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DELAY ANALYSIS IN RESIDENTIAL PROJECT BY USING GENETIC ALGORITHM

Ankush Suryabhan Harle[1], Prof. Rahul D. Shinde[2]

PG Students: RMD Sinhgad School of Engineering Pune[1]
Assistance Professor: Department of Construction Management, RMD Sinhgad School of Engineering Pune[2]

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Abstract:- One of the most communal problems in the creation project is delay. Delay of a structure project can be defined as the late end of works as related to the strategic schedule or deal schedule. Projects can be late due to number of causes that may be outstanding to the consumer, the contractor, acts of God, or a third party. They may happen early or late in the plan growth, alone, or with other delays. Interruptions can be reduced merely when their cause are recognized. The objective of this learning was to classify the main reasons of interruptions, the belongings of delays, and systems of reducing delays in creation plan. This work focus on delay analysis in construction with different measures. This work also investigates the interruption of time as well as cost maximization with different factors. We did all the work and scheduling done using MSP 2013.

Keywords: *Delay analysis, Microsoft project, Construction project, RII approach, Genetic Algorithm, work scheduling.*

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I INTRODUCTION

The Construction industry plays an important role within the economic process of a rustic through the multiple effects of the opposite sectors of economy. Construction is defined as a creation, renovation, repair and demolition of immobile structures and alteration of natural topography. It is somewhat just like the process to satisfy the desired demand of homeowners like modification of arrange specifications and resources within the project schedule, cost and quality. Due to the unique nature of construction project, knowledge gained in coming up with, scheduling and dominant construction method is seldom unfold. This results in value of in-efficiency that is being incurred as a requiring cost. By taking the expenditure of construction industry, the Project Management profession became much valuable in order to create positive the project goes in an exceedingly right track to complete with success. The project management acts as a critical path in construction project, where it contains the information of coming up with, scheduling, controlling and implementing the things. Developing good construction arrange is vital path in construction management. A plan acts as a basis for developing budget and schedule of the work.

A project is now thought of as a cluster of activates interrelated, which could embody a task of specialist and specialized work victimization latest information and talented men out there to be order taken in most systematic manners. The" most systematic manner" involves adoption of techniques are applied to Project Management. Delay is generally acknowledged as the most common, costly, complex and risky problem encountered in construction. comes due to the dominant importance of your time for each the Owner (in terms of performance) and also the Contractor (in terms of money), it's the supply of frequent disputes and claims resulting in lawsuits. to regulate this case, a contract is developed to spot potential delay things beforehand and to outline and fix obligations to preclude such controversies. a considerable variety of General Condition's clauses address this subject in a method or another. Beneath some circumstances, a Contractor is also entitled to say delay damages if he finishes later than is an Owner-accepted early completion schedule however continues to be sooner than the official contract completion date. This might occur if the Contractor establishes an immediate cause-and-effect relationship between Owner's breach of a written agreement obligation and also the delay. Additionally, the Contractor has the burden of creating its multiplied prices as a result of the delay.

Types of delays

Delays operations are divided in following four groups:

1 Excusable Delays

Excusable delays are those not attributable to the contractor's actions or inactions, and typically include unforeseen events. It's allow the contractor to obtain a time

extension to complete the contract without being penalized. However, this type of a delay normally does not entitle the contractor to any damages caused by the delay. The examples of excusable delays to a contractor's action are differing site conditions, design problems, changes to the work, inclement weather, and strikes. This type of clause sometimes called a "force majeure" clause, lists excusable delays. As this list implies, when unanticipated outside 'forces delay completion of the contractor's work, the delay is generally considered as excusable.

2 Non-Excusable Delays

This type of delay presents no entitlement to a time extension or delay damages for the contractor if the delay can be proved to have affected the whole project. The owner however could be the liquidator to the damages. For instance, a non-excusable delay would be when a contractor fails to provide sufficient manpower to complete the job on time. Client can claim their loss if had in the contract agreement. The factor that contribute to the non-excusable delay:

The usual weather and as expected whether,

• Delay cause by subcontractor,

• The inefficiency of contractor to manage the construction site.

• The financial of contractor.

• The lack of labour.

• Failure to manage their work according to the contract schedule.

• Always make mistake or failure to fulfill of owner specification.

3 Compensable Delays

Basically, compensable delay is when the contractor will be receives payment due to the additional cost of delay and as well as addition to a time extension for contract performance if there is any change inscope of work, late supply of owner materials or information, impeded site access, differing site conditions and failure to provide timely and review shop drawings. Furthermore, this type of delay is for which the innocent party is entitled to both a time extension and additional compensation for the resulting costs.

4 Concurrent Delay

Concurrent delays refer to delay situations when two or more delays occur at the same time or overlap to some degree. For example, if an owner denies access to a project site for two weeks, and a severe storm prevents the contractor from working on the project for one of those two weeks as well, there will be a concurrent delay of one week. The contractor will be able to recover for delay damages for one week, as a severe storm is not a cause of delay that is compensable and would have prevented the contractor from performing even if the owner did not deny access to the site. However, if there two concurrent causes of delay, one of which is a relevant event, and the other is not, then the contractor is entitle to an extension of time for the period of delay caused by the relevant event not with standing the concurrent effect of the other event.

