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# AN INVESTIGATION ON THE FACTORS THAT INFLUENCE THE PERFORMANCE OF CONSTRUCTION PROJECTS

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**ABSTRACT**

Construction industry is considered as one of the most important and second largest industries in India after agriculture. It is well known that most construction projects in India, especially in Tamil Nadu are exposed to time and cost overrun or both. Time cost schedule is a crucial task in construction project management. This phenomenon may affect the progress of construction industry in India as well as may expose many institutions of construction to be destroyed for instance; it can materially help to identify the expected financial requirements. It is also an important tool for the time control process. Construction project time schedule is greatly affected by many uncertain but predictable factors. This research list the main factors affecting time and cost overrun and discusses their influence on schedule performance. The main factors are analysis using Statistical Package for the Social Science. From the analysis planning and scheduling deficiencies, financial unavailability, quality of materials, rain / inclement weather effect, inaccurate time estimates**,** design changes by owner found to be most critical factors.

**Keywords: P**henomenon, Critical factors and Construction.

## 1. INTRODUCTION

This thesis aims to identify the various factors influencing duration in construction based on type of projects. Normally the main goals of any successful construction project management system are to complete the project on time, within the planned budget, and with the required quality limits. The three goals are inter-related where each of them is affecting, and being affected by, the others. In order to meet the time deadline of a project, an accurate scheduling should be done. Due to the unique nature of construction projects, time contingency and project uncertainty are essential for accurate scheduling, which should be flexible enough to accommodate changes without negatively affecting the overall duration of the project. It is essential to allocate a contingency value to both cost and time. Yet, there are situations where there could be delays in activities that result in a delay in the overall project duration. These delays will consequently have a negative impact on the quality and budgetof the project. Therefore, estimating time contingency is seen as a major factor for achieving success in construction projects. Although several industrial sectors developed and used software for estimating time and cost contingencies in order to minimize delays and over budget, yet limited efforts are reported in the literature in the area of predicting time contingency in the construction sector.

## 1.1 PROJECT SUCCESS AND FAILURE

A successful project must be on time, on budget, and deliver quality (features and functions) as promised. Anything less will be either a failed projector a challenged project. The disturbing conclusion from the Standish Group Report is that only 16.2% of projects were successful by all measures, and that of the 70% of projects that were not successful, over 52 percent were partial failures and 31% were complete failures.

The top 5 factors found in successful projects are:

User Involvement.
Executive Management Support.
Clear Statement of Requirements.
Proper Planning.
Realistic Expectations.

These were the elements that were most often pointed to as major contributors to project success. These elements alone could not guarantee a success project. But if these are done well, a project will have a much higher probability of success. The time cost overrun is the main effect of a failure project.

## 1.2 RESEARCH PROBLEM

Project finishing on time and absence of cost overruns are considered the most important factors of successful projects, which help to decrease problems for all parties and give new chances to construct other related projects. It also helps to increase the profits and development of construction industry in Tamil Nadu. Most construction projects in Tamil Nadu are exposed to delay to the extent that it may extend to double the period of time specified for that project, causing loss of project's profit, increasing cost and leading to technical and managerial problems among project's parties. Cost overruns are also considered as another big problem, which hinders project's progress, since it decreases the contractor profit leading to huge losses leaving the project in a big trouble.

## 1.3 OBJECTIVE

The objective of this paper is to identify the main factors affecting time and cost contingency based on a comprehensive survey among a collected samples of construction experts in Indian construction experts. In addition, a neural networks model was developed in order to help project planner to have a more reliable prediction for the amount of time contingency that should be added to the scheduled completion time.

The main objective of this research is to,

To find out the factors affecting construction duration activity and costescalation.

Analyzing the most probable factor from the collected data UsingStatistical Package for the Social Sciences (SPSS).

Steps for combining the contingency value to the base estimate.

To find out the real cause of over run in construction projects.

