CAUSES OF DELAYS IN GOVERNMENT SECTOR PROJECT: A CASE STUDY OF POWER GRID COMPANY OF BANGLADESH (PGCB) LTD.

Dissertation

Submitted in partial fulfillment of the requirements for the Degree of

Masters in Procurement and Supply Management

Submitted By

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DECLARATION

I hereby declare that the dissertation entitled “Causes of Delays in Government Sector Project: A Case Study of Power Grid Company of Bangladesh (PGCB) Ltd.” submitted to the BRAC Institute of Governance and Development (BIGD), BRAC University for the degree of **Masters in Procurement and Supply Management (MPSM)** is exclusively my own and original work. No part of it in any form, has been submitted to any other University or Institute for any degree, diploma or for other similar purposes.

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CERTIFICATION

This is my pleasure to certify that the dissertation entitled "Causes of Delays in Government Sector Project: A Case Study of Power Grid Company of Bangladesh (PGCB) Ltd." is the original work of Md. Mahmudul Hasan and it is completed under my guidance and direct supervision. So far I know, the dissertation is an individual achievement of the candidate's own efforts and it is not a conjoint work.

I also certify that I have found the dissertation satisfactory for submission to BRAC Institute of Governance and Development (BIGD), BRAC University which is a partial fulfillment of the requirements for the degree of Masters in Procurement and Supply Management (MPSM).

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ABSTRACT

If we are to make a list of the most perennial problems of development Projects, delays in project will top the list. This very phenomenon is also quite common in the development projects of Bangladesh. For a project, delay leaves an adverse effect on the controlling features of cost, time, safety and quality. Time extension, cost overrun, disputes, arbitration, litigation etc. are few of the vital consequences of delay. Throughout last decade, a pivotal period for Bangladesh, a major shift happened regarding the capacity and volume of the infrastructure development. In this reality, it is an unavoidable necessity to run an in-depth systematic analysis of the factors behind delay and develop a lucid understanding among the professionals. In order to dive deep into the investigation on Project-delay in Government Sectors, PGCB is considered as a case study for this research. This study focuses on identifying delay factors on PGCB projects and analyzing these factors using Relative Importance Index method. To achieve this, 56 different delay factors were identified and later categorized into9major groups through detailed literature review and after that, a survey based on questionnaire was conducted where consultants, clients and contractors were asked about the causes of delay. Relative Importance Index method was used to quantify the relative importance of the delay factors. Ranking was made according to the level of importance. Secondary data was collected from different project offices of PGCB and this data was analysed and investigated to point out the factors of delay. Dominating factors affecting time overrun are Ineffective planning and scheduling, poor site management by contractor, type of project bidding and award, late contract award, slowness in decision making etc.Domestic issues of the country are revealed to be the kind of factors that result in delayed completion of projects. Through this work, four recommendations are provided to help reduce delays in projects. Hopefully, these findings and recommendations will help improve the overall efficiency of construction industry and also be helpful to professionals around the globe.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
BPDB	Bangladesh Power Development Board
CPA	Critical Path Analysis
CPM	Critical Path Method
CIPS	Chartered Institute of Procurement & Supply
DESA	Dhaka Electric Supply Authority
DPP	Development Project Proposal
ECNEC	Executive Committee of the National Economic Council
ED	Executive Director
GoB	Government of Bangladesh
JICA	Japan International Cooperation Agency
kV	Killo Volt
MW	Mega Watt
P&D	Planning and development
PD	Project Director
PCR	Project Completion Report
PLC	Project Life Cycle
PGCB	Power Grid Company of Bangladesh (PGCB) Ltd.
PMIS	Project Management Information System
SS	Sub-Station
TL	Transmission Line
WBS	Work breakdown structure

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CHAPTER ONE: INTRODUCTION

1.1 Background

Development is strategically using the scientific and technical knowledge to meet specific objectives or requirements. Along with knowledge development, infrastructure development is essential for any country's overall economic growth. Government and private, both entities have the potential to be the prime mover behind infrastructure development. Country's development depends, largely, on the development-works carried out by its Government. Majority of Bangladesh's annual budget is meant for development works. After hearing that, a very germane question might arise: How these development works are being carried out? A straightforward answer is: Through Projects.

Public sector development projects or programs are specifically designed for economic and social needs of developing countries and are usually financed by a donor or own fund . These projects are either implemented by recipient governments under a bilateral agreement with the donor country, or through an 'implementing partner' of the donor – frequently a nongovernmental organization or professional contractor (Crawford & Bryce, 2003). The objectives of public sector projects by definition, concern poverty alleviation and improvement of living standards, environment and basic human rights protection, assistance for victims of natural or people caused disasters, capacity building and development of basic physical and social infrastructures(Khang & Moe, 2008, p. 74).

Since the introduction of planning in our economy, we have been investing large amount of money in projects related to industry, minerals, power, transportation, irrigation, education etc. with a view to improving socio-economic conditions of people. A quintessential example of a mere development project turning a dire need into deliverables is "Bangabandhu Bridge". A paradigm shift in the communication and transportation of Bangladesh was brought about by the successful completion of this project. Mega projects like Padma Multipurpose Bridge Project, Payra Deep Sea Port Project etc. are expediting the industrialization and modernization of this South Asian Delta country. As a key requirement in the execution of these projects, demand for electricity is rising commensurately. By keeping generation of electricity in mind, government has instigated the installation process of three power plants (1320MW each) in the southern zone of the country. In order to reach this massive amount of

power to the consumers, a national level power grid is required. In Bangladesh, Power Grid Company of Bangladesh (PGCB) Ltd. is solely responsible for efficient and effective management of national power grid for reliable and quality transmission of electricity throughout the country. In order to ensure safe and successful evacuation of power from existing and upcoming power plants, PGCB has launched various projects funded by GoB, Development Partners and PGCB itself.

Performance of any projects majorly depends on whether or not the project is being completed in time without any delay, within budget and with proper quality. In construction Project, delay could be defined as the time over- run goes beyond the completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule.This phenomenon of delays is being faced by the construction projects globally (Al-Barak, 1993) and such delays are considered to be most recurring issues in the construction sector (Al-Ghafly, 1995).

During past few years, delay has been a buzzword in researches related to project management, and these researches are serving various significant purposes.In Saudi Arabia, Assaf and Al-Hejji found that only 30% of construction projects were completed within the scheduled completion dates and that the average time overrun was between 10% and 30%(Assaf & Al-Hejji , 2006). In Nigeria, Ajanlekoko observed that the performance of the construction industry in terms of time was poor(Ajanlekoko, 1987). Odeyinka and Yusifhave shown that seven out of ten projects surveyed in Nigeria su ered delays in their execution(Odeyinka & Yusif, 1997). Ogunlana and Promkuntong conducted a study on construction delays in Thailand(Ogunlana & Promkuntong, 1996). Al-Momanicarried out a quantitative analysis on construction delays in Jordan(Al-Momani, 2000). Frimpong et al. conducted a survey to identify and evaluate the relative importance of the significant factors contributing to delay and cost overruns in Ghana groundwater construction projects(Frimpong, Oluwoye, & Crawford, 2003). Chan and Kumaraswamystudied delays in Hong Kong construction industry(Chan & Kumaraswamy, 1997). They emphasized that timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery. Failure to achieve targeted time, budgeted cost and specified quality result in various unexpected negative e ects on the projects. Normally, when the projects are delayed, they are either extended or accelerated and therefore, incur additional cost. The normal practices usually allow a percentage of the project cost as a contingency allowance in the contract price and this allowance is usually based on

judgment. Although the contract parties agreed upon the extra time and cost associated with delay, in many cases there were problems between the owner and contractor as to whether the contractor was entitled to claim the extra cost. Such situations, usually involved questioning the facts, causal factors and contract interpretation(Alkass, Mazerolle, & Harris, 1996). Therefore, delays in construction projects give rise to dissatisfaction to all the parties involved and the main role of the project manager is to make sure that the projects are completed within the budgeted time and cost.

1.2Objectives of the research

The objective of this research is to gain a better perception on how timely completion of projects can vastly improve project performance in Public sector. The first objective of the study is to go through elaborated literature review and prepare survey questionnaires on factors of delay related to project time overrun and take feedback from pertinent project personnel of PGCB. The second objective is to, through relative importance index method, scoop out the most potential delay factors affecting the PGCB projects. The third objective is to provide some recommendation that might be followed to mitigate time delays in construction project.

1.3Research Questions

Three key research questions proposed in this study are-

i) What are the factors related to project performance?
ii) Why PGCB projects are being delayed in implementation?
iii) What can be done to reduce the delay of projects launched by PGCB?

The paper has been developed being centered on these three key research questions and examines issues using appropriate methodologies that could answer these questions.

1.4Scope of the study

The main focus of this research will remain on public sectors construction project. The case study will provide in-depth knowledge about the key factors responsible for project delays in public sectors, particularly in Power Grid Company of Bangladesh (PGCB) Ltd. Results are found based on the data collected from PGCB and also the feedback from survey questionnaires.

