strengthening the institution including political, technical, and fiscal capacities.

Chapter-3: Methodology

3.1 Introduction

According to C R Kothari, (2004), research methodology is a systematic process that helps to solve research problems. It can be defined as the study of how scientific research is carried out. It is important to note that research methodology not only discusses the research methods but also examines the rationale for their use in the study context and explains why a specific method or technique is used and why not (C R Kothari, 2004). Theoretical analysis in systematic methods used in research methodology. It is the study of a field's principles from a theoretical perspective. Approaches and methods, methodological approaches, different stages, and quantitative or qualitative techniques are typically included (Ishak & Selangor, 2005). Patel & Patel, (2019) argued that researchers could learn more about the process of scientific inquiry and the materials by studying research methodology. Studying research methodology entails not only outlining and describing various methods but also analyzing how they work, as well as their assumptions and results, as well as considering how they might be applied in the twilight zone where science is just beginning to explore new possibilities (Patel & Patel, 2019).

3.2 Research Approach

The deductive approach is a research strategy that begins with a theoretical framework or pre-existing knowledge and uses it to develop research questions and hypotheses (Bryman, 2016). In a qualitative deductive approach, the researcher starts with an existing theory or framework and develops research questions based on that theory. The theory may be drawn from a literature review or previous research, and the research questions are designed to explore and test that theory in a specific context (Denzin & Lincoln, 2011).

In this study, a qualitative deductive approach will be used to investigate the institutional complexity and factors causing delays in completing the MRT Line-6 project in Dhaka

city. The research question is developed based on the existing theories and frameworks related to institutional complexity and mega infrastructure projects. These theories and frameworks guide the data collection process and help identify themes and patterns in the data. The data collection processes involve collecting qualitative data through interviews with relevant stakeholders, and document analysis. The data collected is analyzed using a deductive approach to identify concepts in the data that support or challenge the existing theories and frameworks.

Overall, the deductive approach for qualitative research is a systematic and structured way of conducting research that allows for testing specific research question or hypotheses based on existing theories or frameworks. It is an appropriate approach for investigating the institutional complexity and factors causing delays in completing the MRT Line-6 project in Dhaka city.

3.3 Research Design

Research design is like an outline or research strategy that helps guide the collection and analysis of data. It serves as a guide for finishing the project. Research design is a plan for gathering, measuring, and analyzing data. It's more of a road map developed to help researchers get where they want to go (Pandey & Pandey, 2015). Research design supports the conceptualization of an operational plan for carrying out the various procedures and activities required to complete the study and ensures that these procedures are adequate for obtaining valid, objective, and accurate solutions to the research questions (Ranjit Kumar, 2011). C R Kothari, (2004) claimed that finding the right research design for a given problem usually involves considering several factors. These include the methods used to collect data; the researcher's abilities and availability; the study's goal; the nature of its subject matter; and any duration and funding resources that may be available (C R Kothari, 2004).

A qualitative method approach is adopted to achieve the purpose of this research. The study examines the research question with a humanistic and idealistic approach. People's views,

experiences, attitudes, behavioral patterns, and communication are studied while conducting the research. A non-numerical data set is generated, which incorporates qualitative research. For example, qualitative research is commonly used in the humanities and social sciences to study topics like education, health, history, and anthropology (Bhandari, 2020).

This study adopts content analysis, which is a sub-division of qualitative analysis. With the assistance of content analysis, the frequency of particular words, phrases, subjects, and concepts in a corpus of contemporary written works is quantified. Content analysis helps to draw the qualitative interface of this research. Content analysis helps investigate various terms and concepts' meanings and semantic connections (Bhandari, 2020). Collecting data in content analysis is flexible, can be checked, and is easy to copy, so this is beneficial for sorting and analyzing data. The first thing to do for this investigation is select content relevant to the research question and objectives. A standard set of coding guidelines is applied to create this analysis. For first cycle of coding In Vivo Coding is used and for second cycle of coding Pattern Codes is used. Finally necessary to draw conclusions based on the data analysis in the section on content analysis.

The analysis part is divided into two parts, one is key informant interview (KII) analysis and another is secondary data analysis. KII analysis includes all the data and information collected through interviews of the officials who are linked to the MRT Line 6 project. The secondary data analysis part covers the analysis of all the data and information collected through secondary sources including newspapers, websites, and articles.

3.4 Study Area

Several mega infrastructure projects are running in Bangladesh, as mentioned in previous literature. These mega infrastructure projects will play a significant role in the economic development of this country (Yeasin, 2021). This study has selected the MRT Line-6 project as a case.

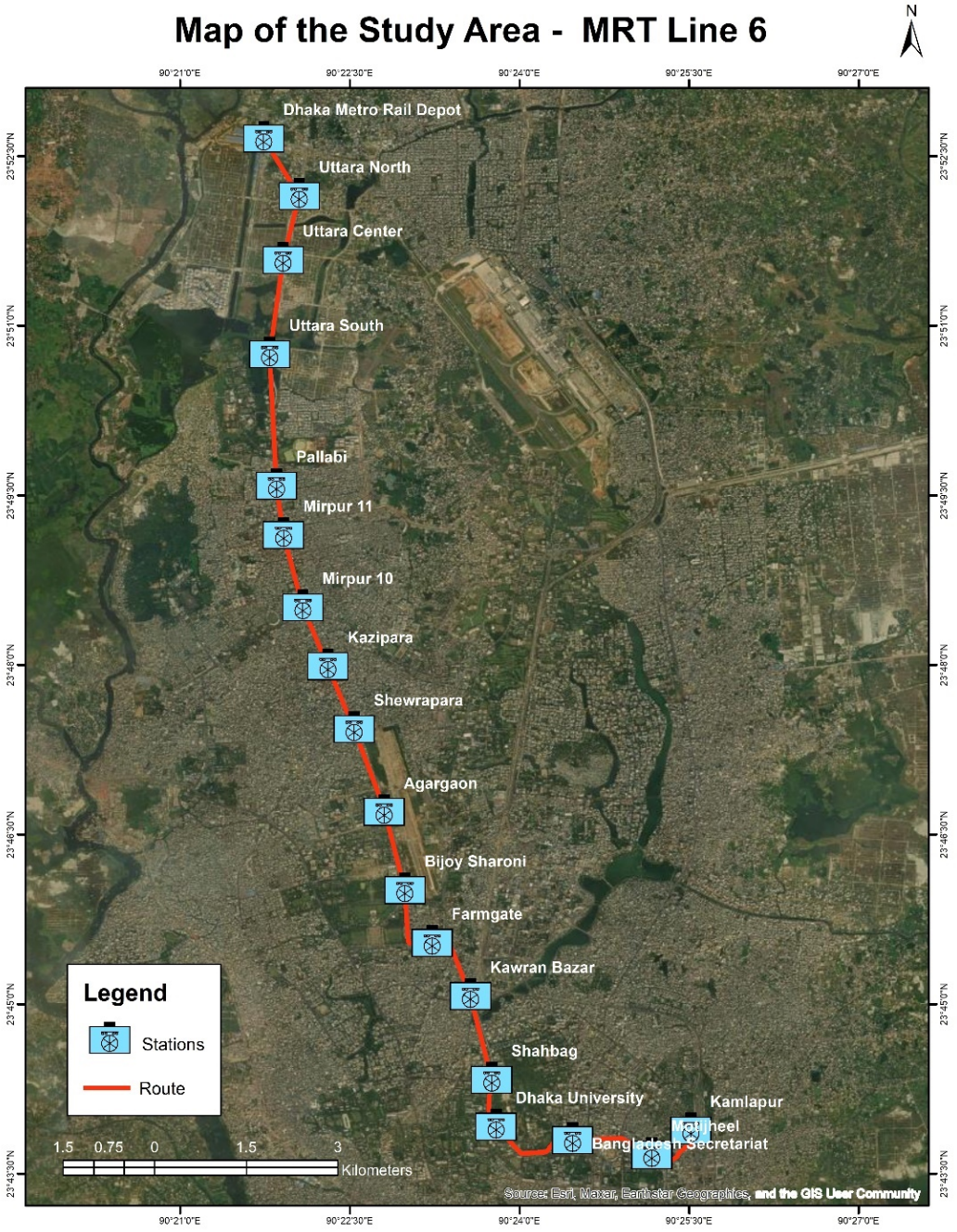
The MRT Line 6 of the Dhaka Metro Rail has elevated electrically powered light rail tracks and at first it was 20.1 km (12.5 mi) and 16 stations that are each 180 m long. Except for the depot, they are elevated above current roads, mainly above road medians, with stations also elevated (Manum, 2017).

