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Procedia Engineering 77 (2014) 196 – 204

**Procedia
Engineering**www.elsevier.com/locate/procedia

Fourth International Symposium on Infrastructure Engineering in Developing Countries, IEDC
2013

Time Extension Factors in Construction Industry of Pakistan

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Abstract

The delays in the construction industry are a global phenomenon and are considered as one of the most persistent problems throughout the world. The construction industry of Pakistan is also no exception to it. The key controlling features of time, cost, quality and safety for a project are adversely affected by the impacts of such delays. The delays in construction industry have many after effects among which the main are time extension, cost overrun, disputes, arbitrations and litigations. The main purpose of this study is to identify the delays that result in time extension factors for project completion. Earlier studies have mostly emphasized on the major causes or the effects of project delays. This study investigates the factors contributing in time extensions in construction project according to key participants of the projects i.e. contractors, consultants and the clients. In this regards, the time extension data of almost 50 projects have been consulted to identify the significant factors contributing in time extensions for completion of the projects. From the data, the 27 key factors were identified which have significant contributions in time extensions. Based upon these factors, a questionnaire has been developed and distributed among professional working in the construction industry for their response to assess the contributions of these factors in the time extension grants in construction industry of Pakistan. The study revealed that domestic issues of the country are the major factors resulting in the delayed completion of the projects.

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Peer-review under responsibility of the Accounting Research Institute, Universiti Teknologi MARA.

Keywords : Time Extension; Delays; Causes; Delay effects; Construction industry; Pakistan

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1. Introduction

The phenomenon of delays is being faced by the construction industry globally [1] and such delays are considered to be most recurring issues in the construction sector [2]. That is why, the level of risk and uncertainty in the construction sector is on the higher side as compared to other industries. In addition to the fact that the construction projects have complex and time consuming designs, the construction processes and methods are also subject to unprecedented events and circumstances[9]. This has resulted in serious challenges and effect risk management has become a major problem that confronts the construction industry [20].

Delay may be defined as an event which results in or causes an extension of time to complete a whole or some part of a project [1]. Another way to define delay is that it may be an overrun in time which has been specified for completion of work in the contract agreement or overrun in time which has been granted as an extension [25]. Delay may also be defined as the time during which some part of the construction project has been extended or not performed due to an unanticipated circumstance [2]. Bartholomew(1998) has defined the suspension as stoppage of work directed to the contractor by a client, while delay is a slowing down of work without stopping it entirely.

Delays occur almost in every project but their effect varies from project to project. During a construction project, an event of delay may occur from any of the factors related to the interest of stake holders of the project which may affect adversely by causing disruption of work, loss of productivity, time loss, cost overruns, claims or sometimes termination of contracts [2]. When there is a delay in the project, the project completion times are justified by extensions or the progress of works is accelerated, however each of the options results in additional costs to the project [3]. The situations become serious between the owner and contractor of the projects when it is questioned that whether the contractor was entitled to claim the extra cost or not. Such situations usually involve questioning the facts, causal factors and contract interpretations [4]. In a study on delays in Hong Kong construction industry, Chan and Kumaraswamy [8] emphasized that completion of project within the stipulated time, budget and level of quality standards specified by the client is an index of successful project delivery. Failure to achieve the completion within targeted time, budgeted cost and specified quality result in various unexpected negative effects on the projects.

The key objectives of construction projects are time, cost, quality and safety. Unfortunately, the phenomenon of delays adversely impacts all the stake holders of the projects including owners, design professionals, construction professionals, users and others. The delays, if occur, jeopardize the objectives and result in extension of time which lead to extra overheads that increase the cost of the project. Time is money and time is an integral part of every construction plan and can affect each party's contractual obligations. The time allowed for construction performance is an important consideration for both the project contractor and the project owner. In order to make sure that the projects are completed within the budgeted time and cost, identification of causes of delays is very much necessary so that once these factors become clear, the stakeholders can take proactive steps to avoid such situations. Therefore, knowledge and understanding of risk of delay is important to help identify and manage effectively and systematically to achieve the project objectives of time, cost and quality.

