

CAUSES AND EFFECTS OF DELAY IN CONSTRUCTION PROJECTS OF MALAKAND DIVISION, KHYBER PAKHTUNKHWA PAKISTAN

Bilal Karim

PhD Scholar, Department of Management Sciences,
Qurtuba University of Science and Information Technology, Peshawar
engineerbilal@hotmail.com

Kashif Amin

Associate Professor, Department of Management Sciences,
Qurtuba University of Science and Information Technology, Peshawar
kasheeamin@yahoo.com

ABSTRACT

In construction projects delay is a global experience and the same issue persists in Pakistani construction industry as well. This study has its major focus on recognizing the factors of delay in government funded construction projects in Malakand division of Khyber Pakhtunkhwa Pakistan. Construction delay and its effects have been studied separately by many researchers. The current study has jointly analyzed the causes and effects of delay in government funded construction projects of Malakand division, Khyber Pakhtunkhwa Pakistan. A questionnaire assessment was executed to investigate the factors which cause delay, and their effects by considering the three main stakeholders of construction industry i.e., Contractors, Clients and Consultants. Accordingly, 50 respondents from various districts of Malakand division of Khyber Pakhtunkhwa province participated in the survey. The ten most important causes of time overrun were identified by the current study from a list of 64 causes and in the same way six effects of delay were identified. The identified 10 major causes are: i. Funding for project/Financial position of constructor, ii. Delayed final inspection and third-party certification iii. Weather conditions, iv. Terrorist activities in construction area, v. Delay in bills payment vi. Flood, earthquake or other natural calamities, vii. Suspension and postponement of work activities, viii. Shortage of construction materials in market, ix. Disagreements in implementation schedule of sub-contractors, x. Late approval and finalization of drawings. Similarly, the 6 major effects identified are: i. Time Overrun, ii. Disputes iii. Cost Overrun, iv. Arbitration, v. Abandonment and vi. Lawsuit. An empirical relationship between causes and effects has been developed by this study.

Keywords: Time Overrun, Construction Industry, Factors, Contractor, Consultant, Client, Construction delay.

INTRODUCTION

Construction industry has been performing a vital role in the economic development of a country and it has turned into one of the leading industries globally. The growing complexity in construction projects indicates a substantial demand from project managers for timely completion of projects within budget and other resources.

Delay in construction projects is defined as the variation between the actual contract period of a project at the time of tendering and the actual completion time of that project (Honrao & Desai, 2015). The tendency of late accomplishment of projects and exceeding of projects from the specified finances is getting incurable worldwide and this problem is intensifying steadily (Ahmed et al., 2002). Assaf and Al-Hejji (2006) during their study in Saudi Arabia, recorded that merely thirty percent of construction projects were getting completed in their stipulated time while the rest of the projects were facing delay in completion. In their view construction delay has been a project deviation from its planned outline and is considered as a universal mess in construction projects. To a contractor, construction delay in some cases means increased overhead costs for the reason of longer work period, increased cost of material and labor due to inflation.

A study undertaken by Chileshe and Berko (2010) in Ghana illustrated those variations in design, late payments for work done, inflation, improper scheduling and lack of appropriate knowledge

regarding project were recognized as the main factors by a range of project stakeholders particularly Constructors, consultants and clients. According to Vidhyasri and Sivagamasundari (2017), creating full work plans breeds unnecessary problems and uncertainties in execution of construction projects and hence results in construction delay, cost overrun, low quality infrastructure and poor performance. The factors which cause delay in construction projects must be ascertained and investigated properly. Making a proper schedule for the construction activities is an involvement practice and is based on many parameters. All these parameters are to be reviewed properly by involving expert professionals in order to make the project successful.

Frimpong et al., (2003) stressed that project implementation within stipulated budget, time and quality specified by the client are indexes of success in project management. In case of delayed project completion, the project is either accelerated or extended which ultimately leads the project to additional costs and payments. In spite of the fact that the parties agree upon the additional cost or escalation even then issues arise as to whether the construction firm is entitled for claiming the additional cost, which leads to contract interpretation.

Construction projects are composite in nature and deal with large expenses and extended time periods. Different team members perform consistent and interconnected activities in the implementation of the project. Despite that a project is carefully prepared with thorough concentration even then numerous uncertainties and unexpected situations appear. When so ever they emerge during the implementation of a construction project they lead it towards time overrun which in turn cast a very annoying effect on project execution, stakeholders and the end users as well. Before the start of the project, it is essential to know about the responsibilities of each and every person. If duties are not allocated appropriately, a possibility of discrepancy arises among the stakeholders of the project, and it can lead to lawsuits. In such circumstances managers must be acquainted with the conflict management tools in order to resolve the issues among them. Similarly, to keep the project away from delay the most significant causes and their origins must be recognized (Aleksander, 2015)

In parallel to other countries globally, Pakistani construction industry is also having a lot of issues and uncertainties, associated to time and cost overruns. Hydro power projects at Khan Khwar, Allai Khwar and Duber Khwar in Khyber Pakhtunkhwa province of Pakistan, instigated by WAPDA in 2003 and got accomplished with a time overrun of 200% on average as well as acquired 2.5 times more budget than the original estimate (Batool & Abbas, 2017).