1.5Organization of the Study

The study presented in six distinct chapters. They are summarized below:

- **Chapter One** gives a general overview of the study including its overall objectives, key research questions and scope of the study.The introduction chapter presents the background of the study illustrating the chronological evolution of public Sector Project management.It highlights the problem statement why the topic has been taken for study.
- **Chapter Two** describe the literature review of the study. This chapter will give a theoretical knowledge of project and project management, different terms related with project management and also gives an overview of Power Grid Company of Bangladesh (PGCB) Ltd.
- **Chapter Three** describesthe approach and methodology of this study and method of data analysis regarding delay factor. This chapter also present the questionnaires design procedure.
- **Chapter Four** describes the findings/ results of the study. Data and information collected through various means are thoroughly analyzed, reported, and discussed in this chapter
- **Chapter Five** provides conclusion and recommendation of this study based on the information leading to conclusion.

References and appendices are placed at the end of the report to support the research work.

CHAPTER TWO: LITERATURE REVIEW

This chapter muses on theoretical knowledge of project management, factors influencing the project performance and project scheduling. This chapter investigates the reasons why deviation from project schedule occurs and focuses on the adverse effect this deviation is leaving on project performance. The research work starts with thorough and critical review of existing literature. Hence the mentioned concepts are used to dive deep into the ins and outs of factors behind time overrun in public sector projects. Different books, journals, publications & websites have been reviewed to get in-depth knowledge in causes of project delay.

2.1 Theoretical Concept of project and project management

A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. A project may also be terminated if the client (customer, sponsor, or champion) wishes to terminate the project.

Meredith and Mantel (2006) discuss projects and characterize them based on multiple factors. A specific, finite task to be accomplished combined with seven factors common to projects: importance, performance, finite due date, interdependencies, uniqueness, resources and conflict.

According to the Association for Project Management projects are unique, transient, endeavors undertaken to achieve a desired outcome.

So it can be said that project is not a regular routine work, rather it serves a unique purpose with time bound activities and after the achievement of the desired goal, project gets dissolved.

Project management is associated with specialized type of work. Projects differ according to the core nature of work: for example, a project could be the construction of a primary school building, or, on the other hand, it could be the construction of Rooppur Nuclear Power Plant.

Project management is the process by which projects are defined, planned, monitored, controlled and delivered such that the agreed benefits are realized.

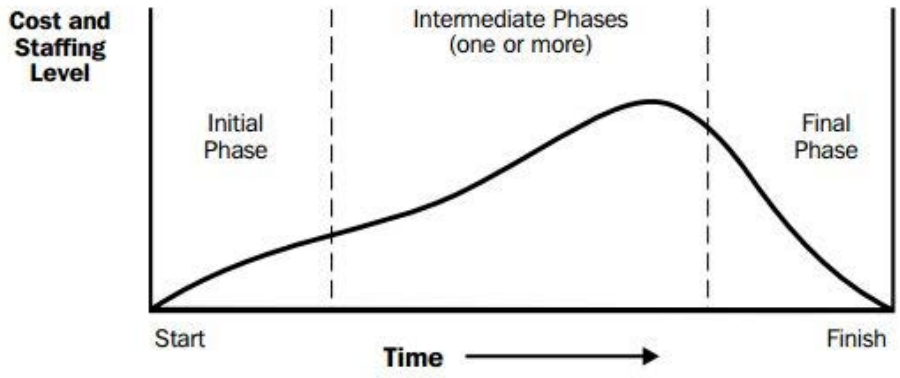
Project Management is also related to the stakeholder management. Stakeholders are individuals and groups who have a legitimate interest or 'stake' in a project. They may have invested money in it, or contributed to it, or they may be affected by its activities and outcomes.

It can be drawn for the above discussion that change is brought about by projects while project management is the most efficient way of executing that change.

2.2 Project Life Cycle (PLC)

The project life cycle (PLC) defines the beginning and the end of a project. Cycle time is the required time to complete the project life-cycle. Cycle- time measures are based on standard performance. That is, cycle times for similar types of projects can be benchmarked to determine a Standard Project Life-Cycle Time. Measuring cycle times can also mean measuring the length of time to complete any of the processes that comprise the project life-cycle. With shorter the cycle time, investment is returned to the organization with less delay. Meredith and mantel (2009) find out three phase of a typical project: start-up phase, middle phase, ending phase.

Figure 1 : Typical Project Life Cycle



Source: https://activecollab.com/blog/project-management/project-management-life-cycle

By sequence, project life cycle is divided into different phases. According to Maylor, PLC has four stages which he nicknamed as 4D. The stages are:

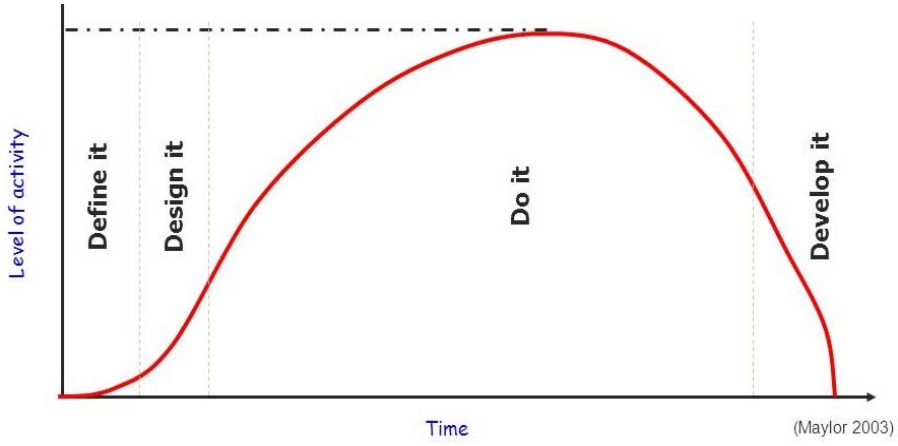
D1: Define the project (Need Assessment, Goal Identification, Strategy Analysis)

D2: Design the project process (Planning and Design, Estimation, Resource analysis etc.)

D3: Deliver the project (Implementation, Control & Monitoring, Leadership and Problem Solving)

D4: Develop the process (Assessment of the process and Outcomes of the project with future recommendation)

Figure 2 :Maylor's Four Stage PLC



https://slideplayer.com/slide/11571799/

There is another alternative model of PLC by Joseph Weiss and Robert K Wysocki (in 5-Phase Project Management: A Practical Planning and Implementation Guide) suggesting five stages:

Table 1 : Weiss and Wysocki's Five-Phase lifecycle

PHASE	ACTIVITIES	DELIVERABLES
Definition	Sate Problem Identify goals List objectives	Project overview

	Obtain Preliminary resources Identify assumptions and risk	
Planning	Identify project activities Estimate time and cost Sequence activities Write project proposal	Work breakdown Project network Critical path analysis Project proposal
Organizing	Obtain resources Recruit project leader Recruit project time Organize project team Assign work packages	Criteria for success Work description Work assignments
Controlling	Define management style Establish control tools Prepare strips Review project schedule Issue change orders	Variances from targets Stirpes Staff allocation
Closing	Gain client acceptance Install deliverables Document the project Issue final report Conduct review of the project	Final report Audit Recommendation for future projects

Sources: Programme and project management, Professional diploma in procurement and supply, the official CIPS source book

2.3 Project Time Management

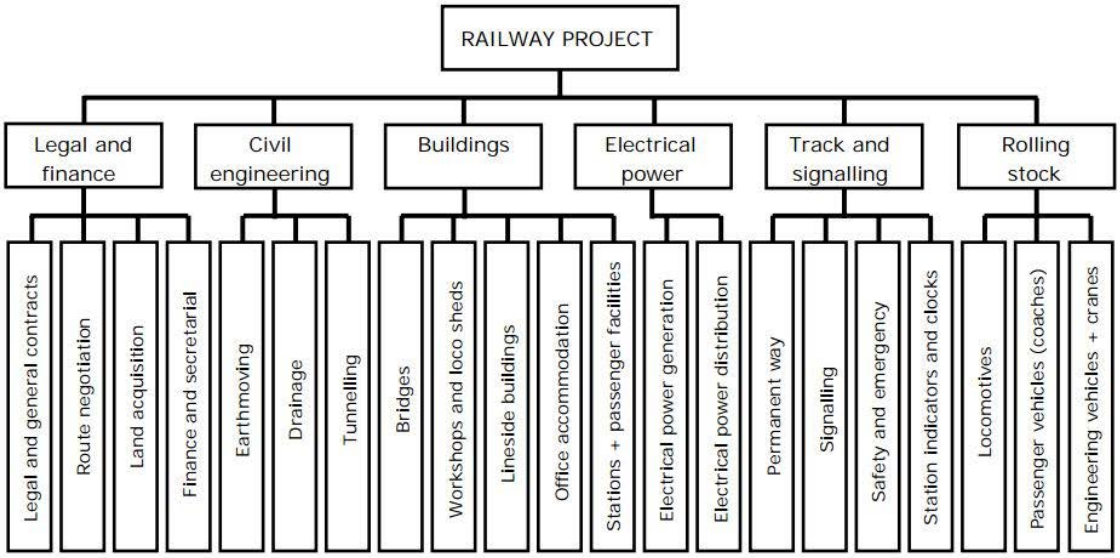
Project Time Management includes the steps required to ensure timely completion of the Project. Defining and sequencing the relevant yet separate activities, estimation of the activity resources and the duration of these activities, development and control of the schedule are crucial for proper time management.