The Construction industry of Pakistan is making its vital contribution in the followings economic sectors:

- Energy
- Water Resources Development and Dam Engineering
- Communication
- Architecture and Planning
- Public Health Engineering
- Oil, Gas and Petrochemical
- Industrial [21]

There are almost 40 to 50 other sectors and industries in the country which are directly and indirectly affected by the performance to the Construction industry [11]. Salient are:

- Steel Industry
- Cement Industry
- Mining Industry
- Chemicals Industry

- Paints Industry
- Manufacturing Industry
- Marble & Tiles Industry
- Glass Industry
- Aluminum Industry etc.

The construction industry of Pakistan is no exception to the global phenomenon of delays. Thus, it is important to identify the most significant causes of delay in the Pakistan construction industry to be able to find ways to avoid them, or at least, mitigate their impact. Even quite small advances in the recovery of a delayed schedule are likely to have a significant impact on the financial returns of those involved.

2. Literature Review

Since delay is associated with cost and time overrun, the phenomenon of delays have been a matter of concern for construction professionals as well as a topic of study for researchers. Some researchers have studied the causes of delays and few researchers have studied the effects of project delays in the construction industry. In order to determine the damages caused by delays, Saleh et.al [2] has defined the following types of delays as under:

2.1 Types of Delays in Construction projects.

In order to determine the compensations for delays, the delays may be explained into the following two categories:

- Inexcusable delays
- Excusable delays

2.1.1 Inexcusable delays (Non- Excusable delay)

The delays which are caused solely by the contractor or its suppliers are called inexcusable delays. In such case, the contractor does not receive any compensation and is obliged to expedite the progress of works or make compensations to the owner. The projects get delayed and these compensations are adjusted either through liquidated damages or actual damages if there is no liquidated damages clause the contract.

2.1.2 Excusable delays

a. Non-compensable delays are caused by third parties or incidents beyond the control of both the owner and the contractor. E.g. acts of God, unusual weather, strikes, fires or acts of government in its sovereign capacity etc. In such cases, the contractor is normally has entitlement for time extensions but no financial compensations for their delay damages.

b. Compensable delays are caused by act or actions of the owner or the owner's agent e.g. late release of drawings from the owner's architect. An excusable, compensable delay usually leads to a schedule extension which also puts the owner to financial damages claimed by the contractor. In this case, the contractor incurs additional indirect costs for his overheads including field office and home office overheads.

Ahmed et al. has grouped delays into two categories - internal causes and external causes. Internal causes arise from the parties to the contract (e.g. contractor, client, and consultant). External causes, on the other hand, arise from events beyond the control of the parties. These include the act of God, government action, and material suppliers [23].

2.2 Causes of construction delays:

A delay can be caused by a number of unexpected events during construction resulting in an increase the time required for completing the work or increase the work which must be completed within a specified period of time [1]. Acharya et. al [9] has defined the following types of delays and their causes with explanation provided in table 1.

Table 1. Types of Delays [9].

Delay Types	Sources	Explanation
Owner caused delays (OCD)	Participants' activities based	Owner and consultant activities
Contractor caused delay (CCD)		Owing to contractor activities
Third-party caused delay (TPCD)		Owing to other causes rather than project participants activities
Concurrent (dependent) delays (CD)	Time of activities based delays	Delays due to effect of one activity to other
Non-concurrent delay (NCD)		Delays due to independent activities
Excusable delay (ED) with compensation	Extension of time (EOT) and financial compensation based	EOT and final compensation granted for delay
Excusable delay (ED) with no compensation		Only EOT granted (no final compensation)
Non-Excusable delay (NED)		No compensation for either financial or EOT

The contributions of some other researchers pertinent to the construction delays are also detailed in table 2 given as under:

Table 2. Contributions of previous researchers regarding causes of construction delays

Research Scholar	Country	Findings
Murali Sambasvan & Yan Wen Soon [1]	Malaysia	Top most important causes as 1) contractor's improper planning, (2) contractor's poor site management, (3) inadequate contractor experience, (4) inadequate client's finance and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labor supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage.
Saleh et al. [2]	Libya	Identified 43 major factors that caused delays in construction projects in the city of Zentan
Al-Momani [5]	Jordan	Main causes of delay in construction of public projects were related to designers, user changes, weather, site conditions, late deliveries, economic conditions and increase in quantity
Assaf and Al-Hejji [6]	Saudi Arabia.	"Change Order" was identified as the most common cause of delay identified by all the parties and about 70% of the projects experienced time overruns.

