

# Significant Causative Factors of Delay in Road Construction Projects in Pakistan

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**Abstract:** Construction industry of Pakistan is creating number of job opportunities and also playing role for development of economic growth. The problem of delay is more severe in road projects compared to other types of construction projects. Delay in construction projects indicates negative perception to the stakeholders as well as to investors or donors. Main objective of this research is to find out significant causative factors of delay in road construction projects in Pakistan. From previous studies and interviews 75 common factors of delay were identified. A questionnaire was developed and distributed amongst 95 respondents from client, consultant and contractors engaged in road construction projects, respondents were asked to rank each factor according to their experience. Gathered data was analyzed by using average index method. After data analysis, the results showed that inadequate planning, late payment to contractor, changes in design, changes in specification of material, delay in material supply, weather impact, poor coordination between parties and poor site management were found significant causative factors of delay in road construction in Pakistan. The finding of this paper is useful for construction stakeholders for achieving effective cost performance in road construction projects.

**Keywords:** Causative factors, road Projects, Delay, Pakistan

## 1. Introduction

**S**uccessful project can be defined as the project is completed in approved time duration, budget and quality [1]. Project can be defined as a number of activities fulfilled completed within time, budget and with quality as per requirements of owner [2]. According to research carried by Aziz et al.[3] that road projects takes more time to complete as compared to approved duration; if any project of road construction is completed in approved time frame, it is called as ideal highway project [3].

Transportationsector is an important sector which contributes more than 10% to GDP (gross domestic production) and also more than 17% to GCF (gross capital foundation) in Pakistan [4]. Nowadays government of Pakistan is focusing on good and high quality of road projects [5].

Worldwide, many studies have been carried out to find causativefactors of delay in construction projects. However, less studies have been carried out to identifysignificant factors of delay in road construction projects globally. Further, the causative factors of delays vary compared to the types of construction projects. Thus, this paper focuses on to identify significant causative factors of delay in road construction projects.

## 2. Previous Studies

Mezher et al. conductedresearch to determine critical factorsofdelay in road projects from perspective of

designer, client, and contractors. It was observed that financial difficulties of owner, contractual related issues between partiesand poor project management are most causative factor of delay in roads construction projects[ 6]. A research carried by Mahamid et al. through distribution of questionnaires, identified that government influence in projects, procedure of tendering at lower bidding, delay in payment by the client, inexperience consultant staff and designers, imperfect design, and errors in drawings were most serious factors of delay in construction projects [7]

Ejaz et al. performeda questionnaire survey among construction stakeholders to determinecritical factors contributing to delay in road projects. From research results main critical factors of delay were fluctuation of materials prices, continuous financial difficulties faced by client [8]. Haseeb et al. [9]found critical factors of delay inconstructionprojects were the shortageof funds, interference of owner, change of orders, lack of materials and equipment, poor planning and feeble management at site [9] .Choudhry et al. identified most critical factors of delay in projects were delay in cash flow, natural disaster, financial problems by contractor, revenue issues, change in project scope and inexperienced management and noplanning by the contractor [10]. Another research conducted by Santoso and Soeng, through questionnaire survey point out critical five factors of delay were poor site arrangement, slow process of payment, low productivity

labor, the award of the contract on low bid and weather affect [11].

### 3. Research Methodology

In this study quantitative method is adopted to know the viewpoints of stakeholders towards causative factors which leads to delay in roads construction projects. Research methods to achieve object of this study was consists of two phases. The first phase comprises of conducting literature review and interviews. From this phase, 73 causative factors of construction delays were found. At the second phase, questionnaire was developed which comprises of two sections, section A and section B. In Section A: bio-data, company profile, experience, and qualification of respondents were asked. In Section B, Respondents were asked to rank each causative factor with respect to their importance level.

#### 3.1. Statistical Method for Evaluation of data

Data was evaluated by using formula of Average Index (AI) method as given below:

$$AI = \Sigma(1X_1 + 2X_2 + X_3 + 4X_4 + 5X_5) / N \dots \dots \dots (1)$$

Where,

N= Overall number of respondents

X<sub>i</sub>= indicates number of respondents for "Not important"

X<sub>2</sub>= indicates number of respondents for "slightly important"

X<sub>3</sub>= indicates number of respondents for "moderately important"

X<sub>4</sub>= indicates number of respondents for "very important"

X<sub>5</sub>= indicates number of respondents for "extremely important".

In this research, evaluation values to assess significant level is used as follow:

Value of AI from 5.0 to 4.0 extremely important

Value of AI from 4.0 to 3.0 very Important

Value of AI from 3.0 to 2.0 moderately important

Value of AI from 2.0 to 1.0 slightly important

Value of AI from 1.0 to 0 not important

Before Actual data collection, a preliminary study was carried out by conducting interviews from 7 experienced persons who are involved in road construction projects.

This study was done to validate the relevancy of designed questionnaire in road construction projects of Pakistan. Table.1: shows the profile and experience of respondents interviewed.

