



Identifying the Causes of Delays in Large Construction Projects of Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

The construction delay becomes a routine and naturally acceptable problem in large construction project of Khyber Pakhtunkhwa, Pakistan. Large construction project is very necessary for the development, economy and progress of the province. In research methodology, a questionnaire based survey form is develop involving government departments related to construction, client, contractor, workers and consultant, who plays their key part in delivering the project, to identify the major causes of delay and interview session was conducted with those who were unable to fill out the questionnaire form to record their personal view about the main causes of delay. To evaluate the respond of all the parties we use the RIR (Relative importance Rating) technique to rank the causes and identify the major causes of delay. Then we discuss the 12 main causes which were rank highest according to RIR technique, we will describe all these causes in realtion to some main large construction project of Khyber Pakhtunkhwa which are delayed are facing delays and the reason of its delay as per our evaluation result. At the end we suggest conclusion and recommendations to counter these delay in order to complete the project in specified timeline.

Keywords: construction delays, causes of delays, Large construction projects, Khyber Pakhtunkhwa, Pakistan

Introduction

The construction industry plays a very important role in the development and economic growth of Khyber Pakhtunkhwa, Pakistan, which is third biggest underdeveloped province of the country. There are many large construction projects completed in the past, some are undergoing and many will start in the future. We are focusing on large construction projects of Khyber Pakhtunkhwa, Pakistan. A large construction project is a project with a budget of more than Billions of Rupees. In these construction projects, there are some problems faced such as delays in the completion or delivery of the project. The delay in completion of construction projects become a worldwide problem. In construction industry, construction delay refers to the time overrun in specified completion data or time overrun in the delivery of the construction project on which all parties agreed. Assaf SA. & Al-Hejji S. (2006).

Construction delays have an adverse impact on the project sponsor, client, project team member and participant involved in the entire project, which frequently result to disagreement, suspicion, financial problem and claims, lawsuit, and renegotiations (Megha and Bhatt 2013)

According to Shehu et al. (2014), stated that delay is a reoccurring incidence that can occur in almost every project carried out by any construction industry if appropriate project management knowledge is not employed.

According to Shebob et al. (2012) and Addo (2015), delay may differ from project to project depending on the type and magnitude of the 9 structure. Andrew and Holt (2012) confirm that delays in project can result in increase in costs, such as direct costs that come as a result of crashed programmes and events to reach an exciting height. However, delays on any task during construction can change the programmed schedule of the project with adverse effect that might lead to loss of massive capital.

In Khyber Pakhtunkhwa, Pakistan, it is very often seen that the large construction project is completed within deadline specified before the start of the project. There are many large construction projects in Khyber Pakhtunkhwa, Pakistan, which suffered tremendous delay or in some cases project abandonment. Some examples of large construction projects, which faces delay or suffering delay, are: Reconstruction of Earthquake affected area of Khyber Pakhtunkhwa, Pakistan, reconstruction of Floods affected roads and bridges, Malam Jabba road, Lawari tunnel project, Swat Express way, Peshawar Bus Rapid Transit (BRT), Swat to Kalam Road, Mohmand Dam, etc.

Literature review

In the review study of previous researches, we found out that the most common and frequent problem in large construction projects is the delay in project delivery or completion. Construction delay refers to the time overrun in completion or delivery of project beyond the data on which parties agreed or project completion data specified. Assaf SA. & Al-Hejji S. (2006). Whether the large construction projects are simple or complex, in Pakistan we mostly see the construction delays. It is difficult to analyze the delays, because there are many activities in the construction project.

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 Khyber Pakhtunkhwa, Pakistan has numerous examples of projects Delay 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 delay of main construction projects it is more important for the developing world to enhance their technical abilities. Considering this fact, Khyber Pakhtunkhwa, Pakistan province 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 province is suffering due to inherent problems like conceptual differences about the projects, inefficient feasibility studies, and deficiency in proper technology and economic stability.

According the different researchers, the projects those 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 construction of BRT Peshawar, South Rohri fresh ground water development scheme and installation of 110 tube wells in the Federally Administered Tribal Areas (FATA) of Bajour Agency, Swat expressway and 350 mini hydropower dam are few main examples. Most of these projects in the province had been started without proper feasibility study due to the influence of political personalities which are now facing serious crises.