## 1.4 CAUSES OF PROJECT DELAY

Major factor that has been identified as reasons for cost overrun in most projects is **design errors**. It is important to note that proper representation of client's requirement and the blue print to achieving good technical input to project execution are usually mapped out base on project designs. Thus, a design with errors practically means wrong or insufficient representation of project deliverables. This will lead to wrong application of techniques in achieving result, such that as the actual execution phase of the project unfolds these design errors, attempt to correct it will lead to delay and cost overrun. Another way design errors could lead to cost overrun and delay couldbe seen in the fact that project estimations are done base on the produced designs, as such, having errors in design in a form of omission or misrepresentation will mean that the estimation for the project cost will also include these omissions, therebyleading to extra works, change order etc., thus resulting in delay and cost overrun. Similarly, designs that are done without extensive investigation of site realities could contain potential errors. This is because such designs could lead to additional work, revision of scope of work, and contract revision as the actual site conditions begins to float up at the construction phase of the project. These will no doubt affect the overall project delivery time and cost. Causes of design errors cited in most projects are

inadequate field investigation, error in design and specifications, plan errors, design changes etc. In controlling project delay and cost overrun due to design errors, the basic thing to be considered is the involvement of professional skills and application ofcompetent tools throughout the project. Achieving error free design entails good communication with the entire design team and integrating a design process that is properly planned, giving enough time for corrections, extensive investigation andreviews. Similarly, an effective project planning, controlling and monitoring should be established to enhance project performance throughout the project life cycle. Proper site investigation should be done to ensure that all site conditions are noted in the design, and application of value management could be used to obtain the best Cost-effective design options.

Delay and cost overrun in project could be as a result of **scope change**. Scope is the term that defines the entire deliverables that is expected at the end of a project. Therefore, logically, it can be said that all project plans, estimation, schedule, quality and base lines are usually designed base in the initial project scope. Thus, any change in the project scope during execution will mean that the entire initial project plan will have to be reviewed such that a reviewed budget, schedule and quality will have to be developed. This means more time and resources will be needed as against the initial baseline. "With each scope change, precious project resources are diverted toactivities that were not identified in the original project scope, leading to pressure on the project schedule and budget". Project scope change could be as a result of wrong initial scope definition, inherent risk and uncertainties, sudden change of interest, project funding change, etc. this could lead to change request which in turn could lead to change in project deliverables, budget and/or even the entire project team. Poor scope change management could lead to dispute that may require spending time and money on arbitration and litigation for what the contractor or the client believes he is entitle to. This will no doubt lead to delay and cost overrun of the project. To achieve aproper control for scope change, it is important to first identify the fact that change is inevitable in project and could equally be beneficial to the entire project success. Thus, the most important thing to do is to integrate a proper change management plan such that a proactive approach could be adopted involving the project stakeholders and incorporating their needs throughout the project lifecycle. During the planning phase ofthe project, it is important to identify the key success factor in conjunction with the client and establish key performance indicators (KPI) in the form of milestone that willmeasure the success for of attaining the project scope. Similarly, to avoid disputes, it isimportant to always seek approval for changes from sponsor and communicate changesin a timely way. For highly evolving change in project, the scope could be frozen so as to concentrate on the expected deliverable.

Another major reason for cost overruns and delay in project is **inappropriate and inadequate procurement** and faulty contractual management system. Contracts read out virtually every aspect of a business correlation, including payment terms, pricing, and service levels. Therefore, a contract that has not highlighted the entire project scenario may lead to dispute in the contract system. For instance, if the initial contract does not completely specify every relevant aspect of the project work, thismay lead to long chains of negotiations, arbitration and/or mitigation due work change orders and the quest for reviewed contractual agreement with new budgets and schedule. The result will no doubt be a project delay and cost overrun. Similarly, ambiguous contractual agreement with unclear clauses can be of potential dispute thus generating delay and cost overrun in project. In the same vein, delay and cost overrun could be inherent in terms of poor contractor selection and unethical behavior, contract bid amount, difference between the winning bid and second bid, difference between the winning bid and the engineer's estimate, etc. and since majority of projects are executed by contractors, it is important to note that procurement process and contract management is critical to the successful completion of projects. Thus, poor selection of contractors due to low bids, with no technical capability to handle the project will lead to cost overruns, schedule delays, poor quality, and a final result that is not acceptable. Also, a contract management system with clients that have a slow payment schedule could lead to delay and cost overrun. To solve these problems, the needful and ethical thing to do is to firstly identify the most qualified contractor via an ethical tender system and draft out the most suitable contract type as applicable to the conditions of the project and also explicitly define the terms and conditions that govern the contract in clear clauses. These clauses should spell out the penalties associated to delays and cost overruns and the party to bear risk associated to these events. Similarly, all important potential dispute contract clauses should state in clear unambiguous terms. The use of generic contract templates should be avoided and "careful consideration should be done when forming the contract, about what might happen during its operation, this will ensure that things are included in the contract documents that enable effective contract management.