It is important at the initial stage of a project to identify all the activities crucial to the completion of that project. Even if it is difficult to mark every possible task at the early stage of a project, with necessary effort it will improve the quality of project planning. Work

breakdown structure (WBS) is one of the methodical tools that helps listing all he tasks to be completed, with assignment of responsibility for each work. To sum it up, WBS is basically an exhaustive, hierarchical tree structure of deliverables and activities that need to be performed to achieve the desired goals of a project.

An example of WBS for a project for a new Railway construction is demonstrated as follows:

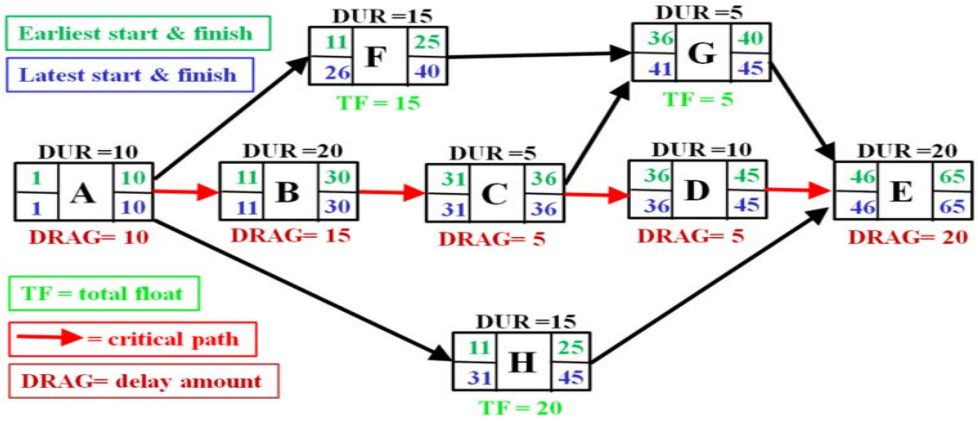
Figure 3 : WBS for a Project to build a new railway



Source: Project management, 9th Edition by Dennis lock, chapter 12, page 169

Normally Projects comprise a large number of separate activities which are related to each other in terms of timetabling. For example, it might occur where an activity C can only be commenced after activities A and B have been completed. Network analysis is the process of analyzing the relationships between activities and exhibiting them through a diagram. Estimated durations of the relevant activities is mandatory in order to draw a network diagram.

Figure 4 : Sample Critical path Network



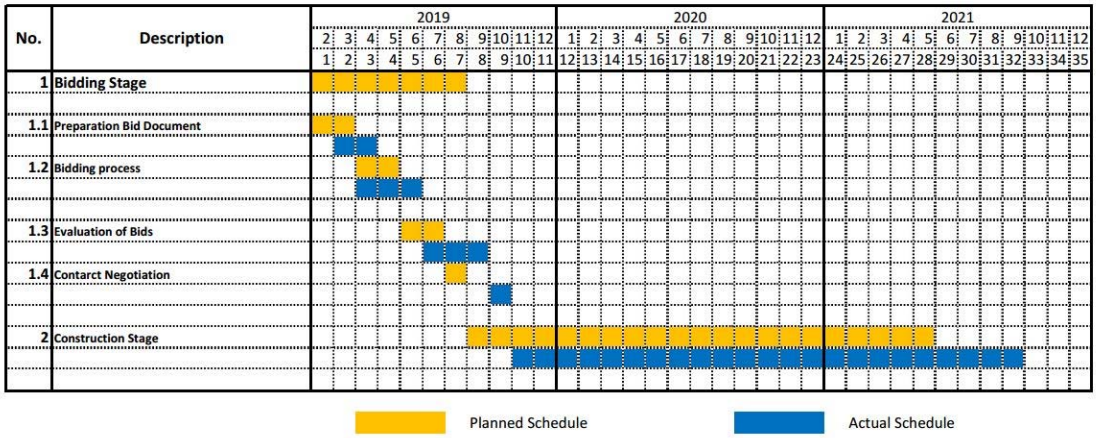
Source: https://en.wikipedia.org/wiki/Critical_path_drag

One of the forms of Network analysis is Critical Path Analysis (CPA) or Critical Path Method (CPM) which helps to find out the critical path in the Network. Delay in the activities of the critical path will lead to a delay in the overall completion of the project. Basically, it is a technique used to predict project duration by analyzing which sequence of activities has the least amount of scheduling flexibility.

Gantt chart is another important tool for project planners. It can be used to keep track of actual progress with respect to scheduled progress, and any case of time overrun will be visible in it.

Gantt charts were created to keep its users on track, providing a visual timeline for starting and finishing specific predefined tasks. By providing a visual overview of milestones and other key dates, these charts offer a more understandable and memorable method of maintaining timescale-based tasks and deliverables whether tracked on a daily, weekly, monthly or yearly basis. In case of relatively complex tasks, visual framework for the work can be done by Gantt charts which helps understand the tasks more lucidly. Interrelation between various tasks can be depicted through this charts. Relationships between these tasks revolve around the understanding of the timing of each task, which then impacts other tasks listed.

Figure 5 : Sample Gantt charts



2.4 Factors controlling Project Performance

Quality, cost & time are the most important subjects in project management.Combination of these three is known as Iron triangle or the project management triangle. In an ideal world, we would like all projects to finish on time, within budget, and to the highest level of quality- all three objectives are important. But in reality, the project manager is often faced with trade-offs between the three objectives. The schedule is slipping but could be brought back on track by investing additional resource. But this impacts on the cost objective, so the project manager must arrive at a balance.

2.5 Review of Related Works

Time and cost are the two common concerns of construction management. Many factors relate to delay and cost overruns and vary along with types of project, locations, sizes, and scopes. Delay and cost increase are common phenomena in projects worldwide. However, this are especially severe in developing countries.

Different researchers studied and evaluated the delay-influencing factors in different type of projects. Surveys conducted by Assaf et al. outlined 56 main causes of delay in large construction projects. Delay factors are assembled into nine major groups with different levels of importance to different parties(Assaf, Al-Khalil, & Al-Hazmi, 1995). AlGhafly discussed the delay in public water and sewage projects. Sixty causes were identified and classified(Al-Ghafly, 1995). Chan and Kumaraswamy conducted a survey to evaluate the

relative importance of 83 potential delay factors in Hong Kong construction projects and found five principal factors: poor risk management and supervision, unforeseen site conditions, slow decision making, client-initiated variations, and work variations(Chan & Kumaraswamy, 1997).Al-Momani investigated causes of delay in 130 public projects in Jordan(Al-Momani, 2000). The main causes of delay were related to designer, user changes, weather, site conditions, late deliveries, economic conditions and increase in quantity. Delays have strong relationship with failure and ineffective performance of contractors.

Ubaid discussed the performance of contractors as one of the major causes of delay. Thirteen (13) major measures were considered. These measures are related to contractor resources and capabilities(Ubaid, 1991). Al-Barak discussed the main causes of failure in Construction industry in Saudi Arabia by surveying 68 contractors and about 34 different causes of failure(Al-Barak, 1993).Arditi et al. (1985) reported the causes of delay on Turkish public-sector construction projects in the 1970s and 1980s by surveying public agencies and contractors involved in public sector projects. This study divided the identified factors into those that are influenced by national economic policies and those that can be controlled by the public agencies and contractors (Arditi, Akan, & Gurdamar, 1985). Investigating the factors causing delay in construction projects in United Arab Emirates, Faridi and ElSayegh (2006) reported that over 50% of construction projects experience delay due to factors such as delay in approval of construction drawings, poor pre-planning and slow decision making process (Faridi & El-Sayegh, 2006). Ling and Hoi (2006) provided time performance guideline for Singaporean contractors working in India (Ling & Hoi,, 2006). In Malaysia Sambasivan and Soon (2007) adopted an integrated approach for causes and effects of construction delays. Out of 28 listed factors, they identified 10 important factors and six main effects of delays using relative importance index and Spearman rank correlation (Sambasivan & Soon, 2007).

Perception and biases of different groups involved in the project, sometimes shift the relative importance of potential delay factors. Kumaraswamy and Chan studied the causes of construction delays in Hong Kong(Kumaraswamy & Chan, 1998). They found that there was a difference in perceptions as to causes of delays by different groups of participants in building and civil engineering works. They suggested that biases of different industry groups might direct blame for delays to other groups.

From the above discussed literature review, it is evident that most of the studies stressed on finding out the potential factors of delay under different industrial and geographical condition. Now my endeavor is to identify the significant delay factors from the perspective of public sector of Bangladesh.

