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Analysis of Causes of Delays in Construction Project

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Abstract – The budget of Infrastructure projects in India are worth around Rs.100 lakh crore according to the budget 2019. Also a huge number of these projects are getting delayed invariably. According to the MOSPI reports, of the 1634 infrastructure projects in the country, 373 projects reported cost overruns, while 552 projects saw time escalation.(Express News Service / Published 09th December 2019) This is indicative of the fact that the causes of delays and their implications on the cost and time overruns warrant the need of studying. This study covers the various causes of delays in detail, as well as delays which are caused at various stages of the project. For this study only the transportation infrastructure projects are considered Currently there are no formal decision tools or guidelines to assist owners and project managers in choosing delivery systems and project strategies that allow reductions in the project cycle time. Project delivery systems in the construction industry have gone through an evolutionary process to reduce delivery time, while maintaining quality and containing cost. The most commonly utilized project delivery systems prevalent today are traditional design-bid-build; construction managed by a professional construction manager; design-build lump-sum and guaranteed maximum price; and bridging a hybrid of two different systems. Faster delivery of projects has been one of the critical success factors in almost all industries. In the construction area, fast-tracking (or phased construction), in which activities are executed concurrently, has been argued to be an effective approach to a faster project delivery

Keywords – Infrastructure, Budget, Delay

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1. INTRODUCTION

In today's businesses owners rely on first-to-market product strategies to gain competitive advantage and increase profit margins. Within the construction industry, this has created a growing need for enhanced performance delivery systems that can achieve successful project delivery in shorter time. Owners demand greater improvements in the quality of project construction at lower costs and within reduced schedules. The completion of project's time milestones is a crucial factor because not meeting them usually involves significant economic impacts to the owner while time savings can lead to profit improvements. As a result, owners are sometimes forced to make last-minute revisions to project scope, which delays project completion by a considerable amount. Moreover, today's market opportunities and competitiveness within the industry can also force the owner to accelerate project execution and demand earlier completions. In the presence of increased demands for shortening project cycle times, research has dedicated in the last years significant time and effort in searching for the right tools and techniques to assist owners and construction managers to effectively manage time and resources aiming at expediting project execution and reducing project delivery time. Several sources of research provide the construction community with different strategies and techniques to effectively address today's aggressive schedules and tight delivery demands. The document presented herein is a recompilation of the most effective techniques available to the construction manager that enable project acceleration to achieve reduced delivery times.

2. LITERATURE REVIEW

Analysis of Causes of Delay and Time Performance in Construction Projects

Pablo González1; Vicente González, Ph.D.2; Keith Molenaar, Ph.D., M.ASCE3; and Francisco Orozco, Ph.D.4

Construction activity delays are a typical occurrence, and they can have a negative impact on both the timeline and the budget of a project. Quantitative assessments of delay effects have been the subject of recent study. The literature implies that further study is needed to comprehensively link the causes of delays to their consequences in the building sector. In order to get around this problem, this research investigates why

some tasks didn't get finished on time. There is a need to investigate both the qualitative and quantitative aspects of delays. This study provides a framework for doing so. As a time-performance metric for assessing the consequences of delays on both important and noncritical tasks, the article suggests using two indicators: (1) the reason for noncompliance (RNC) and (2) the delay index (DI). Planning and subcontractors are the key RNCs that have the biggest influence on time performance in the paper's two case studies. Planned delays were the most damaging to our ability to meet our deadlines.

Application of Time Buffers to Construction Project Task Durations

Marion M. Russell1; Gregory Howell, M.ASCE2; Simon M. Hsiang3; and Min Liu, A.M.ASCE4

Individual task durations are buffered during planning to adjust for uncertainty and defend against workflow variance to ensure a predictable hand-off to following crews, which is the purpose of this study. The use of temporal buffers has been acknowledged in prior research, but their practical use has not been examined. This study examines why people create and increase their time buffers. In order to determine the most common and severe causes for including time buffers in construction work durations, a countrywide survey was performed to project managers, supervisors, and foremen. A total of 47 buffer elements were divided into nine categories, including project characteristics, prerequisite work, detailed design/working technique, labour force, tools and equipment, material and components, work/jobsite circumstances, management/supervision/information flow, and weather conditions. Research contributions include: (1) identifying the 12 most common and severe causes of time buffer; (2) analysing (understanding) how foremen, superintendents, and project managers, as well as the perception of different trades and between general contractors and subcontractors, view buffers; and (3) investigating how companies that do not regularly use the Last Planner System and the th In addition, an integrated risk assessment technique was used to produce quantitative risk profiles for the buffer components. Construction managers will be better able to target issue areas and inefficiencies if they have a better grasp of how time buffers are used and the frequency and severity with which they occur.