Changes in station design and the extension of the elevated rail line to Kamalapur from Motijheel are the main reasons for a major revision to be made to MRT Line-6 as the authority claimed and length increased by 1.16 km and Kamlapur station newly added (Adhikary, 2020; Adhikary & Byron, 2022). The MRT Line-6 project was approved in July 2012 and is planned to be implemented with the financial support of Japan. The government and the Japan International Cooperation Agency (JICA) jointly funded the project. An estimated TK 22,000 crore will be spent on the project's eight construction packages. JICA will contribute TK 16,500 crore to the total as a loan. (Noman, 2020b). The Road Transport and Highways Division proposed a 52.25 percent increase in project costs, or TK 11,487 crore, in its revision proposal, which was submitted to the Planning Commission. Tk 21,985 crores were the original estimate for the project in the first DPP (Adhikary & Byron, 2022).

MRT Line 6 is the first metro rail in Bangladesh and the project period was from 2012 to 2024 (*Dhaka Mass Rapid Transit Company Limited (DMTCL)*, n.d.). From the special order of the Honorable Prime Minster from Uttara to Agargaon construction part was targeted to finish within 2019 and from Uttara to Bangladesh Bank was targeted to finish within December 2020, but it could not meet its deadline and then the time bind was increased by 1 year to December 2021, but the project again failed to meet the deadline (*Dhaka Mass Rapid Transit Company Limited (DMTCL)*, n.d.; "Dhaka Metro Rail Project Delayed by 1yr, to Be Launched Dec 2021," 2019) as a result, the government mentioned that MRT Line 6 is a fast-track government project, and this will be completed within 2024 (Adhikary & Byron, 2022). But the line extension increased the project period to 2025 (*Dhaka Mass Rapid Transit Company Limited (DMTCL)*, n.d.). At the end of the year 2022, the authority opened only a portion of MRT Line 6 from Uttara to Agargaon ("PM Opens Bangladesh's First Metro Rail," 2022). The project is currently running, Dhaka Mass Rapid Transit Company Ltd (DMTCL) is the implementing agency of this project and other

stakeholders of this project are JICA, Dhaka Metropolitan Police (DMP), Ministry of Finance, Ministry of Planning, Rajdhani Unnayan Katripokkha (RAJUK), Dhaka North City Corporation (DNCC), Dhaka South City Corporation (DSCC), Dhaka Transport Coordination Authority (DTCA).

Figure 2: Map of the Study Area



3.5 Sampling

An essential part of conducting research is sampling, selecting a subset of the target population. Most research projects rely on a smaller group of people for data collection because the entire population of interest isn't always available. Data can be collected more quickly and cheaply by taking a population sample (Turner, 2020). Probability sampling and non-probability sampling are the two main categories of sampling and these two types are also divided into other parts (Pandey & Pandey, 2015). This study suites with Judgmental Sampling; the research question and objectives support the study to choose Judgmental Sampling. Judgmental Sampling is a part of non-probability sampling. Using the available information, a small proportion of the population is chosen and assumed to be representative of the entire population. In this case, the selection of groups is also based on intuition or a self-evident criterion. Judgmental sampling is selected because this study interviews the officials of this project. All sectors of officials are not interviewed; only the interviewees selected relate to the variables. For choosing the key officials, it is also challenging to interview every targeted interviewee on their schedule. It is faced to require changing or alternating the targeted interviewees. Using the investigator's expertise, the judgmental sampling technique yields the most accurate results (Pandey & Pandey, 2015).

The following table represents the number of interviewees:

Table 1: Details of the interviewees

Designation	Organization	ID
Additional Program Director	DMTCL	P1
Chief Town Planner	DSCC	P2
Town Planner	DNCC	P3
Deputy Town Planner	DTCA	P4
Academician (Associate Professor)	Jahangirnagar University	P5
Journalist	BSS	P6

3.6 Variables

A variable is a concept, image, or perception that is measured and can take on different values. In brief, "variable" refers to an object or concept to which numerical or other values can be assigned (Ranjit Kumar, 2011).

The research question and the objectives determine which variables will be considered. The main goals to achieve through these variables are to identify the factors causing delays and explore institutional complexity when executing MRT Line 6 mega infrastructure project. At first all the factors of delay will be explored following the first objective and then only institutional complexities will be investigated from the explored factors.

Table 2: Variable Table for first objective

Objective	Variables	Indicators
To identify the factors causing delays in completing MRT Line-6	Land Acquisition	Project location
		Time for getting legislative permissions and acquiring land
		Communication among stakeholders to acquire land
		Public Interfere
		Environmental issues
		Physical obstacles
	Budget and Finance	Funding Issues
		Contractor's cash flow at the project period
		Selection of contractors
		Prices of materials
		Equipment shortage
		Assign new contractors
	Social and Political Aspects	Political issues
		Public counteraction

	Planning and Management in the Perspective of Project Management	Experience
		Quality of planning and management
		Proper monitoring
		Contractor's heavy workloads
		Skills
		Decision making
		Knowledge
		Time period for the design
		Rework for errors or faulty construction
		Site management
		Role of the implementing agency
		Proper investigation by the authorities and contractor
		Time estimation by the authority
		Material collection
		Design changes
		Supportiveness' of the Institutions
		Technical Issues
		Institutional Capacity
		Availability of workers
	Collaboration and integration of institutions	Institutional issues
	Legislative Issues	Time for getting legislative permission
		Changing client requirements
		Client issues
		Legislation issues for approval and permits

Table 3: Variable Table for second objective

Objective	Variables	Indicators
To investigate the institutional complexity while executing MRT Line-6 in Dhaka city	Collaboration and integration among institutions	Supportiveness' of the Institutions
	Legislative Issues	Time for getting legislative permission
		Client issues
		Legislation issues for approval and permits
	Social and Political Aspects	Political issues
	Budget and Finance	Funding issues
		Selection of contractors
		Assign new contractors
	Capacity of the Institution	Institutional capacity
		Role of the implementing agency

3.7 Methods of Data Collection

3.7.1 Primary Data Sources

This study used key informant interviews (KII) to collect primary data. Key informant interview (KII) is a process that incorporates elements of both structured and unstructured interviews into a single interview. Interviewers often follow a predetermined set of questions and a general strategy, but there is room for creativity. This allows interviewers to think outside the box to get the information they need for their research (Ineed Editorial Team, n.d.). Primarily, this research targets the people who are participating as the projects' key stakeholders. The people may include project directors, advisors, consultants, engineers, workers, government officials, and the clients or users of the two projects.

