

Assessment of delays and cost overruns during construction projects in Pakistan

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Abstract

Construction projects are commonly delayed due to price escalation of building materials and faulty management in Pakistan. This research paper focused on the main reasons of delay and cost overruns. This research activity was exclusively assessed through questionnaire survey, interviews, field visits and discussion to the concerned authorities. A preplanned survey was conducted through a questionnaire for assessment and evaluation of the important factors those may effect construction delays and cost overruns. Approximately, twenty six numbers of factors were selected initially for the proper assessment of most critical factors. The respondents were selected from construction hub mainly client, contractor and consultant firms. At the same time, the opinion of general public and other stakeholders were also assessed while considering the indigenous trends. The results accomplished from survey revealed that the major causes of delays and cost overruns during construction projects are the escalation of the materials prices and discontinuity of funds.

According to the group of contractors escalation of prices is the significant factor for delays. The consultants are blaming the poor supervision and mismanagement by contractors. The overall ranking analysis are indicating that Escalation of material prices, inadequate control procedure, shortage of technical persons, delays in work approval and shortage of materials, plant/equipment are most critical factors, those are responsible for construction delays and cost overruns in Pakistan.

Keywords: Construction delay, construction projects, planning, management, overruns

Introduction

The success of a project can be assessed easily after comparing the proposed and actual cost with respect to the level of achieved objectives. A project can be manifested as successful if its technical performance is maintained according to the schedule and remained within the allocated budgeted of cost [1]. Due to technical, financial and market behavior, construction projects are seriously facing delay and cost overruns in Pakistan. These delay and cost overruns can be controlled by effective management tools. Proper management tools and techniques can successfully improve the performance of a project. Project management task can be further subdivided in to the following groups [2].

1. Management of material resources
2. Management of financial resources
3. Management of mechanical resources
4. Management of human resources

Negligence of management in any of these above mentioned zones may cause failure, delay or cost overruns during construction.

A lot of required data from field visits and questionnaires was collected during this research activity to assess the reasons of delay and cost overruns during construction in Pakistan. It is concluded that there are numerous factors that caused the delay in construction work and cost overruns. These factors are directly or indirectly related to management, technology, social and financial environment depending upon the circumstances. Preliminary information and data were collected through site visits and personal discussions with the concerned authorities. It has been observed during the field investigations that delay and cost overrun are frequently occurring in Pakistan and as well as in developing countries during the construction phase.

Literature review

Approximately, more than 4000 construction activities were examined throughout the world, and result indicates that these were not completed within the specified time limit [3]. Related literature presents different reasons of delays depending upon the circumstances like escalation of materials prices, unavailability of required machinery and labor-shortage or strikes etc. Considering these factors a list of major causes of construction delay were presented [4]. The factors like inadequate planning, delay due to subcontractors, lack of proper co-ordination, poor administration, deficiency in construction activities, shortage of technical staff and poor communication may affect the project. Considering these factors, the causes of construction delays of high-rise building projects in developing world like Pakistan are so common [5].

The history of construction projects in Pakistan has numerous examples of projects failure due to improper planning of construction activities [6]. These kinds of project failures are clearly indicating the short fall of technical supervisory staff in developing world. To protect the economy and to avoid the failure of main construction projects it is more important for the developing world to enhance their technical abilities. Considering this fact, Pakistan would have to make considerable achievement to develop technical abilities in the fields of construction machinery and construction management. Collected data during this research is clearly showing that the project activities and achievement in the country is suffering due to inherent problems like

conceptual differences about the projects, inefficient feasibility studies, and deficiency in proper technology and economic stability.

According to the different researchers, the projects that have been started without undertaking a detailed investigation and planning may seriously create technical, political and financial issues during the construction. Consequently, huge losses are occurring as many of these concerns cannot even meet their operational expenses. The water management sector of the country is also facing the same kind of situation. Chashma Right Bank Canal (CRBC) project, South Rohri fresh ground water development scheme and installation of 110 tube wells in the Federally Administered Tribal Areas (FATA) of Bajour Agency, are few main examples. Most of the projects in the country, those that had been started without proper feasibility study due to the influence of political personalities are facing serious crises.

From the investigation it has been explored that due to delays, the cost of development projects may rise up to double depending upon the circumstances. Some of the national projects like, Kotri Drainage project, Aeronautical Communication and Control System (ACCS) Project, Family Health Project in Sindh, small irrigation schemes in Balochistan and the establishment of a university in Azad Jammu and Kashmir are presenting the worst example of cost escalation [6].