Assaf et al. [7]	Saudi Arabia	56 main causes of delay , important delay factors were: preparation and approval of shop drawings, delays in contractor's progress, payments, design changes, relationship between subcontractors and the slow decision making process of the owner etc.
Chan&Kumarswamy [8]	Hong Kong	Identified five major causes of delays as: poor site management and supervision, unforeseen ground conditions, low speed of decision making involving all project teams, client initiated variations and necessary variations of works.
Frimpong et. al. [10]	Ghana	The main causes of delay and cost overruns in construction of groundwater projects were monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performance; and escalation of material prices.
Mansfield[14]	Nigeria	16 major factors that caused delays and cost overruns
Odeh and Battaineh [15]		Owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision making, improper planning and were among the top ten most important factors.
Odeyinka and Yusif [16]	Nigeria	Client-related delays included variation in orders, slow decision-making and cashflow problems. Contractor-related delays identified were: financial difficulties, material management problems, planning and scheduling problems, inadequate site inspection, equipment management problems and shortage of manpower. Extraneous causes of delay identified were: inclement weather, acts of nature, labor disputes and strikes
Ogunlana&Promkuntong [17]	Thailand	The construction industry in developing economies could be: (a) shortages or inadequacies in industry infrastructure (mainly supply of resources); (b) caused by clients and consultants and (c) caused by contractor's incompetence/inadequacies.

3. Research objectives

The construction industry of Pakistan is no exception to the global phenomenon of delays where major no. of projects are being completed beyond the original time specified in the Contract Agreements. The main objective of this research is to identify the significant causes of delay resulting in the time overrun beyond completion specified in the contract based upon which extension of time are being granted. Furthermore, the research is aimed to identify 10 most significant causes of time extensions for the construction projects after overall analysis. This shall enable the construction industry stake holders to prioritize and focus on the factors causing the most effects on the performance of the industry and adopt necessary remedial strategies to enhance the performance of the same.

4. Research Methodology

The data base of some of the leading organizations working in the construction industry was consulted. The data of almost 50 active projects from these organizations was reviewed along with the comprehensive reports/ cases pertinent to Time extensions proceedings by the organization for different projects. A total of 27 prominent factors involved in time extensions were identified from the real time data of these organizations. Based upon these identified factors, a questionnaire was developed to access the contributions of these factors in the time extension grants in construction industry of Pakistan. The respondents of the survey included the practicing professionals in

the construction industry working in Client, Consultant and Contractor organizations. These professionals were visited personally and telephonically interviewed for their participation in the survey. For result discussions, these 27 identified factors were categorized in the following major groups:

4.1. Client related factors:

Slow decision making by Client (SDMC), payment delays (PD), unrealistic time durations (UTD), design changes (DS), improper availability of funds with Client (IFC), political/ bureaucratic influences (PBI)

4.2. Contractor related factors:

Improper planning (IP), low financial capability of construction firms (LFCF), lack of program of work (LPW), underestimation of time for completion by Contractors (UTCC), poor site management (PSM), mistakes during construction (MDC), construction methods (CM)

4.3. Consultant related factors:

Delayed instructions from Consultants (DIC), delays in preparation and approval of drawings (DPAD), discrepancies between drawings and specifications (DDS)

4.4. Material related factors:

Instability of domestic construction market (IDCM)

4.5. Labor and equipment related factors:

Least use of high tech tools/equipment in construction (LHTEC), shortage of skilled manpower (SSM)

4.6. Contract related factors:

Legal disputes (LD), variations (VS)

4.7. External factors:

Fluctuation in import duties (FID), war and terrorism (WT), law and order situation (LOS), inflation of local currency (ILC), unprecedented price escalation (UPE), bad weather conditions (BWC)