REVIEW OF LITERATURE

A study conducted by Assaf and Al-Hejji (2006) in Saudi Arabia recognized more than 55 factors which cause delay in building construction projects. They also gave the relative importance of each and every factor. According to the constructors interviewed, the major factors of construction delay were delayed progress of contractor, delay in preparing and approving drawings, delayed payment by client/owner and changes in design. In the view of engineers and architects the relations between sub-contractors, owner's slowness in making decision proved to be the principal construction delay factors. While according to owners: shortage of labor, errors in design and improper labor skills were the major causes of delay in completion.

In research carried out in Sri Lanka by Vaardini, Ezhilmathi and Karthiyayini (2016) investigated different causes of construction delay by making use of various methods like Severity Indexing, Frequency indexing, Relative indexing methods etc. by distributing questionnaires among the respondents. They came out with a conclusion that improper scheduling and planning, lack of proper site management, alterations in materials' costs, poor financial control, inappropriate usage of resources during project execution are the main factors of construction delay.

Durdyev et al., (2012) in their descriptive survey conducted in Turkey acknowledged a range of delay factors in projects of construction. They made use of RII method for the analysis of their collected data. They analyzed the data whose results indicated that the key construction delay factors in Turkish construction projects are inappropriate planning, improper estimation of project costs, inflated costs of mandatory resources, shortage of experienced workers, high prices of land and construction materials.

The causes of construction delay in the opinion of the 3 principal stakeholders i.e., Consultant, Client and Contractor are: delayed payment to contractors for work done, weather conditions, imprecise

scheduling and project planning by contractors, too much work in hand with construction firms, lack of expert staff with construction firms.

Ismail et al., (2013) during their study in Malaysia identified the noteworthy delay causes by carrying out a questionnaire survey. They used RII method for assessment of delay causes and it was found that the 3 vital delay causes in construction industry are: financial inefficiency of the construction firms, fluctuation in material prices and contractor's substandard administration and site management.

Sweis et al. (2013) in their study about project delay, carried out in Jordan identified the factors of construction delay in governmental construction projects. They found that material price hike, increase in fuel prices, changes in design, deficiency of expertise, lack of knowledge regarding local set of laws, shortage of equipment's and weather conditions are the principal delay causes in public sector construction projects of Jordan.

After analysis of many documents and reports of a number of projects, Al-Hazim and Salem (2015) came to know that the major construction delay factors are: Variation orders, Terrain and weather conditions and unavailability of labor force.

During a study of Indian construction projects, Shanmugapriya and Subramanian (2013) examined the vital construction delay factors by going through a questionnaire assessment. The analysis of the data collected from the 3 core agencies of construction industry namely contractors, clients and consultants through questionnaire was carried out by making use of the method of RII. It was found that the major construction delay factors in Indian construction projects were adjustment of contracts, market rate of material and high quality of work constraint.

Construction projects face delay because of the client's delayed provision of some of the material to the constructor and client's delayed payments of running bills. Some other related problems together with the above-mentioned problem like getting belated clearances and approved drawings/designs from clients and consultants make it much difficult to complete the project in time. An additional challenge faced by the construction industry has been the resources' low productivity particularly productivity of equipment's (Mulla & Waghmare, 2015).

After the review of literature and analysis of questionnaire Kamble and Dhawade (2016) recognized the principal construction delay causes in Indian construction projects. They pointed it out that local political interference, Ill project scheduling and planning of activities, belated payments by client to constructor, insufficient funds' allotment, material prices escalation were the key factors of construction delay in Indian construction industry. They used Relative Importance Index for ranking and analyzing these factors.

Koushki et al., (2005) executed a research study in the State of Kuwait for delay in private residential construction projects. They recorded the 3 major factors of construction delay as financial constraints of owner/client, change in orders and lack of expertise with owner in the business of construction. They recommended that these factors can be minimized by ensuring the availability of proper funding source, adequate time allocation and funds at the planning stage and hiring a reliable and experienced construction firm as well as consultant to execute the project successfully.