3.7.2 Secondary Data Sources

Secondary data comes from many places, like the project offices and websites of the relevant ministries, departments, and institutions. In addition, information is collected from academic journals and magazines, as well as websites run by governments. As secondary data sources, newspapers also played a significant role.

3.8 Data Processing and Data Analysis

The goal is to investigate and discover the unique issues in mega infrastructure projects. Accordingly, qualitative research is employed to examine the complexity and the factors associated with project delays at MRT Line 6 project. This method is ideal when exploring a new problem or creating new ideas for future research. KII with project staff and officials will be the primary method for gathering data. Interviews will be conducted in English and Bangla, both languages. The interviewer will typically ask interviewees how they dealt with obstacles while working on the project. The study works with people with increasing responsibility positions throughout the project. The data is more reliable and consistent because the study conducts multiple interviews with informants and compare their views on a given topic. The investigator used judgmental sampling while interviewing people for the study. The study identifies the parameters which help to reach a specific outcome. Because of this investigation, the investigator is now better able to understand the causes and factors that led to the incidents that took place on the mega infrastructure project. Participants' interviews are supplemented by information from the project's documentation. As soon as the study has our interviews transcribed, the investigator "codes" them. Every reported incident or anecdote involving project delays is extracted during the study's coding process. Each of these occurrences will be labeled based on its type. A large number of incidents are coded. After all of the incidents from the transcribed interviews have been put into subcategories, the study goes through each one and removes the ones that didn't impact delays in the MRT Line 6 project. Since these subcategories is featured incidents, they represent general issues of the MRT Line 6 project. So, through this process, the study is able to figure out the problems that mega infrastructure projects face by asking questions,

coding answers from informants at different levels, and comparing their stories and codes. Furthermore, these identified challenges are unique to the dynamics of mega infrastructure projects.

3.9 Summary

The research on the MRT Line 6 project follows a deductive approach, which means that it starts with a theoretical framework through data collection and analysis. The study employs qualitative research methods, including content analysis and framework analysis, which are commonly used to analyze large amounts of qualitative data in a systematic and organized manner. This study's data collection process is divided into KII and secondary sources. The KII process involves interviewing individuals who are knowledgeable about the MRT Line 6 project, including officials from DMTCL, DTCA, DNCC, DSCC, an academician, and a journalist. The participants were selected through judgmental sampling, which means that they were chosen based on their expertise, knowledge, and experience related to the MRT Line 6 project. The secondary sources of data for this study include relevant documents, reports, and publications related to the MRT Line 6 project. Overall, this chapter provides a comprehensive understanding of the MRT Line 6 project by employing qualitative research methods, the study seeks to capture the complexities and nuances of the project from the perspectives of key stakeholders and experts in the field.

Chapter 4: Findings and Analysis

4.1 Introduction

This chapter finds and analyze the factors that caused delays in the MRT Line 6 project. To do so, content analysis is utilized to identify the various factors that led to delays and created complexity and institutional complexity. Initially, all the factors that contributed to the delay of the MRT Line 6 project were analyzed, and categorized as total complexity. This step involved identifying all the elements that made the project complex and resulted in delays. Next, institutional factors were narrowed down and analyzed as institutional complexity. The data from KIIs were analyzed first, followed by the process analysis of secondary data was done. Coding is divided into two steps first one is First Cycle Coding that helps to arrange and summarize all the information collected through interview and secondary sources. Next one is Second Cycle Coding, Pattern Codes is a way of grouping those summaries into a smaller number of categories or themes. Overall, this chapter provides a comprehensive analysis of the factors that led to delays in the MRT Line 6 project. Through content analysis and a detailed examination of total complexities and institutional complexities, it was possible to identify the key issues that hampered the project's progress and to gain insights into how to improve similar projects in the future.

4.2 First Cycle Coding: In Vivo Coding

In Vivo Coding is one of the most popular and used qualitative coding methods. This uses words or short phrases from the participant's own language in the data record as codes (Miles et al., 2014). At first In Vivo Coding is applied for the primary data and then the same process is applied for secondary data.

4.2.1 Analysis of Primary Data

Description represents the text that are received from the interviewees and code sections represents 'Codes' are created for the analysis.

Table 4: Analysis of Primary Data

ID	Descriptions	Codes
P1	[1] Line 6 faced construction delays. International contractors are responsible for construction, but directly blaming them is not much pointful. We [2] had no experience implementing this type of project, and it is the first metro rail in Bangladesh. [3] Line extension from Motijeel to Kamlapur also extended the project period, but hopefully, we can finish the project within the extended DPP.	[1] Delay of contractors
		[2] Lack of institutional capacity
		[3] Line extension
P2	I thought that [4] MRT Line 6 was delayed as Dhaka is a highly populated city that generates heavy traffic, and most of the lines go at the center of the roads, delaying the project's completion. [5] Locals, including engineers and the authorities, required time to adopt new technology as Bangladesh's first metro rail project. Besides, [6] Materials for MRT Line 6 need to import from foreign countries, which causes complexity and time consume more.	[4] Pressure of heavy traffic on the city
		[5] Lack of knowledge
		[6] Material collection
P3	I had joined some meetings with DMTCL and thought that [7] multi-stakeholder (RAJUK, DNCC, DSCC, DMP, DWASA) engagement in MRT Line 6 project causes complexity that	[7] Complexity among the stakeholders

	increases the project period— [8] bureaucratic complexities before declining as a first track project from Bangladesh Government. [9] Political problems and political instability, including decision changes and political strikes in specific periods in the country. [10] Shortage of local skilled human resources was unable when the government started the project as it was the first metro rail in this country.	[8] Bureaucratic complexations [9] Political Issues [10] Lack of skilled local manpower

P4	The institutional issues of MRT Line 6 are that [11] DMTCL does not take any suggestions or permissions from DTCA, though DTCA is the regulating agency according to law. The Managing Director of DMTCL was a high government official; he is able to directly contact the government's higher authority. [12] Multi-stakeholder causes legislative problems as many government institutions are directly engaged with this project. [13] The procurement process of contractors and sub-contractors takes much time because each time new tender has to assign. [14] Design changes influence or pushes to change the contracts that increase the period.[15] Moreover, design changes push for searching for new contracts. [16] Lack of skilled local labor as it is the first metro project in Bangladesh. [17] The metro line and stations touched hospitals, parliament, airport, and other sensitive areas that caused delays in the design period.	[11] Complexity among the stakeholders [12] Legislative problems due to multi-stakeholders [13] Assign new contractors [14] Design changes [15] Selection of contractors [16] Lack of skilled local manpower [17] Touched sensitive areas

