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CAUSES OF DELAYS IN TRANSPORTATION INFRASTRUCTURE AND ITS REMEDIAL MEASURES : AN OVERVIEW

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Abstract: - Due to the inherent risks and increasing complexity of modern infrastructure construction projects, delays and cost overruns have become common facts in the construction industry. Delays can lead to many negative effects such as lawsuits between owners and contractors, increased costs, loss of productivity and revenue, and contract termination. In India, several construction projects experiencing more delays which results in exceeding the initially fixed delivery time and cost. "Delay can be defined as the time overrun or the extension of time to complete the project". This project aims to find out the most significant factors causing delays in Indian construction projects through literature review and questionnaire survey. Nowadays, highway construction suffers from delay and cost overruns, which causes traffic problems, changes of design, poor planning, disputes, cost overruns, poor safety practices and time delays. The questionnaire is to be distributed to various respondents owners, consultants, contractors, etc. and data collected through it is analysed to rank the causes of delays. Possible measures are suggested to avoid the delays in construction projects.

I INTRODUCTION

One of the most common concerns in building projects is delays. A construction project's delay is described as the project's completion time being longer than expected. Miscommunication between contractors, subcontractors, owners, and suppliers is a common cause of construction delays. Clean and effective preparation mechanisms, which specifically define the job and timetable to be used, are typically used to prevent these forms of impractical exceptions. Delays in building projects are costly, and they can also cause serious harm to the parties concerned. The construction industry is critical to a country's economic development. It is the process of putting plans, proposals, criteria, and specifications into a physical facility and assigning resources to fulfil the owner's particular requirements. Construction management is the method of producing results by integrating the efforts of the consultant, client, and designer. Construction is a very unique and innovative practise that organises four terms of construction into a systematic structure: Material, Manpower, Machinery, and Money. As a result, construction management encompasses the planning, execution, and supervision of a project's construction activities. The primary objective of construction management is to plan and schedule resources within a project's context. During the building phase, the construction resources rules and procedures. Both types of office work, such as preparing, designing, forecasting, bargaining, ordering, arranging, and managing, should be carefully completed before the work on the site begins.

However, the construction sector of India has been facing problem regarding various internal and external environment pressures. These issues result in the restriction in the flow of construction work. Government action issues are associated with the development of transparency in the legislation and regulation that initially create an obstacle to starting the project. In addition, the market pressure restricts the better performances regarding the progression of the construction work. Internal restrictions are associated with institutional initiatives. Lack of the initiatives did not provide the necessary support to the construction industry. Operational inefficiency between the pressure groups and informed employees to work in collaboration results in the creation of deterioration of the environment. Furthermore, the occurrence of the obstacles mainly results in the delay of the completion of the construction project.

II LITERATURE SURVEY

The primary function of roads is to provide accessibility and mobility. Presently, developing countries around the world are prioritizing the improvement and linking of their road networks. Road projects are being listed as the primary focus in

