Causes and Effects of Cost Overrun On Construction Projects in Madhya Pradesh

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***Abstract* - Many projects experience cost overrun and there for exceed initial contract amount. In Madhya Pradesh, the number of construction projects is increasing from time to time. However, it becomes difficult to complete projects in the allocated cost and time. Taking into account the scarce financial resources of the country, cost overrun is one of the major problems in Madhya Pradesh. Therefore, this research was carried out to dig-out information on the factors that cause cost overrun during construction and their effects on construction projects in Madhya Pradesh. Questionnaire survey together with desk study was used to collect data on cost overrun. A total of 27 questionnaires from clients, consultants and contractors were collected and a desk study of 34 completed public building construction projects in Madhya Pradesh were investigated and analyzed using both descriptive and inferential statistics. From these results it was found that 44 out of 15 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 120% of the contract amount for individual projects. In this research it was found that the rate of cost overrun decreases with the increase in contract amount. The case of time and cost overruns in any sort of projects is a long standing one. However, reviewing the existing literature reveals that most of the projects in developing countries often encounter problems with delays and cost overruns. While a significant number of transportation projects in Madhya Pradesh experience several puzzles with delays in completion and cost overruns, there hardly exist any of investigations on these major concerns. The purpose of this study is to identify this is important causes of cost and schedule overruns in transportation sector projects of Madhya Pradesh and to suggest possible solutions for reducing such overruns. The most common effects of cost overrun identified by this research were delay, and supplementary agreement or adversarial relations among stakeholders, and budget shortfall of project owners. It is so hoped that these findings will guide efforts to improve the performance of the construction industry in the future.**

***Key words* - cost overrun, cause, effect, rate, public buildings.**

I. INTRODUCTION

In many construction projects project managers and contractors find difficulties like poor planning of project, poor material, labour shortages, less equipments, increased cost of material, delays in deliveries, wastage of material, over budgeting, unexpected weather changes, lapse in management and control, loss and short of material, poor communication etc. These result into cost and time overruns, conflicts in project. So there is need to identify cost reduction or cost control techniques for carrying construction projects effectively. Due to cost reduction techniques cost of project is managed so that contractor does not suffer losses while carrying different activities of projects. Now a day's awareness of importance of VE has grown within construction industry. The construction industry has both positive and negative impacts on the environment and people. So both value engineering and sustainable development play a very important role regarding quality, reliability, durability as well as in enhancing the performance throughout the life of project.

Time and cost overruns have significant impact on the national economy. He argues that, if the completion of a project exceeds the planned schedule, the people as well as the economy have to wait for the provisions of public goods and services longer than is necessary and hence delays limit the growth potential of the economy. Similarly, cost overruns in public sector projects seem to reduce competitiveness of the economy. Thus, how to minimize or eliminate delays and cost overruns in certain governmental projects has become a major concern over the years.

II. Objectives of the Research

The overall objective of the study is to identify the factors responsible for the over-runs of time and cost in a construction project and suggest suitable remedial solutions. The specific objectives of the study are as follows:

- The main causes of cost overrun and their overall effects for public building construction projects in Madhya Pradesh .
- There lasted responsible party to the causes of cost overrun.
- The rate of cost overrun for various types of public building construction projects.
- The relationship between rate of cost overrun and contract amount.

- Forwarding recommendations to minimize or to avoid cost overrun and frequency of its occurrence; and hence to reduce its consequential effects on public building construction projects in Madhya Pradesh.
- To identify the factors affecting cost overrun in building construction in the School Building in Palestine from consultants' perspective
- To identify the risk map for cost overrun factors