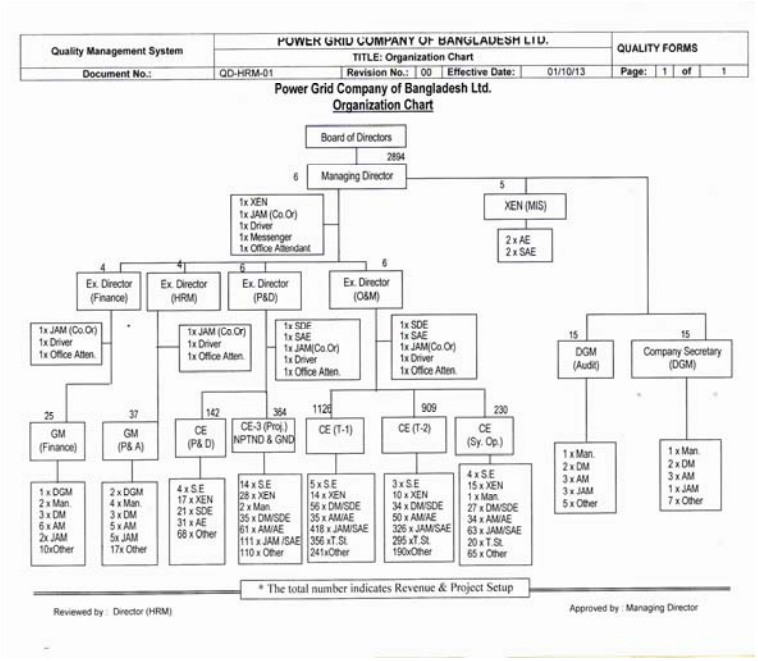
2.6 Overview of the Organization (PGCB)

Power Grid Company of Bangladesh Ltd. (PGCB) was formed under the restructuring process of Power Sector in Bangladesh with the objective of bringing about commercial environment including increase in efficiency, establishment of accountability and dynamism in accomplishing its objectives. PGCB was incorporated in November 1996 with an authorized capital of Tk.10 billion. It was entrusted with the responsibility to own the national power grid to operate and expand the same with efficiency. Pursuant to Government decision to transfer transmission assets to PGCB from Bangladesh Power Development Board (BPDB) and Dhaka Electric Supply Authority (DESA), PGCB completed taking over of all the transmission assets on 31.12.2002. PGCB expanded its network and capacity manyfold and operating those efficiently and effectively.

(Source: PGCB Website)

2.7 PGCB's Organogram

Figure 6 : Organogram PGCB



Source: PGCB web site, www.pgcb.org.bd

2.8 Main Activities of PGCB

1. Power system planning & development
2. Implementation of transmission projects
3. Maintenance of transmission network (line & substation)

To meet the continuously growing demand of electricity, PGCB is expanding its network and capacity through various development projects. PGCB's already **completed** projects:

1. Bibiyana-Kaliakoir 400 KV and Fenchuganj-Bibiyana 230kV Transmission Line Project
2. Barisal-Bhola-Burhanuddin 230 kV Transmission Line Project
3. Feasibility Study to Connect Nuclear Power Plant with National Grid
4. Comilla-Meghnaghat-Haripur 230 kV Transmission Line and Turn in and out at Rampura of Existing Ghorasal-Haripur 230 kV Transmission Line Project
5. Hasnabad-Aminbazar (Savar)-Tongi& Haripur-Meghnaghat 230 KV Transmission Line Project
6. Khulna-Ishurdi and Bogra-Barapukuria 230 kV Transmission Line Project
7. Joydevpur-Kabirpur-Tangail 132 kV Transmission Line Project
8. Second East-West Electrical Interconnector Project (Ashuganj-Jamuna Multipurpose Bridge-Sirajganj 230 kV Transmission Line)
9. Ishwardi-Baghabari-Sirajganj-Bogra 230 kV Transmission Line Project
10. NLDC (National Load Dispatch Centre) Project
11. Three Transmission Lines (132 KV) Project
12. Natore-Rajshahi 132 kV Single Circuit Transmission Line Project
13. Aminbazar-Savar 132 kV Transmission Line &Savar 132/33 kV Substation Project
14. Naogaon - Niamatpur 132 kV Transmission Line Project
15. Ashuganj - Shahjibazar 132 KV Single Circuit Transmission Line Project
16. Meghnaghat-Aminbazar 400 kV Transmission Line (Phase-1)
17. Transmission Efficiency Improvement through Reactive Power Compensation at Grid Substations and Reinforcement of Goalpara Substation
18. Aminbazar - Old Airport 230 kV Transmission Line and Associated Substations
19. Siddhirganj - Maniknagar 230 kV Transmission Line Project

20. Feasibility Study for the Transmission System Improvement, Western Zone
21. Construction of 230 kV Switching Substation at Bibiyana
22. Grid Interconnection between Tripura (India) and Comilla (South substation) (Bangladesh)
23. Two New 132/33 kV Substations at Kulaura and Sherpur with Interconnecting Lines
24. Goalpara - Bagerhat 132 kV Double Circuit Transmission Line Project

Under annual development program, PGCB's currently ongoing projects are:

1. Enhancement of Capacity of Grid Substations and Transmission Lines for Rural Electrification.
2. 400/230/132 kV Grid Network Development Project
3. 132 kV Grid Network Development Project in Eastern Region.
4. National Power Transmission Network Development Project
5. Western Grid Network Development Project
6. Ashuganj-Bhulta 400 kV Transmission Line
7. Amnura 132/33 kV Grid Substation with associated 132 kV Transmission Line Project.
8. Capacity Upgradation (500 MW) of the existing Bangladesh (Bheramara)-India (Baharampur) Grid Interconnection
9. Mongla-Khulna(S) 230 kV Transmission Line Project
10. Aminbazar - Maowa - Mongla 400 KV Transmission Line Project
11. Dhaka - Chittagong Main Power Grid Strengthening Project
12. Institutional Strengthening of PGCB
13. Energy Efficiency in Grid Based Power Supply Project
14. Power Grid Network Strengthening Project under PGCB (G2G)
15. Construction of Patuakhali (Payra) - Gopalganj 400 kV Transmission Line &Gopalganj 400 kV Grid Substation
16. Patuakhali -Payra 230 kV Transmission Line Project
17. Matarbari Ultra Super Critical Coal-Fired Power Project (II) (PGCB Part: "Matarbari-Madunaghat 400 kV Transmission Line")
18. Bangladesh Power System Reliability and Efficiency Improvement Project

19. Construction of Bakerganj-Barguna 132kV Transmission Line &Barguna 132/33kV Substation
20. Construction of Bheramara (Bangladesh)-Baharampur(India) 2nd 400kV Transmission Line (Bangladesh Portion)
21. Development of Transmission Infrastructure at Mirsharai Economic Zone for Reliable Power Supply

2.9 Project Management in PGCB:

In PGCB Development work has been done under Department of Planning and Development headed by Executive Director (P&D). Most of the project has been done on Turnkey Basis by International Competitive Bidding Process. Project fundscome from GoB, Development Partner and PGCB itself. At the project initiation stage, DPP (Development Project Proposal) isprepared byDepartment of Project Planning. After that, ECNEC approves that DPP. After the issuance of Government Order (GO), PGCB appoints a project director for implementing the project. Afterward, Office of the Project Director gets formulated. Coordination between the Consultant, Contractor, PGCB, Development Partners, Government and other stakeholders are carried out through Project Director's office. Project Direct and his/her team is responsible for the monitoring and control of the project at implementation stage. Completion period of overall project is defined in its DPP. At the initial stage of implementation, contractor submits the WBS of the project to complete it within the pre-defined time. Project Completion Report (PCR) is prepared at the project office after the completion of that project.

CHAPTER THREE: RESEARCH AREA & METHODOLOGY

3.1 Research area

In public sector scenario of Bangladesh, most of the projects run behind the schedule. Projects without any delay are very rareto find.Delays in project results in increase of cost of the project in many ways.Delays also cause some other management and performance issues. In this scenario, it has become very important to find out the nature, pattern and causes of the delay, so that they can be solved or minimized in order to get efficient performance in the management of projects.The research area for this case study is PGCB's Completed and ongoing project.

3.2 Research Methodology

This research has adopted field survey methodology to find the impact of various factors influencing on delay in the Bangladeshi construction sector drawing from various international researchers mentioned in literature review and also based on practical data collected from different project office of PGCB. An interview questionnaire has been developed to assess the perceptions of those in the PGCB's projects on the relative importance of causes of delays. The designed questionnaire is randomly distributed to three principal construction parties (Client, consultant and contractor). The collected data has been analyzed through the Relative Importance Index (RII) method(Sambasivan & Soon, 2007). The analysis included ranking the different causes according to the relative importance indices. The analysis revealed the factors and groups that contribute most to delays.

3.3 Questionnaire Design

Identification of critical attributes for the study and preparation of questionnaire is a crucial step for the success of the research. Significant amount of work has already been done on causes of construction delay and there is a well-documented and peer-reviewed set of delay attributes available in the literature. For this research, the questionnaire has been prepared by incorporating the key delay attributes reported in the literature. The questionnaire is divided into two main parts. Part I is related to general information for both the company and respondent. Part II includes the list of the identified causes of delay in construction project.