Evaluations and planning at early stages are indicating deficiencies in the project. Improvement of these deficiencies can save the cost and time during the construction phases. A good evaluation can provide ways to improve project design and formulation and help the decision-makers to reduce implementation lags. But unfortunately such evaluations are rarely done even at the federal level on a regular basis. Projects such as Pak-Iran Textiles Ltd., Tarbela Cotton and Spinning Mills, Bannu Sugar Mills, Harnai Woollen Mills, Larkana Sugar Mills and General Refractories Ltd. have suffered substantial losses at one stage or another throughout the cycle.

Inflation in Pakistani markets and material prices are also responsible for the construction delay, especially, during the years 2007-2010. The inflation is still out of control due to the adverse law and order situation in Pakistan. It forces many contractors either to leave a project or stop it. In some of the cases negotiations were made between contractor and client. At TELECOM Tower, Blue area Islamabad, contractors were at the verge of leaving the site as price difference in estimated and construction cost was twice (i.e. cost of material was doubled due to inflation as compared to their original prices). The clients and consultant after market analysis increased the rates and saved the project from getting delay or even fail.

Corruption is one of the most devastating factors in construction industry as well as playing its role towards cost overruns. In Pakistan, so many projects are getting failed due to the same reason.

In Nigeria a survey performance of 61 construction activities, acknowledged, and evaluated the delay reasons. Time delay and price escalation affected the construction work. The construction site activities to improve were united with project supervision measures. A proper contingency preparation in the pre-contract estimation was recommended to reduce the adverse effect of construction delays [7].

The construction period for public housing projects in Hong Kong has been focused by Chan and Kumaraswamy [8]. The study conducted includes 15 case studies of standard New Cruciform type housing blocks. Statistical Linear Regression was developed to scrutinize the data and formulating construction duration model. The analytical model was determined using an independent set of project information. The low level of this model's

error was less than 10%, in predicting the durations. This model could be a reliable tool for forecasting the construction period for public housing projects in Hong Kong.

Research objective

The main objective of this research was to assess and evaluate the factors those are contributing to the delay and cost overruns during construction works in Pakistan.

Methodology

To evaluate and analyze the factors causing delays and cost overruns in construction projects, a large range of community attached to the construction industry of Pakistan was targeted. Respondents were randomly selected from Pakistan Engineering Council (PEC) website. The main groups of respondents were contractors, consultants, project managers, client’s representatives and construction managers. A detailed questionnaire was circulated to collect useful details from professionals groups belonging to construction industry. The viewpoint of contractors and consultants were analyzed to rank. Twenty-six factored questions were prepared from preliminary investigations. A web based questionnaire page was also developed and emailed to the contractor and consultant firms. It was arranged in the order of priority scale, like 1= very low (less than 20%), 2= low (20-50%), 3= medium (50-70%), 4= high (70-90%), 5= very high (100%). Fifty questionnaires were distributed to different groups like contractors, consultants, clients and public. Each of these groups making a sum of two hundred as shown in Table 1. After collecting the useful information through different set of questionnaires, the collected data were analyzed according the aim of study.

Data analysis

For the analysis of results, the procedure of analysis was adopted while considering the relative importance of the factors responsible for project delays and cost overruns. The score obtained by the respondents in the form of a questionnaire are summed up for each listed factor for the identification. Therefore, the observation and scoring made by the consultants, contractors and other respondents are arranged by their relative weights according to the level of importance. The Relative Importance Weight (RIW) was calculated by using the following equation [9]:

$$(RIW) = \frac{\sum_{i=1}^5 a_i n_i}{\sum_{j=1}^N x_j} \times 100 \tag{1}$$

Where:

x_j = The sum of the j th factor

j = The factors 1, 2, 3, 4, N

N = Total number of factors (26)

a_i = Constant expressing the weight given to the i^{th} response

n_i = 1, 2, 3, 4, 5

The levels of response are:

Very high $a_1 = 5$

High $a_2 = 4$

Medium $a_3 = 3$

Low $a_4 = 2$
 Very low $a_5 = 1$

n_i = The variable showing the frequency of the i th response
 n_1 = Frequency of 'very high' response
 n_2 = Frequency of 'high' response
 n_3 = Frequency of 'medium' response
 n_4 = Frequency of 'low' response
 n_5 = Frequency of 'very low' response

Table 1: Percent of questionnaire distribution and their response

Description	Questionnaire distributed	Number of respondents	%age of responses
Consultants	50	26	39.4
Clients	50	23	46.0
Contractors	50	24	36.4
General Public	50	26	52.0
Total	200	99	49.5

