

# Factors Influencing Time and Cost Overruns in Construction Projects

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**ABSTRACT:** Construction industry is considered as one of the most important industries in India. It is well known that most construction projects exposed to time and cost overrun or both. These phenomena may affect the progress of construction industry in India as well as may expose many institutions of construction to be destroyed. Literatures of previous studies were classified into two main parts which are: (1) Factors influencing time overruns of project; (2) Factors influencing cost overrun. Most related studies were revised which included the study of these factors in many countries. The aim of this study is to assess factors influencing time and cost overruns on construction projects in our country. The objectives of the study were achieved through valid questionnaire. The study clarified that "Low productivity of labour", "Delaying in Bill settlement", "Lack of maintenance of the equipment" "Poor procurement programming of materials, Strikes, riots and other external factors was the most critical factor that influence project delay. The study illustrated that "delay in preliminary handing over the site" was one of the most important factors that may lead to cost overrun. Also it clarified that contractor's delay of material delivery and equipment has led to cost overrun. The study also clarified that prices inflation highly contributes to cost overrun.

**KEYWORDS:** contractor; employer; site engineer; owners; selection; IBM SPSS Statistics (Statistical Package for the Social Sciences)

## I. INTRODUCTION

The construction industry is the total through which physical development is achieved, and that is truly the locomotive of the national economy. The more resources, engineering, labour, materials, equipment, capital, and market exchange are provided from within the national economy, the higher the factor of the extent of self-reliance. The increasing complexity of infrastructure projects and the environment within which they are constructed place greater demand on construction managers to deliver projects on time, within the planned budget and with high quality. It is known fact that a larger number of infrastructure projects in India have been delayed due to various issues. Infrastructure plays a paramount role in the economic growth of our country. Today, India is one of the leading outsourcing hubs in the world.

## II. CONSTRUCTION INDUSTRIES IN INDIA

The construction industry is the total through which physical development is achieved and that is truly the locomotive of the national economy. The more resources, engineering labour, materials, equipment, and capital market exchange are provided from within the national economy, the higher the factor of the extent of self-reliance. The increasing complexity of infrastructure projects and the environment within which they are constructed place greater demand on construction manager to deliver projects on time within the planned budget and with high quality. The successful execution of construction projects and keeping them within estimated cost and prescribed schedules depend on a methodology that requires sound engineering judgment. To the dislike of owners, contractors and consultants, however, many projects experience extensive delays and thereby exceed initial time and cost estimates. This problem is more evident in the traditional or adversarial type of contracts in which the contract is awarded to the lowest bidder-the awarding strategy of the majority of public projects in developing countries like India. Although the construction

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

industry in the our country has suffered ever since last decade, recent events in the region coupled with the restructuring of economies, joining regional and global free trade organizations, and attracting foreign investment are expected to yield an unprecedented growth in the construction activities. Therefore, improving construction efficiency by means of cost-effectiveness and timeliness would certainly contribute to cost savings for the country as a whole. Efforts directed to cost and time effectiveness were associated with managing time and cost, which in this study were approached via investigating time and cost overruns of construction projects in India. The formal sector consists of public and private contractors. The Construction industry of India is an important indicator of the development as it creates investment opportunities across various related sectors. The industry is fragmented, with a handful of major companies involved in the construction activities across all segments, medium-sized companies specializing in activities; and small and medium contractors who work on the subcontractor basis and carry out the work in the field. In 2011, there were slightly over 500 construction equipment manufacturing companies in all of India.

### III. TIMES OVERRUNS

Time overruns is defined as the extension of time beyond planned completion dates traceable to the contractors. Delays are incidents that impact a project's progress and postpone project activities, delay causing incidents may include weather delays, unavailability of resources, design delays etc. In general, project delays occur as a result of project activities that have both external and internal causes and effect relationship. The actual date of completion is invariably different from the expected date. Further it is defined that the time overruns as the difference between the actual completion time and the estimated completion time. It was measured in number of days. Project delays are those that cause the project completion date to be delayed. Thus time overruns is defined as the time increased to complete the project after planned date which caused by internal and external factors surrounded the project. Delays are incidents that impact a project's progress and postpone project activities, delay causing incidents may include weather delays, unavailability of resources, design delays, etc. In general, project delays occur as a result of project activities that have both external and internal cause and effect relationship.

### IV. COST OVERRUNS

Cost overrun is defined as excess of actual cost over budget. Cost overrun is also sometimes called "cost escalation," "cost increase, or "budget overrun." Cost overrun is defined as the change in contract amount divided by the original contract award amount. This calculation can be converted to a percentage for ease of comparison. The difference

$$\text{cost overruns} = \frac{\text{Final Contract Amount} - \text{Original Contract Amount}}{\text{Original Contract Amount}}$$

between the actual cost and the initially projected cost.

### V. LITERATURE REVIEW

Several studies have addressed many different factors that cause overruns in different types of construction projects. Generally Construction delay is considered to be one of the most recurring problems in the construction industry.