From the detail analysis and investigation reports 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 provisional projects like, BRT Peshawar, Construction of Kalam road, Construction of 365 mini hydropower dam and construction of Swat Expressway are presenting the worst example of cost escalation.

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 PakIran 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 2006-2020. The inflation is still out of control due 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. 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 Khyber Pakhtunkhwa, Pakistan, so many projects are getting failed due 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 adverse the 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 identify the causes of delay in large construction project of Khyber Pakhtunkhwa, Pakistan.

Methodology

To identify the causes of delays in large construction projects, a large range of community attached to the construction industry of Pakistan was taken onboard. Respondents were randomly selected from different construction project of Khyber Pakhtunkhwa, Pakistan through formal and informal channels. The main groups of respondents were government department related to construction, contractors, consultants, client or his representatives and general public or construction workers. A detailed questionnaire was circulated to collect useful details from professional groups belonging to construction industry. The viewpoint of contractors and consultants were analyzed and evaluate to rank. Fifteen factored questions were prepared from preliminary investigations. A web based questionnaire survey was also developed and emailed to the contractor and consultant firms. It was arranged in the order of priority scale, like 1= Strongly disagree (less than 25%), 2= Disagree (20-50%), 3= Agree (50-75%), 4= Strongly agree (75-100%). 100 questionnaires were distributed to different groups like Government Employees, contractors, consultants, clients and general public or construction labors. Each of these groups respond in certain percentage. After collecting the useful information through different set of questionnaires, the collected data were analyzed and evaluate according the aim of study.

Out of 100 questionnaires distributed, 100 (75%) were returned. There were 10 (50%) questionnaires from government departments related to construction, 15 (75%) from clients, 18 (90%) from contractors, 12(60%) from consultants and engineers, and 20 (100%) we completed by taking interviews from labor. The table 2 as shown below shows the sector wise distribution and return of questionnaires.

Table 2. Sector wise questionnaire distribution

Questionnaires Distributed and Returned		
Sectors	Questionnaires distributed	Questionnaires Returned
Government Employees	20	10
Clients	20	15
Contractors	20	18
Consultants & Engineers	20	12
Construction Labor	20	20

Data analysis

We applied a statistical formula to find out the relative importance of different causes of delays and effects in construction projects. We adopted a four-point scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree) and then for each causes and effects. We transformed the ranged values into RIR by the formula as follows:

$$RIR = \sum W/A*N \quad (0 \leq RIR \leq 1)$$

Where: W – is the weight given to each factor by the respondents and ranges from 1 to 5, (where “1” is “strongly disagree” and “4” is “strongly agree”)

A – is the highest weight (i.e. 5 in this case) and

N – is the total number of respondents.

In the RIR value, zero is not inclusive. Higher the RIR value, higher the cause/effect of delay. We applied this methodology and formula for the importance of causes of delay.

Delay in Large Construction Projects

Ogunlana SO, Promkuntong K. (1996). Conducted a study on the delays in construction industry of Thailand. They found out that the problems faced by construction industry in developing countries could be shortages or inadequacies in construction infrastructure (particularly supply of resources), caused by clients and consultants, and also caused by contractor's incompetence /inadequacies. The major problem faced by construction industry is the delay in the delivery or completion of the construction project. There are many causes of delay in construction industry, which leads to some effects of delay on the construction projects. These causes of delay are explained as follows and their importance is calculated by the above research methodology and statistical formula.

Causes of Delay

There are some major causes of delay. Assaf SA, Al-Hejji S. (2006), found out the most important cause, which is the change order (all participants agree to this). Some key causes (according to clients, contractors and consultants) According to Assaf SA and Al-Hejji S (2006), the four key causes of delay according to clients are contractor's improper planning, contractor's poor site management, subcontractor issues, and skilled labor supply and productivity. According to Assaf SA and Al-Hejji S (2006), the four key causes of delay according to contractors are insufficient client's payments for completed and ongoing work, subcontractor issues, acquiring difficulties for work permit and approval, and availability and failure of equipment. According to Assaf SA and Al-Hejji S (2006), the four key causes of delay according to consultants are contractor's improper planning, contractor's poor site management, insufficient client's payments for completed and ongoing work, and shortage of equipment and materials.