For all the factors of project delay and cost overruns Eq. (1) was used for the calculation of the Relative Importance Weight (RIW). The factor influence was calculated keeping in view the rank of Contractors, Consultants, Client and General Public opinion. These ranks are presented in Table 2 according the questionnaire out comes. The Kendall's coefficient of concordance as shown in equation (2) was used for the determination of the degree of influence [9]. Where as the value of 'U' can be calculated by using equation (3) after introducing the vales of 'RIW' from equation (1).

$$w = \frac{12U - 3m^2n(n - 1)^2}{m^2n(n - 1)} \quad (2)$$

Where:

n = Number of Factors

m = Number of the groups

j = The factors 1, 2, 3, 4, N

$$U = \sum_{j=1}^n (\sum R)^2 \quad (3)$$

Table 2: Ranking of all the selected factors responsible for project delays and cost overruns

Sr. No.	Factors	Symbols	Rank
1	Deficiencies in Planning and scheduling	PSD	13
2	Deficiency in cost estimates preparation	DCEP	12
3	Inadequate control procedure	ICP	2
4	Delays in work approval	DWP	4
5	Waiting for information/lack of meetings	WIM	8
6	Mistakes during construction	MDC	6
7	Delays in inspection and testing works.	DITW	26
8	Cash Flow during construction	CFDC	16
9	Frequent breakdown of construction plants and equipments	FBCE	19
10	Shortage of technical persons	STP	3
11	Labor shortage	LBS	20
12	Monthly payments difficulties	MPD	14
13	Poor contract management	PCM	25
14	Shortage of materials, plant/equipment parts	SMP	5
15	Contractors financial difficulties	CFD	22
16	Low bid	LBD	23
17	Material procurement	MTP	9
18	Late delivery of materials and equipments	LDM	24
19	Escalation of material prices	EMP	1
20	Slow decision making	SDM	10
21	Difficulties in obtaining construction materials at official current prices	DCMP	11
22	Bad weather	BWT	7
23	Unexpected geological conditions	UGC	18
24	Bureaucracy and political influence (Govt. changes)	BPI	15
25	Effect of terrorist activities	ETA	17
26	Imported materials	IMT	21

Results and discussions

The questionnaire was analyzed from different perspectives to identify the influencing factors; those are dependable for the delay and cost escalation during construction phase. These factors were ranked in various groups as shown in Table 2. The factor which was declared most influencing factor during the analysis and awarded highest marks was ranked as first and so on. In this way the most influential factors that caused project time and cost overruns were identified.

A number of factors that causes delay and price escalations during construction work in a developing country like Pakistan. The important factors on which all groups agreed according to their ranks are escalation of material prices, inadequate control procedure, shortage of technical persons, delay in work approval and shortage of material/plant equipment parts as shown in Fig 1.

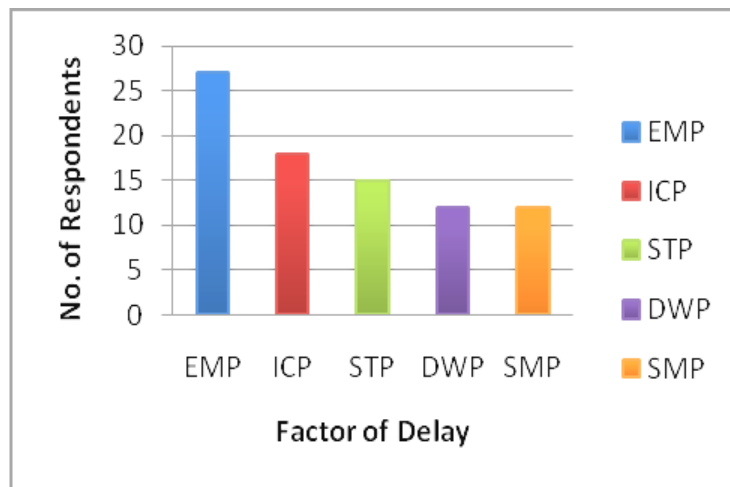


Fig 1: Comparison of five priority factors

According to most of the contractors, price escalation as first priority factor due to high and unpredictable inflation trend in Pakistan. The overall trend in the developing world is likely same. This trend is probably due to high demand of construction materials. The sensitive price indicator (SPI) in Pakistan shows the inflation factors as; 4.84 in 2000-2001, 3.37 in 2001-2002, 3.58 in 2002-2003, 6.83 in 2003-2004, 11.55 in 2004-2005 and 7.02 in 2005-2006. Recently the SPI is reported as 9.86 [10]. Sometimes fake scarcity is developed by the providers of materials to make a hyper-inflation in developing countries. The unpredictable inflationary trend is observed in many developing countries. The second cause delay during construction is inadequate control procedure. Most of the consultants suggest that contractors are responsible for adopting inadequate procedure for construction. Mostly, projects are awarded to the lowest bidder with lack of supervision skills. In such cases, less consideration is paid to contractor's plan, cost control, resource allocation i.e. human, material and financial recourses. Most of the contractors in developing countries like Pakistan are submitting low bids just for the sake of contract without any management plan [1].