5. Data Analysis Research Methodology Online license transfer

The relative importance index method was used to determine the relative importance of the various causes and effects of delays. The same method, as adopted by Kometa et al [11], was adopted in this study within various groups (i.e. clients, consultants or contractors etc.). The five-point scale ranged from 1 (very weak) to 5 (very strong) was adopted and transformed to relative importance indices (RII) for each factor as follows:

$$RII = \sum W / A \times N \quad (1)$$

where W is the weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (i.e. 5 in this case), and N is the total number of respondents. The RII value had a range from 0 to 1 (0 not inclusive), higher the value of RII, more important was the cause or effect of delays. Each individual cause perceived by all respondent were used to assess the general and overall rankings in order to give an overall

picture of the delays contribution in time extensions. The indices (RII) were then used to determine the rank of each item (effect). These rankings made it possible to cross compare the relative importance of the items as perceived by the respondents. Based on the relative importance index RII, the factors were ranked. The ranking of each individual factor enable to identify the factors that play a most important role for grant of time extensions in construction industry. Refer Fig.1. as given below:

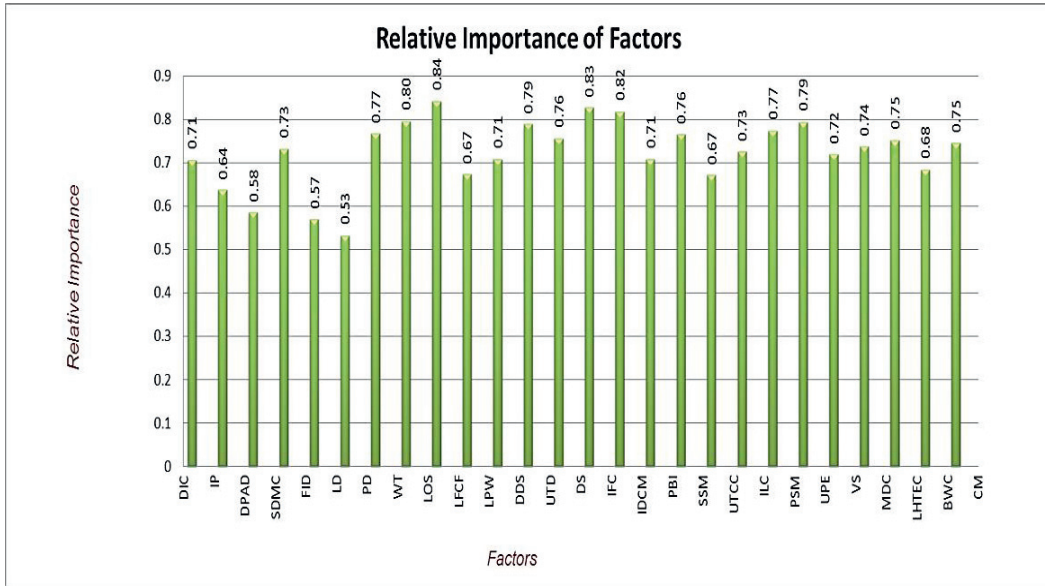


Fig. 1. Relative importance factors

The frequency analysis was also performed for the data as shown in Fig.2 given below:

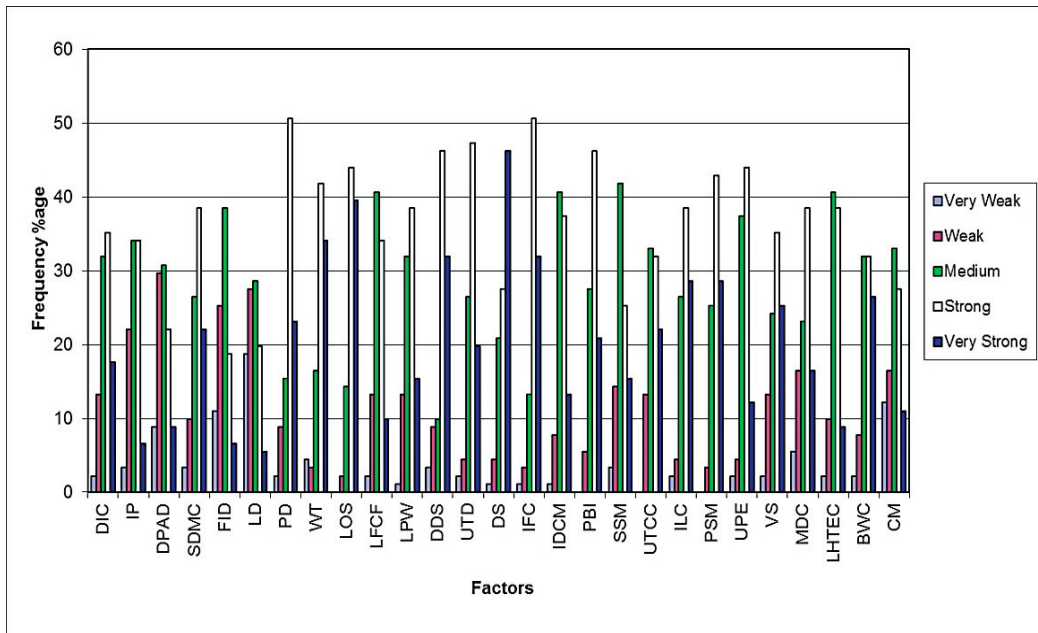


Fig. 2. Frequency analysis for factors

6. Results and discussions

The ranking of these factors yielded that the top most influential factors for time extension which are given at table - 3 given as under:

Table 3. Top ten most influential factors

Item No.	Factor	Relative Importance of Factors (RII)	Rank
9	Law and Order Situation	0.84	1
14	Design Changes	0.83	2
15	Improper availability of Funds with Client	0.82	3
8	War and Terrorism	0.80	4
21	Poor Site Management	0.79	5
12	Discrepancies b/w Drawings and Specifications	0.79	6
7	Payment Delays	0.77	7
20	Inflation of Local currency	0.77	8
13	Unrealistic Time Durations	0.76	9
17	Political / Bureaucratic influences	0.76	10

From the top ten rankings, the factors related to Client are ranked 2, 3, 7, 9, 10, the factors related to Consultant is ranked 6, the factor related to the Contractor is ranked 5, factors related to external factors are 1, 4 and 8. It is interesting to note that the Employer of the projects have been, Themselves, the major cause of delays leading to the extended time periods beyond the Contractually stipulated time periods. These results yield that the Employer lack planning to avoid the design changes, proper availability of funds, timely arrangement of funds, avoid unrealistic time schedules and avoid political influences. All these factors delay the projects and result in time over run as well as cost overrun. The funding is one of the main sources to complete the project within time. The delayed payments after result in disputes between the Client and Contractor which after leads to slow down of progress, termination of Contract, Arbitration, Litigations, claims for time extension and cost overrun. Also, due to the political culture of the country, the Clients in public sector mostly remained unable to withstand the political influence which is also one of main cause of delays ultimately resulting in time extension. The consultants have been responsible for delays due to discrepancies between the drawing and specifications whereas the contractors contributed in delays because of their poor site management. However, the major causes of delay, as a result of this study, are the external factors of law and order situation, war and terrorism and inflation of local currency. All these three factors are interlinked and had adversely affected the project time duration.

7. Conclusions and Recommendations

The factors resulting in time extension of the projects in construction industry of Pakistan have been focused in this study and top ten influential factors have been identified based upon their relative importance. Most of the top ranked factors of delay are caused due to the external factors of law and order situations, war and terrorism , inflation in local currency or due to role of Clients in design changes , improper availability of funds, payment

delays, unrealistic time durations and political/bureaucratic influences. A close coordination with law enforcing agencies of the country, proper security arrangements, and compensations against currency devaluations, proper planning before project award and proper arrangement of funds are the incentives if adopted can result in lowering the effects of delays in construction industry. However, a specific vision and environment needs to be developed with stable political environment, sustainable fiscal policies in financial sector and long term planned accomplishments in the country which can only be achieved by serious efforts and cooperation of government authorities and construction industry stake holders.

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