The **complexity** of project could also be a contributing factor to delay and cost overrun. Complexity could be defined in terms of the size of the project, most megaprojects tend to have relatively long implementation

period when compared to small project. This could be affected by inflation, change in material price and changes in exchange rates such that the initial budget may need to be supplemented for the projectto be completed. The result could be cost overrun and long chains of negotiation whichwill lead to delay. Similarly, projects with high degree of complexity usually result in complex plans, schedules and estimations. Such that, if care is not taken the tendency of omitting certain aspect of the project plans and/or estimation could be prominent, thereby leading to change orders. This could lead to delay and cost. Also, project complexity could also be defined in term of the diversity of stakeholders with different interest and long chain of communication channel with slow feedbacks. Therefore, integrating their interest could take a lot of time and resources which when overlooked could result in conflicts and dispute, thus affecting the project in the context of delay and cost overrun. To eliminate or reduce the effect of delay and cost overrun due to project complexity, vigorous planning should be done, incorporating every important aspect of the project scope, milestones, detailed Work breakdown structure (WBS), delivery time, stakeholders, and methodology to be used. "Managing complex projects needs experience, expertise and exposure". Thus, Project needs its goals and scope to be defined, based on the client requirements. This helps the project to be kept on track and ensures doing only the job that is intended. It is therefore important to build a goodteam with project success interest at heart to achieve this.

Finally, the **post execution phase** (closure) of a project contains potential factors that can lead to delays and cost overrun. Being the very last part of the project life-cycle it is often been ignored even by organizations, especially in multi-project environments. Slow closeout could be seen as dragging the various handover activities course by unresolved disputes linked with client acceptance, contracts and procurement, change order issues not resolved, final change orders not issued, poor close out of final account, poor documentation of project success and lessons learnt, slow client acceptance and failing to close the work order can allow unexpected delay and stray charges to be made to the project. For instance, if project team is not decommissioned on time after the project work has been completed, their exist a tendency of running an idle team that may incur extra project expenses due to overheadand this may overrun the project cost. Similarly, delay in payment of contractors and suppliers after project completion could lead to dispute and delay in signing the certificate of final completion of the project. Delay and cost overrun of slow closeout can be avoided when the project closure phase is implemented as planned.

## 2.LITERATURE REVIEW

**Divya.R1 *et al*., (2015),** The construction industry is one of the main sectors that provide important ingredients for the development of an economy. The construction is the tool through which a society achieves its goals of urban and rural development. However, it is becoming more complex because of the sophistication of the construction process itself and the large number of parties involved in the construction process, i.e., clients, users, designers, regulators, contractors, suppliers, subcontractors, and consultants. Modern construction projects are characterized by new standards, advanced technologies, multiparty participation, and frequent owner-desired changes. Coupled with this state are inherent uncertainties and complexities in the physical, financial, and economic environment in which most projects are performed. Such conditions have made completing projects on schedule and on budget a difficult task to accomplish, often leading to claims on cost compensations and time extensions. This eventually leads to delay in the completion of the project. Delay could be defined as the time over run either beyond completion date specified in a contract or beyond the date that parties agree upon for delivery of a project. It is slipping over its planned schedule and is considered as common problem in construction projects. The objective of this study is to identify the major causes of construction delays, its effects, and minimizing delays in construction projects. This study is carried out based on literature reviews and questionnaire survey.

**Muhammed Mufazzal Hossen *et al*., (2015),** In this study, Nuclear Power Plant (NPP) construction schedule delay risk assessment methodology is developed and the construction delay risk is assessed for turnkey international NPP projects. Three levels of delay factors were selected through literature review and discussions with nuclear industry experts. A questionnaire survey was conducted on the basis of an analytic hierarchy process (AHP) and Relative Importance Index (RII) methods and the schedule delay risk is assessed qualitatively and quantitatively by severity and frequency of occurrence of delayfactors. This study assigns four main delay factors to the first level: main contractor, utility, regulatory authority, and financial and country factor. The second and the third levels are designed with 12 sub-factors and 32 sub-sub- factors, respectively. This study finds the top five most important sub-sub-factors, which are as follows: policy changes, political

instability and public intervention; uncompromising regulatory criteria and licensing documents conflicting with existing regulations; robust design document review procedures;redesign due to errors in design and design changes; and worldwide shortage of qualified and experienced nuclear specific equipment manufacturers. The proposed combined AHP-RII methodology is capable of assessing delay risk effectively and efficiently. Decision makers can apply risk informed decision making to avoid unexpected construction delays of NPPs.