Case Studies of the Allocation and Reduction of Time Buffer through Use of the Last Planner System

Marion M. Russell1; Min Liu2; Gregory Howell, M.ASCE3; and Simon M. Hsiang4

The inherent complexity and uncertainty of building projects necessitates the usage of buffers to smooth out the fluctuations. Construction job durations have a time buffer applied to them in these case studies. For this study, the term "time buffer" refers to the extra time that is added to the duration of individual tasks to account for uncertainty and defend against workflow variance. It was determined that two case studies were done, one of which involved a mechanical contractor and the other of which was a big general contractor. For the benefit of the field, this study adds to what is already known in three ways: by examining the impact of time buffers on project performance; empirically demonstrating the effect of last planner systems (LPS) on decreasing time buffer and increasing the percent planned complete (PPC); and (3) by looking at trends in different trades and activity types' time buffers.

Concurrent Delays in Construction: International Legal Perspective

Farrukh Arif, A.M.ASCE1; and Ayman A. Morad2

"Concurrent delays" refers to situations in which many delays occur at the same time, each of which would cause the total project to be delayed. Consecutive delays are frequently the fault of competing contract parties like the owner and the contractor. This frequently results in disagreements on the degree to which each party is to blame for the delay in the project. Various legal systems throughout the world cannot agree on the way to correctly allocate damages due to concurrent delays. Due to a lack of agreed-upon legal practise, court decisions on apportionment are frequently reliant on precedents and case law. For this reason, this paper provides an overview and comparison of several court rulings on concurrent delays and apportionment under various legal systems, including the United States (US), Canada, the United Kingdom (UK) and Australia. ' Generally speaking, this analysis suggests that the US approach to concurrent delay claims is significantly more developed and consistent than the other legal systems investigated in this study.

Cost Overruns and Failure in Project Management: Understanding the Roles of Key Stakeholders in Construction Projects

Hemanta Doloi1

Poor cost performance is a common topic in the mainstream project and construction management literature. In spite of this, key players (clients, consultants, and contractors) in the Australian construction sector are unsure of their duties in handling this ongoing issue. An in-depth examination of these important stakeholders' roles and duties aims to uncover the industry's belief that the contractor's performance is solely responsible for cost performance. This analysis was based on a thorough assessment of literature and the involvement of relevant industry experts. Planning

and scheduling flaws have the greatest influence on cost performance from the standpoint of customers, consultants, and contractors, according to the relative significance weighting technique on 48 selected variables. Factor analysis of the combined replies from all three groups shows that strong control mechanisms and proper programming, coupled with efficient design and excellent site administration, are the most important aspects.

Effects of Schedule Pressure on Construction Performance

Madhav Prasad Nepal1; Moonseo Park2; and Bosik Son3

The benefits of speeding up a project are numerous. Even if the effort is worth it in the long run, sacrificing productivity and quality in order to stay ahead of the game might have serious implications. When making timetable decisions, it is common to neglect the tradeoffs and routes of schedule pressure, as well as its origins and effects. Schedule pressure has an impact on construction performance, and this research studies the tradeoffs in scheduling. A causal diagram has been used to depict the cause-and-effect analysis of scheduling pressure in a research context. A survey of 102 construction workers from 38 Singapore building sites was used to conduct an empirical research. The results of this survey data analysis show that gains in productivity and quality might be countered by losses in speed of work, by working under schedule pressure. Working out of order, creating job flaws, cutting shortcuts, and losing enthusiasm are all side consequences of working under time constraints. Scheduling construction tasks realistically and planning them ahead of time, encouraging employees, and building an efficient project coordination and communication structure helps reduce the negative consequences of timetable pressure.