P5	As an academician, I thought that MRT Line 6 was delayed for [18] inadequate capacities for a successful implementation of this type of project; [19] lack of clear definition of the implementing agencies' responsibilities and lack of coordination mechanisms and [20] time management—besides, [21] inefficient implementation/delivery arrangements are institutional issues. Other reasons for the project delay are [22] frequent changes in the design of the MRT Line 6 route were the main challenges for the initiation of the project. [23] Any minor changes required approval from the ministry through revised DPP. This bureaucratic system prolongs the approval process, and overall, the project is delayed.	[18] Lack of institutional capacity [19] Role of implementing agency [20] Wrong time estimation [21] Quality of planning and management [22] Design changes [23] Bureaucratic complexations

P6	DMTCL is implementing MRT Line 6 through the funding of JICA. The project was planned to complete within 2020, but unable to meet the deadline. [24] Institutional limitations were also an important factor in this. MRT Line 6 was delayed for [25] lack of Institutional capability as Bangladesh's first metro rail project. [26] Lack of skilled local labor as it is the first metro project in Bangladesh. [27] Land Acquisition problems and [28] design change rapidly due to lack of institutional experience causing complexity in this project. [29] Different international organizations were engaged in this project, which is why DMTCL failed to coordinate between them. As a result, the project is delayed.	[24] Institutional limitations [25] Lack of institutional capacity [26] Lack of skilled local manpower [27] Land acquisition problem [28] Rapidly Design changes [29] Bad quality of planning and management

	There are many other reasons for delaying the project. [30] [31] A terrorist attack on Holey Artisan café in Gulshan killed 8 Japanese; as a result, foreign workers left the country. [32] Covid 19 Pandemic stopped the project in 2020. [33] Land Acquisition complexity increases project cost and time. [34] Line extension from Motijeel to Kamlapur creates complexity with Bangladesh Railway. [35] Manage the traffic on the roads, pushes them to continue most of the work only at night.	[30] Dependency on foreign labor [31] Safety and security concerns of foreign workers [32] Covid 19 [33] Land Acquisition [34] Line extension [35] Pressure of heavy traffic

4.3 Analysis of Secondary Data

The description section represents the required text from secondary sources and code sections represents 'Codes' are created for the analysis.

Table 5: Analysis of Secondary Data

Source	ID	Description	Codes
(SULTANA, 2022)	S1	[36] The company also finds problem convincing the existing contractors of the Mass Rapid Transit Line-6 (MRT-6) project to carry out the work on the extension part due to a variation in their work. Italian-Thai Development Public Limited Company known as ITD, two Japanese companies working under contract package 4 and 5 did not show interest in the proposal put forward by the DMTCL for the extension part. [37] Necessary study and detailed design work on the Motijheel-Kamalapur part have already been done, the DMTCL could start the work on 1.16 kilometers without any delay if negotiations with the existing contractors are held and the BR and Dhaka South City Corporation (DSCC) give approval. Though the Bangladesh Railway verbally agreed to set up the Kamalapur MRT station outside the Kamalapur iconic building, it is dragging its feet over giving its nod to the design DMTCL submitted by	[36] Less interest of contractors. [37] Complexity with Bangladesh Railway.

		integrating the design with BR's MMTH. When contacted, BR officials failed to give any reason for the delay.	

(Z. Ahmed, 2021)	**S2**	[38] We were progressing towards meeting the deadline, but the issue is with the foreign workforce. The Japanese consultants working on the project have to follow health rules and restrictions due to the pandemic. [39] We also have to import materials from abroad. Much of the equipment requires on-the-spot inspections. But our consultants are unable to visit the site, causing delays. There are also problems with acquiring equipment and bringing foreign workers here due to embargoes imposed by certain countries. [40] We also have to import materials from abroad. Much of the equipment requires on-the-spot inspections. But our consultants are unable to visit the site, causing delays. There are also problems with acquiring equipment and bringing foreign workers here due to embargoes imposed by certain countries.	[38] Health issues of Covid 19. [39] Restrictions of Covid 19. [40] Problems in material collection for Covid 19.

(Noman, 2020a)	**S3**	[41] When the virus situation worsened, many local staff and workers also left the project sites as they were unwilling to work amid the pandemic.	[41] Health issues of Covid 19.

		The authorities did not force them to work and the entire project gradually stalled. [42] The project was already delayed by a 2016 terror attack on Holey Artisan café in Gulshan – killing 22 people including seven Japanese nationals. Work on the Line 6 project was disrupted for six months following the attack.	[42] Safety and security concerns of foreign workers.

(The Daily Sun, 2021)	**S4**	[43] Although a portion of the Dhaka metro rail project was supposed to be finished in 2019-20 and was later rescheduled for 2021, it did not materialize as works were delayed due to Covid-19 wreaking havoc across the country.	[43] Restrictions of Covid 19.

(*Dhaka MRT Delayed by Lack of Skilled Labour - Tunnels & Tunnelling International*, n.d.)	**S5**	[44] Construction work on the Dhaka Mass Rapid Transit (MRT) 6 has been delayed due to lack of necessary Bangladeshi engineers	[44] Lack of skilled local manpower.

(Adhikary & Habib, 2022)	**S6**	[45] Although the project was approved in December 2012, its physical works could not commence before mid-2016 as the authorities had to complete detailed design and other preparatory works. Prime Minister	[45] The long time period for the design.

		Sheikh Hasina finally inaugurated the construction work of MRT Line 6 on June 26, 2016. [46] Although the project was approved in December 2012, its physical works could not commence before mid-2016 as the authorities had to complete detailed design and other preparatory works. Prime Minister Sheikh Hasina finally inaugurated the construction work of MRT Line 6 on June 26, 2016. [47] The works on MRT Line 6 halted after the attack, although the deceased Japanese engineers and consultants were involved with the feasibility study of MRT Line 1 and MRT Line 5 (Northern route). [48] Physical work came to a halt again when the government imposed a shutdown in March 2020 to contain the spread of the coronavirus. The project saw only 0.55% progress in April and May that year. Many foreigners, especially Japanese, were unable to return to Bangladesh for work, severely hampering progress.	[46] Long time is required for preparatory work. [47] Safety and security concerns of foreign workers. [48] Restrictions of Covid 19. [49] Traffic congestion in the city. [50] Design changes of proposed roots.

		[49] In addition to these challenges, managing traffic during construction was a major concern for the project authorities. As a result, much of the work was done at night, with certain sections of busy roads, particularly in Mirpur, being blocked off. [50] According to the original route plan, the metro rail line was supposed to run through Bijoy Sarani, but the Bangladesh Air Force objected to the route on Bijoy Sarani, arguing that it would be an obstruction to aviation-related operations from the Tejgaon airfield nearby during emergencies. [51] Later, the authorities realigned the metro line through the Khamarbari side of the parliament premises. In addition to the route, the authorities faced a similar problem in selecting a location for the metro rail depot. After two attempts, they were able to select Diabari as the depot.	[51] Design changes of proposed roots.