Efficient communication among the stakeholders of a project is vital for its success. Consistent with Sambasivan and Soon's (2007) findings, oil and gas construction projects of Oman deteriorated due to poor communication among stakeholders of the project. The problem of communication gap always results in rework and thus delay in completion of a project occurs. For that reason, to lessen the risk of delay, it is crucial to ascertain a proper channel of communication for all the stakeholders of a project. Also, informal channels of communication be ascertained as they facilitate convenient flow of information among stakeholders of the project in a shorter time span (Al-Rawas & Easterbrook, 1996; Bassi et al., 2012).

A research study carried out by Ramanathan et al. (2012) acknowledged that rising demand of resources like construction material, labor force and construction equipment's can cause scarcity of these resources and consequently it will slow down the execution of projects. It was also concluded that mismanagement on the part of owner, consultant and contractor will surely direct the project to delay. They derived from reviewing 7 case studies regarding delay in the execution of construction projects that the factors causing delay in project completion were lack of standard material and proper equipment's in the local market, delayed delivery of material, absence of schedule for delivery of material by the contractor, late approval of drawings by consultant, unpredictable weather conditions, delayed dealing with property owners at construction site, fluctuation in prices of raw material and

amendments because of below standard works. They also recommended that for elimination of the negative impact these issues must be taken care of at pre-design stage.

In their study conducted in Jordan for the purpose of finding out the factors causing delay in construction projects, Sweis et. al (2008) pointed out that financial problems of the construction firms, change orders from client and improper project scheduling by constructors prove to be the key factors of delay in residential construction projects. They also argued that the main causes of delay are connected with the environment of the system particularly that of the construction company and the labor, whereas the external causes cast a very minor effect on completion of project.

Sambasivan and Soon (2007) carried out a study regarding the causes of delay in construction industry of Malaysia. They conducted a survey where 150 participants took part. Their study recognized ten key factors which cause delay in construction projects from a list of twenty-eight various factors. The 10 key factors identified are: insufficient experience of contractor, poor planning by the contractor, contractor's poor management of site, improper payment to contractors for work done by client, subcontractors' issues, material shortage, shortage of labor, unavailability and failure of equipment's, communication gap among stakeholders and blunders during construction.

METHODOLOGY

The assessment of the perceptions of contractors, clients and consultant was conducted by developing a self-administered questionnaire. The questionnaire was having 3 portions. Portion 1st was regarding the information about the respondents. The focus of 2nd portion of the questionnaire was on the factors causing time overrun in government funded construction projects in Malakand division of Khyber Pakhtunkhwa Pakistan. The participants were asked to respond in Likert scale of 1 to 5 to sixty-four well-recognized construction delay factors identified from the literature of many studies. The following 7 categories accommodated all the construction delay factors.

1. Factors related to Client: Belated payment to contractor for work done, owner's unnecessary hindrance, impractical duration of contract by client, owner's slow decision making.
2. Factors related to Contractor: Subcontractors' delayed initiation of work, site administration, inappropriate methods of construction, inappropriate scheduling, mistakes at some stages in construction and insufficient experience of contractor.
3. Factors related to Consultant: Drawings' preparation and approval, Contract management, Assuring quality, delayed inspections and approval of tests.
4. Factors related to Material: Shortage of material and below quality material in market.
5. Factors related to labor and equipment's: Shortage of experienced labor, Low productivity of labor and unavailability and failure of equipment's.
6. Factors related to External conditions: unpredictable weather condition, Administrative or governmental changes, disputes with neighbors and terrorism activities.
7. Factors related to Project: unavailability of material at site, difficulty in accessibility of construction site, difficulties in contract relationships, key disputes among stakeholders and communication gap among parties.

During the questionnaire survey the participants were requested to emphasize their suggestions for improving the performance of Pakistani construction industry, Khyber Pakhtunkhwa in particular by responding to the open-ended queries in the questionnaire.

Third portion of the questionnaire was focusing on the effects of delay in government funded construction projects of Khyber Pakhtunkhwa Pakistan. The already recognized 6 effects of delay in construction projects from the review of literature were: time overrun, cost overrun, arbitration, dispute, litigation, and project abandonment. Parallel to 2nd portion the participants were requested to show up their commendations for minimizing the effects of delay by responding to an open-ended query in the questionnaire.

Likert scale from 1 (very low) to 5 (very high) was used to know about the significance of causes and effects of delay in construction projects. Prior to questionnaire distribution, a pilot study was carried out by investigating 5 clients, 5 consultants, and 5 number of contractors. The main reason of this practice was to make sure the integrity of the questionnaire and to verify the completeness of the questionnaire in mentioning the causes of delay applicable for Khyber Pakhtunkhwa Pakistan. All the participants approved that the questionnaire was satisfactory for capturing the causes and effects of

delay. Therefore, no changes were made to the identified causes and delays from the review of various studies related to construction delay in different countries.