III. LITERATURE REVIEW

- Construction project is a mission, undertaken to create a unique facility, product or service within the specified scope, quality, time, and cost. In practice, however some construction projects encounter cost overrun, delay on completion time or poor workmanship upon completion. Cost overrun, bed quality workmanship and delay of construction projects require an in-depth investigation to improve the outputs of the construction industry.
- It is not uncommon to see construction projects failing to achieve their mission of creating facilities within the specified cost and time. Hardly few projects get completed on time and within budget since construction projects are exposed to uncertain environments because of such factors as construction complexity; presence of various interest groups such as the project owners, end users, consultants, contractors, financiers; materials, equipment, project funding; climatic environment; the economic and political environment and statutory regulations.
- The successful execution of construction projects, keeping them within estimated cost and the prescribed schedules, primarily depends on the existence of an efficient construction sector capable of sustained growth and development in order to cope with the requirements of social and economic development and to utilize the latest technology in planning and execution adequate planning at the early stages of a project is crucial for minimizing delays and cost overrun.
- Cost overrun is common in infrastructure and building construction projects. Researches on construction projects in some developing countries indicate that by the time a project is completed, the actual cost exceeds the original contract price by about 30 % . One of the most comprehensive studies of cost overrun that exists found that 9 out of 10 projects had cost overrun. Overruns of 50 to 100 % were common Studies of construction projects in Madhya Pradesh, for example, found that more than 60 % of projects experienced up to 200 % time overrun and 75 % cost overrun.[3]
- There is a wide range of views for causes of quality shortfall, schedule delays and cost escalations in engineering and construction projects. Some are attributable to a single party, others can be ascribed to several quarters, and many relate more to systemic faults or deficiencies rather than to a group or groups of people. The successful execution of construction projects and keeping them within estimated cost and prescribed schedules depend on a methodology that requires sound engineering judgment.

IV. RESEARCH METHODOLOGY

41 factors that might affect cost overrun in building construction projects were defined through a detailed literature review. The similar factors were grouped under one main group; the factors were divided into 5 groups: cost estimating, construction items, project participants, environmental, and financing. The factors were tabulated into a questionnaire form. Then the draft questionnaire was discussed with some construction parties who are involved in building construction to evaluate the content of the questionnaire. Modifications and changes have been done. Recommendations for minimizing cost overrun in building construction projects were emphasized in view of the results of the study.

V. Questionnaire design

The questionnaire is divided into two main parts. Part I is related to general information for the company. The consultants were requested to answer questions pertaining to their experience in building construction and their opinions about the percentage average cost overrun in building construction projects they have experienced. Part II includes the list of the identified factors affecting cost overrun in building construction. For each factor two questions were asked: what is the degree of severity of this factor on cost overrun in building construction? And what is the frequency of occurrence for this factor? Both frequency and severity were categorized on a five-point scale as follows: very high, high, moderate, little and very little.

VI. Data analysis -

Frequency index (F.I) and severity index (S.I) are calculated for each factor according to the following formula Index (%) = $\sum$ a (n/N)∗100/5 (1)

Where; a is the constant expressing weighting given to each response (ranges from 1 for very low up to 5 for very high) n is the frequency of the responses N is total number of responses Table 3 shows the scale used to determine the severity and frequency levels for cost overrun factors. When the factor's severity and frequency levels are calculated, its location in the risk map is identified according to Figure 1 and Table 4. Figure 1 and Table 4 show the standard risk map which is used to determine the risk zone for each identified cost overrun factor. The map is 5x5 matrix with severity ranging from VL to VH on the horizontal axis and frequency (with the same range) on the vertical axis. Three zones are presented in the map: green, yellow and red.

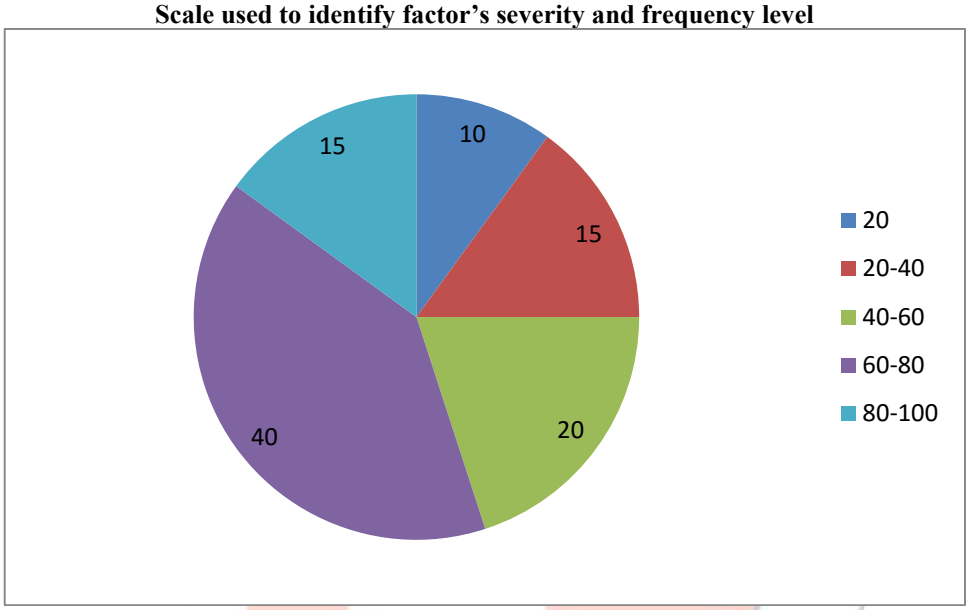
The zones have the following characteristics:

- Green zone: risks in this zone are low level, and can be ignored.
- Yellow zone: risks in this zone are of moderate importance; if these things happen, one can cope with them and move on. However, if their frequency is moderate it should be reduced and if their severity is moderate, it should be controlled and reduced and a contingency plans should be in place just in case they do.
- Results and findings of the research

- General characteristics of respondents
- The questionnaire was sent out to a total of 30 consultants, asking their contribution in identifying the risk map for the considered 41 factors in terms of severity and frequency using an ordinal scale. A total of 26 consultants filled the questionnaire. The response rate by the consultants is 87%.
- Figure 2 shows the distribution of the respondents according to their experience in building construction. It shows that most of respondents have experience of more than 15 years in building construction.

Index value (Scale)	Severity	Frequency
≤ 20%	very low (VL)	very low (VL)
20% - 40%	low (L)	low (L)
40% - 60%	moderate (M)	moderate (M)
60% - 80%	high (H)	high (H)
80% - 100%	very high (VH)	very high (VH)

Scale used to identify factor's severity and frequency level

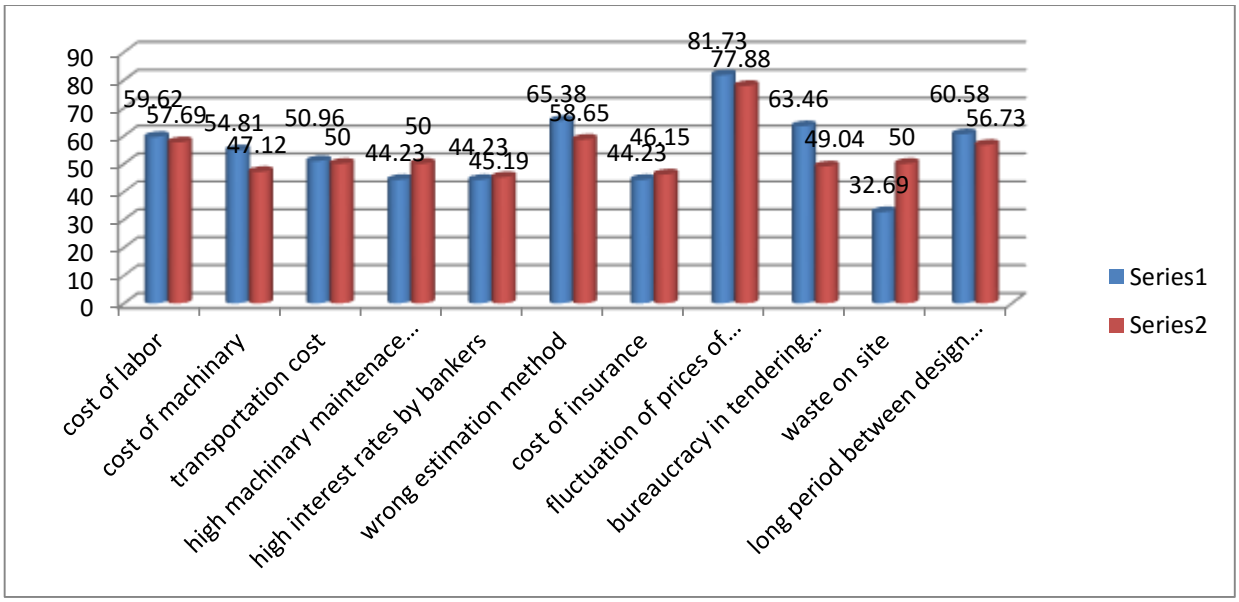


Size of cost overrun in building construction projects

The analysis of the participants' responses regarding the cost overrun in building construction projects reveals that 100% of respondents indicated that the average cost overrun in building construction projects that they have experienced is between 10% and 30% of the original estimated cost of a project. More illustration is shown in Figure 3.