(Mamun, 2022)	**S7**	[52] We've taken all the preparations to print smart cards for collecting fares from metro rail users. We will not depend on the rapid pass as we don't know when it will be available. Our smart card must be available before launching the new metro service in Dhaka. We can supply smart cards as per the demand of the passengers," said MAN Siddique, managing director, DMTCL. While replying to a query, he said there will be a provision to use the rapid pass once it is available. Printing of smart cards for metro rail will start immediately after getting approval of the fare rate as the fare rate must be put into the software.	[52] Lack of coordination from the Rapid Pass Project Authority

4.4 Second Cycle Coding: Pattern Codes

Pattern codes is a second cycle method used to group segments of data into a smaller number of categories, themes, or constructs (Miles et al., 2014). Pattern codes are explanatory or inferential codes that identify an emergent theme, configuration, or explanation, pulling together material from First Cycle coding into more meaningful and parsimonious units of analysis (Miles et al., 2014).

In this section codes are included into broad category and the categories are the factors that influence project delay.

Table 6: Secondary Cycle Coding

Codes	Broad Categories
[1] Delay of contractors	Issues of the contractors
[13] Assign new contractors	
[15] Selection of contractors	
[36] Less interest of contractors.	
[2] Lack of institutional capacity	Institutional issues
[7] Complexity among the stakeholders	
[8] Bureaucratic complexations	
[11] Complexity among the stakeholders	
[12] Legislative problems due to multi-stakeholders	
[18] Lack of institutional capacity	
[19] Role of implementing agency	
[23] Bureaucratic complexations	
[24] Institutional limitations	
[25] Lack of institutional capacity	

[37] Complexity with Bangladesh Railway	
[52] Lack of coordination from the Rapid Pass Project Authority	
[4] Pressure of heavy traffic on the city	Traffic pressure in the city
[49] Traffic congestion in the city	
[35] Pressure of heavy traffic	
[5] Lack of knowledge	Lack of knowledge and skills
[10] Lack of skilled local manpower	
[16] Lack of skilled local manpower	
[26] Lack of skilled local manpower	
[44] Lack of skilled local manpower	
[30] Dependency on foreign labor	
[3] Line extension	Design changes
[14] Design changes	
[22] Design changes	
[28] Rapidly Design changes	
[34] Line extension	
[45] The long time period for the design	
[50] Design changes of proposed roots	
[51] Design changes of proposed roots	
[17] Touched sensitive areas	
[20] Wrong time estimation	Low quality of planning and management
[21] Quality of planning and management	
[29] Bad quality of planning and management	
[46] Long time is required for preparatory work	
[32] Covid 19	Covid 19

[38] Health issues of Covid 19	
[39] Restrictions of Covid 19	
[40] Problems in material collection for Covid 19	
[41] Health issues of Covid 19	
[43] Restrictions of Covid 19	
[48] Restrictions of Covid 19	
[31] Safety and security concerns of foreign workers	Safety and security concerns of foreign workers
[42] Safety and security concerns of foreign workers	
[47] Safety and security concerns of foreign workers	
[6] Material collection	Material collection
[9] Political Issues	Political issues
[27] Land acquisition problem	Land acquisition
[33] Land Acquisition	

4.5 Institutional Complexity

This section explores the institutional complexities from all factors that are influenced project delay. Matrix display is used here to visualize the insights of institutional complexities.

Table 7: Factors linked with institutional complexity

Key Point	Factors
Institutional Complexities	Institutional issues
	Issues of the contractors
	Political issues

4.6 Factors Relation with Variables

The following table represents the explored factors relation with the variables and the objectives.

Table 8: Factors relation with the first variable

Objective	Variables	Factors
To identify the factors causing delays in completing MRT Line-6	Land Acquisition	Land Acquisition
	Budget and Finance	Issues of the Contractors
	Social and Political Aspects	Political Issues
	Planning and Management in the Perspective of Project Management	Low quality of planning and management
		Design changes
		Lack of knowledge and skills
		Material collection
	Collaboration and integration of institutions	Institutional Issues
	Legislative Issues	
	Not discussed in the variables	Covid 19
		Safety and security concerns of foreign workers
		Traffic pressure in the city

Table 9: Factors relation with the first variable

Objective	Variables	Factors
To investigate the institutional complexity while executing MRT Line-6 in Dhaka city	Collaboration and integration among institutions	Institutional Issues
	Legislative Issues	
	Capacity of the Institution	
	Budget and Finance	Issues of the Contractors
	Social and Political Aspects	Political Issues

4.7 Description and Rationale of the Explored Factors

This section contains the description and rationality of the explored factors with the reference of the participants and secondary data. At first all factors are discussed according to the first objective and the second objective.

4.7.1 Land Acquisition

From **P6**, land acquisition problem caused delay in the project and land acquisition complexity increases project cost and time. Regarding the land acquisition, the project required land owned by private individuals, which had to be acquired through negotiations or legal proceedings. This was a time-consuming process, as it involved assessing the value of the land, negotiating a fair price, and dealing with legal and administrative procedures for transferring ownership.

The project required a larger area of land than originally anticipated, perhaps due to changes in the design or scope of the project. This would have required additional negotiations and legal procedures to acquire the necessary land, which contributed to the project delay.

Regarding the lack of space for footpaths at the Shewrapara and Kazipara stations, these areas were already densely populated or developed, which limited the available space for the construction of the footpath (Sani, 2022). This could have required additional negotiations with local authorities or residents to find a solution, which contributed to the overall delay in the project.

4.7.2 Issues of the Contractors

According to SULTANA, (2022), **S1**, the implementation of the extension section of the MRT Line 6 project is being delayed due to a lack of interest from contractors. Current contractors were less interested to participate to complete the extension section of the MRT Line 6 project (SULTANA, 2022).

P1 expressed that international contractors are working here, and reasons for the lack of interest from contractors are not entirely clear. From **P4,** some contractors may also be hesitant to take on such a large-scale project given the risks and uncertainties involved. Besides government faced problems selecting the contractors, new contractors have to face all the challenges again, so government want the old contractors but they were not interested.

4.7.3 Political Issues

P3 mentioned that political problems and instability have been a significant cause of delays in the construction of the MRT Line 6 project in Bangladesh. The country has faced numerous political disturbances and crises in recent years, leading to interruptions and delays in major infrastructure projects like the MRT Line 6.

One notable example is the political unrest that occurred in Bangladesh in 2014-2015, which led to violent protests and strikes across the country. The MRT Line 6 project was severely affected by the unrest. Bangladesh has experienced periods of political turmoil, including widespread protests, and violence, which have hampered progress on the project.

In addition to political instability, mismanagement in the country's political system have also contributed to delays in the MRT Line 6 project. The lack of accountability and transparency in the government's decision-making processes has led to inefficient and ineffective project management, further hindering progress.