their national budget, given that a good road network contributes to the development of the economy and national growth. The authors cannot deliver goods and services without adequate transportation infrastructure. Therefore, road projects should be completed in accordance with the schedule to serve the immediate needs of stakeholders. Unfortunately, delays in road construction projects due to various reasons are a major problem facing construction professionals. It has been proven that the incapability to finish projects punctually and within a given budget continues to be a persistent issue worldwide [1]. Although the causes of delays are quite comparable across developing countries, several factors unambiguously pertain to local industries, socio-economic backgrounds, cultural matters, and project features, such as land disputes and problems of the right of way for roads. With road construction projects already producing a multitude of issues to the community, such as heavy traffic and increased possibilities of road accidents, among others, project personnel is also facing the consequences of project failure, profit decrease, and loss of faith to the public in government-funded projects. Therefore, on-time completion of a road project is exceptionally crucial. Card [2] stated that " . . . the advancement of scientific knowledge is based on the systematic building of one study on top of a foundation of prior studies, the accumulation of which takes our understanding to ever-increasing heights." Hence, in order to develop a better framework to address the current problems faced by the construction sector in the process of developing a road, the authors will compile the leading causes of delays from 25 countries around the world. The approach to conduct this study is through a universal comparison of various research studies in these countries on the reasons for a delay in a road project. The researchers will identify the primary reasons that directly influence the untimely completion of a road project and recommend proven techniques based on a literature review to address the problem. Meanwhile, the research findings could be considered a reference to road project implementers, both the government and the contractor, as to the precautionary actions to be taken to avoid delays in road project implementation. Battaineh [3] determined that road delays are widespread. The typical proportion of the real completion time to the scheduled length is around 160% for new road projects. Delays have undesirable results on every participant in the project. They affect the growth in confrontational relations, mistrust, lawsuit, arbitration, cash-flow issues, and an overall sense of anxiety [4]. This problem is not limited to developed countries. Developing countries also experience the same issues [5]. Duran's [6] study concluded that most of the delays in construction projects had not been managed appropriately or stringently. Even no analysis was also easily observed. As an upfront tactic, contingency is a common method to back up delays. Accordingly, it is not easy to assure project completion dates. The study emphasized the significance of delays in the implementation of construction projects. The study's primary objective is to recommend precautionary measures that will guide road project implementers to reduce delays in road construction projects from the results of the analysis in identifying the ten (10) principal reasons for a delay in road construction projects in 25 developing countries. In addition, this study also identifies the likelihood of delay situations in the delivery of road construction projects in these countries. This study aims to develop a broad knowledge of the primary causes of delays in road construction projects. Therefore, it is necessary to understand what a project is and how the authors can materialize an idea of a project. According to Loftus [7], a project is a temporary effort with a start and an end. It creates a unique output, service, or result. Concerning its construction, three principal stages must be completed: the Planning and Definition Stage, the Design Stage, and the Procurement and Construction Stage. In the first stage, the owner determines the main requirements and sets the initial budgetary constraints. The definition of the main requirements refers to the establishment of the broad project components such as the scope, the equipment that will be required, and the primary outcomes expected. The information assembled for the main features of the future project will help the owner draw an idea of the amount of money required for the building. This information will form the basis for the second stage. Along with this theory of project management, Sears and Clough [8] define the second stage, such as the engineering and architectural stage. The primary purpose of this phase is the preparation of the final working designs and

specifications for the technical requirements. In this phase, the engineers and technical staff will schedule the main activities for the development of the project. The scheduling defines what will be performed, how it will be performed, and the plan for its accomplishment. The purpose of scheduling is to divide the project into many subcomponents, which are called activities. Once the schedule for the construction is completed, the contractors will establish a calendar-date agenda for the timing of specific activities. Sears and Clough [8] propose that a project schedule is a timetable for its construction and operation. According to the authors, there are eight steps for appropriate scheduling:

- Estimation of the time required to perform each network activity
- Computation of the overall project time required using the previous estimates
- Establishment of time intervals within which each activity must commence and conclude to satisfy the completion date requirements
- Identification of those activities that are crucial to timely project completion
- Decreasement of the project length at the lowest cost if the project completion date is not likely to meet the contract or other requirements
- Adjustment of the start and completion time of selected activities to minimize resource conflicts and set suitable demands for workforce and equipment using surplus or float time that most activities possess
- Preparing a working project schedule that focuses on anticipated calendar dates for the commencement and conclusion of each network activity

Recording the assumptions made and the plan's necessary boundary conditions for an integral aspect of the completed baseline project schedule. Sears and Clough [8] define the third phase as the delivery phase in which the key project equipment and materials will be collected. According to the authors, the phase of construction must be regarded as a procedure of the physical progress of the project. This activity involves the setting up of materials, manpower, and construction equipment, and addressing workforce complaints to accomplish the project successfully. Burke [9] indicates that a delay is "the event in which something happens later than the expected", and according to him, there are four primary methods to classify delays: "Critical or Non-Critical, Excusable or Non-Excusable, Compensable or Non-Compensable, and Concurrent or Non-Concurrent". Critical delays are the ones that affect project completion. The category of critical factors depends on the type of project; nevertheless, some factors can determine the activities that can be identified as critical. Some of those factors are the requirements of the construction equipment, the physical constraints of the project, etc. The second category, Excusable–Non-Excusable Delays, refers to the delays that occur due to unforeseeable events such as general labor strikes, fire, floods, weather changes, and force majeure events. The third category of delay, Compensable Delay, introduces the delays in which the contractor can be compensated for the occurrence of one determined event, to summarize some delays in which the contractor can be compensated. Returning briefly to the second category of delay, the third category of delay in many cases is related to unforeseen events. To prevent disputes between the contractor and the owner, it is necessary to specify which items in the contract of construction can be considered as non-compensable or compensable. Finally, the fourth category of delay or the Concurrent Delay is when the concurrency dispute is not from the position of defining the project's severe delays but from the viewpoint of conveying accountability for damages related to critical path delays. In their investigation for the main causes of construction delays, Trauner, Manginelli, and Nagata [10] presented a relationship between the delays. The analysis of the main cause of the delay in project construction is a key issue in the appropriate management of the project on account of two things. The good management of delays allows accomplishing the objectives of the project and the allocation for the reliabilities. Sears and Clough [8] mentioned that when the contractor is accountable for the delay, the loss caused by the delay must be covered by the contractor. When the owner is in charge of the delay, the contractor must request additional contract time. Faridi and El-Sayegh [11] said that construction delays are the most recurring problems in the building industry, which hurt the success of the projects in terms of safety, cost, time, and quality. Therefore, it must be a

priority for the owner and the contractor to define and identify the most significant causes for project delay to reduce the scope of its impact on the construction project.

