

## **Causes of Change Orders and Slippage of Schedule and cost Baselines in the Construction Projects in Pakistan**

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### **Abstract**

Construction industry is exposed to high vulnerability and involves multiple stakeholders. These factors and actors influence the projects either directly or indirectly, ultimately affecting the progress of the projects. The primary stakeholders are contractors, consultants and clients. Apart from these stakeholders, project variations and slippage occurs due to several other factors like slow cash flow, design errors, constructability issues and lack of planning. This paper is an attempt to identify and analyze the sources of variations, their effects on projects and control measures to avoid these VOs. The author conducted structured interviews and surveys with construction professionals, contractors, architects, design engineers, suppliers and sub contractors. Similarly pertinent literature on the subject has been studied and consulted in order to reach at concrete findings and conclusions. A questionnaire was distributed among respondents on performance of various completed and ongoing construction projects, with a view to find out major sources of variation orders which trigger the construction schedule from schedule baselines.

The major findings and conclusions derived from this paper are; lack of Change Control Board(CCB),lack of detailed planning, delay in decision making on shop drawings, poor site management, delay in site mobilization by contractors, and lack of project integration management, lack of design technology, frequent changes during execution and site inaccessibility.. There is need to explore more the factors which slip the project timelines, in order to build reputation of the industry. Similarly the research of this paper was limited to surveys and interviews in Rawalpindi and Islamabad cities of Pakistan. The paper defines practical problems as these exist today in Construction Industry of Pakistan.

### **Keywords**

Causes, Construction, Change Orders, Pakistan.

### **1. Introduction**

Majority of the construction projects have very poor record of meeting the schedule and cost baselines in Pakistan particularly in Pakistan. Construction Industry involves wide range of stakeholders like; design professionals, architects, engineers, contractors, sub contractors, suppliers and owners. Apart from their influence, it is also directly or indirectly affected by external factors like government's regulatory agencies, environmental agencies, law and order, market hegemonic forces, force majeure, lack of accessibility to the site and poor soil conditions. These all internal and external factors and actors play a

The basic aim for Project Integration Management is to synchronize and harness, all the subsidiary plans in order to achieve project goals on time and within budget (Haseeb *et al.*,2011). Unfortunately this aspect is neglected or forgotten, as a result of which projects are subjected to or confronted with massive constructability issues, conflicts and clashes, design errors, frequent change orders, cost overruns and late completions. In the worst scenarios, some projects are completely abandoned when contractor disserts out of frustration from the jobsite.

Planning is a very significant phase in which all stakeholders have a significant role to play. Lack of adequate planning, results into slippage of schedule baselines, claim for Extension of Time (EOT), change orders and extra costs (Haseeb et al ,2010) . Site management is itself an important issue which warrants diligent consideration. Inefficient site management causes schedule slips and construction wastages (Seung Heon at al., 2009).

In this paper a substantial effort has been made to identify, the most probable causes of schedule overruns in order to find out best ways for addressing these issues.

## **1. Scope And Objectives**

To identify the major sources of variation orders, their effects over projects and control measures needed to avoid their occurrence and also to recommend options to improve upon the project performance.

## **2. Literature Review**

Construction industry is very famous for offering wide job opportunities and a significant contributions for the development and economic growth of any country. Unfortunately the industry is under serious criticism for slippage of projects from their schedule and cost baselines. This phenomenon taxes the sponsors or clients more heavily due to poor productivity and loss of revenue It is also an established fact that majority of schedule delays and cost overruns arise out of client's actions; such as poor cash flows , slow in decision making, and lack of intimate involvement in planning (Haseeb *et al.*,2011). Lack of state-of-the-art methodology and technology as well as modern tools and techniques impede the progress of the project drastically. It also entails reworks, scrap, change orders, design errors and constructability issues. Out of Triple Constraints of Time, Cost and Scope; performance of time and cost for a construction project are directly linked together. Slip in schedule baseline will directly influence cost overruns. Normally five major causes of variation orders are; change of plans, delay in progress payments, design errors, poor site management and inaccessibility of sites (Ruth et al, )