II LITERATURE REVIEW

Delays are one of the main complications facing by the building production. The interruptions in building plans have weighty economic and public effect to all parties involved in the projects. Construction interruption is a main difficulty facing by the building industry. In most construction projects, there are delays and their impact level varies from plan to project ranging since a few days to years. It is regularly understood that the building interruption is the greatest critical factors affecting to deliver the plan in time, within budget, and expected quality. It can be found rarely that a project was completed within the specified time. There are various negative belongings of delays such as proceedings among owners and contractors, increased costs, loss of productivity and income, and indenture finish. Effects of delays which mainly marks are loss of Interest by the Investor, prohibit by Consultants, unused of Money and Time, Declination of Reputation etc. Delays began by servicers can commonly be official to poor supervisory expertise. Lack of scheduling and a meager accepting of accounting and economic moralities have led to many a contractor’s downfall. In this study, most critical factors causing delay and their effects in large residential construction projects in India A project is now thought of as a cluster of activates interrelated, which could embody a task of specialist and specific work oppression modern info and a gifted men out there to be direction taken in most organized protocols.

Ahmed TaghiMultashi, Rohit R. Salgude (2015) This analysis of the Olympic sports stadium in Alkut delay factors investigated. Participant observation was adopted an approach has advised that from the descriptive principles of anthropology? The last Olympic game stadium construction until completion prior professional conduct as a senior design engineer major human-relations factors were discovered and known that the management and development had an impact on performance of the designing. Designing method and its effectiveness planning this shadow culture within the team and immediately the quality of relationships between the stakeholders associated with human difference management serves to modify. The analysis concludes by questioning the parable amongst project participants that construction coming up with could be a mechanistic method that has got to be conducted entirely by the look team.

Vinod M1, Kiran K M2, (2013) has investigated exploitation construction schedule to predict project completion , contractors will alter crew size, shifts or instrumentality to hurry or slow the progress. It's a project slippery over its planned schedule and is taken into account as common downside in construction comes. tiny project will be managed with efficiency manually; whereas massive project aren't thus massive project will be handled by the utilization of laptop. Analysis

ought to be in serious trouble the aim on creating right choices on time and value compensation claims. The main of this study is to analyse the Project Management Techniques by planning varied construction activities, allocation of resources and resource levelling exploitation Microsoft Project and Microsoft stand out software system , personnel of every activities determined and allocation is completed exploitation software system for residential building.

SongulDayi (2010) mentioned in her study that dwells on the importance of construction schedules in achieving the aim of producing good quality construction work within the specified duration. Building construction within a period specified in the quality objective of the importance of achieving production dwells mentioned in his study. Constant monitoring interactive relationship program and contractor demand concerning delay is a complicated process. Here both time money, owner and contractor, and for this reason the construction schedule delay must be analyzed and corrective measures should be taken in a timely manner, simple and basic approach.

Mohamed Marzouk and Tarek El-Rasas (2013) are found the Construction delays are common problems in civil engineering projects in Egypt. Often leading to controversy and litigation project life-time during these problems. Therefore, this study and analysis of the reasons for the delay in construction is required to. The research gained from the construction delay literature presents a list. The interview was obtained through expert feedback. Later, a survey questionnaire was prepared.

Ghulam Abbas Niazai and KassimGidado (2012) mentioned that Construction delay in Afghanistan is explained through literature review and field survey. . Extensive literature reviews through 83 identified the causes of delay, factor in nine groups combined. Customers including contractors and 15 20 25 consultants responded to three major stakeholders, questionnaire forms. Respondents from delay is highly contributes to 12months at the reported contract.

According to Nagaraju& Reddy (2012) useful Primavera software for source arrangement of a fast track creation of a marketable building with constrained time duration. In this paper, the learning has been passed out in two phases. In the first phase, by resources of PRIMAVERA software, project was scheduled for various doings for the creation of a commercial building. Subsequently, requirements of properties remained planned to the doings based on Standard Schedule Rates (CPWD) and IS 7272 (part I – 1974). The mandatory data was composed from the detailed drawings and prevailing site conditions. In the second stage, a Resource Constrained Investigation was supported out by Source Razing for many activities by declining possessions with enlarged time of float activities.

In system Indrasen and Venkateswarulu (2014) For project arrangement CPM/PERT, changed softwares like MSP, Primavera and optimization techniques, fuzzy logic is used. It had effectively applied Primavera software to National Highway project for preparation & adjusting cost and properties and help to achieve timely achievement of project. Resource scheduling is normally used to decrease the duration & cost of project, by proper allocation and leveling of resources. For schedule monitoring Earned Value Management (EVM) method is used.

On the basis of Antony and Thirumalai (2014) have associated the accounted cost of work completed beside real cost of exertion achieved and planned cost of work programmed to entree rate and schedule adjustment respectively.