Table. 1. Profile of respondents interviewed for questionnaire validation

S.No	Organization	Position	Academic Qualification	Experience in roads projects
1	Contractor	Project Manager	Bachelor in Civil Engineering	32 years
2	Contractor	Managing Director	Masters in Civil Engineering	30 years
3	Contractor	Managing Director	Masters in Civil Engineering	28 years
4	Contractor	Deputy Project Manager	Bachelors in Civil Engineering	25 years
5	Consultant	Resident Engineer	Master in Structural Engineering	22 years
6	Consultant	Resident Engineer	Masters in Construction Management	20 years
7	Client	Project director	Bachelors in Civil Engineering	18 years
8	Client	Deputy Director	Bachelors in Civil Engineering	15 years

Table.1 indicates that interviewed respondents have more experience in highway projects from 26 to 14 years. Overall experience of the 08 respondents is 157 years (average approximate experience of 20 years). Respondents were senior employers in their respective organizations and having high positions. Hence, aim of conducting interviews was to validate the causative factors of construction delays obtained from literature review. All the respondents of interviews were agreed that causative factors of delays mentioned in the design questionnaire were relevant to roads construction projects in Pakistan.

#### 3.2. Data collection

Survey was conducted by distribution of 95 questionnaires set. Questionnaires were randomly distributed to 29 consultants, 33 client, and 33 consultant personnel. From 95 questionnaires, 78 sets of questionnaires were received back from respondents. From 78 few sets of questionnaires further cannot be analyzed due to incomplete data. Details of the survey are presented as in Table. 2.

Table. 2. Facts of surveys

Parameters	Values
Number of questionnaire distributed	95
Number of questionnaire received	78
Number of incomplete information	06
Number of valid questionnaire	72
Total % of questionnaire received	82.1
Total % of questionnaire valid	92.3

#### 4. Data Analysis and Discussion

Collected data was analyzed by statistical method of average index. The factor whose score is more than 3.6 is selected causative factors of delay in road construction

projects in Pakistan. Significant causative factors which contribute to delay in delays in road projects in Pakistan are mentioned in table 3.

Table 3: Serious factors of delay in roads projects

Identified Causative Factors	Score	Rank
Inadequate planning by contractor	4.31	01
late payment to contractor	4.27	02
changes in design	4.14	03
changes in specification of material	4.03	04
delay in material supply	3.92	05
Weather impact	3.86	06
Poor Coordination between parties	3.81	07
Poor site management	3.62	08

Table 3: indicates that inadequate planning by contractor, late payment to contractor, changes in design, changes in specifications of materials, delay in material supply, weather impact, poor coordination between parties and poor site management with their average index value 4.31, 4.27, 4.14, 4.03, 3.92, 3.86, 3.81 and 3.62 respectively are the causative factors of delay in construction of road construction projects.

##### 4.1 Inadequate planning by contractor

After data analysis, inadequate planning by contractor was found as most causative factor of delay in construction of roads projects with score of 4.31. Proper planning of project should be done by contractor in initial execution of project. Because of appointment of inexperienced engineers and project managers causes delay in project [12].

##### 4.2 Late payment to contractor

Contractors play an important role to finish project from initial stage to final stage of project. If the contractors are not paid their payment on time subsequently the construction process delayed and stopped which affects the project to complete within time [1].

##### 4.3 Changes in design

Client and contractors are equally responsible for sudden and frequent changes in design of project. Complete and detailed design of project should be finalized before tendering of project. Because of this factor of changes in design mostly projects are facing problem of delay [3]

##### 4.4 Changes in specification of materials

Sudden changes in specification of materials causes delay in completion of project because contractor ordered the material as per given in contract document. Approval and supply of new materials causes delay in construction projects [13].

##### 4.5 Delay of supply of materials

Every project must be completed within approved time but because of supply of materials at site causes delay in completion of project within that time. Because of delay in supply of materials construction activities remains suspended which causes delay factor [13].

##### 4.6 Weather impact

Weather impact means heavy rains and floods causes the issue of delay in construction of roads projects.

Many construction projects are delayed because of heavy rains and floods [14].

#### 4.7 Poor Coordination between parties

Poor coordination between parties like consultant, contractor and client delay the flow of construction at site. Sometimes conflict between parties delay the construction activities for some time which effects the performance of project to complete in approved time [15]

#### 4.8 Poor site management

Inexperienced and unqualified staff appointment by contractor causes delay in completion of project. Quit of project manager from running project effects the project progress and that projects take times to complete because construction activities remains suspended for certain time period.

### 5. Conclusions

This study explores causative serious factors the delay in roads construction projects of Pakistan. 73 factors were found from literature review and from interview which causes the delay in the construction industry. A preliminary study was carried out to validate delay factors then questionnaire was developed and dispersed to experienced experts of roads projects to rank each factor carefully. Each factor was statistical analyzed by average index, 8 factors were found as serious causative factors which delay in roads projects. The serious factors which were identified were poor planning, cash flow problem faced by the contractor, rapid design changes, late delivery of materials, political influence, and financial difficulties by owner, inexperienced staff and poor site management. The results of this study are beneficial to control serious factors which the delay of roads construction projects.

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