These causes are classified into nine (9) groups according to the sources of delay: Factors related to project, Client, contractor, consultant, design-team, materials, equipment & labor, external & Contract Management factors. To reflect the cross-section of the already available delay attributes in the context of Bangladesh, personal interviews with Bangladeshi construction experts were also conducted. The final questionnaire survey was on design based on these two inputs. The attributes are listed in Table 3. A five point Likert scale (1=not important, 2=slightly important, 3= moderately important, 4=very important, 5=extremely important) was adopted where respondents were asked to rank the importance and impact of a particular attribute on delay in one of their selected projects.

3.4 Data Analysis

Many Researchers (Assaf et al., 1995; Kumaraswamy and Chan, 1998; Layer and Jha, 2005; Sambasivan and Soon, 2007) are of the opinion that mean and standard deviation of each individual attribute is not a suitable measure to assess overall rankings as they do not reflect any relationship between them and hence used RII which can be calculated using the following equation:

$$RII(Relative\ Importance\ Index) = \frac{\sum W}{A \times N}$$

Where W= weighting given to each factor by respondents (ranging 1 to 5)

A= Highest weight (i.e., 5 in this case)

N= Total number of respondents

The RII value had a range of 0 to 1 (0 not inclusive); the highest RII indicates that it has the maximum impact on the delay while the factor with lowest indicates that it has the least impact on delays.

CHAPTER FOUR: ANALYSIS AND DISCUSSIONS

Project management performance can be evaluated from three different aspects: time, cost and quality. Timely completion of a project is an indication of success in that project. But from the literature review and post-project appraisal it has been observed that most of the projects have failed to be completed within scheduled period. For this thesis my surface of interest was limited to PGCB's projects only. In order to improve project performance, detection and further analysis of delay factors affecting the PGCB's projects are necessary.

Thisthesis work is based on primary data from survey questionnaires and secondary data from PGCB's post-project appraisal reports collected from different project offices. The primary data collected from the second part of the questionnaire has been analyzed from the perspective of clients, consultants and contractors. Each individual cause's RII perceived by all respondents is computed for overall analysis. **Table 2**show the frequency indices and their rankings. These causes are rated by three different respondent groups. It can be seen from these table that there is nearly no difference in the ranking orders of cause delays by overall. The relative importance index (RII) is computed for each cause to identify the most significant causes. The causes were ranked based on RII values. The first fifteen causes in overall ranking have a good agreement between three parties of projects.From the ranking assigned to each cause of delays, it has been possible to identify the most important factors or causes of delays in PGCB's project.

Table 2 : RII and Ranking of Delay Factors

SL	Factors Causing Delays	Client		Consultant		Contractor		Overall	
		RII	Rank	RII	Rank	RII	Rank	RII	Rank
	Project Related								
1	Original Contract duration is too short	0.720	28	0.720	24	0.733	17	0.724	26
2	Type of project bidding and award (negotiation, lowest bidder,)	0.824	4	0.820	4	0.827	3	0.824	4
3	Type of construction contract (Turnkey, construction only,)	0.792	9	0.740	12	0.773	8	0.776	10
4	Ineffective delay penalties	0.688	51	0.680	46	0.680	51	0.684	51
	Client related Cause								
5	Delay in progress payments by Client	0.600	56	0.620	56	0.680	51	0.628	56
6	Client's late contract award	0.832	3	0.840	2	0.827	3	0.832	3
7	Excessive bureaucracy in client's organization	0.704	43	0.740	12	0.747	14	0.724	26
8	Delay to furnish and deliver the site to	0.720	28	0.720	24	0.760	12	0.732	18

SL	Factors Causing Delays	Client		Consultant		Contractor		Overall	
		RII	Rank	RII	Rank	RII	Rank	RII	Rank
	the contractor by the Client								
9	Late in revising and approving design documents by Client	0.704	43	0.740	12	0.747	14	0.724	26
10	Poor communication and coordination by Client and other parties	0.696	49	0.740	12	0.707	35	0.708	39
11	Slowness in decision making process by Client	0.808	6	0.800	5	0.827	3	0.812	5
	Contractor related cause								
12	Difficulties in financing project by contractor	0.696	49	0.640	55	0.640	56	0.668	54
13	Conflicts in sub-contractors schedule in execution of project	0.800	7	0.800	5	0.787	7	0.796	7
14	Rework due to errors during construction	0.744	17	0.700	34	0.733	17	0.732	18
15	Poor site management and supervision by contractor	0.856	2	0.840	2	0.853	1	0.852	2
16	Poor communication/coordination by contractor with other parties	0.720	28	0.720	24	0.720	25	0.720	31
17	Ineffective planning and scheduling of project by contractor	0.872	1	0.860	1	0.853	1	0.864	1
18	Delays in sub-contractors work	0.752	15	0.720	24	0.720	25	0.736	16
19	Frequent change of sub-contractors because of their inefficient work	0.760	13	0.760	10	0.760	12	0.760	12
20	Poor qualification of the contractors technical staff	0.776	11	0.740	12	0.680	51	0.740	15
21	Delay in site mobilization	0.720	28	0.700	34	0.707	35	0.712	35
	Consultant related cause								
22	Inadequate experience of consultant	0.664	55	0.660	54	0.720	25	0.680	53
23	Conflicts between consultant and design engineer	0.712	35	0.680	46	0.707	35	0.704	44
24	Late in reviewing and approving design documents by consultant	0.768	12	0.740	12	0.773	8	0.764	11
25	Poor communication/coordination between consultant and other parties	0.704	43	0.680	46	0.707	35	0.7	48
26	Delay in approving major changes in the scope of work by consultant	0.712	35	0.680	46	0.707	35	0.704	44
	Design Related								
27	Mistakes and discrepancies in design documents	0.752	15	0.740	12	0.747	14	0.748	14
28	Delays in producing design documents	0.712	35	0.700	34	0.707	35	0.708	39
29	Unclear and inadequate details in drawings	0.736	18	0.720	24	0.720	25	0.728	22
30	Complexity of project design	0.712	35	0.700	34	0.720	25	0.712	35
31	Insufficient data collection and survey before design	0.736	18	0.740	12	0.733	17	0.736	16
32	Inadequate design-team experience	0.704	43	0.700	34	0.707	35	0.704	44
	Material Related								
33	Shortage of construction materials in market	0.712	35	0.700	34	0.707	35	0.708	39
34	Changes in material types and specifications during construction	0.704	43	0.680	46	0.667	54	0.688	49

SL	Factors Causing Delays	Client		Consultant		Contractor		Overall	
		RII	Rank	RII	Rank	RII	Rank	RII	Rank
35	Delay in material delivery	0.800	7	0.800	5	0.773	8	0.792	8
36	Late procurement of materials	0.760	13	0.760	10	0.733	17	0.752	13
37	Quality of material	0.728	21	0.700	34	0.707	35	0.716	33
38	Shortage in material	0.712	35	0.700	34	0.720	25	0.712	35
	Labor and Equipment category causes								
39	Equipment breakdowns	0.712	35	0.700	34	0.693	48	0.704	44
40	Shortage of equipment	0.704	43	0.720	24	0.707	35	0.708	39
41	Low level of equipment-operators skill	0.784	10	0.780	9	0.773	8	0.78	9
42	Low productivity and efficiency of equipment	0.728	21	0.700	34	0.707	35	0.716	33
43	Shortage of labors	0.728	21	0.740	12	0.733	17	0.732	18
44	Unqualified workforce	0.816	5	0.800	5	0.800	6	0.808	6
45	Low productivity level of labors	0.736	18	0.740	12	0.720	25	0.728	22
46	Personal conflicts among labors	0.720	28	0.700	34	0.707	35	0.712	35
	External Causes								
47	Effects of subsurface conditions (e.g., soil, high water table, etc.)	0.728	21	0.720	24	0.733	17	0.728	22
48	Delay in obtaining permits from local authorities	0.728	21	0.740	12	0.733	17	0.732	18
49	Rain effect on construction activities	0.712	35	0.700	34	0.707	35	0.708	39
50	Unavailability of utilities in site (such as, water, electricity, etc.)	0.728	21	0.740	12	0.720	25	0.728	22
51	Effect of social, Political and cultural factors	0.688	51	0.680	46	0.693	48	0.688	49
52	Accident during construction	0.672	54	0.680	46	0.653	55	0.668	54
53	Differing site (ground) conditions	0.720	28	0.720	24	0.733	17	0.724	26
54	Changes in government regulations and laws	0.680	53	0.680	46	0.693	48	0.684	51
	Contract relationships related causes								
55	Major disputes and negotiations	0.728	21	0.720	24	0.720	25	0.724	26
56	Lack of communication between the Stakeholder	0.720	28	0.720	24	0.720	25	0.72	31

Based on the ranking in Table 2, the mean RII and the ranking of all groups are shown in Table 3, the top most 15 important factors causing delays are shown in Table 4. There is a closer consensus between client and overall ranking of groups (Table 3).