The importance and ranking of delay causes resulted by our research methodology of questionnaire survey and applying of statistical formula is as follows in the tables below.



Importance and ranking of financial related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Client's financial problems	3	5	47	45	0.835	9 th
Client's constraints	2	8	51	39	0.818	14
Contractor's financial problems	6	14	55	25	0.748	42
Inadequate fund allocation	4	11	35	50	0.828	12
Monthly payment problems	5	16	55	24	0.745	45
Inflation	8	20	42	40	0.759	40
High interest rate	20	10	33	37	0.718	58
Delay in payments to supplier and subcontractor	1	14	30	55	0.848	7 th

Importance and ranking of client related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Finance and Payments	1	3	43	53	0.870	1 st
Interference of Client	6	8	50	36	0.790	28
Slow decision making	10	5	35	50	0.813	17
Unrealistic contract duration and requirements	5	3	37	55	0.855	4 th
Non-capable client's representative	15	20	25	40	0.725	52
Change in specifications	14	6	35	45	0.778	34

Importance and ranking of contractor related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Delays caused by subcontractor	3	7	37	53	0.850	5 th
Poor site management	7	8	41	44	0.805	21
Inappropriate construction methods	1	14	55	30	0.785	30
Improper planning	4	7	30	59	0.860	2 nd
Errors during construction	2	10	42	48	0.833	10 th
Inadequate contractor's experience	8	21	42	29	0.730	48
Inaccurate time estimation	6	12	40	42	0.795	25
Inaccurate cost estimation	5	12	38	45	0.808	19

Importance and ranking of consultant related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Contract management	3	11	56	30	0.783	31
Preparation and approval of drawings	3	8	32	57	0.858	3 rd

Incomplete drawings	1	10	44	45	0.833	11
Changes in drawings	5	5	49	41	0.815	16
Quality assurance	15	15	36	34	0.723	57
Inaccurate site investigation	6	13	41	40	0.788	29
Inadequate consultant experience	10	12	32	40	0.771	38
Slow response and inspection	6	14	45	35	0.773	36

Importance and ranking of material related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Quality of material	6	15	39	40	0.783	31
Shortage of material	13	17	33	37	0.735	47
Supply of material	5	10	44	41	0.803	23
Late delivery	11	17	42	30	0.728	50
Rise in material prices	10	20	40	30	0.725	52
Inadequate material	20	22	30	28	0.665	65

Importance and ranking of labor related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Labor supply	11	19	30	40	0.748	42
Labor productivity	15	12	28	45	0.758	41
Shortage of Skilled Labor	2	14	44	40	0.805	21
Slow working of Labor	17	15	28	40	0.728	50
Labor injuries	14	30	30	26	0.670	64
Labor Strikes	19	16	30	35	0.703	62
Non-attendance	36	30	15	19	0.543	67

Importance and ranking of equipment related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Improper equipment	11	18	41	30	0.725	52
Inadequate quantity of equipment	3	11	46	40	0.808	19
Shortage of equipment parts	16	11	33	40	0.743	46
Equipment failure	11	8	41	40	0.775	35
Slow equipment movement	18	22	41	19	0.653	66
Allocation problems	14	20	36	30	0.705	61
Improper old equipment	13	23	36	40	0.730	49

Importance and ranking of contract related delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Change orders	13	11	30	46	0.773	36
Mistakes in contract document	11	22	33	34	0.725	52
Incomplete documents	7	5	44	34	0.792	27
Contract modifications	2	15	37	46	0.818	14
Major disputes and negotiations	20	13	33	34	0.703	62
Lack of communication between parties	1	5	49	45	0.845	8 th
Improper organizational structure	15	11	34	40	0.748	42

Importance and ranking of external delay causes by RIR value

Delay causes	1	2	3	4	RIR	Ranking
Weather conditions	14	16	41	29	0.713	60
Natural disasters	11	14	43	42	0.764	39
Regulatory changes	11	10	30	49	0.793	26
influence form political parties	1	8	41	50	0.850	6 th
Unforeseen site conditions	11	18	41	30	0.725	52
Organizational changes	11	7	40	41	0.780	33
Slow site clearance	13	17	40	30	0.718	58
Conflicts	2	13	49	36	0.798	24
Geological and geographical conditions	3	16	30	51	0.823	13
unrealistic promise made by political leaders for project delivery	3	10	47	40	0.810	18

