

Causes of Time Overrun in Construction of Building Projects in Pakistan

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Abstract—Time overrun in construction projects is a very serious issue in developed and developing countries. The main object of this research is to find the main causes of time overrun in the construction of building project and its possible mitigation measures. Quantitative approach was adopted in this research to achieve object and RIW (relative importance weight) approach was used for collecting data. Financial issues faced by the contractor, contractor's inexperience, weather impacts, late delivery of material, mistakes in design, shortage of skilled labor, incompetent subcontractor and mistakes in time estimation were identified as main causes of time overrun in construction projects and possible mitigation measures were also proposed from experts. This research will help in giving awareness to stakeholders to narrow down the factors of time overrun in construction projects in Pakistan.

Keywords—time overrun; causes; building projects; mitigation measures; Pakistan

I. INTRODUCTION

Time overrun is one of the most serious issues in construction industry globally [1]. "Construction time overrun is the change between a project's actual contract period at the time of tender and its final contract period on which construction project finished" [2]. Time overrun can result in many negative impacts on the construction project like budget overrun, low productivity, contract expiration, work acceleration resulting in bad quality, and disputes among construction stakeholders [3]. It is observed that many construction projects face the issue of time overrun worldwide both in developing and developed countries like USA or UK [4, 5]. Authors in [6] stated that more than 40% of projects in construction industry experiences time overrun. Construction industry is not famous in terms of project completion within time. Ignorance of time overrun analysis resulted in many construction projects failing to complete on the given time frame [7]. According to [8] only 47% of projects were

completed within approved time frame, around 38% of construction projects were behind time frame and 15% of construction projects were completed ahead of time in Indonesia. Like other countries, time overrun is one of the most severe problems in the construction industry of Pakistan [9, 10]. Author in [11] reported that the majority of the Pakistan construction projects were 11% to 30% below their approved time fame. Only a few studies have been carried out to find factors of time overrun in the construction of building projects in Pakistan.

II. PREVIOUS STUDIES

Many researchers conducted studies on the causes of time overrun in different kinds of construction projects to find factors and causes of time overrun. Authors in [12] conducted survey on 130 randomly selected engineers. Identified causes of time overrun were delayed payments, material shortage, changes in selected material prices, poor site management, and problems in bank credit. Authors in [13] identified 83 common factors of time overrun and arranged these factors in 8 groups. By using relative importance index five causes of time overrun were identified which were poor supervision at site and site management, delay in making decisions, owner interference in the project, ground conditions, and necessary changes from the owner. Authors in [14] identified 16 causes of time overrun, the top 5 being: financial problems faced by the contractor, poor contract management, site supervision, lack of planning, and delay in material supply. Authors in [15] carried out a survey through questionnaire distribution to selected experts of construction industry in Nigeria. Identified causes of time overrun were inexperienced sub-contractors, shortage of labor, poor site management, shortage of selected materials and mistakes during works. Authors in [16] conducted survey about the causes of time overrun in infrastructure projects of Qatar. The results of the survey revealed that major causes of time overrun were design changes, inadequate planning and

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scheduling, changes in scope of project, inadequate estimation project time duration, and shortage of skilled labour. Authors in [17] identified the major causes of time overrun through quantitative approach in construction projects of Vietnam. The main causes of time overrun were poor monitoring, poor project management and financial problems faced by owner.

III. RESEARCH METHODOLOGY

This study was divided in two phases. In the first phase the objective was to find the main causes of time overrun and in the second phase was to find the mitigation measures of these identified causes. In the first phase, a literature review was carried out providing a total of 51 probable causes of time overrun. A questionnaire was developed, in which the aforementioned causes were imposed and respondents were asked to rank them. In the second phase, another questionnaire was distributed in which mitigation measures from literature review and unstructured interviews were incorporated.

IV. DATA COLLECTION AND ANALYSIS

For the first phase, the developed questionnaire was distributed among 131 professional respondents (either consultants, clients or contractors) involved in handling the construction of building projects, 87 were received back and 84 were usable for data analysis (Table I). Table II indicates the respondents' qualification and Table III indicates their experience.