**Assaf SA. & Al-Hejji S. (2006):** The construction industry is a very important sector for the development and economic growth of Pakistan, which is developing country. A large construction project is a project with a budget of more than 1 million US \$. In these construction projects, there are some problems faced such as delays in the completion or delivery of the project. In construction industry, construction delay refers to the time overrun in specified completion data or time overrun in the delivery of the construction project. For the client, construction delay refers to the loss of revenue, lack of productivity, dependency on existing facilities, lack of rentable facilities etc. **Aftab Hameed Memon et al. (2013):** University of Engineering, Science & Technology, Pakistan analyzed Time and Cost Performance in Construction Projects in Southern and Central Regions of Peninsular Malaysia. This research briefs Time and Cost performance is the fundamental criteria for success of any project. Unfortunately construction industry in Malaysia has been regarded as industry facing poor performance leading to failure in achieving effective time and cost performance. As a consequence most of the project face huge amount of time and cost overrun. **Susana Gomez Arcila, August (2012):** Construction has been considered as a dynamic industry which is constantly facing uncertainties

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in its budgets, processes and technology. These uncertainties, the complexity of projects and the increase of stakeholders make the management of costs difficult in a construction project. Even though there have been improvements in the management of construction projects, the problems of cost and time overruns are still a critical issue in the construction industry. **Ibrahim Mahamid (2013)**: Analyzed common risks affecting time overrun in road construction projects in Palestine: contractor's perspective. The construction sector is one of the key economic sectors and is the main force motivating the Palestinian national economy. However, it suffers from a number that affect time, cost and quality performances. **KASIMU, M. A (2012)**: Department of Quantity Surveying, Federal Polytechnic, Bida in Nigeria analysed the Significant Factors that causes Cost Overruns in building construction project with qualitative research approach was adopted to obtain vital information concerning the major's factors that causes cost overrun in the building Construction projects. The factors are ranked according to the degree of significance as assessed by the respondents. The results obtained from the ranking factors shows that the top five major's causes of cost overruns are: materials price fluctuation insufficient time, lack works. **Lucius Baloyi and Michiel Bekker (2011)**: Explored Causes of construction cost and time overruns in the 2010 FIFA World Cup stadia in South Africa. A three-tier research approach covers a comprehensive literature review on the causes of cost overruns and time delays on construction-related projects globally as well as an investigation into the factors that caused cost overruns and time delays on six of the stadia.

**Intan Rohani Endut, Akintola Akintoye and John Kelly**: Cost and time overruns are major problems in project development and are regular features in construction industry especially for developing country. This makes projects costly for the parties involved in construction especially for contractors and clients. The same holds for time overrun. Impact of project time overrun or delays for contractors include increased costs, reduced profit margin and battered reputation.

## VI. STUDY DESIGN

"Study design" refers to the plan or organization of scientific investigation, designing of a study involves the development of a plan or strategy that will guide the collection and analyses of data.

This research consists of five phases;

1. The first one is the proposal for identifying and defining the problems and establishment of the objectives of the study and development of study plan.
2. The second phase of the research includes literature review. Literatures of time and cost overruns were reviewed.
3. The third phase of the study includes the questionnaire design, through distributing the questionnaire to a sample of local contractors, Engineers and owners firm
4. The fourth phase of the study was questionnaire distribution. The questionnaire was used to collect the required data in order to achieve the study objective.
5. The fifth phase of the study focused data analysis and discussion. Statistical Package for the Social Sciences, (SPSS) was used to perform the required analysis.

## VII. SAMPLE SIZE DETERMINATION

The samples were selected randomly from contracting companies, consultant offices and public owner's sectors. Respondents assigned the major responsibility for delays to the contractor but the contractor placed it mostly on owner.

The major areas of respondents are:

- Owner
- Project Manager
- Site Engineer

## VIII. METHODOLOGY USED IN THE STUDY

Causes of delay and cost overruns in construction project in developing countries. A questionnaire of 60 factors was carefully designed from priority scaling (1 = No Significant, 2 = Slightly Significant, 3 = Moderately Significant, 4 = Very Significant, and 5 = Extremely Significant).

The procedure used in analyzing the results aimed at establishing the Mean Values of the various factors responsible

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for project delay and cost overruns. The score for each factor is calculated by summing up scores assigned to it by respondents. Therefore, the level of importance as indicated by the owners, Project Managers and Site Engineers were used to measure the relative weight of each factor.

## IX. DATA MEASUREMENT

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. For each type of measurement, there is/are an appropriate method/s that can be applied and not others. In this study, ordinal scales were used. Ordinal scale is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the agreement or degree of influence (1, 2, 3, 4, and 5) does not indicate that the interval between scales is equal, nor do they indicate absolute quantities. They are merely numerical labels. Based on Likert scale.

## X. STRUCTURE VALIDITY OF THE QUESTIONNAIRE

Structure validity is the second statistical test that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all the fields of the questionnaire that have the same level of Likert scale.