The technique used by this study for the purpose of collection of data was simple random form of the probability sampling. Out of the total 482 construction companies (contractors), 50 companies were selected randomly from the PEC list of companies working on government funded construction projects in Malakand division of Khyber Pakhtunkhwa province of Pakistan for the purpose of collection of data. Sample size for this study has been determined by making use of krejcie and Morgan Formula. Questionnaires were distributed in person and through friends working in the construction industry of Malakand division, Khyber Pakhtunkhwa Pakistan. A total number of fifty sets of questionnaires were distributed among potential respondents within the construction industry of Khyber Pakhtunkhwa. All the 50 questionnaires, means 100 percent were returned filled.

RII Calculation

The method of finding the relative importance index of each and every factor has been used by a number of researchers like Sambasivan and Soon (2007), Kometa et al., (1994) etc. In the current study the same RII method was applied to find out the relative importance of each and every cause of delay in government funded construction projects of Malakand division, Khyber Pakhtunkhwa Pakistan. Likert scale from 1 (very low) to 5 (very high) was used to know about the significance of causes and effects of construction delay and changed to RII for each factor as below.

Relative Importance Index, $RII = \sum W / A * N$.

Where "W" indicates the weightage specified for each cause by the respondents, "A" shows the maximum weightage i.e., 5 in case of our study and "N" denotes the overall number of participants.

Relative Importance Index ranged between zero and one. The higher value of RII of a factor means higher importance of that factor for causing time overrun. The purpose of using "RII" was for the ranking of various factors which cause time overrun which enabled us to compare the relative importance of the factors as in the view of the most important 3 pillars of construction industry i.e consultants, clients, and contractors. The relative importance index of each cause as observed by all the participants was used to evaluate the overall rankings for presenting an overall picture of factors causing delay in government funded construction projects of Malakand division, Khyber Pakhtunkhwa Pakistan. Same was the case with the effects of delay. RII for each effect was calculated and ranked accordingly which enabled us to mark the most important and highly ranked effect of delay in construction industry of Malakand division, Khyber Pakhtunkhwa Pakistan.

The method of Relative Importance Index has been used by many researchers for their studies. Table .1 shows the details of the authors who used the same method in their studies.

Table No. 1

S.No	Authors	Techniques	Country of study
1	Odeh and Battaineh (2002)	Importance Index (II)	Jordan
2	Assaf and Al-hejji (2006)	Relative importance index (RII)	Saudi Arabia
3	Aibinu and Odeyinka (2006)	Relative importance index (RII)	Nigeria
4	Sambasivan and Soon (2007)	Relative importance index (RII)	Malaysia
5	Enshassi et al. (2009)	Relative importance index (RII)	Gaza Strip (Palestine)
6	Fugar and Agyakwah-baah (2010)	Relative importance index (RII)	Ghana
7	Doloi et al. (2012)	Relative importance index (RII)	India
8	Kazaz et al. (2012)	Mean Importance Rating (MIR)	Turkey
9	Fallahnejad (2013)	Relative importance index (RII)	Iran
10	Akogbe et al. (2013)	Relative importance index (RII)	Benin
11	Marzouk and El-Rasas (2014)	Relative importance index (RII)	Egypt
12	Aziz and Abdel-Hakam (2016)	Relative importance index (RII)	Egypt
13	Durdyev et al. (2017)	Relative importance index (RII)	Cambodia
14	Sambasivan et al. (2017)	Relative importance index (RII)	Tanzania
15	Al-Emad et al. (2017)	Average index (AI) Makkah	(Kingdom of Saudi)
16	Mpofu et al. (2017)	Relative importance index (RII)	UAE
17	Bagaya and Song (2016)	Importance index (II)	Burkina Faso
18	Chen et al. (2017)	Mean importance rating (MIR)	China
19	Maqsoom et al. (2018)	Mean importance rating (MIR)	Pakistan

RESULTS AND DISCUSSION

Table below contains the characteristics of the participants on the basis of their demography. In accordance with the gathered data, 14 respondents were in the age group of 31-40, 19 were in the age group of 41-50 while rest were in the age group above 51 as shown in table below. In a similar way job designation of the respondents showed that 5 of the respondents were working as Chief Engineers, 10 were working as CEOs, 1 was Engineer, 2 were Executive officers, 1 was General Manager, 11 were MDs, 8 were senior engineers, 9 were site engineers, 2 were sub divisional officers and 1 was technical head of their respective organizations.

Table No. 2.