4.7.4 Low Quality of Planning and Management

Adhikary & Habib, (2022), **S6**, said the MRT Line 6 project faced a long delay before construction begin, even though it was approved in 2012. The authorities had to do a lot of work before they could start constructing the line. This included figuring out where it would go, designing it, buying the land, and getting the money. Finally started the construction work in June 2016 (Railway Technology, 2023). The reason for the delay was that the project was complex, and a lot of planning and preparation were needed (Adhikary & Habib, 2022).

The concept being discussed affects to the delay in the implementation of the MRT Line 6 project, which can be attributed to poor planning and management as expressed **P6**. According to **P5** the project authority made incorrect time estimations, and the planning and management quality were substandard, given that it was the first project of its kind in Bangladesh. The incorrect time estimations made by the project authority were a significant contributing factor to the project's delays. The authority did not consider the complexities involved in the project, which led to a significant underestimation of the time and resources required for completion.

4.7.5 Design Changes

According to (Adhikary & Habib, 2022), **S6**, the MRT Line 6 project faced significant challenges related to the alignment of its route. JICA initially proposed a route from Uttara to Sayedabad, but the government rejected the proposal due to conflicts with the Mayor Mohammad Hanif Flyover project. Subsequently, the authorities suggested a new alignment to JICA, which involved diverting the route towards Curzon Hall from the TSC

of Dhaka University towards the Jatiya Press Club and Bangladesh Bank. After careful consideration, JICA agreed to the proposed new alignment (Adhikary & Habib, 2022).

However, the original design of the metro rail line included a route through Bijoy Sarani, which was later changed due to objections from the Bangladesh Air Force. The Air Force claimed that the metro line would interfere with aviation-related operations at the nearby Tejgaon airfield (Old Airport) during emergencies. As a result, the authorities rerouted the metro line through the Khamarbari side of the parliament grounds. However, they encountered similar security concerns related to the National Parliament and had to choose a new location for the metro rail depot. After two attempts, the authorities were able to select Diabari as the depot location (Adhikary & Habib, 2022).

It is important to note that the preparation and design phase of the project took four years, which is a substantial portion of the project period. The challenges faced during the alignment process demonstrate the complex nature of large-scale infrastructure projects and the importance of stakeholder engagement and collaboration in overcoming project obstacles.

At first, MRT Line 6 connects Uttara North to Motijeel and the project period was from 2012 to 2024 according to DPP, later the revised DPP increased the project period to one year (2025) and added a new station Kamlapur that increased the project period as expressed **P1**, line extension increased project period (*Dhaka Mass Rapid Transit Company Limited (DMTCL)*, n.d.). The new station will improve accessibility and connectivity, but this is a bad practice for project management. For extending only a small section, new feasibility study, topographic study, new design, new tender and overall, all the task required to do for a new project. As a result, the period gets increase and created an example of poor planning.

P4 mentioned that the project touched many sensitive areas, including Dhaka University, Bangabandhu Shekh Mujibur Rahman Medical University, BARDEM Hospital, National Parliament, and Tejgaon Air Field (Old Airport), and therefore, encountered several challenges related to stakeholder engagement and design. The construction of the MRT Line 6 project faced significant protests when the authority started construction in the Dhaka University campus. The proposed location of a metro station within the university

campus was also a source of controversy, as the students of Dhaka University claimed that it was a bad design example. The students were concerned that the construction process would disrupt the campus's daily activities and cause traffic congestion, environmental pollution, and noise pollution.

P4, P5, P6 expressed that address the concerns raised by the stakeholders, the project's authority had to make significant design changes for the security of the National Parliament and the Tejgaon Air Field. The authority faced significant delays in the project timeline due to the design changes that had to be made to address the concerns raised by the stakeholders.

4.7.6 Lack of Knowledge and Skills

P3, P4, P6, S5 expressed that unskilled local labor is one of the main problems that hinder the construction of MRT Line 6. Before starting this project, local workers and engineers have less knowledge about and no experience of working this type of project as said by **P2**. As it is a mega infrastructure project, various unknown challenges have to face the workers that they didn't face yet in any construction project. Italian-Thai Development Public Limited Company (ITD) and Sinohydro Corporation done the civil works; Marubeni and L&T was contracted to provide electrical and mechanical rail systems; Kawasaki Heavy Industries (KHI) and Mitsubishi Corporation supplied rolling stock and maintenance equipment; the preparatory study for the project was carried out by JICA, Almec Corporation, Oriental Consultants Global, and Nippon Koei; the environmental impact assessment was prepared by the NKDM Association comprising Nippon Koei, Katahira & Engineers International, Oriental Consultants, Delhi Metro Rail Corporation (India), Nippon Koei India, Mott MacDonald, and Development Design Consultants (Railway Technology, 2023), all these companies have to face shortage of skilled local manpower and at first they have to trained the local engineers and works to assign for the metro rail project. Local labor had lower technical knowledge and it put pressure on foreign workers. According to **P6** Dependency of foreign labor is also a factor of project delay, because

quantity of foreign labor was not enough to complete the project and they take a long leave when the visit their country and chance of their availability is low.

4.7.7 Material Collection

According to **P2** The construction of MRT Line 6 in Bangladesh required the import of a significant number of materials, including metro coaches and electronic parts, which are not readily available in the country. However, the project authority faced several challenges in procuring these materials.

One of the primary challenges was the need to import most of the materials from foreign countries since the technology is new to Bangladesh. The import process involves several bureaucratic procedures, such as obtaining necessary permits and certifications, which can be time-consuming and complicated.

Moreover, the COVID-19 pandemic further complicated the situation. The pandemic created disruptions in the global supply chain, making it difficult to import materials from some countries. Additionally, some countries hardly followed the rules and regulations regarding the COVID-19 pandemic, making it difficult for the project authority to import materials from those countries. The restrictions imposed by these countries put additional pressure on the project authority to find alternative sources for the required materials.

4.7.8 Institutional Issues

The MRT Line 6 project in Bangladesh has faced significant delays due to lower institutional capacity of the implementing agency as **P2 & P5** expressed. The implementing agency has faced a lack of institutional capacity, which has resulted in improper restiveness and an inability to define clear responsibilities. This has contributed to delays in the project, as the agency has not been able to effectively manage and oversee the construction works. Moreover, the MRT Line 6 project is the first metro rail project in Bangladesh, and the implementing agency lacks the institutional capability for a successful implementation.

The implementing agency has been unable to keep up with the project's complexities, resulting in inadequate capacity to manage the construction works.

According to **P5**, a lack of clear definition of the implementing agencies' responsibilities has also contributed to delays in the project. The agency's role in the project has not been properly defined, leading to confusion and mismanagement in the decision-making process. Besides the implementing agency has some limitations according to their organogram that also pushes them to the confusion and mismanagement.

The construction of MRT Line 6 in Dhaka, Bangladesh has been significantly delayed due to several complex issues among the stakeholders. One of the key challenges has been the complexity with Bangladesh Railway as explored **S1**, which has been attributed to their individual development plan (SULTANA, 2022). This has complicated matters and led to delays in decision-making and progress. **P5** expressed that the bureaucratic complexities among various authorities involved in the project. Each authority is not responsible to another authority, leading to restiveness and further delays. This bureaucratic complexation has been a significant challenge in the implementation of MRT Line 6. Additionally, there have been several other complexities among the stakeholders, including lack of coordination from the Rapid Pass Project Authority as the rapid pass authority failed to provide cards for Metro rail as mentioned S7 (Mamun, 2022).