**Pranit Sathe (2015)**, Not all the projects finish on time any within given budget. Delays and changes occur during construction that impact the schedule, consequently impacting the project in its completion. Delay of a construction project is defined as late completion of the project as compared to the planned schedule. Delays in construction projects are quite expensive; sometimes they may result in severe damages to the involved parties. The time and cost for performance of a project are usually important to the employer and contractor. Time overruns always contributed as expensive to all parties. Delays are unique one in every of the largest issue's construction companies are facing today. Delays will result in several negative effects like lawsuits between house ownersand contractors, exaggerated prices, loss of productivity and revenue, and contract termination. Thus, comprehensive study on delays in construction projects is important. The aim of this study is to discuss the most common existing delay analysis techniques as well as review the issue that are often missed in the analysis and required improvement need. The scope of this study involves investigating the techniques application thoroughly with the view to developing appropriate frame work for improving their proper uses, in order to help reduce frequent delay claims resolution difficulties.

**Mr. Salim S. Mulla *et al.*, (2015),** The Construction industry is one of thekey economic industries in India and is the main motivating force in Indian national economy. But it suffers from a number of problems that affect time, cost and quality performances. Successful management of construction projects is based on three major factors i.e. time, cost and quality. The successful completion of construction projects within the specified time has become the most valuable and challenging task for the Managers, Architects, Engineers and Contractors. How to achieve this task is a problem, which should be solved. The overall objective of this study is to identify the factors responsible for overruns in time and cost of the construction project and suggest the suitable remedial solutions. Poor planning, implementation and management are the main reasons for time and cost overruns in construction projects in India. Since most of the reasons are well known and can be controlled if a proper arrangement is made.

**Jose Ramon San Cristoba (2014), The** construction sector represents one of the most dynamic and complex industrial environments where conflicts among builders and owners are very common particularly in a bidding or claiming situation where owners, builders and contractors pursue their own interests at the expense of the others, leading to conflict or cooperation. The timerequired to complete the project is usually greater than the time specified in the contract and, because of the overriding importance of time for both the owner and the contractor, delays are the source of frequent disputes and claims among owners, clients and consultants, leading to lawsuits. There is a general consent between theorists that Game theory provides, by its very nature, the appropriate tools for the analysis and eventual solution of conflicts of any kind. The courseof a conflict as well as its resolution depends on the decisions made by the various factors involved. Each party, when considering is decisions, should take into account the decisions made by all the other parties. Game theory is a naturaltool that can be used in such interactive situations where the results of the interaction depend on all the players' decisions. Despite the extensive literature devoted to the delay is acknowledged as one of the most common, costly, and risky problems, and the source of frequent disputes and claims among owners, clients and consultants leading to lawsuits. Such situations usually involve questioning the facts, causal factors, contract interpretations and quantum of the claims. Since the ability to make a claim is very much based on what the contract says about delays, contractual documentation needs to reflect the particular nature of each project in order to prevent disputes and claims. This paper proposes a method based on game theory and applies it to a road building project, in order to identify the activities that are responsible for the delay of the project and divide the costs among them. Using the model presented in this paper, a wide variety of project situations can be modelled and placed as contractual obligations. The number of variables, equations, and inequalities needed to model these real-life situations will depend on the complexity of the problem.

## 3. METHODOLOGY

This describes the methodology of this project, the main topics included inthis project are, it outlines the steps carried out in the following chapters in termsof fieldwork, analysis of dated, and deriving a conclusion.


**Fig:1 Methodology of work**

## 4. FINDINGS AND SUGGESTIONS

Findings and suggestions describe the result and discussion of questionnairesurvey concerning contingency assessment from contractors, consultants and owner viewpoint in India. They focus on describing the respondent's characteristics in addition to the discussion of the factors that influences time cost overrun.