Researchers also suggest that lack of communication and project integration management which results into conflicts with regard to project methodologies, designs, integration of subsidiary management plans, and constructability issues during execution phase. When such environment prevails, then design engineers, architects and the contractors cannot synchronize their efforts for the common project goals (Sambasivan M.20078). This problem and situation gets compounded when the designer or architect are egoistic and rigid in their approach towards dealing with contractors. They try to enforce their own verdict, may it be on the fault lines.

Sometimes consultants do not accord timely approvals of shop drawings or try to delay as much as they can. Instances have also been reported when consultants added additional scope in order to pad up project cost without formal approval of the client (Hoai, Le-Long, et al,2009). This unprofessional attitude has resulted into 29% of time overruns (Vidalis. S.M. et al, 2002). Once the project is formally kicked off for execution of works, the contractor and consultant get involved in fire fighting because they had not spent enough time for detailed planning of the project. Similarly poor alignment of goals between contractors and the clients, compromises time performance of the project (Kagapaylan. B, 2008., Baloyi. Lucius, et al, 2011).

In order to solve these issues, there are three types of different types of project controls i.e. establishment of CCBs, detailed planning, quick approvals of shop drawings and payments, maintenance of cash flows, site management, quick site mobilization and certified staff in project management. (Ramanathan, Chidambaram, et al, 2012 and Ford, N. David et al, 2008,) Construction industry is a competitive high-risk business in the world. Countries have adopted numerous project delivery system and methods in order to averse the risks; such as fixed price or lump sum contract, design build, partnering and joint ventures. Malaysian construction industry has successfully reaped the benefits of partnering in construction projects. Through this arrangement, the industry achieved high customer satisfaction, enhanced communications, reduced reworks, superior quality, improved time control and lesser disputes (Shah, Ali, Azlan, et al (2004).

Most of the reworks , schedule delays and cost overruns arise out of variation orders.. This trend can only be eliminated or mitigated if client and design team, coordinate at each phase, manage the site effectively, improve project communications and adopt modern procurements technique like JIT in a holistic manner. Further to this, government should adopt conducive taxation and public procurement policy through which hegemony of market forces and price escalations can be controlled (E.D. Love, Peter,,et al 2004 and M.A Kasimu, 2012)

### **3. Research Methodology**

This research was spanned over two phases i.e.; data collection and data analysis. For the purpose of data collection, a questionnaire was designed by incorporating the causes which slip the schedule baselines of projects. The questionnaire was divided into two parts. In part A, general information about respondents was asked so that reliability and validity of the data can be ensured. Moreover in case of missing data or untrue information, outliers can be eliminated. In part B, specific questions were asked. These questions were grouped into five domains, and each domain depicted a particular stakeholder of projects. These stakeholder were; the project executives, civil engineers, contractors, consultants, CEO, Directors, Project Managers (PM),clients and suppliers. Each domain had one major question having various sub options.

First the authors discussed about the questionnaire as a pilot study, with industry related contractors, construction managers, architects, design professionals, suppliers, sub contractors and supervisors for ascertaining and confirming the validity and reliability for data collection. Basing on the valuable suggestions, input and pertinent feedback, the questionnaire was approved with minor modifications and adjustments.

Subsequently, the authors carried out random sampling for the selection of the respondents. A total of 150 questionnaires were disseminated among the respondents and team of authors struggled to get the reliable data as accurate as possible.. The panel of authors received 100 completed questionnaires, which comes to about 66.67 % of response. Once this major milestone was achieved, the authors analyzed the data by using STAD-pro software.