A study on the factors affecting delays in road construction projects determined that the most severe aspects are human-related. They can be managed and reduced by refining the skills of the construction sides [12]. Santoso and Soeng [13] emphasized that delays affect not only the last time of the project but also the cost and quality. Recommendations to decrease delays in road projects must include authorities of services in the early stage of the project. Consistent conferences with the authorities are imperative to recognize their needs and accommodate them during the first phase of the project. This approach offers the authorities of services a chance to design their work packages and control the procurement of the materials required in the project. Thus, it is expected to have a nominal adverse influence on the road project [14]. A study by Mahamid [12] indicates that the administrative skills of construction parties should be enhanced, the labor motivation system developed, and communication among construction parties enhanced at the early project stages to minimize late changes during the construction phase. In addition, the procedure of contract awarding could be improved. The resources and capabilities of bidders should be verified carefully for minimizing schedule delays in public construction projects. For a successful Social Overhead Capital (SOC) project, it is critical for a government to control cost overruns and estimate a realistic budget. There are many reasons for the cost overruns, such as changes in the project scope, delays in construction, inappropriate estimation, alteration of the cost of the project, and the absence of the earned value management system [15].

III RESEARCH METHODOLOGY

In India, several construction projects experience more delays which result in exceeding the initially fixed delivery time and cost. Also highway construction suffers from delay and cost overruns, which causes traffic problems, changes of design, poor planning, disputes, cost overruns, poor safety practices and time delay. In this study design and develop a case study to identify the most influence factors for delay in roadways transportation construction. This study collects a primary data from questionnaire survey and predict the factors ranking according to achieved weight. Research methodology is carefully designed after assessing the extent of the objectives to be fulfilled. The Questionnaire is believed to be the best technique for gathering the required data. The questionnaire has to be designed and distributed to the Government clients that are in charge of executing public projects, companies, contractors and their consultants that are supervising these projects. A questionnaire is developed in order to evaluate the severity and importance of the identified causes. The data collected to determine the most influential factors on project management of the project was done through a survey by explorative questionnaire to the respondents involved in daily activities of construction firms in various regions in the Pune region of India. The questionnaire was designed so that respondents can give the rank to their answers based on their opinions

Data Collection and Discussions

This study generated two results, while the frequency and intensity of each cause of delay were identified. Repetition ranks the cause of delay in the number of countries in which the delay was mentioned in the comprehensive data gathered. One of the main findings is that the frequency of a delay does not always imply importance. According to the results of the homologation in the assessment of the impact of the causes of delay, the lack of experience of the construction manager and the inadequate planning and scheduling and influence on people's land alongside the road construction project (expropriation for the construction of the project) have a more significant impact than the frequent changes to the design (which was listed as the most frequent cause of delay). Below is the list of the most important causes of delay:

- Ineffective construction method implemented by contractor
- Shortage of materials
- Payment problems between contractor and his employees
- Improper planning and scheduling of project by contractor
- Shortage of manpower
- Shortage of equipment

- Interference by the owner during execution operation
- Delay in decision making by the owner
- Budget availability for the project
- Lateness in reviewing and approving contract documents by the owner
- Suspension of work by owner
- Delay in solving design problem
- Major change of design during construction by consultant
- Bad project cost estimation
- Lack of competent person to monitor the progress at site
- Delay in performing testing and inspection by consultant
- Difficulties in obtaining work permits
- Land acquisition
- Traffic diversion
- Hot weather effect on execution activities
- Scarcity of materials in the market
- Effect of social and cultural conditions of inhabitants
- Political situation and security
- Accidents at execution site

IV CONCLUSION

In this section of the conclusion chapter, the researcher has intended to analyze the qualitative data and develop the appropriate conclusion for the research. The entire discussion related to the findings from the case study and the responses provided by the managers regarding the questionnaires has been aligned with the research. In the next section, the researcher has described the background of the research and relates the objectives with the findings from the data. Moreover, depending on the conclusion the researcher has suggested some recommendations that can address the delay issues of the research. In addition, the research has also highlighted the future scope of the research.

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