After the analysis of data, 12 important causes of delays based on the RIR and their ranking are discussed with realistic cases as follows:

Finance and payments (RIR=0.870)

Ranked 1st in the delay list. refers to the most critical and highly ranked amongst all factor are finance and payments, refers to the Poor financial arrangement and late payments made by the clients to contractor or contractor to sub-contractor which effect the project directly and with that delays in payments it causes delay in the project. The more

the payment released in time the more project activities will boost on and vice versa. lack of control over cash flow has been the major factor in the delays of a project. Such type of problems are caused by many factors such as intensive works by the labors, payments to, suppliers or sub-contractor paid before receiving payments from client's, purchase of fixed assets, time lag between billing and receiving its collection, cash used for long lead item, overstock of inventory are other reasons. The contractors must ensure that it has adequate funds available to manage the project. In Khyber Pakhtunkhwa most of the project are facing delays due to poor issuance of financial and payment method from the Government side just like Kalam road, Malam jabba road, BRT Peshawar and swat motorway.

Improper Planning (RIR=0.860)

Ranked 2nd in the delay list. poor planning in a project creates more chances for project delays and failure. This phase is important to be taken into account to avoid delays because it define the whole project, about its starting and finishing with define activities and methodology. The Project Management and planning officer has to play their role in the Planning stage by providing realistic time frame and construction cost estimation also to provide proper monitoring during the project to achieve the desire goals. It guaranteed that every activity in the project is in cohesive mode with adequate resources, budget, procedures schedule, cost, procurement and others are aligned to achieve project objective.

Preparation and approval of drawings (RIR=0.858)

Ranked 3rd in the list of delays, refers to approval of the drawing before justification of design scope, defective design error & omissions and inadequate specifications and approved before proper examination. which create serious problem during execution of the project, the project which is approved without justification and as per ground realities have serious consequences just like BRT Peshawar is facing, one of the main cause of this project delay is preparation and approval of drawing without justification.

Unrealistic contract duration and requirements (RIR-0.855)

Ranked 4th in the list of delay. Refers to assigning the deadline to the completion of the project which is unrealistic as well as have contract requirement which doesn't met during project execution, such contract clauses and duration create delays during construction of the project. Realistic example of this delays is BRT Peshawar which was compromised to be completed within six months and under 40 billion rupees. Which was totally failed during execution due to unrealistic contract duration and requirement.

Delays caused by Sub contractor (RIR=0.850)

Ranked 5th in the delays list, this type of delays take place when there is lack of communication between the main contractor and subcontractor as well as subcontractor and client about the project goals and achievement, the clash of interest which they agreed upon before the start. Which changes in between the project create project delays which result in abonnement or boycott of work, causes delay in project.

Influenced from political and influential groups (RIR=0.850)

Ranked 6th in the delay list. One of the most serious problem which project are facing is influenced of political and influential group which causes appointment of incompetent staff as well as assigning project to incompetent contractor, subcontractor and suppliers due to influence of the group in power or person in power which causes delays the project. BRT Peshawar is one of its live example, there is a blame the incumbent government of that time that they allotted the project to the blacklisted contractor, due to which majority terminal of BRT Peshawar was constructed wrongly and was dismantled many time.

Delays in payment to suppliers and sub-contractor (RIR=0.848)

Ranked 7th in the delays list. refers to the delays and stoppage of work on construction projects due to the payment didn't paid to the subcontractor and supplier, In Kpk most of the project are facing such type of delay due to the late payment made by the contractor to the sub-contractor and to supplier which result in boycott, strike and abonnement. Result in delay of the project.

Lack of communication between parties (RIR=0.845)

Ranked 8th in the delay list. refers to the difference in conditions in the design and the real site scene. Most of the project faces this problem due to lack of proper communication channels amongst the project drivers. Which is necessary for every project because the project goals and target can only be achieve when there is a proper communication between all the parties who is involve directly or indirectly in the project. During planning and feasibility report preparation all parties should be taken on board to generate project scope, duration and cost estimate after consultation with all parties involved in the project its only possible when there is proper communication between the organization.

