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IDENTIFICATION OF CRITICAL DELAY FACTORS IN CONSTRUCTION

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Abstract

The aim of this paper is to develop a mathematical model and identifying the most critical factors that influence the causes of delay in construction projects. Delay is one of the most common, important and serious problem which impacts the time factor with relation to cost of projects in the Construction Industry, Conducted analysis acquired through survey of the delays experienced in very high rise building construction projects in every country of the world. We have presented four delay factors representing reason of late in development projects. The factors are client problems, contractor problems, resources problems, and general problems.

Key words: Project management, causes of delay, claims, most critical delay factors

1. Introduction

The construction industry produces various resources, infrastructure and facilities. It appears that the progress of a country depends on the success of its development plans with high construction content. Today's huge demand for construction of all types, coupled with an ailing economy and tight money, provides the construction industry with its bigger challenge (Qamar and Mushtaq's, 1989).

The success of projects can be depended as meeting goals, objectives, and within budget limits as well as completion of a time. Management of project is mostly based upon tools and techniques which plays important role. Most of the key factors of project management are the management of workers, machines, materials, money and methods etc.

Even today late is serious and coming problem in the construction or establishing industry. Despite technological advances and improved the understanding of project management by the management concerned is also one cause of delay in project completion. True are various reasons for the delay occurance such as due to stakes material shortage, equipment failure etc. In some cases delays are interconnected and make the situation more complex, Kraiem and Diekmann.

Delay of a project is a main factor and the major cause of construction claims. There is a acute necessity for a detailed investigation to identify the delay factors and choose correct actions to minimize the adverse effects of delays on time, within cost and for a high quality.

Using the control system by project managers is an important part of the process in which schedules can provide proper planing monitoring along with the objective clients (Timely completion of Project) is achieved, Ireland.

There is a acute necessity to identify the factors responsible for the reasons of delays, as well as their effects on the Pakistan construction industry. After the analysis and identification of delays, conclusions and recommendations to help mitigate such delays are detailed.

In this research paper, we suggest most critical factors causing delay in construction projects and develop a mathematical model.

2. Related Work

Sadi A. Assaf *et al*, In many countries, there are many causes of delay but most important cause of delay in projects which causes problems are approval of shop drawings, delay in payments to contractors etc including decision making and executive bureaucracy in owners organization.

Various aspects of causes delay was studied by Baldwin and Manthei. They noticed that weather, labour supply and sub-contractors were also the main causes of delay.

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Jonathan Jingsheng Shi and David Arditi have presented and described a method for computing activity that delays and assessing their contributions to project delay. That computing method is based on simple finish to start relationship. Stephen Ogunlana and Vithool Jearkjirm have determined six factors relating the sources and reasons for delays in the construction projects in Bangkok, Thailand. Delays can be reduced through various efforts during the time of construction where the common efforts suppliers, finance houses, educational institutions and manufacturers are required. The United States of America (USA), the United Kingdom (UK) and Western Germany, Mobbs have identified that construction time is managed adequately. An investigation by Odeyinka and Yusif has shown that seven out of ten projects in Nigeria suffered delays in their execution.

Chan and Kumaraswamy has established that poor performance of projects in terms of time overruns over the last three decades is a common place in the construction industry. For example, as per statical data 50-80% delays in 1627 World Bank sponsored projects (1974-1988), together with an average of 23.2% time overruns on UK Government constitutional projects from 1993 to 1994, further average time overruns on sample public building projects studied during 1994 in Hong Kong, were assumed to be 9 %..Alkass *et al*, delays are the most common problem and are costly also in construction projects. Its expansive for both owners and contractors. The owner loses the potential revenues from the use of the project and by increasing the overhead costs along with lost opportunities for new projects because of diminished financial capabilities.

One of the common and most important problems in the construction industries is delay. Richard and Glemm (1994) studied the effects reasons of delays on construction projects and found that delays had a serious effect on cost and project time too. Thus, he stated that delay is an important and significant problem in the construction Industry.

Bromilow (1980) also studied the effect of delays on construction projects and analysed a technique for contract time performance. The study was carried out to find the reasons of delays and the time performance activity of building projects in Australia. His study showed that the major causes of delays were the consultants and client interference, financing matters and the lack of proper planning techniques.

Delay occurs when the contractor and the project owner jointly or severally contribute to the non completion of the project within the original or stipulated or agreed contract period. Occurance of delays are a major source of claims and disputes with the construction of various projects which have been cited as the most common and expansive cause of construction problems (Qamar and Mushtaq's, 1989).

3. Material and Method

I- Effects of Delay on project

Overall delay in the construction project is caused by several factors. Some of which are within the owner's responsibility and some are within the contractor's responsibility. The overlapping nature of the events makes it difficult to discern what proportion of the overall delay is which party's responsibility (Arditi and Gurdamar, 1985).

The contract time, which can be defined as the maximum time allowed for the contractor to complete all work specified in the contract documents, is one of the most important aspects of the entire construction process. As for as dispute between the contractor and the contracting is concerned there is a possibility of decrease disputes between the contractor and the contracting on the other hand reasonable contract time may avoid higher bid costs etc (Hancher and Rowings, 1981).

Associated delay problems can also result in dispute, arbitration, litigation, total abandonment and protracted litigation by the parties. To some extent contract parties, through claims, usually agree upon the extra cost and time elongation associated with delay, Alkass and Mazerolle, 1996.