Demographic Characteristics	Frequency	Percentage
Age		
31-40	14	28
41-50	19	38
Above 51	17	34
Sex		
Male	50	100
Job Designation of the Respondent		
Chief Engineer	5	10
Chief Executive Officer (CEO)	10	20
Engineer	1	2
Executive Officer	2	4
General Manager	1	2
Managing Director	11	22
Senior Engineer	8	16
Site Engineer	9	18
Sub Divisional Officer	2	4
Technical Head	1	2
Type of Organization the respondent is working in		
Client	2	4
Contractor	46	92
Consultant	2	4

Table No. 3 Categorization Of Experience of Respondents

S.No	Experience Category	No. of Respondents	Percentage
1	01 to 12 years	5	10
2	13 to 18 years	11	22
3	19 to 25 years	23	46
4	26 to 30 years	8	16
5	above 30 years	3	6

The above table indicates that 5 of the respondents belonged to the experience category of 1-12 years, 11 belonged to 13-18 years, 23 belonged to 19-25 years, 8 belonged to 26-30 years while 3 of them belonged to the experience category of above 30 years' experience.

Causes Of Delay

The second portion of the questionnaire collected the primary data whose analysis was carried out from the viewpoint of contractors, clients and consultants. For the purpose of overall analysis, each individual factor's relative importance index, as viewed by all the participants, was calculated. For identification of the most important factors causing delay in construction projects the RII was calculated for each and every factor and all the factors were ranked on the basis of their values. This ranking enabled us to

recognize the most significant causes of time delay in the construction projects of Khyber Pakhtunkhwa Pakistan.

On the basis of this ranking the most significant five factors causing delay in construction projects related to the three important pillars i.e Client, Contractor and Consultant are as below;

Table No. 4

S.No	Factors	Relative Importance Index	Rank
Client related factors			
1	Delayed payment of bills	0.99	1
2	Suspension and postponement of work activities	0.99	2
3	Belated site delivery to contractor	0.98	3
4	Belated approval and finalization of drawings	0.98	4
5	Slowness in making decision	0.98	5
Contractor's related factors			
1	Belated approval and finalization of drawings	0.992	1
2	Laziness in making decisions	0.984	2
3	Belated evaluation & approval of designs	0.98	3
4	Variations in specifications	0.976	4
5	Delayed supervision of site	0.964	5
Consultant related factors			
1	Financial capability of contractor (funding for project)	0.996	1
2	Disputes in sub contractors' implementation schedule	0.992	2
3	Frequently changing sub contractors/suppliers	0.984	3
4	Delayed delivery of material at the construction site	0.984	4
5	Belated work of sub contractor	0.98	5

The vital 10 construction delay causes in construction projects of Khyber Pakhtunkhwa as identified through the current study are; Constructor's Financial capacity (0.996), Weather effect (0.994), Environmental restrictions(0.994), Slowness in permission (0.993), 3rd party's delayed inspection and certification (0.993), War against terror, protests, strikes etc., (0.992), Terrorist activities in the area of the construction site (0.992), Earthquake, Flood or any other natural disaster(0.991), belated bill payments (0.990), Suspension and postponement of work activities(0.988).

All the factors identified in this study have been ranked according to their RII values. The ranking of all those construction delay factors in construction industry of Khyber Pakhtunkhwa Pakistan has been shown in table 5.