### **4. Results and Discussions**

This research has been divided into three domains, the details of results is described in the succeeding paragraph:-

**4.1 Major Sources of Variation:** - Sources of variation in construction projects. Every project experiences variation, deviation and changes due to the involvement of several key stakeholders as well as external factors. It has been observed that majority of clients keep changing the project plans which entrails large variations thus causing extra cost and scope creep. Similarly clients and sponsors do not

ensure continuous to the variation and deviations in the original scope. The authors identified following ten main sources of variations:-

- Design and Drawings Errors
- Lack of construction Technology
- Poor Scope Definition
- Defective Workmanship
- Substitution of Materials and procedures.
- Poor QA and QC Mechanisms.
- Change of Plans by Clients.
- Financial Constraints.
- Gold Plating
- Delay in Site Mobilization.

After analysis of these sources, top three most significant sources are:-

- Change of Plan by clients
- Financial constraints.
- Lack of project Management information system

After analyzing the most recurring sources of variations, their effects have been analyzed after compilation of data form respondents. The details of their adverse effects are appended below:-

- Disruption in supply of materials.
- Work on Hold.
- Extension of Time (EOT) issues.
- Extra claims by contractors
- Delay in payments
- Slippage in schedule baselines.

## **5. Findings and Conclusions**

From the results and discussions, following findings and conclusions have been drawn:-

- Financial constraints while impeding the progress of the project, adds to variation in costs and schedule baselines.
- There is a trend of frequent change of plans by client or consultants which becomes a source of change or variation.
- Majority of Pakistani consultants revise the designs and drawings very frequently which speaks of inadequate initial planning at their end.
- Inefficiency and ineffectiveness of site management, results in to reworks, scope creep, scrap, poor quality and frequent change orders by the contractors.
- Planning of judicious use of resources possesses very high significance. Absence or lack of effective planning directly delays the schedule baseline.

- Delay in site mobilization by contractor is one of the cause of variation in the projects schedule and budget because Pakistani building and roads material market undergoes phenomenal fluctuations in prices.
- Lack of the modern design software and design data results into design errors in drawings and sub detailing.
- Delay in approvals of shop drawings and submittals by the consultants, affects the construction schedule of the contractor.
- Lack of Project integration leads to conflicts and constructability issues during execution phase.
- Insufficient funds delays the project timeline very significantly.
- All stakeholders especially the clients must remain involve during planning phase of the project.
- Timely decision making is a hull mark for the success of a project and vice versa.
- Tendency of Gold plating must be avoided because it leads to compromise on quality.
- Sometimes limited access to the site and bad weather conditions become problematic in the smooth execution of activities.

## 6 Recommendations

From the findings and conclusions, following viable recommendations have been drawn and suggested in order to avoid unnecessary project delays.

- ***Availabilities of Sufficient Funds.*** Majority of the projects get delayed or abandoned due to paucity of funds. The clients must ensure and maintain supply of funds as per cash flow demands. Unnecessary disruptions of cash flows or excessive financial controls hinder the performance and the productivity of the projects.
- ***Quick Design Approvals.*** Consultants and clients very often do not offer prompt or timely approvals. Every activity in the construction management plan is harnessed with CPM. Delay in one activity jeopardizes the timelines of succeeding activities. Eventually project slips out of approved schedule baseline. In order to avoid this situation, relevant stakeholders must give timely approval of the drawings, designs or any other submittal.
- ***Detailed Planning.*** Lack of detailed planning leads to formation of unrealistic schedule which the contractor cannot follow. Detailed planning eliminates the chances of schedule delays.
- ***Market Stability.*** Frequent market fluctuations and price hike by few market players have seriously affected the construction industry. The government should evolve stringent mechanisms and policies to arrest such type of unhealthy trends and unethical practices.
- ***Site Management and Site Mobilization.*** Contractors should improve their project management skills and articulate their resources in order to address these two issues for the benefits of their own as well as the projects.
- ***Project Management Information System.*** *PMIS* serves as eyes and ears of any construction project. All efforts in terms of men, machines and materials can be used optimally by using an effective *PMIS*.

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