Accelerometer-Based Activity Recognition in Construction

Liju Joshua1 and Koshy Varghese2

Safety, productivity, and quality on construction sites may be measured and controlled by recognising the actions of construction employees. The measuring system's efficiency can be improved by using automated activity recognition. Accelerometer-based activity categorization is the focus of this investigation. Accelerometer data segments are used to produce feature sets for testing classifiers that can identify activities. Accelerometers linked to the mason's waist are used in an experimental study to categorise masonry tasks in both instructed and uninstructed modes. The multilayer perceptron, a neural network classifier, was shown to be the most effective of the three types of classifiers tested. Classifier performance was boosted by a 50% overlap in data segments. Using only the best characteristics instead of all of the available ones did not have a significant impact on classification accuracy, but it did drastically shorten the overall run time.

No-Damages-for-Delay Clause: Evaluating Contract Delay Risk

H. Randolph Thomas1 and John I. Messner2

No-damages-for-delay provisions in construction contracts have been the subject of several court battles in recent years. Legal elements of the "no damages for delay" provision are discussed in this article, and a flowchart detailing the difficulties that need to be solved is shown. When it comes to collecting damages, contractors face a severe roadblock in the shape of the clause. Most of the time, the contractor has to prove that the owner or the owner's agent interfered actively or showed ill faith toward the contractor in some other way. An important factor in evaluating the contractor's exposure is the clause's wording. Minimal, middle and high risk language examples are provided.

Scheduling Policies for the Stochastic Resource Leveling Problem

Hongbo Li1; Zhe Xu2; and Erik Demeulemeester3

Uncertainty makes it impossible to implement a levelled baseline schedule generated by solving the deterministic resource levelling issue. This schedule may even be infeasible. Furthermore, typical stochastic approaches may not be able to develop schedules that are sufficiently levelled. New processes are urgently needed in order to cope with resource levelling under uncertainty. They investigate the challenge of resource levelling under uncertainty of activity durations, in which renewable resources must be levelled across time. In order to minimise the predicted total of the weighted coefficient of variation of resource utilisation, two heuristics for developing scheduling strategies are described. Different approaches to solving the stochastic resource levelling problem are represented by two heuristics

Concurrent Delays in Construction

Farrukh Arif, A.M.ASCE1; and Ayman A. Morad2

"Concurrent delays" refers to situations in which many delays occur at the same time, each of which would cause the total project to be delayed. Consecutive delays are frequently the fault of competing contract parties like the owner and the contractor. This frequently results in disagreements on the degree to which each party is to blame for the delay in the project. There are strict time and financial constraints in construction contracts. It is common for building projects to take longer than

expected to complete because of their unique character. Worldwide, there has been a great deal of interest in studying construction delays because of the tendency of projects to be delayed. One of the most difficult aspects of preparing and defending construction claims is analysing schedule delays. When there are several delays, this type of analysis gets more difficult.

The study's findings can be used as a standard for different legal situations when evaluating the practises of concurrent delay evaluation. Legal systems that have usually followed the English common law method were included in this analysis. We should look at the legal systems of other countries and conduct comparative analyses of concurrent delay evaluation techniques in different areas as part of future study.

The Predictability of Fast-Track Projects

A. ALHOMADI 1*, R. DEHGHAN1 and J. Y. RUWANPURA1

Project predictability is impacted by the use of fast-tracking to accelerate, overlap, or compress timelines (time, cost, and quality). Predictability is critical to the success of a project. Fast-tracking has been examined in certain studies, but no research has explicitly examined the link between fast-tracking and the project's goals. It is the purpose of this research to examine the link between fast-tracking and predictability with reference to project success.

Shortening the duration of projects has become increasingly popular in recent decades due to the rapid growth of several project markets, such as industrial, engineering, procurement and construction (P3) and information technology (IT). In most cases, cutting corners increases the project's complexity, posing new problems for the project's team. The project's stages are intertwined, and the project's reactions to changes over the course of the project provide the most significant problems.

3. CONCLUDING REMARK

Adopt efficient information retrieval and distribution systems to guard against communication gaps; respond as quickly as possible to contractor and client questions and requests for clarification to avoid associated delays and confusions which consequentially will lead to cost overrun. Continuous coordination and direct communication, which will eliminate design discrepancies and errors as well as omissions in design and also provide an opportunity for professionals to review the contract documents thoroughly. This would help in eliminating change orders or variations due to discrepancy in contract documents. Provide comprehensive information required for easier interpretation of the drawings and setting out of the works. Specifications should also be standardized for ease of understanding by project participants; ensure adequate and realistic specifications of materials and methods are stated in the contract documents.

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