The effect of delay is different for different parties involved in the project although the common problem is the loss of time, money and facility. To the owner, delay means the loss of revenue through production facilities and rentable space not being yet available or continuing dependence on present facilities. To the contractor, delay means the loss of money to be able to continuous pay for the equipment and the persons hired on daily wages. Additionally, the contractor's running capital is tied up and other projects cannot be pursued. To the public it means that buildings and facilities are not available for use as planned. The service revenues lost through delay can not be recovered, Odeyinka and Yusif, 1997.

Most projects incur increased costs when completed later than planned. Additionally, some

times the structure of become worn out during lag and many of their parts need to be re-done before the end of the construction.

Overall the delay occurs due to several factors but any way it affects over the entire project. Due to delay the conflict may start and the contractor claims for the additional payments which is not easy to resolve it.

II- Most Critical Delay Factors in Construction

After going through literature review and others studies, we have determined the following most critical factors representing causes of delay in construction projects.

Client problems
Bid problems
Incomplete drawings and specifications
Delay in work approval
Change orders/change site conditions/changes in scope of wok **(Fig-1)**.
Delays in inspection and testing of work
Late payment by client to the contractor during construction
Slow decision-making

Contractor problems
Planning and scheduling problems
Late payment by contractor to workers during construction
Poor performance of work

Resource problems
Panelity of development materials materials suppliers
Late delivery of material
Supplier and late delivery of equipments
Low quality of materials
Shortage of workers
Shortage of equipments
Failure of equipments
Inflation

General problems
Environmental problems
Ground problems
Weather problems

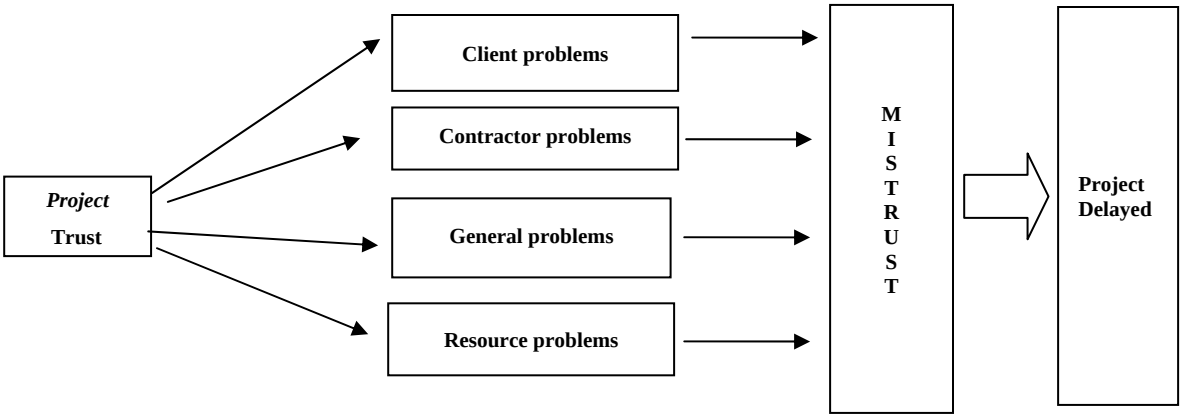

Fig. 1 Lay out of Delayed Factors in Construction

5. Result and Discussions

Its observed and experienced that increase the appointment of liability. This increase also manifests itself within the construction industry. Fenn and Spon (1992) found that literature show that there was a 100% increase construction in 1973 and 1980**.** In the past, delays in the completion of construction projects was accepted in the construction industry, but in current tight budgets it can not be accepted. As a result, construction delays very often end up as construction claims. Bordoli and Baldwin 1998 found that 52% of UK construction projects end up with claims of some type.

Mansfield and Doran 1994 realized the importance of study in Nigeria. He suggests that accurate estimates can be obtained by paying attention from the contractors. More ever clients and consultants must allow the various parties sufficient time and resources to produce these effectively. More training is required to improve contract management. Lack of availability of material has to be addressed at state level.

O. Ogunlana and K. Promkuntong (1996) studies Thai construction industry, finding that "Joint and construction efforts can reduce delay in construction projects. Can be reduced through the joint efforts of The participants of the construction industry owner associations, designers, contractors is necessary can reduce delay by joint efforts. Its also responsibility of Government to cooperate to necessary infrastructure for efficient project management".

Schedules consisting upon networks can help to identify the interrelationships among multiple causes of delay. Sometimes in some cases it is important in cases where both the client and the contractor contribute to the project's delay. In cases such as this, liability has to be identified so damages can be apportioned.

Construction schedules can play an important part in identifying, preparing, analysing or refuting delay claims because they can provide a precise medium for comparing measuring time and meaning. (Callahan, 1992)

6. Conclusion

Our purpose is to develop mathematical model of most critical delay factors responsible for reasons of delay in construction projects. Delay affects the performance, cost and time of the project. By assessing the frequency of delay, the extent to which the delay may occur, and who is responsible for the delay can provide insights into early planning to control these factors and improve project performance. After identification of delays, conclusions and recommendations to help mitigate such delays are detailed. We can't eliminate the total delay but we can minimize the delay activities affecting the project.

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