According to Mohamed Marzouk and Tarek El-Rasas are create the Creation delays are public difficulties in civil engineering missions in Egypt. Often leading to controversy and litigation project life-time during these problems. Therefore, this study and analysis of the reasons for the delay in structure is required to. The research gained from the structure delay literature presents a list. The interview was obtained through expert feedback. Later, a survey questionnaire was prepared.

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For proper development of possessions Robert (1990) had developed a Packing method which is based on Critical Path Method (CPM). In this method, to measure the level of resources, the smallest minute of resource histogram was used. The empirical program dispenses project goings-on to definite days so that the final stockpile histogram styles a checkbox and its second methods a minimum value. To diminish uninvited source vacillations and to capitalize on effectiveness of resource application on structure site.

According to Khaled and DhoHeon (2009) developed two innovative resource levelling matrices. The first metric reflects the total aggregate of possessions that need to be momentarily unrestricted through short demand phases and rehired at a advanced step all through great demand periods. The second metric actions the total number of slothful and non productive source days because of undesirable resource fluctuations. Claim samples of these two conditions highpoints that these two conditions are convenient to creation planners and schedulers to augment the efficacy of resource exploitation and improvement in construction productivity.

In system James and Gerald Serial (1991) devices for source levelling and a quota for mediating the efficacy of supply steamrolling methods was accessible this approach. This paper agreements with formation of early source contours for creation projects, source levelling of the program, investigation of source usage verses rumored levels and the adjustment of resource profiles based upon this analysis.

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III MODELING AND ANALYSIS

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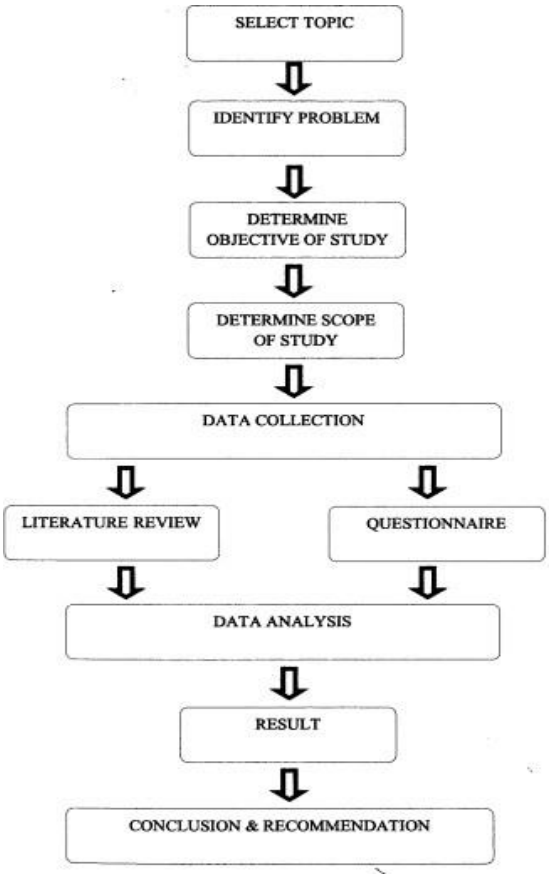

Figure 3.1 : Methodology of Study

The research methodology is a description of how the objectives can be realized. The data collection can be found through qualitative and quantitative methods. The data collection through these methods will be analyzed and the results will be presented. In this study, a questionnaire was developed to assess the perceptions of consultants and contractors on the relative importance of causes and effects of delays in construction industry in Skudai, Johor. The questionnaire was divided into three parts. The first part requested background information about the respondents. The second part of the questionnaire focused on causes of construction delay. The respondents were asked to indicate their response category on 32 well-organized construction delay factors and some other additional causes from the literature review that is suitable. This study is based on traditional contract only. These causes were categorized into the following eight major groups:

1. Client related factors: finance and payments of completed work, owner interference, slow decision making, unrealistic contract duration and requirements imposed and permits from municipality.

2. Contractor related factors: sub-contractors, site management, construction methods, improper planning, mistakes during construction stage, inadequate contractor experience, financing by contractor during construction and mistakes in preliminary stage (soil investigation)

3. Consultant related factors: contract management, preparation and approval of drawings, quality assurance and waiting time for approval of test and inspection.

4. Material related factors: quality of material and shortage in material.

5. Labour and equipment related factors:labour supply, labour productivity and equipment availability and failure.

6. Contract related causes: change orders and mistakes and discrepancies in contract document.

7. Contract relationship related causes: major disputes and negotiations, inappropriate overall organizational structure linking to the project and lack of communication between the parties.

8. External factors: weather condition, regulatory changes, problems with neighbors, unforeseen site condition and accidents during construction.

This part of the questionnaire focused on effects of construction delay in construction industry. The six effects of construction delay identified were: times overrun cost overrun, dispute, arbitration, litigation and total abandonment.

IV CONCLUSION

The paper presents a basic study of delay analysis. For source embarrassed breakdown resource leveling is done. The resource type for this project is considered manpower (labor) only. The mission plan increases day by day cost due to sudden requirement of labor or any unavoidable circumstances thus, it has an impact on the overall cost of the mission. Duration is increased for decline in source constraints. We study the different factor affect on delay in construction, but we can eliminate the such delay suing proper planning as well as scheduling.

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