Client's financial problems (RIR=0.835)

Ranked 9th in the delay list. refers to the inadequate fund allocated to the project which faces shortage during construction and the client thus unable to pay extra money to the project due to inaccurate cost estimation during feasibility preparation of the project.

Error during construction (RIR=0.833)

Ranked 10th in the delay list. refers to the faulty construction during the project which causes delay to the project once it is identified that the completed task was incorrect due to incompetency of contractor and poor supervision by the consultant.

Incomplete drawings (RIR=0.833)

Ranked 11th the delay list. refers to the changes in design and drawings demanded by clients and contractors. Just like changes in BRT Peshawar route (from underpass to flyover and from flyover to underpass) which contributed more to delay the project.

Inadequate fund allocations (RIR=0.828)

Ranked 12th in the delay list. refers to inadequate total cost estimation of the project, which increased during construction create the problem for both the client and contractor which causes delay the project.

BRT Peshawar initial completion cost was estimated 40 Billion rupees which reaches to almost 80 Billion causes the project to delay almost 18 month.

There are many more causes, but we discussed the main and more important causes. These causes lead to the effects on the construction project The Karakorum Highway is 1300 km (806 km in Pakistan, 494 km in China) is the highest highway of the world. It connects Pakistan with china at altitude of 4,693 m through Khunjerab pass. It was constructed with many difficulties because of the high mountainous region and problems of land sliding and rock sliding delayed the work and delaying the rework on this construction project. The upgrading of this highway like doubling the width and making to more durable and workable is facing delay.

There are also many other large construction projects in Khyber Pakhtunkhwa, Pakistan faced or facing delays in construction due to many causes leading to many effects on construction industry of Khyber Pakhtunkhwa, Pakistan.

Conclusion and Recommendations:

We carry out the Questionnaire base survey research in Kpk to identify major causes of delay in large construction project of Kpk. We developed the questionnaire to collect the major factor about the causes of delay. We analyzed and evaluate all these factor by a statistical formula to calculate to relative importance index (RIR). Based on the RIR value, we ranked the causes of delay. Greater the RIR value, more it contributes to the delay. We discussed the 12 important major factor which causes delay, which are: Finance and payments, Improper Planning, Preparation and approval of drawings, Unrealistic contract duration and requirements, Delays caused by Sub contractor, Influenced from political and influential groups, Delays in payment to suppliers and sub-contractor, Lack of communication between parties, Client's financial problems, Error during construction, Incomplete drawings, Inadequate fund allocations. We also relate these causes to most of the large construction projects faced or are facing delays. Some main large construction projects in Kpk faced or facing delay are: Reconstruction of Earthquake affected area of Khyber Pakhtunkhwa, Pakistan, reconstruction of Floods affected roads and bridges, Malam Jabba road, Lawari tunnel project, Swat Express way, Peshawar Bus Rapid Transit (BRT), Swat to Kalam Road, Mohmand Dam, etc. These delays are very common in Khyber Pakhtunkhwa, Pakistan's large construction industry. We mentioned the main causes of delay. This study can be also used to lessen the delays in large construction industry of Pakistan by dealing with the main causes and reducing the delay by tackling it with appropriate focus on time.

It is recommended that for the project to be completed with in specified time in which all the parties agreed upon before the commencement of construction work, there should be a clear and strong commitment of all the the stakeholder who are involved in the project, to complete the project with in specified deadline by highltnig all the above mentioned finding which are more seriously contributing to the dealy as compare to all others finding, if all these finding are given appropriate attention during planning, designaning, awarding contract and during construction then its possible to eliminate all those factors which causes the project to delay.

The other factor which must be prioritize during construction project is the communication amongst all the parties involve in construction project. If there is proper and understandable communcition amongst all the parties regarding all the finding which are disucussed above, then their will be a strong commitement action to avoid these factor which casues the project to delay.

Comply with all these findings and recommendations can mitigates the causes of dealys and will complete the project with in specified duration.

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