Table 3 : Mean RII and Ranking of Groups of Delay Factors

SL	Category	Client		Consultant		Contractor		Overall	
		RII	Rank	RII	Rank	RII	Rank	RII	Rank
1	Project related Causes	0.756	2	0.740	3	0.753	2	0.752	2
2	Client related Causes	0.745	3	0.743	2	0.756	1	0.737	3
3	Contractor related Causes	0.770	1	0.748	1	0.745	3	0.758	1
4	Consultant related Causes	0.712	8	0.688	9	0.723	5	0.710	8
5	Design related Causes	0.725	6	0.717	7	0.722	6	0.723	6
6	Material related	0.736	5	0.723	5	0.718	8	0.728	5
7	Labor and equipment category causes	0.741	4	0.735	4	0.730	4	0.736	4
8	External Causes	0.707	9	0.708	8	0.708	9	0.708	9
9	Contract relationships related causes	0.724	7	0.720	6	0.720	7	0.722	7

According to the overall ranking of the groups, the tree factors of each group that contribute most to delays are discussed in what follows.

Contractor (RII = 0.758): The contractor related group of delay factors was the most important groups to cause delays. This was mainly due to the factors Ineffective planning and scheduling (RII=0.864), Poor site management (RII = 0.852), Conflicts in sub-contractors schedule (RII = 0.796).

Project (RII= 0.752): The second most important group was the project related group, whose most significant factors were Type of project bidding and award (RII= 0.824), type of construction contract (RII- 0.776) and short contract duration (RII= 0.724).

Client (RII= 0.737): After the project related group, the client related delay factors came in the third most important group. The significant factors were late contract award (RII = 0.832), slowness in decision making (RII= 0.812) and delay to furnish and delivery the site (RII= 0.732).

Labor and equipment (RII = 0.736): Following the client, the labor and equipment related group of delay factors ranks as the fourth most important group. The notable factors were unqualified workforce (RII=0.808), low level of equipment-operators skill (RII= 0.780) and shortage of labors (RII= 0.732).

Material (RII= 0.728): The fifth most important group was the material related group. The prominent factors were delay in material delivery (RII=0.792), late procurement of materials (RII= 0.752) and quality of material (RII= 0.716).

Design (RII= 0.723): After the material, the design related delay factors was the sixth most important group. The significant factors were mistakes and discrepancies in design document (RII= 0.748), insufficient data collection and survey before design (RII= 0.736) and unclear and inadequate details in drawing (RII= 0.728)

Contract relationship (RII= 0.722): Following the design related group of factors, the contract relationship related group of delay factors ranked as the seventh most important group.

Consultant (RII= 0.709): the eighth most important group was the consultant related group. The prominent factors were late in reviewing and approving design document (RII= 0.764), delay in approving major changes in scope of work (RII= 0.704) and poor communication and coordination with other parties (RII= 0.700)

External (RII= 0.707): The external causes of delay factor was the last and least important group. The notable factors were delay in obtaining permits from local authorities (RII= 0.732), effects of subsurface condition (RII= 0.728) and unavailability of utilities in site (RII= 0.728).

The most frequent fifteen causes of delay according to overall (owners, consultants and contractors) are shown in**Table 4**. Ineffective planning and scheduling of project by contractor is the top most frequent cause of time overrun in a project implementation.

Table 4 : Most 15 Important Factors Causing Delays

SL	15 most important factors causing delays	Factor	RII	Rank
1	Ineffective planning and scheduling of project by contractor	Contractor related	0.864	1
2	Poor site management and supervision by contractor	Contractor related	0.852	2
3	Client's late contract award	Client related	0.832	3
4	Type of project bidding and award (negotiation, lowest bidder,.)	Project Related	0.824	4
5	Slowness in decision making process by Client	Client related	0.812	5
6	Unqualified workforce	Labor and Equipment related	0.808	6
7	Conflicts in sub-contractors schedule in execution of project	Contractor related	0.796	7
8	Delay in material delivery	Material Related	0.792	8
9	Low level of equipment-operators skill	Labor and Equipment related	0.78	9
10	Type of construction contract (Turnkey, construction only,.)	Project Related	0.776	10
11	Late in reviewing and approving design documents by consultant	Consultant related	0.764	11
12	Frequent change of sub-contractors because of their inefficient work	Contractor related	0.76	12

13	Late procurement of materials	Material Related	0.752	13
14	Mistakes and discrepancies in design documents	Design Related	0.748	14
15	Poor qualification of the contractors technical staff	Contractor related	0.74	15

In order to find out delay factor with the survey questionnaires, secondary data for completed project has been collected from different PD office of PGCB. A comparative presentation of the planed and actual duration of these completed projects is given below:

Table 5 : Planed and actual duration of completed Project

SL.	***Project Name***	***Planned Duration***	***Actual Duration***	***Delay (days)***
1	Bibiyana-Kaliakoir 400 KV and Fenchuganj-Bibiyana 230kV Transmission Line Project	09-01-2012 to 08-07-2014	09-01-2012 to 31-08-2015	419
2	NLDC (National Load Dispatch Centre) Project	01-07-2003 to 30-06-2007	01-07-2003 to 30-06-2010	1096
3	Naogaon - Niamatpur 132 kV Transmission Line Project	01-07-2005 to 30-06-2008	01-07-2005 to 30-06-2010	730
4	Bibiyana - Comilla (North) 230 kV Transmission Line Project	01-10-2010 to 30-12-2012	01-10-2010 to 30-06-2013	182
5	Meghnaghat-Aminbazar 400 kV Transmission Line (Phase-1)	20-09-2006 to 30-06-2009	20-09-2006 to 30-06-2014	1826
6	Aminbazar - Old Airport 230 kV Transmission Line and Associated Substations	July,2006 to June 2010	July,2006 to 30 June 2015	1826
7	Grid Interconnection between Bangladesh (Bheramara) and India (Baharampur)	17/08/2010 to 30/06/2012	17/08/2010 to 30/06/2014	730
8	Grid Interconnection between Tripura (India) and Comilla (South substation) (Bangladesh)	January 2015 to Dec 2015	January, 2015 to June, 2016	182
9	Transmission Efficiency Improvement through Reactive Power Compensation at Grid Substations and Reinforcement of Goalpara Substation (1st REVISED)	01-02-2008 to 30-06-2010	01-02-2008 to 30-06-2014	1461
10	Construction and Extension of Grid Substations including Transmission Line Facilities (Phase-I) Project.	23-10-2005 to 30-06-2009	23-10-2005 to 30-06-2014	1826

(Source: Different Project Director's office of PGCB)

It is clearly evident from Table: 5 and corresponding graph that already completed projects have gone through significant delays. From **fig. 8** it has been seen that, five projects out of ten are being delayed more than 100%. These delays are degrading the overall project performance. Currently, PGCB is executing 21 projects in order to ensure reliable and quality transmission of electricity throughout the country. For better management of ongoing and upcoming projects, it is essential to find out the most influential causes or factors responsible for the delay.