### 4.1 ANALYSIS AND PREDICTION OF COST AND TIME OVERRUN

The characteristics of the project were obtained and used to tabulate the estimated project duration, final project duration, estimated project cost and finalproject cost of the projects. The Statistical Package for Social Scientists (SPSS) 19.0 version was used to analyze the variables using Paired t-test. The paired t-test method of analysis compares two samples and determines the likelihood of the observed different between the samples occurring by change. The change is reported as the p- value. A p-value close to 1 means, it is likely that the hypothesized and sample means are the same, since it is very likely that such would happen by change, if the null hypotheses of no difference exist. The choice of this model is informed by the fact that once the relationship has been determined, it can be used to mark any number of forecasts simply by inserting the value of x for which a forecast is necessary. Where change may have taken place, itis necessary to collect new set of data and recomputed the value of "a" and "b"

| Sl.no | Estimated Project duration (Months) | Actual Project duration (Months) | Time overrun (Months) | % Time overrun | Estimated Cost of Project (Lakhs) | Final cost of Project (Lakhs) | Cost overrun (Lakhs) | % Cost Overrun |
|---|---|---|---|---|---|---|---|---|
| 1 | 12 | 17.00 | 5.00 | 41.67 | 4.70 | 6.00 | 1.30 | 27.66 |
| 2 | 12 | 13.50 | 1.50 | 12.50 | 86.40 | 93.50 | 7.10 | 8.22 |
| 3 | 24 | 18.50 | 6.00 | 27.08 | 21.02 | 25.76 | 4.74 | 22.55 |
| 4 | 23 | 30.50 | 6.50 | 13.04 | 300.00 | 370.00 | 70.00 | 23.30 |
| 5 | 15 | 20.00 | 5.00 | 33.33 | 30.90 | 40.00 | 9.10 | 29.45 |
| 6 | 8 | 11.50 | 3.50 | 46.75 | 4.74 | 6.84 | 2.10 | 44.30 |
| 7 | 18 | 25.00 | 7.00 | 38.89 | 62.80 | 89.60 | 26.80 | 42.68 |
| 8 | 13 | 16.00 | 3.00 | 23.08 | 5.70 | 6.10 | 0.40 | 7.02 |
| 9 | 11 | 12.50 | 1.50 | 13.64 | 402.00 | 503.00 | 101.00 | 25.12 |
| 10 | 24 | 38.00 | 14.00 | 58.33 | 20.67 | 29.23 | 18.56 | 31.74 |
| 11 | 12 | 10.00 | 2.00 | 16.67 | 78.00 | 89.00 | 11.00 | 14.10 |
| 12 | 7.0 | 8.50 | 1.50 | 21.43 | 254.00 | 290.00 | 36.00 | 14.17 |
| 13 | 24 | 28.00 | 4.00 | 16.67 | 60.87 | 50.45 | 10.42 | 17.12 |
| 14 | 22 | 28.00 | 6.00 | 27.23 | 4.50 | 6.70 | 2.20 | 48.89 |
| 15 | 12 | 15.50 | 3.00 | 25.00 | 24.00 | 27.00 | 3.00 | 12.50 |
| 16 | 23 | 29.50 | 6.50 | 28.26 | 300.00 | 370.00 | 70.00 | 23.33 |
| 17 | 17 | 24.50 | 7.50 | 44.12 | 320.00 | 358.00 | 38.00 | 11.88 |
| 18 | 7 | 8.00 | 1.00 | 14.29 | 12.00 | 10.00 | 2.00 | 16.67 |
| 19 | 24 | 36.00 | 12.00 | 50.00 | 17.23 | 22.94 | 5.71 | 33.14 |
| 20 | 16 | 19.00 | 3.00 | 18.75 | 53.30 | 64.10 | 10.80 | 20.26 |
| 21 | 21 | 27.50 | 6.50 | 30.95 | 48.00 | 62.00 | 14.00 | 29.17 |
| 22 | 24 | 29.00 | 5.00 | 20.83 | 72.60 | 85.50 | 12.90 | 17.77 |
| 23 | 9 | 13.50 | 4.50 | 50.00 | 4.74 | 5.84 | 1.10 | 23.21 |
| 24 | 5 | 7.00 | 2.00 | 40.00 | 43.70 | 54.80 | 11.10 | 25.40 |
| 25 | 24 | 29.00 | 5.00 | 20.83 | 58.30 | 72.50 | 14.20 | 24.36 |