Despite the completion of necessary studies and detailed design work on the Motijheel-Kamalapur part of the MRT Line 6, the project had been delayed due to pending approval from Bangladesh Railway and Dhaka South City Corporation. The delay was due to BR's failure to provide approval for the design submitted by DMTCL, even though they had agreed to set up the Kamalapur MRT station outside the Kamalapur iconic building (SULTANA, 2022). DMTCL also delayed in negotiations with the existing contractors to start work on the 1.16-kilometer section to expedite the construction process, pending approval from BR and DSCC.

P4 said that legislative problems caused by the involvement of multiple stakeholders, the project's complexity, which involves various parties such as the government institutions, private investors, and local residents, has contributed to challenges in complying with a countless of regulations, laws, and policies. The legislative problems in question refer to

the difficulties in navigating the legal and regulatory frameworks involved in the project. These may include obtaining permits and approvals, negotiating contracts, ensuring compliance with safety standards, and addressing concerns from local communities. Additionally, differing opinions and priorities among stakeholders have further complicated the situation, as each party seeks to protect its interests.

4.7.9 Covid-19

According to **S2** and **S3** The construction of MRT Line 6 in Bangladesh has faced significant delays due to the Covid-19 pandemic. Physical work came to a halt in March 2020 when the government imposed a shutdown to contain the spread of the virus. The project was severely affected by the inability of many foreign workers, particularly Japanese, to return to Bangladesh for work (Z. Ahmed, 2021).

Although a portion of the Dhaka metro rail project was scheduled for completion in 2019-20, it was later rescheduled for 2021 due to Covid-19 delaying works across the country. As the virus situation worsened, many local staff and workers left the project sites, and the authorities did not force them to work, resulting in the project gradually delaying.

The importation of materials from abroad has also presented problems for the project. From **S3**, equipment requires on-site inspections, but consultants have been unable to visit the site due to Covid-19 restrictions, causing further delays. Restrictions imposed by certain countries have also made it difficult to acquire equipment and bring foreign workers to the project (Z. Ahmed, 2021).

Although the project was progressing towards meeting the deadline, the foreign workforce's health rules and restrictions have become a significant issue. Japanese consultants working on the project have had to follow strict Covid-19 guidelines, which have further delayed progress expressed by **S2** and **S3**.

4.7.10 Traffic Pressure in the City

Dhaka, the capital city of Bangladesh, is known for its congested roads and high traffic volume. From **P2** and **S6**, every day, thousands of vehicles move throughout the city, causing traffic jams and delays. The metro lines are elevated and run over the roads, with stations situated above the roads.

Constructing metro lines in a busy city like Dhaka is not an easy task. The construction work requires blocking the roads, which can lead to heavy traffic jams and pose risks to the commuters. To minimize the impact of construction work on traffic, the authority decided to carry out the work mostly at night, especially in highly busy areas like Mirpur. The delays caused by the construction work, coupled with the difficulty of carrying out the work during peak hours, have led to a delay in the completion of the project (Adhikary & Habib, 2022).

4.7.11 Safety and Security Concerns of Foreign Workers

The Holey Artisan attack in July 2016 had a profound impact on the construction of the MRT Line 6 project. The attack, which targeted the Holey Artisan café in the Gulshan area of Dhaka, resulted in the tragic loss of 22 lives, including seven Japanese nationals (Noman, 2020a). Some of the deceased Japanese engineers and consultants were reportedly involved with the MRT Line 6 project, further highlighting the impact of the attack on the project and its personnel.

Following the attack, work on the Line 6 project came to a halt for a period of six months expressed **S6** (Adhikary & Habib, 2022). The disruption to work was likely due to a range of factors, including heightened security measures in the area, psychological trauma experienced by workers, and a backlog of work that needed to be completed once construction resumed.

4.8 Summary

In analyzing the delay of the MRT Line 6 project, a thorough examination of all factors that may have contributed to the delay was conducted. By analyzing these factors, the institutional complexities of the project are also figured out. The interpretation of these factors was done. This interpretation involved an in-depth analysis of the factors identified exploring their impacts on the MRT Line 6 project. The interpretation aims to provide a clear understanding of the institutional complexities that contributed to the project's delay. Overall, the findings and analysis chapter plays a critical role in identifying the root causes of the delay of the MRT Line 6 project.

Chapter-5: Discussion and Conclusion

5.1 Introduction

Mega infrastructure projects differ in terms of goals, period, complexity, and stakeholder engagement (Flyvbjerg, 2014). Understanding, expertise, tools, and methods in project management are used to carry out specific tasks in terms of meeting project goals and objectives. The focus must not only be to meet the specific requirements of projects in terms of scope, period, expense, and quality. Mega-infrastructure projects are usually a haphazardly organized collection of unconnected components presented together as a whole. This chapter will bring to light the key findings, contribution, and limitation of a study on the project delay of a mega infrastructure project.

5.2 Discussion

The construction of MRT Line 6 in Bangladesh faced delays due to challenges in land acquisition and space constraints for footpaths, Patil, (2013) argued that transportation projects are delayed for the purpose of land acquisition. Acquiring land owned by private individuals involved a time-consuming process of negotiation, legal proceedings, and administrative procedures. The project also required a larger area of land than originally anticipated, leading to additional negotiations and legal procedures. The project location limitation is also a major cause of delaying mega construction projects (Islam et al., 2015) that occurred at Shewrapara and Kazipara stations, lack of space for footpaths as the areas already being densely populated or developed, which required additional negotiations with local authorities or residents. These challenges contributed to the overall delay in the project.

The implementation of the extension section of the MRT Line 6 project is being delayed due to a lack of interest from contractors. The reason behind lack of interest is not much clear but some contractors may be hesitant to take on such a large-scale project due to the

risks and uncertainties involved. Funding scarcities, contractors cash flow during the project period, contractors heavy work load (Islam et al., 2015), changing subcontracts frequently, changing client requirements (Patil, 2013) can be the main issues. Government faced problems selecting the contractors as the old contractors were not interested.

The construction of the MRT Line 6 project in Bangladesh has been severely impacted by political instability including widespread protests, strikes, and violence, corruption, and mismanagement in the country's political system. Mizanur et al., (2014) also claimed that political instability causes project delay in Bangladesh. Besides political instability increases complexity for mega infrastructure project (Ezzat Othman, 2013).

Project delay also occurred due to poor planning and management, lack of monitoring (Islam et al., 2015), lack of site management (Patil, 2013) and poor construction planning (Oyegoke & Kiyumi, 2008). The MRT Line 6 project faced a significant delay before construction began due to poor planning and management. The authorities underestimated the complexities involved in the project, resulting in incorrect time estimations, delays. Furthermore, the project was the first of its kind in Bangladesh, and the authorities lacked experience and knowledge of the best practices for planning and executing such large-scale infrastructure projects, leading to inefficient management and ineffective decision-making.