Table No. 6

S.No	Factors	Category	Total Value	RII	Rank
1	Financial capability of contractor (funding for project)	Contractor	249	0.996	1
2	Weather effect (Snow fall, hot, rain, etc.)	External Conditions	249	0.996	2
3	Environmental restrictions	External Conditions	249	0.996	3
4	Slowness in permission by government/municipality	External Conditions	249	0.996	4
5	War against terror, protests, strikes etc.	External Conditions	249	0.996	5
6	a third	External Conditions	249	0.996	6
7	Terrorist activities in the area of the construction site	External Conditions	249	0.996	7
8	Earthquake, Flood or any other natural disaster	External Conditions	249	0.996	8
9	Delayed payment of bills	Client	248	0.992	9
10	Suspension and postponement of work activities	Client	248	0.992	10
11	Belated approval and finalization of drawings	Consultant	248	0.992	11
12	Disputes in sub contractors' implementation schedule	Contractor	248	0.992	12
13	Shortage of construction materials in market	Material	248	0.992	13
14	Shortage of labours	Labor	248	0.992	14
15	Low productivity level of labours	Labor	248	0.992	15
16	Traffic control and restriction at job site	Construction Site	247	0.988	16
17	Belated site delivery to contractor	Client	246	0.984	17
18	Belated approval and finalization of drawings	Client	246	0.984	18
19	Laziness in making decisions	Consultant	246	0.984	19
20	Frequently changing sub contractors/suppliers	Contractor	246	0.984	20
21	Delayed delivery of material at the construction site	Contractor	246	0.984	21
22	construction	Material	246	0.984	22
23	Equipment availability and failure	Labor	246	0.984	23
24	Unavailability of utilities in site	Construction Site	246	0.984	24
25	Belated evaluation & approval of designs	Consultant	245	0.98	25
26	Belated work of sub contractor	Contractor	245	0.98	26
27	table, etc.)	Construction Site	245	0.98	27
28	Slowness in making decision	Client	244	0.976	28
29	Variations in specifications	Consultant	244	0.976	29
30	Delay in material delivery	Material	244	0.976	30
31	Fluctuations in cost/ currency	External Conditions	244	0.976	31
32	Ambiguity about material	Client	243	0.972	32
33	Changes in government regulations and laws	External Conditions	243	0.972	33
34	Delayed supervision of site	Consultant	241	0.964	34
35	Use of inappropriate methods of construction	Contractor	240	0.96	35
36	Ineffective planning and scheduling of project	Contractor	240	0.96	36
37	Delay in site mobilization	Contractor	240	0.96	37
38	Details lacking in conceptual drawings	Consultant	239	0.956	38
39	Unqualified Engineers and other staff	Contractor	239	0.956	39
40	Human resource issues with contractor	Contractor	239	0.956	40
41	Unqualified workforce	Labor	239	0.956	41
42	Slowness in giving instructions	Consultant	238	0.952	42
43	Variations in original drawing	Client	234	0.936	43
44	Unrealistic completion time concerns	Client	234	0.936	44
45	the site	Construction Site	233	0.932	45
46	Lack of communication between the parties	External Conditions	233	0.932	46
47	Weak supervision of construction site	Contractor	232	0.928	47
48	Accident during construction	Construction Site	232	0.928	48
49	Corruption	Client	231	0.924	49
50	Communication gap with the contractor	Consultant	231	0.924	50
51	Unskilled consultancy staff at site	Consultant	231	0.924	51
52	Unavailability of consultant's staff at the site	Consultant	231	0.924	52
53	Problem with neighbors	Construction Site	229	0.916	53
54	Rigidity of Client's representative	Client	227	0.908	54
55	Disputes of contractor with client and consultant	Contractor	226	0.904	55
56	Communication gap with contractor	Client	221	0.884	56
57	Consultant's rigidity	Consultant	220	0.88	57
58	Clients interruption	Client	218	0.872	58
59	Conflicts among labor force	Labor	217	0.868	59
60	Injury of labors during work	Labor	217	0.868	60
61	Communication gap with other parties	Contractor	216	0.864	61
62	Rigidity of contractors staff with labor force	Labor	216	0.864	62
63	Wages problems	Labor	211	0.844	63
64	Labor's nationality	Labor	209	0.836	64

Table No. 7 Categories Wise Ranking

S.No	Category	RII	Rank
1	Factors related to External conditions	0.99	1
2	Factors related to Material	0.98	2
3	Factors related to Contractor	0.96	3
4	Factors related to Construction site	0.95	4
5	Factors related to Consultant	0.95	5
6	Factors related to Client	0.95	6
7	Factors related to Labor	0.91	7

Table No. 8 Overall Ranking of Factors

S.No	Factors	Category	RII of impact	RII of Frequency	Over All RII	Rank
1	Financial capability of contractor (funding for project)	Contractor	0.996	0.928	0.92	1
2	Weather effect (Snow fall, hot, rain, etc.)	External Factors	0.996	0.924	0.92	2
3	Delay in performing final inspection by third party	External Factors	0.996	0.92	0.92	3
4	Terrorist activities in the area of the construction site	External Factors	0.996	0.908	0.9	4
5	Earthquake, Flood or any other natural disaster	External Factors	0.996	0.896	0.89	5
6	Delayed payment of bills	Client	0.992	0.864	0.86	6
7	Suspension and postponement of work activities	Client	0.992	0.856	0.85	7
8	Belated approval and finalization of drawings	Consultant	0.992	0.852	0.85	8
9	Disputes in sub contractors' implementation schedule	Contractor	0.992	0.844	0.84	9
10	Shortage of construction materials in market	Material	0.992	0.84	0.83	10

Table No. 9 Ranking Of Seven Districts of Malakand Division on the Basis of RII

S.No	District	RII	Rank
1	Swat	62.51	1
2	Shangla	62.03	2
3	Dir Lower	61.23	3
4	Dir Upper	60.66	4
5	Buner	60.54	5
6	Chitral	60.46	6
7	Malakand	59.6	7

The 10 principal factors of construction delay recognized in this study from the questionnaire based on how frequently they occur, and the magnitude of their impact are illustrated as follow. The relative importance index (RII) of Financial capability of contractor is 0.92, RII of Weather effect i.e., Hot, Snow fall, rain and Delayed certification and inspection etc is 0.92, RII for activities related to terrorism in construction area is 0.90, RII value for natural disaster like Flooding and earthquake etc is 0.89, belated bill payment to contractor for work done has RII value equal to 0.86, RII value of Suspension and postponement of work activities is 0.85, In the same way the RII for delayed approving

and drawing finalization is 0.85, Value of RII for Disputes in implementation schedule of sub contractors is 0.84 while the value of Relative importance index for scarcity of material is 0.83.