Factor	S.I	Severity level	F.I	Frequency level	Map zone
cost of labor	59.62	M	57.69	M	Yellow
cost of machinary	54.81	M	47.12	M	Yellow
transportation cost	50.96	M	50.00	M	Yellow
high machinary maintenace cost	44.23	M	50.00	M	Yellow
high interest rates by bankers	44.23	M	45.19	M	Yellow
wrong estimation method	65.38	H	58.65	M	red
cost of insurance	44.23	M	46.15	M	Yellow
fluctuation of prices of materials	81.73	VH	77.88	H	Red
bureaucracy in tendering method	63.46	H	49.04	M	Red
waste on site	32.69	L	50.00	M	Green
long period between design and time of tendering	60.58	H	56.73	M	Red

Risk map for cost estimating factors



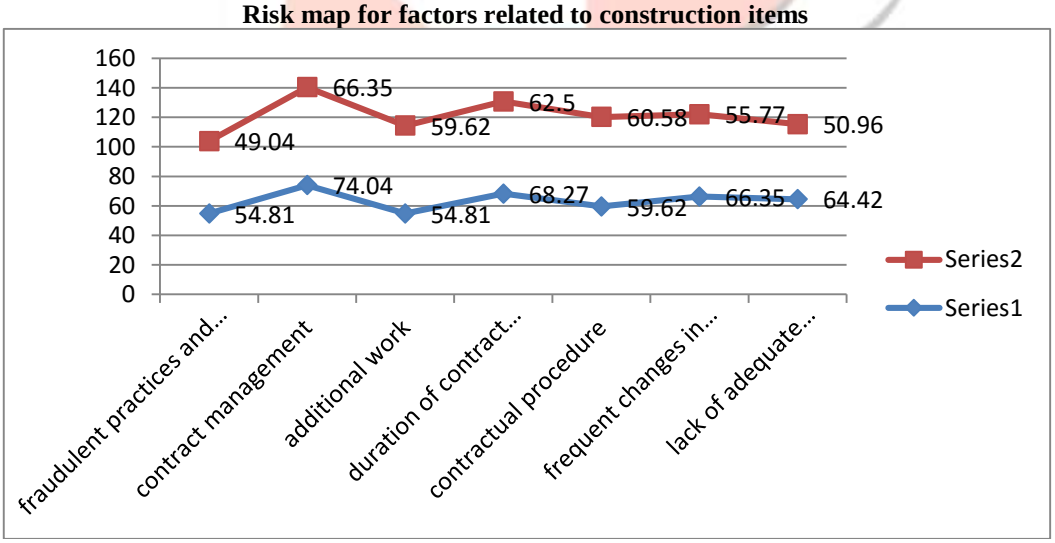
Factors' risk map

VII. Cost estimating factors

Table 5 and Figure 4 illustrate the risk map for cost estimating factors. 11 factors are considered under this group. The results indicate that 4 factors are located in the red zone, 6 factors are located in the yellow zone and 1 factor is located in the green zone.

Factor	S.I	Severity level	F.I	Frequency level	Map zone
fraudulent practices and kickbacks	54.81	M	49.04	M	Yellow
contract management	74.04	H	66.35	H	Red
additional work	54.81	M	59.62	M	Yellow
duration of contract period	68.27	H	62.50	H	Red
contractual procedure	59.62	M	60.58	H	Red
frequent changes in design	66.35	H	55.77	M	Red
lack of adequate manpower	64.42	H	50.96	M	Red

Risk map for factors related to construction items



VIII. CONCLUSION

This study is conducted to investigate the cost overrun in Schools building construction projects from consultants' perspective through a questionnaire survey. The analysis of the participants' responses reveals that the cost overrun in building construction projects is a severe problem. 100% of the respondents indicated that the average cost overrun that they have experienced is between 10% and 30% of the project's estimated cost. The study also identified the risk map for 41 cost overrun factors. 26 factors were concluded as critical factors. Inputs of the consultants underline that the top five factors affecting cost overrun in building construction projects are: political situation, fluctuation of prices of materials, level of competitors, currency exchange, and economic instability. The statistical analyses of the severity and frequency responses indicate that the data has good compactness and homogeneity, meaning that there is a good data consistency and agreement between consultants on the severity and frequency of the identified cost overrun factors. It also shows that the participants are highly agreed on the impact and frequency of the top affecting factors. Based on the study findings, the following points are suggested in order to minimize and control cost overrun in building construction projects:

- Training courses and workshops should be conducted to improve managerial skills of project participants
- Material prices and labor rates should be updated continuously.
- Sufficient time should be given for preparing feasibility studies, planning, design, information documentation and tender submission. This helps avoiding or minimizing late changes.
- Progress payment should be paid on time.
- More communication and coordination between project participants during all project phases.
- Top management must react positively to political and environmental changes by means of managerial and financial policies.

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