The MRT Line 6 project faced challenges related to the alignment of its route, as the proposed routes conflicted with other projects and were met with objections from stakeholders. The project faced significant delays during the design phase, which took four years to complete, design change is a common nature of complexity when implementing this type of project (Han et al., 2009). Additionally, the project faced challenges related to the security of the National Parliament and the Tejgaon Air Field, Bangladesh Air Force raised concerns about the project's potential impact on airplane landings. The revised DPP increased the project period to 2025 and added a new station, which is an example of poor planning. Overall, the challenges faced during the alignment process demonstrate the complex nature of large-scale infrastructure projects (Flyvbjerg, 2014).

Insufficiency of workers (Oyegoke & Kiyumi, 2008), inadequate experience (Ezzat Othman, 2013; Islam et al., 2015) are one of the major of delay in projects. MRT Line 6 construction also faced the same problems, due to the local labor force's lack of skills the project has run into difficulties. It is the nation's first metro rail project, the workers and the engineers on site haven't enough training and experience needed to complete it. Because of the demand for foreign workers and the lack of skilled local labor, the project has been delayed. Due to a lack of foreign labor, the project delays have also been attributed to the dependency on foreign labor.

The construction of MRT Line 6 in Bangladesh has faced significant challenges in procuring materials. As most of the materials are not readily available in the country, the project authority has to import them from foreign countries. (Fallahnejad, 2013; Mizanur et al., 2014) also claimed that material collection and equipment shortage created delay in the completion of mega infrastructure projects. However, this process involves obtaining permits and certifications, which can be time-consuming and complicated. The COVID-19 pandemic has further complicated the situation by creating disruptions in the global supply chain, making it difficult to import materials from some countries.

The MRT Line 6 project in Bangladesh has been significantly delayed due to the lack of institutional capacity of the implementing agency, also claimed by (Ezzat Othman, 2013). This has resulted in improper restiveness and an inability to define clear responsibilities. Additionally, there have been several complex issues among the stakeholders, such as the complexity with Bangladesh Railway and the bureaucratic complexities among various authorities involved in the project. These issues have led to delays in decision-making and progress, this has resulted in difficulties in complying with regulations, laws, and policies, as well as differing opinions and priorities among stakeholders. Bureaucratic complexity (Ezzat Othman, 2013) and diverse stakeholders (Qiu et al., 2019) make mega infrastructure projects more complex.

Mega infrastructure project faced many unknown challenges (Flyvbjerg, 2014), Covid 19, congested road and traffic volume of Dhaka city and safety and security issues of foreign workers are those unknown challenges. Due to the Covid-19 pandemic, construction on MRT Line 6 in Bangladesh has been significantly slowed. Due to the shutdown, physical

work stopped in March 2020, and the project was severely impacted by the inability of many foreign workers, particularly Japanese workers, to return to Bangladesh for work. Consultants have been unable to visit the site due to Covid-19 restrictions, which have complicated the importation of materials from abroad. It has been challenging to acquire equipment and bring foreign workers to the project due to embargoes imposed by certain countries.

Dhaka is known for its congested roads and high traffic volume. To minimize the impact of construction work on traffic, the authority decided to carry out the work mostly at night. The delays caused by the construction work, coupled with the difficulty of carrying out the work during peak hours, have led to a delay in the completion of the project.

The Holey Artisan attack in July 2016 had a profound impact on the construction of the MRT Line 6 project. Work on the Line 6 project came to a halt for a period of six months due to heightened security measures, psychological trauma experienced by workers, and a backlog of work that needed to be completed once construction resumed.

5.3 Contribution of the Study

The study that was conducted focused on investigating the reasons behind the delay in the implementation of the MRT Line 6 project, which is a major infrastructure project in Bangladesh. This project is one of the six proposed metro rails in Dhaka that Bangladesh plans to construct, as outlined in the Revised Strategic Transport Plan of Dhaka (RSTP). Through the study, the project authority was able to gain valuable insights into the factors that led to the delay and identify areas where improvements could be made. These lessons learned can be applied not only to this project but also to future mega infrastructure projects in Bangladesh and other developing countries, allowing them to better anticipate and mitigate potential challenges and uncertainties. The study's findings can also help policymakers in developing countries make more informed decisions about allocating resources and designing effective implementation strategies for large-scale infrastructure projects. Overall, this study is a valuable contribution to the growing body of knowledge on infrastructure development and can provide insights into how to complete such projects successfully.

5.4 Limitation of the Study

The study is based on both primary and secondary data. It is very difficult to take key informant interview in a large number of government officials is this type of criticized research. Researcher also faced to refuse of giving interview of the higher officials. If more interview can be taken there is a possibility is to explore more reasons that influence project delay. Besides this project is funded by JICA and Bangladesh Government, these is possibility of being more reasons in project delay, if the doner agency is changed.

This research only explored the reasons behind project delay, but no suggestion is given to reduce the project delay. Further research can be done how to reduce the delay of a project and reduce uncertainty of the mega infrastructure project. This will also help to reduce the extra expenditure of a project.

5.5 Conclusion

In conclusion, this thesis has investigated the complexity and factors responsible for the delays in the construction of MRT Line-6 in Dhaka City. Through content analysis using a qualitative approach, the study identified various factors contributing to the delays, including issues with contractors, institutional challenges, traffic pressure in the city, lack of knowledge and skills, design changes, low quality of planning and management, the impact of Covid-19, safety and security concerns of foreign workers, material collection difficulties, political issues, and land acquisition challenges.

The study has made significant contributions by providing valuable insights to the Dhaka Mass Transit Company Limited (DMTCL) and other stakeholders involved in the MRT Line-6 project. The findings can help DMTCL gain a deeper understanding of the delay factors and identify areas for improvement. Moreover, the knowledge generated from this study can be applied to future mega infrastructure projects not only in Bangladesh but also in other developing countries. The study's insights can enlighten infrastructure policy decisions and aid in the successful completion of similar projects.

The lack of access to higher officials may have hindered a comprehensive exploration of project delay reasons. Additionally, as the MRT Line-6 project is funded by the Japan International Cooperation Agency (JICA) and the Bangladesh Government, there is a possibility of additional reasons for project delays if the donor agency were to change.

Furthermore, the study focused on identifying delay factors rather than providing specific recommendations for reducing delays. Future research can be done in concentrating on developing strategies and approaches to reduce delays and uncertainty in mega infrastructure projects. This would help mitigate the extra expenditure associated with project delays and enhance overall project efficiency. By addressing these issues, future studies can contribute to the advancement of infrastructure development and offer valuable insights into successful project completion.

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Appendix-1

Questionnaire

Key Informant Interview

Thesis Topic: Mega Infrastructure Project Delays: A Study on MRT Line-6 of Dhaka City

Interviewer: Abhijit Biswas, Undergraduate student, Department of Urban and Regional Planning, Jahangirnagar University, Savar, Dhaka-1342.

Date:

Name of the Interviewee:

Age:

Organization:

Designation:

1. What is your institution's role or duty in the MRT Line 6 project?

2. According to your knowledge and thought, what institutional issues or problems in the MRT Line-6 project hindered its completion?

3. According to your knowledge and thought, what factors influence project delay for MRT Line-6?

4. What is your suggestion to reduce the project delay of the MRT Line-6?