Table No. 10 Ranking Of Effects Of Construction Delay

Effects	Percentage of Participants Score					RII	Rank
Time Overrun	0	0.7	19.6	57	22.7	0.801	1
Cost Overrun	0.8	2.6	29.1	37.5	30	0.787	2
Disputes	0.6	14.8	40.3	39	5.3	0.665	3
Arbitration	1.98	22.11	45	25	5.3	0.619	4
Litigation	4.7	21.3	48.7	22.7	2.7	0.595	5
Abandonment	6.7	36	29.3	21.3	6.7	0.5716	6

The above table shows that the most important effect on the basis of RII is Time overrun having a value of 0.801. It means the causes of delay highly affect the project completion in the form of time overrun. Cost overrun has RII value of 0.787 which means it is also a big effect of the causes of delay. Disputes with RII value of 0.665 is ranked 3rd, Arbitration with value of 0.619 is ranked 4th, Litigation with value of 0.595 is ranked 5th while abandonment with a value of 0.571 has been ranked 6th by this study.

CONCLUSION

The current research study was intended to judge the viewpoint of consultants, contractors and clients about the most important factors which cause delay in construction projects of Malakand division of Khyber Pakhtunkhwa Pakistan. For that purpose, a questionnaire survey was conducted in construction industry of Malakand division which clearly identified the main factors causing delay in construction projects. These factors were further ranked on the basis of RII with the aim to know the major factor causing construction delay. The results obtained from the analysis showed that financial capability of contractor, belated final assessment by a third Party, weather effect i.e., hot, snow fall, rain, etc., delayed payment of bills to contractor for work done, terrorism activities in the area of the construction, earthquake, flood or any other natural disaster, suspension and postponement of work activities, disputes in sub contractors' implementation schedule, belated approval and finalization of drawings, shortage of construction materials in market are the most important factors of delay in construction projects in Malakand division of Khyber Pakhtunkhwa Pakistan.

Similarly, it was also recognized by the current study that external conditions, material, contractor, construction site, consultant, client, labor are the major categories causing delay in construction projects of Malakand division. The current study identified that the most effected district of Malakand division because of these causes is district Swat, followed by district Shangla and Dir Lower on the basis of relative importance index of these causes.

Though the current study is confined to the construction projects of Malakand division of Khyber Pakhtunkhwa, the stakeholders of the construction industry in other divisions and provinces of the country can also take help from its findings in understanding the principal causes of delay in construction projects. In addition, the majority of the identified factors in this study confirms those identified in previously conducted studies specifically in developing countries of Asia and Africa.

To avoid schedule delays in construction projects there are no simple elucidation to the challenges in construction projects of Malakand division. However, some systematic steps that we can take to lessen these causes are recommended as follow;

1. It is direly needed to improve the management skills of the staff related to construction industry. The construction staff/workers should be trained with the required techniques and skills including planning, costing, time control, risk analysis etc.

2. Project partners must review all the clauses of payment in the contract. A translucent and precise procedure and timeline must be clearly specified in the contract and payment against work done must be ensured timely. Moreover, the schedule of payment must be prepared at the planning stage in order to ensure that construction companies and consultants are paid in a regular way.
3. A realistic and easy to achieve duration for the completion of work should be defined by the client in the contract in order to avoid extension of time and rework.
4. Construction companies should regularly monitor the quality of their construction works for the purpose to avoid mistakes which always lead to rework and hence extension in project time.
5. Contractors should not try to engage lowest priced sub-contractors but during selection of sub-contractors the expertise and technical abilities of their staff should be considered.
6. Clients should straightforwardly interfere in case there is a dispute between contractors and subcontractors in order to minimize the harmful impact on implementation of project.
7. Construction firms should take an early action to attain approvals of various governmental departments to avoid possible consequences on schedule of project.
8. The current study has worked on the factors causing delay and their impacts on construction projects. A research study regarding the effects of construction delays and how to minimize them can also be carried out.