Figure 7 : Project competion time and delay

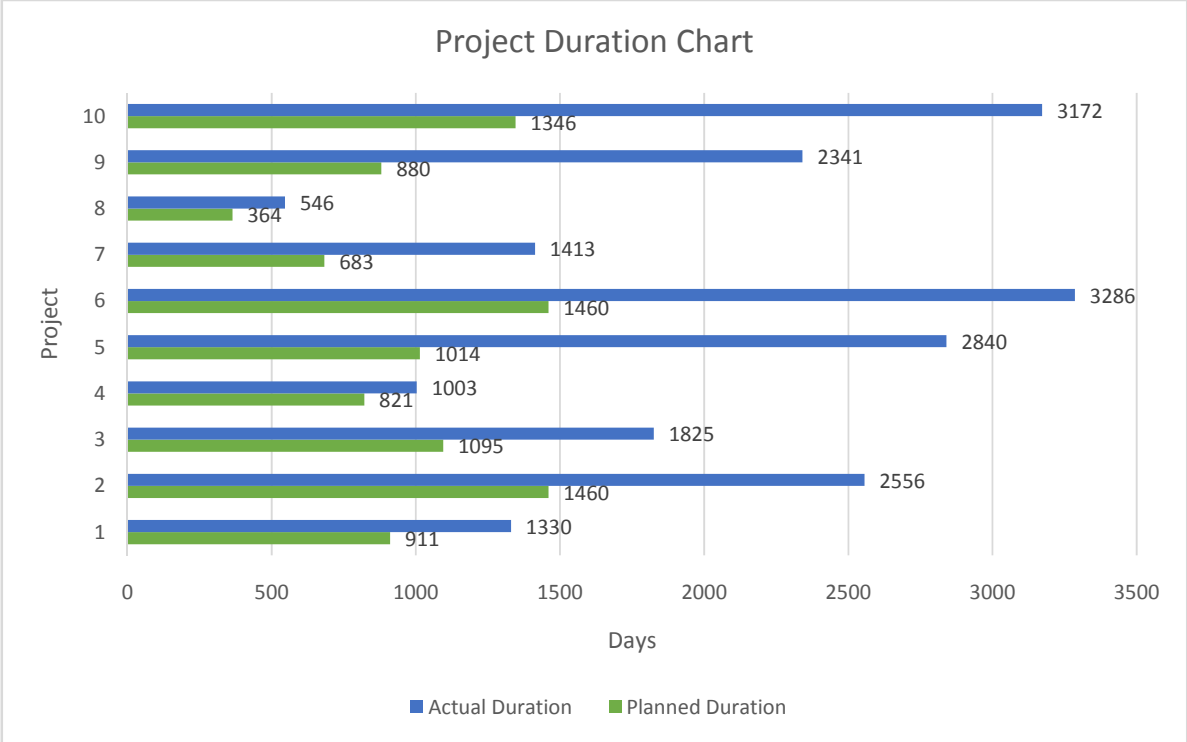
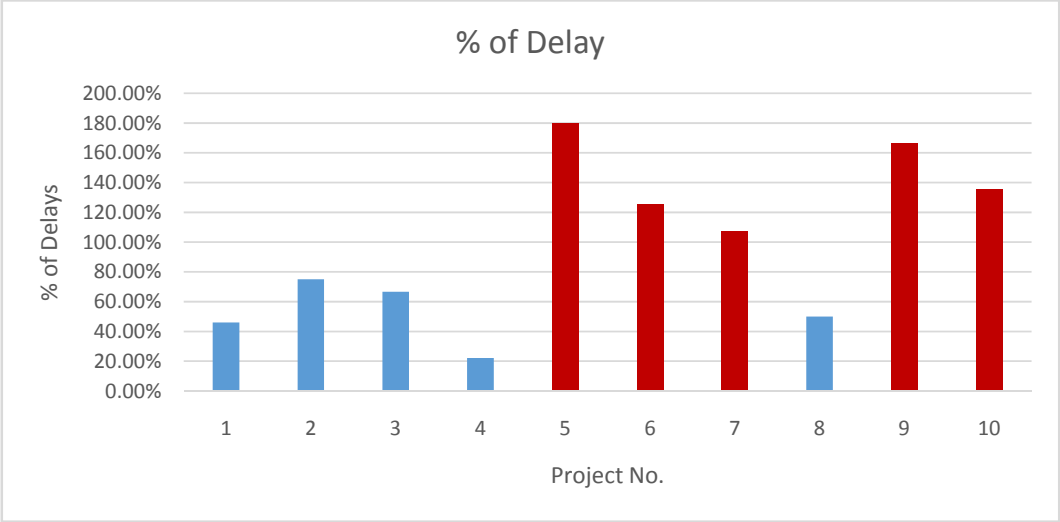


Figure 8: Persentage of delays in completd Project



Here, three project scenario have been analyzed further from collected data to find out the factor of delays.

1. **Aminbazar - Old Airport 230 kV Transmission Line and Associated Substations Project:**
   Aminbazar- old airprt 230 kV Transmission line and Associated substation project had five packages. Package-wise planned and actual completion period has been described in Table6.

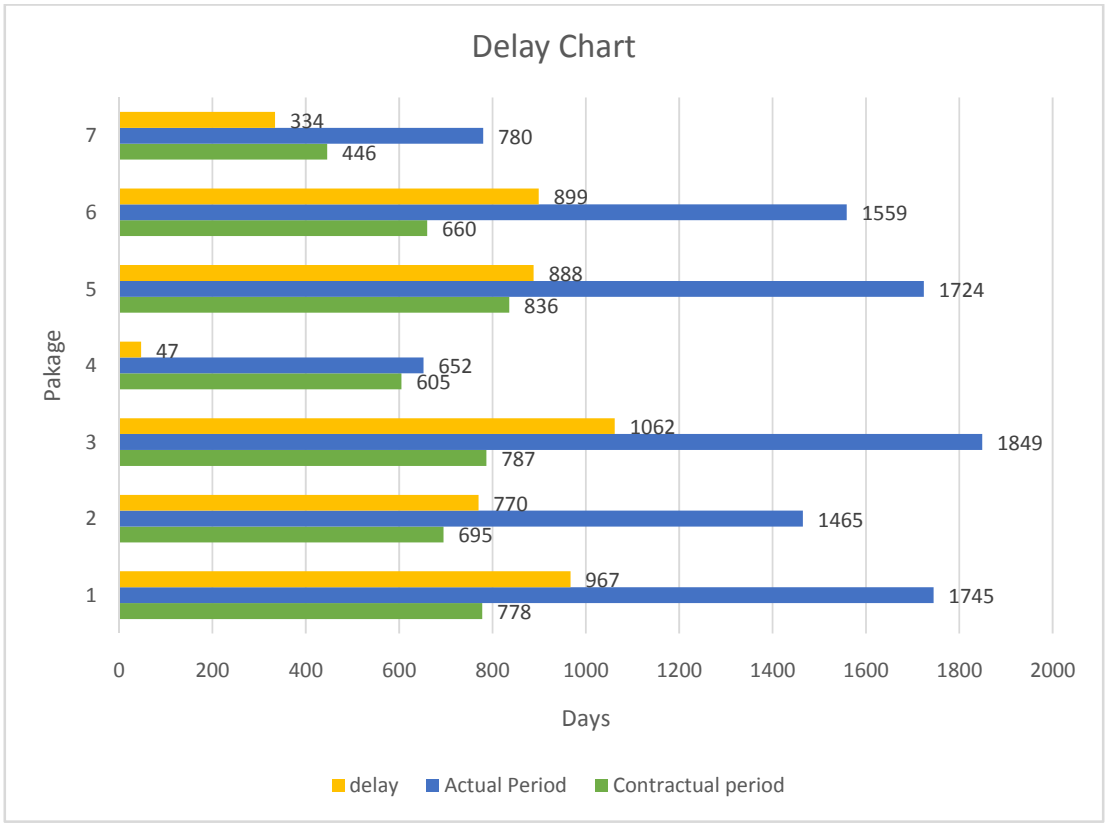
Table 6: Package wise time duration for Aminbazar-Old Airport Project

Sl	Package	Date of award of contract		Contractual date of completion	Actual Completion Date	Time delay (days)
1	Aminbazar-Old Airport 230 kV Overhead and Underground Transmission Line.	21. 03.2010	08.08.2010	07.05.2012	30.12.2014	967
2	Old Airport – Cantonment 132 kV Underground Transmission Line.	15.11.2009	12.07.2010	11.10.2011	19.11.2013	770
3	Old Airport – Satmosjid 132 kV Underground Transmission Line.	15.11.2009	12.07.2010	11.01.2012	08.12.2014	1062
4	Rampura –Ullon 132 kV Underground Transmission Line.	15.11.2009	13.07.2010	13.07.2011	29.08.2011	47
5	Old Airport 230/132 kV GIS Sub-Station	11.04.2010	26.07.2010	25.07.2012	30.12.2014	888

6	Cantonment and Satmosjid 132/33 kV Grid Sub-Station	21.09.2010	13.01.2011	12.07.2012	28.12.2014	899
7	Aminbazar 230/132 kV Grid Sub-Station Extension	16.06.2010	06.09.2010	05.09.2011	04.08.2012	334

From **Table 6** and corresponding **Figure 9,** it is clear that all package of this project are being delaye. Going through the PCR of this project, it is clearly perceivable that delay in different packages can be assigned to few issues. Problems in achieving RoW (Right of Way), Delay in site handover, Delayed procurement process, Slow decision making, Lack of technically skilled stuffs of contractor etc. are few of the issues directly responsible for project delay.

Figure 9: Delay chart in Aminbazar- Old Airport Project



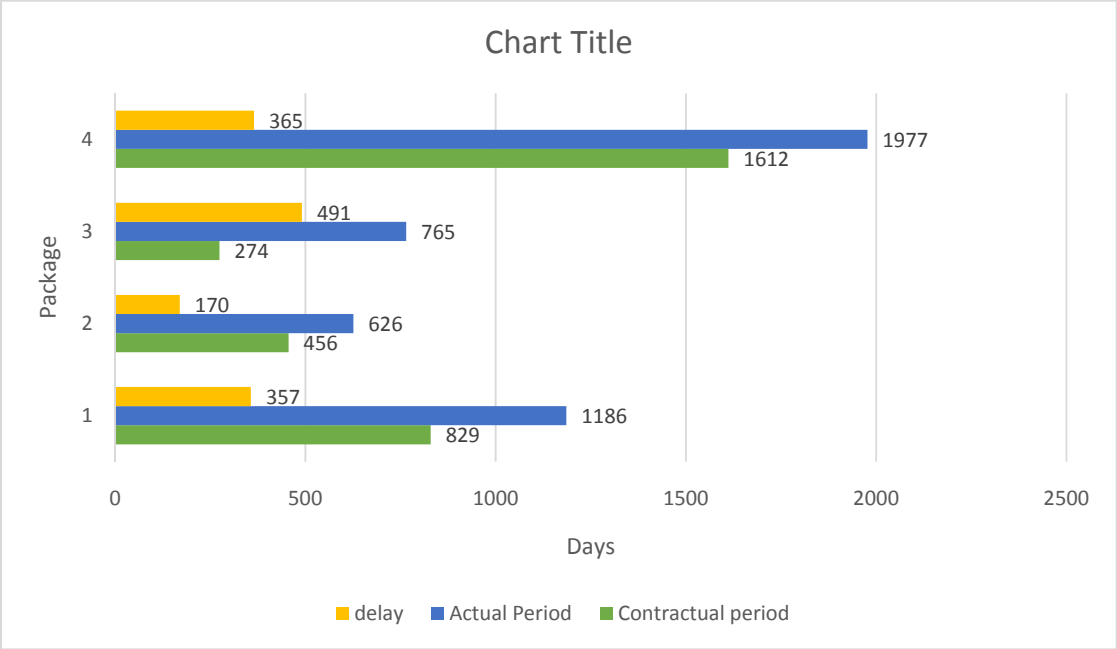
Meghnaghat - Aminbazar400kV Transmission Line PROJECT (Phase-I).