TABLE I. SURVEY DETAILS

| Parameter | Value |
|------------------------------------|-------|
| Total distributed questionnaires | 131 |
| Received back questionnaires | 87 |
| Invalid questionnaires | 3 |
| Valid questionnaires | 84 |
| Percentage of valid questionnaires | 96 |

TABLE II. QUALIFICATION OF RESPONDENTS

| Degree name | Frequency | Percentage |
|-------------|-----------|------------|
| Bachelor | 68 | 80.9 |
| Master | 14 | 16.7 |
| PhD | 2 | 2.40 |
| Total | 84 | 100 |

TABLE III. EXPERIENCE OF RESPONDENTS

| Experience | Frequency | Percentage |
|--------------|-----------|------------|
| 0-5 years | 8 | 9.52 |
| 6-10 years | 24 | 28.58 |
| 11-15 years | 21 | 25.00 |
| 16-20 years | 18 | 21.43 |
| 20 and above | 13 | 15.47 |
| Total | 100 | 100 |

For the first phase respondents were given questionnaires and were asked to rank each cause on a Likert scale. RIW approach was successfully used in previous studies giving accurate and good results [18]. The weight formula in RIW was calculated as shown in (1):

$$RIW = \frac{\sum a_i x_i}{\sum x_i} \quad (1)$$

where a_i shows a constant which represents the weight given to i , and x_i is a variable denoting the frequency of the answer for i . The values are established from x_1 having the least importance and a_1 being 1, to x_5 for most significant and a_5 equal to 5. The results are shown in Table IV.

TABLE IV. CAUSES OF TIME OVERRUN

| Rank | Identified Causes | RIW Value |
|------|--------------------------------------|-----------|
| 1 | Financial issues faced by contractor | 0.834 |
| 2 | Inexperienced contractor | 0.831 |
| 3 | Weather impact | 0.812 |
| 4 | Delay in supply of materials | 0.783 |
| 5 | Mistakes in design | 0.769 |
| 6 | Shortage of skilled labour | 0.761 |
| 7 | Incompetent subcontractor | 0.688 |
| 8 | Errors in time estimation | 0.511 |

A. Financial Issues Faced by Contractor

Financial issues faced by the contractor were found as the most major cause of time overrun. Contractors play important role from execution to completion of a project. Construction activities are suspended and stopped by the contractors due to financial issues [19]. Continuous funding to contractors can help to complete project on approved time.

B. Inexperienced Contractor

Inexperienced and incompetent contractor can cause time overrun. Selection of contractor on favoritism causes time overrun in construction projects [20].

C. Weather Impact

Most buildings constructed in tropical regions face chances of heavy rains, floods and earthquakes which affect construction activities causing delays on building projects. Weather impact causes time overrun from approved time in construction projects [21].

D. Delay in Supply of Materials at Site

Construction site of building is often located at remote and sometimes in tropical areas, so it is difficult to have a continuous supply of materials on time. Delay in material supply creates gaps in construction activities at site which causes time overrun in construction projects [22].

E. Mistakes in Design

Before project tendering, easy and accurate design should be prepared. Mistakes in design delay the project construction activities which can lead the project to time overrun [23].

F. Shortage of Skilled Labor

Shortage of skilled labor is one of the main causes of time overrun in the construction industry. Pakistan is a developing country and many workers are not skilled enough. Another cause of shortage of skilled labour is that many construction projects are running simultaneously [24].

G. Incomplete Subcontractor

Contractor appoints subcontractors for the completion of different activities of the project but appointment of incompetent subcontractor, can cause construction activities to run very slow compared to the given schedule. Incompetent,

with no experience contractors and subcontractors do many mistakes during construction [25].

H. Errors in Time Estimation

Errors in making estimation of time duration because of lack of experienced engineers or planners leads to improper estimation of completion period of project. Estimation of project length is based on resources and their output [26].

V. MITIGATION MEASURES

The second phase of this study was to identify mitigation measures of the identified causes. A questionnaire was developed having mitigation measures identified from literature review and interviews from experts. The respondents were asked to highlight their relative importance on a Likert scale. The collected data were analyzed by using RII (relative importance index) and the results are shown in Table V.

TABLE V. MITIGATION MEASURES OF CRITICAL FACTORS

| Mitigation Measure | Value |
|---|-------|
| Adequate funds should be allocated for each project. | 3.0 |
| Highly experienced contractors should be appointed. | 2.97 |
| Proper arrangements should be done in flood and rainy seasons | 2.94 |
| Suitable resources should be used for supply of materials. | 2.91 |
| Well reputed consultants should be hired. | 2.90 |
| Skilled labor should be with facilities. | 2.89 |
| Favorite subcontractor should not be appointed. | 2.88 |
| Proper filed investigation should be made. | 2.86 |

VI. CONCLUSION

The purpose of this study was to find the major causes of time overrun in the construction projects in Pakistan and possible mitigation measures. After statistical analysis, the major causes of time overrun were: financial issues faced by the contractor, inexperienced contractor, weather impact, delay in supply of materials at site, mistakes in design, shortage of skilled labour, incompetent subcontractor, and errors in time estimation. Possible mitigation measures to control these causes were recognized and are depicted in Table V. The outcomes of this study will help stakeholders to control causes of time overrun.

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