REFERENCES

- Ahmed, S. M., Azhar, S., Castillo, M., & Kappagantula, P. (2002). Construction delays in Florida: An empirical study. *Final report. Department of Community Affairs, Florida, US*.
- Al-Hazim, N., & Salem, Z. A. (2015). Delay and cost overrun in road construction projects in Jordan. *International Journal of Engineering & Technology*, 4(2), 288.
- Al-Rawas, A., & Easterbrook, S. M. (1996). *Communication problems in requirements engineering: a field study* (pp. 47-60). National Aeronautics and Space Administration.
- Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. *International journal of project management*, 24(4), 349-357.
- Bassi, A., Howard, R., Geneletti, D., & Ferrari, S. (2012). UK and Italian EIA systems: A comparative study on management practice and performance in the construction industry. *Environmental Impact Assessment Review*, 34, 1-11.
- Batool, A., & Abbas, F. (2017). Reasons for delay in selected hydro-power projects in Khyber Pakhtunkhwa (KPK), Pakistan. *Renewable and Sustainable Energy Reviews*, 73, 196-204.
- Chileshel, N., & Berko, P. D. (2010, July). Causes of project cost overruns within. In *Proceedings 51st Built Environment Conference* (Vol. 18, p. 20).
- Durdyev, S., Ismail, S., & Bakar, N. A. (2012). Factors causing cost overruns in construction of residential projects: case study of Turkey. *International Journal of Science and Management*, 1(1), 3-12.
- Frimpong, Y., & Oluwoye, J. (2003). Significant factors causing delay and cost overruns in construction of groundwater projects in Ghana. *Journal of Construction Research*, 4(02), 175-187.
- Honrao, Y., & Desai, D. (2015). Study of delay in execution of infrastructure projects-highway construction. *International Journal of Scientific and Research Publications*, 5(6), 1-8.
- Kamble, Y. G., & Dhawade, S. M. (2016) Impact of Equipment Downtime on Construction Projects.
- Kometa, S. T., Olomolaiye, P. O., & Harris, F. C. (1994). Attributes of UK construction clients influencing project consultants' performance. *Construction Management and economics*, 12(5), 433-443.
- Koushki, P. A., Al-Rashid, K., & Kartam, N. (2005). Delays and cost increases in the construction of private residential projects in Kuwait. *Construction Management and Economics*, 23(3), 285-294.
- Maqsoom, A., Khan, M. U., Khan, M. T., Khan, S., & Ullah, F. (2018). Factors influencing the construction time and cost overrun in projects: empirical evidence from Pakistani construction industry. In *Proceedings of the 21st International Symposium on Advancement of Construction Management and Real Estate* (pp. 769-778). Springer, Singapore.

- Mulla, S. S., & Waghmare, A. P. (2015). Influencing factors caused for time & cost overruns in construction projects in Pune-India & their remedies. *Int. J. Innovative Sci. Eng. Technol*, 2(10), 622-633.
- Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: traditional contracts. *International journal of project management*, 20(1), 67-73.
- Patil, A. P. (2017). Analysis of Cost over run in construction Projects. *International Research Journal of Engineering and Technology (IRJET)*, 4(11), 1234-1237.
- Rahman, I. A., Memon, A. H., Karim, A. T. A., & Tarmizi, A. (2013). Significant factors causing cost overruns in large construction projects in Malaysia. *Journal of Applied Sciences*, 13(2), 286-293.
- Ramanathan, C., Potty, N. S., & Idrus, A. B. (2012). Analysis of time and cost overrun in Malaysian construction. In *Advanced Materials Research* (Vol. 452, pp. 1002-1008). Trans Tech Publications Ltd.
- Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of project management*, 25(5), 517-526.
- Shanmugapriya, S., & Subramanian, K. (2013). Investigation of significant factors influencing time and cost overruns in Indian construction projects. *International Journal of Emerging Technology and Advanced Engineering*, 3(10), 734-740.
- Srdić, A., & Šelih, J. (2015). Delays in construction projects: causes and mitigation. *Organization, technology & management in construction: an international journal*, 7(3), 1383-1389.
- Sweis, G. J. (2013). Factors affecting time overruns in public construction projects: The case of Jordan. *International journal of business and management*, 8(23), 120.
- Sweis, G. J., Sweis, R., Hammad, A. A., & Shboul, A. (2008). Delays in construction projects: The case of Jordan. *International Journal of project management*, 26(6), 665-674.
- Vaardini, S., Karthiyayini, S., & Ezhilmathi, P. (2016). Study on cost overruns in construction projects: a review. *International Journal of Applied Engineering Research*, 11(3), 356-363.
- Vidhyasri, R., & Sivagamasundari, R. (2017). A review on factors influencing construction project scheduling. *International Journal of Civil Engineering and Technology*, 8(3), 146-157.