This is the 1st 400kV transmission line project of PGCB. According to DPP, implementation period of this project was July 2005 to June 2009. But in reality, project was finished in June 2014. This project had four different packages. Package-wise time duration is showed in the **Table 7**. Graphical presentation of time overrun of this project is presented in **Figure 10.** Form this table and figure, it is find that the longest time delay occurs in land development package of this project which was 491 days.

Table 7:Package wise time duration for Meghnaghat-Aminbazar TL Project

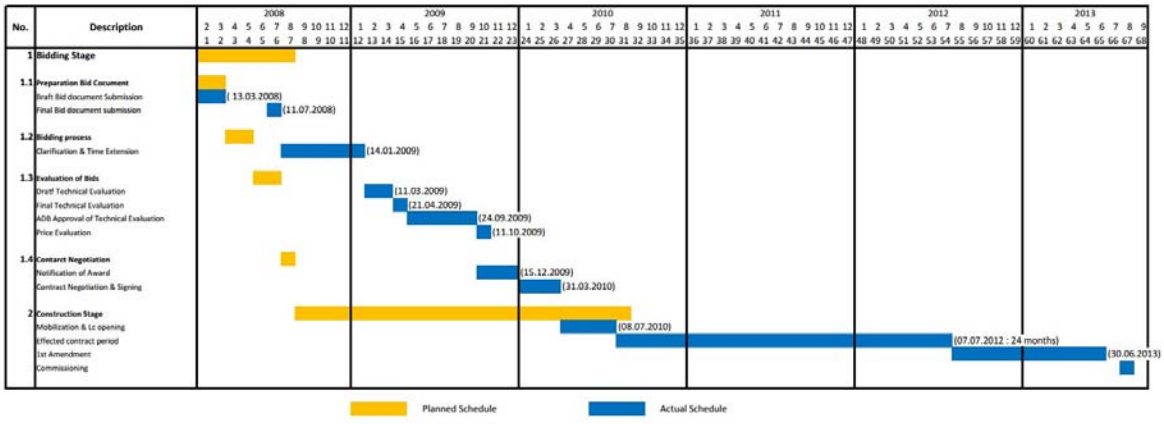
Sl	Package	Tender Invitation	Date of award of contract	Contractual date of completion	Actual Completion Date	Time delay
1	Design, supply, erection, testing and commissioning of 400kV Meghnaghat-Aminbazar Transmission Line	30/07/2008	31/03/2010	7/07/2012	29/06/2013	357
2	Design, supply, erection, testing and commissioning of Extension of Existing bays at Aminbazar and Meghnaghat 230kV Substations	18/08/2008	10/10/2012	9/01/2014	28/06/2014	170
3	Land development with slope protection work for Aminbazar 400 kV Substation	118/01/2011	21/03/2012	20/12/2012	25/04/2014	491
4	Consultancy Services for 400kV Meghnaghat-Aminbazar Transmission Line	29/04/2007	31/01/2008	30/06/2012	30/06/2013	356

Figure 10 : Delay chart for Meghnaghat–Aminbazar TL project



Different reports collected from PGCB, it is observed that Bid document preparation and technical evaluation took relatively longer period than the planned schedule which consequently led to the delayed award of contract**(Figure 11)**. During construction period, mobilization also got delayed and contract amendment became inevitable because of the complexity and change of scope in the project. Construction period was exceeded by 11 months due to inefficient site management by the contractor. From the above passage it can be inferred that slowed decision making, late contract award, poor site management by contractor, change in scope, lack of proper planning and scheduling etc. work as a collective force behind the delay of a project.

Figure 11 : Gantt chart for Meghnaghat-Aminbazar TL project



Grid Interconnection between Bangladesh (Bheramara) and India (Baharampur) Project

As a part of a signed Memorandum of Understanding (MoU) between the Government of Bangladesh and India, the Grid Interconnection between Bangladesh (Bheramara) and India (Baharampur) Project has been taken by the Government of Bangladesh. PGCB is the implementing agency for this project under the Ministry of Power, Energy & Mineral Resources (MoPEMR). Package-wise time duration is showed in the following Table(8):

Table 8: Package wise time duration for Grid Interconnection Project

Sl	Package	Tender Invitation	Date of award of contract	Contractual date of completion	Actual Completion Date	Time delay
1	Design, Supply, Delivery, Installation, Testing and Commissioning of 1x500 MW HVDC Back to Back Station at Bheramara (Bangladesh) Associated with Bangladesh – India Power Exchange Programme	29/06/2011	29/06/2011	28-06-2013	15.12.2013	170
2	Design, Supply, Erection, Testing & Commissioning of 400 KV Baharampur (India)-Bheramara 30km Double Circuit (D/C) Overhead Transmission Line (Bangladesh Portion)	18/08/2008	30-12-2010	29-06-2012	30.06.2013	366
3	Land Development by Dredging from Padma River for Proposed 400kV HVDC Back to Back Station at Bheramara,Kushtia for Grid Interconnection Between Bangladesh-India.	118/01/2011	21-07-2010	20-07-2011	18.07.2012	364

From project completion report of this project, just like other projects, RoW (Right of way), delay is site preparation, slowness in decision regarding land development, delay in procurement process, change in estimation, design and scope of works etc. are moving factors behind the time overrun of project completion.

CHAPTER FIVE: CONLUSION AND RECOMMENDATION

5.1 Summary

Clear Identification of the driving forces of delay is the first step in attenuating the adverse effects of delay. The main objective of this thesis was to scoop out the major factors of delay in the projects of PGCB because delays are considered to be a consequential problem in the construction industry of Bangladesh. Through an elaborated literature review along with interviews with different experts, 56 different factors of delay were pointed out and further categorized into nine groups: project related delay factors, client related delay factors, contractor related delay factors, consultant related delay factors,design related delay factors, material related delay factors, Externality related delay factors, Labor and Equipment related delay factors and Contract relationships related causes. Relative importance of these delay factors were then quantified in this thesis work and the ranking of the factors and groups were depicted according to their importance level in delays. Afterward, data of different completed projects from individual project office was collected for further investigation about these delays.

Following findings are found from the thesis work:

i. According to the opinion of all three groups of practitioners in the project, “poor site management and supervision”, “ineffective planning and scheduling”, “late contract award” and “slowness in decision making involving all project teams” are the most significant factorswhich cause delays in projects.
ii. Even though a good agreement exists between clients and consultants, a visible difference in understanding exists between consultants and contractors, as well as clients and contractors.

5.2 Recommendation

With a view to minimizing and controlling delays in the Projects of PGCB, the following recommendations might be helpful to different parties:

i. In order to ensure more competent contractors, instead of Open Competitive Tender, a preferred way can be adopting selective tendering method through pre-qualification of tenderers.
ii. Contractor-related delays are mainly due to the low technical and managerial skill of contractor personnel. If contractor organizations pay more attention to upgrade the expertise of their technical and managerial personnel through training

programs or recommending short courses in reputed organizations, this class of delay can be reduced.

iii. Contract documents prepared in a perfunctory manner result in delays in Projects. Contract document should be lucid and comprehensive enough to ensure that information is clearly understood among all the parties related to the project.

iv. Lack of coordination between different entities (ERD, IMED, relevant Ministry, and Development Partner) slows down the project activities. In order to decrease this delay, processes like e-filing, online communication etc. should be integrated.

5.3 Recommendation for future studies

It is important to mention that this study is based on a single organization of the Government which discussed mainly the problems concentrated in Power Sector Projects. Similar study should be performed in other government sectors of Bangladesh. Research can be done for a different type of projects like high way construction project, building construction project, dam construction projects, etc. Elaborated studies can be done to evaluate the involvement and effect of a specific party or resource of government project to the time overrun in government sectors project. Also research can be carried out to investigate how financing and cash flow problems create delays in Government or private sectors project.

5.4 Limitation of this Study

Though best efforts was put in this study and findings do make a significant contribution for project management in Bangladesh, this research has some limitation. Due to time constrain, the sample size of 50 is considered to be on the smaller side for statistical analysis. Secondly, the respondents are not evenly distributed among the professional roles which may have induced some bias in responses. The relationship between various reasons of delay and its impact on overall project delay has to be detailed further.

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