According to the ranking, fourth rank is awarded to the delay in work approval. This particular factor is emphasized by contractors mostly, they have complaints that consultants are responsible for most of the delays in a project. Shortage of material was ranked as fifth most important factor. Other factors that could be of interest are bad weather, material procurement, waiting for proper communications during construction. Bad weather is an unknown factor and cannot be controlled. In Pakistan, this natural factor is not significant but need to be considered. For a successful project, there is a need for contract strategy and the management of contracting activities from start to end. The management, specialist and contractors must join their hands to establish proper strategy to minimize all obstacles.

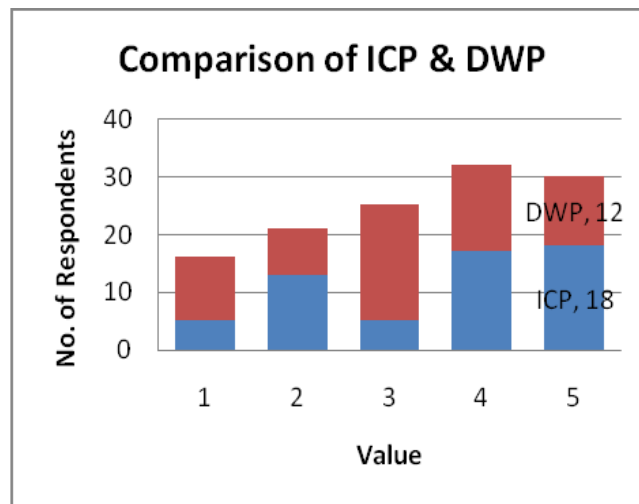


Fig 2: Comparison ICP & DWP

Figure 2 indicates that Inadequate Control Procedure (ICP) will significantly delay in the progress of a project. Contractor and consultant should have meetings before and after milestone so that any confusing step could be eradicated and may not happen in future. Specific standards should be defined at the time of commencement of a project.

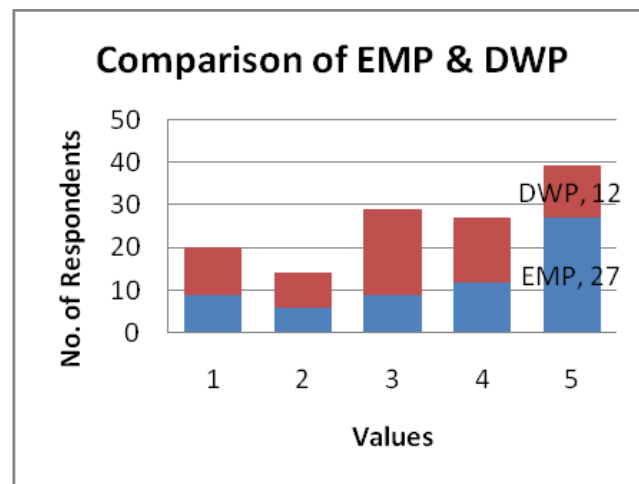


Fig 3: Comparison of EMP & DWP

Figure 3 represents the relation between escalation of material prices and delay in work approval. These two factors are directly related to each other. In a developing country like Pakistan, there is no stability of material prices so these issues are causing serious delay during the construction.

Recommendations

The following recommendations are being proposed while considering the circumstances of developing world:

1. There should be adequate contingency plans to cover the material price escalation.
2. During estimation and planing phase, escalation of material prices in coming future should be kept in mind to avoid this problems.

3. There must be continuous professional training programs for contractor's staff to update their technical knowledge.
4. Contractors, client and consultant should work as a team and make appropriate meetings before and after each milestone to avoid construction delays and cost overruns.
5. Highly professional and expert project manager can play a vital role for the timely completion of a project. Hence, highly professional well trained project managers must be preferred for mega projects.
6. A well defined plan according to real needs and budget is necessary for the timely completion of a project.

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