## XI. CRONBACH'S COEFFICIENT ALPHA

This method is used to measure the reliability of the questionnaire between each field and the mean of the whole fields of the questionnaire. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency.

## XII. PROCESS OF DATA AND ANALYSIS

The data entered into computer spreadsheet, SPSS program was used to analyze the data. In part A of questionnaire (organization profile), the mean and the percent is used to get the result of this part and to compare the opinions of owner, Contractor and consultant, for the (factors influencing time and cost overruns), the importance index is used to rank the factors for time overruns and cost overruns separately, also the importance index is used to rank the groups of time overruns in questionnaire. (Reliability)-The reliability test depicts the consistency degree of the data collected. The Cronbach Alpha coefficient is a measure of the inner consistency. Reliability is in low level when Cronbach Alpha is less than 0.3 and it cannot be accepted. Reliability is in high level when Cronbach Alpha is more than 0.7 where it indicates inner consistency of indexes tables is in high level and it can be highly acceptable. Nominally the value of Alpha is desirable with the range higher than 0.5 to 0.6.

## XIII. RANKING

The ranking of effects of Construction delays and cost overruns are calculated based on the mean rank score. The higher the mean rank score shows the higher is the ranking. The formula used for the mean rank calculation is;

$$M_R = \frac{\sum R_i}{n}$$

Where,

'M<sub>R</sub>' is Mean Ranking,

'R' is individual Mean Rank of effect,

'R<sub>max</sub>' is the maximum Individual Mean Rank of effect and

'n' is the number of effects.

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### XIV.RESULTS AND CONCLUSION

Factors	N	Mean	Rank
Poor economic conditions	10	4.30	<b>1</b>
Poor site management	10	4.10	<b>2</b>
Slowness in giving instruction	10	4.10	<b>3</b>
Delay of materials approval by consultant	10	4.10	<b>4</b>
Unskilled operators	10	4.10	<b>5</b>
Delaying in Bill settlement	10	4.10	<b>6</b>
Low productivity of labour	10	4.00	<b>7</b>
Lack of maintenance for the equipment	10	4.00	<b>8</b>
Poor site conditions (location, ground, etc.)	10	3.90	<b>9</b>
Delay of material delivery to site	10	3.90	<b>10</b>
Insufficient number of staffs (contractor)	10	3.80	<b>11</b>
Unrealistic contract durations imposed by owner	10	3.60	<b>12</b>
Owner interference	10	3.60	<b>13</b>
High quality of work required	10	3.50	<b>14</b>
Lack of subcontractor's skills	10	3.20	<b>15</b>
Poor material handling on site	10	3.20	<b>16</b>
Absence of consultant's site staff	10	3.17	<b>17</b>
Strikes, Riots and other external forces	10	3.14	<b>18</b>
Lack of materials in markets	10	3.10	<b>19</b>
Bad contract management by consultant	10	3.10	<b>20</b>
Equipments and tool shortage on site	10	3.10	<b>21</b>
Contract Modification	10	3.00	<b>22</b>
Equipment availability and failure	10	2.90	<b>23</b>
Problems with neighbors	10	2.90	<b>24</b>

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## XV.CONCLUSIONS

The comprehensive to identify the factors influencing time and cost overruns in construction projects which has a major contribution was carried out. This part of the thesis concludes the main findings as following,

### 1. Factors Influencing Time Overruns

Results have shown that the factor of "low productivity of labour" has been ranked in the 1st position in the contractor's responsibility .This result indicates the high importance of production for the progress of project. "Slowness in giving instruction" factor has been ranked as the major factor by consultant in this group. This result indicates the high importance of each party to perform required work."Delaying in bill settlement" has been ranked in 1st position by owners at this group. Payments are considered as the first priority to complete the project on time, as any delay of freeing contractor payments, it will affect contractor's financial obligations. "Poor procurement programming of materials" has been ranked as the most important factor at material's group. "Lack of maintenance for the equipment" has been ranked in the 1st position at Equipment and Labour's group, by the respondents."Strikes, riots and other external forces" has been ranked in the 1<sup>st</sup> position at external factor by the respondents. This result indicates the high effects of construction industry.

### 2.Factors Influencing Cost Overruns

"Delay in preliminary handing over of project" in the 1<sup>st</sup> position, "wrong/inappropriate choice of site, in the 2<sup>nd</sup> position, inadequate project preparation" in the 3<sup>rd</sup> position", increment of material prices due to continuous closures" in the 4<sup>th</sup> position, "resources constraint in the 5<sup>th</sup> position "unpredictable weather conditions" in the 6<sup>th</sup> position, "fluctuations in the cost of building materials" in the 7<sup>th</sup> position, "equipment allocation problems" in the 8<sup>th</sup> position, "lack of cost reports planning/ monitoring during pre and post contract stages in the position" in the 9<sup>th</sup> position and "design changes" in the 10<sup>th</sup> position .

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