**Fig:2 Cost and time Overrun of various projects**

It shows that the maximum percentage time and cost overrun are (58.33 & 48.89) while the minimum percentage time and cost overrun are (12.50 & 7.02). This indicates that the project has cost and time overrun. The paired T-Test results show significant between contract duration and time overrun and contract cost and cost overrun for projects considered for this study.

| Description | Project duration | Time overrun |
|---|---|---|
| Mean | 16.28 | 4.90 |
| Std. Deviation | 6.58 | 3.12 |
| Observation | 25 | 25 |
| Hypothesis | 0 | |
| Df | 24 | |
| T-Start | 11.48 | |
| Sig. (2-tailed) | 0.00 | |
| P(T<=t) one | 0.00 | |
| T critical one | 12.359 | |
| P(T<=t) two | 0.00 | |
| T critical two | 7.830 | |

**Fig:3 Paired t-Test Result of Contract Duration and time Overrun**

P-Value of 0.00 < 0.05 means that there is less than 5% chance of contract time overrun to be higher than the total projec on.

| Description | Project duration | Time overrun |
|---|---|---|
| Mean | 91.60 | 19.34 |
| Std. Deviation | 118.77 | 25.57 |
| Observation | 25 | 25 |
| Hypothesis | 0 | |
| Df | 24 | |
| T-Start | 3.787 | |
| Sig. (2-tailed) | 0.001 | |
| P(T<=t) one | 0.001 | |
| T critical one | 3.856 | |
| P(T<=t) two | 0.001 | |
| T critical two | 3.781 | |

**Fig:4 Paired t-Test Result of Contract Cost and Cost Overrun**

P-Value of 0.00 < 0.05 means that there is less than 5% chance of contract time overrun to be higher than the total project duration. This shows that for this project there is increase in project Cost.

### 4.2 Factors to Improve: SUGGESTIONS

Improve the effectiveness of site management and supervision.

Follow up efficient and simple construction process.

Clearly defined roles and responsibilities of each project participants.

Increase the coordination of design and construction teams.

Ensure continuous work flow is going on the site

It is the duty of the contractor to validate the drawings given by client at the time ofbidding the tender.

The contractor must also analyze all the factors which may lead to delays fromgovernment bodies, changes in rules and regulations.

The contractor should also be financially stable to digest the cost overrun leading todelays.

## 5.CONCLUSION

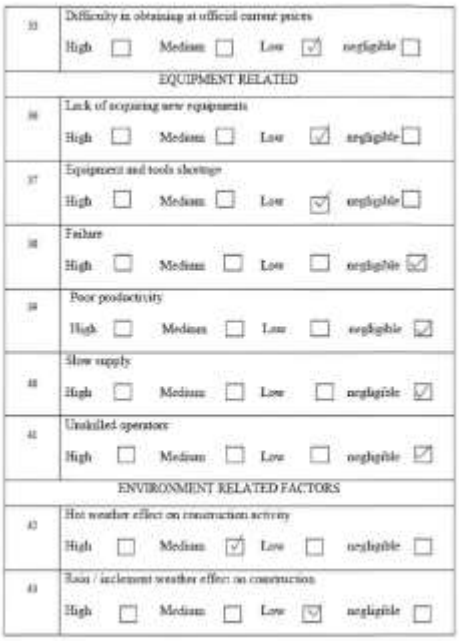
The project on the topic Time and Cost Overrun of Construction, various aspects of the time and cost overrun were studied and listed. The questionnaires to conduct survey in different projects and case studies were prepared. The main factors of time and cost overrun are listed as contractor's factors, client factors and owner related factors. The rest of the project is the questionnaire surveying, Case studies and ranking the findingsas per importance index method. The questionnaire survey is executed in and analysis is done by using the SPSS software. Then the solutions from my point of view for these problems identified are listing and recommendations are enlightened. The following reasons were observed during this thesis work, which can be held responsible for time cost overrunin construction projects are; financial unavailability, planning and scheduling deficiencies, quality of materials, rain / inclement weathereffect, inaccurate time estimates, design changes by owner. So, it is cleared that the top means of minimization of construction delays are effective strategic planning, frequent progress meeting, accurate initial cost estimates, proper project planning and scheduling, site management and supervision.

QUESTIONNAIRE FORM TO IDENTIFY CAUSES FOR COST AND TIME OVER RUN

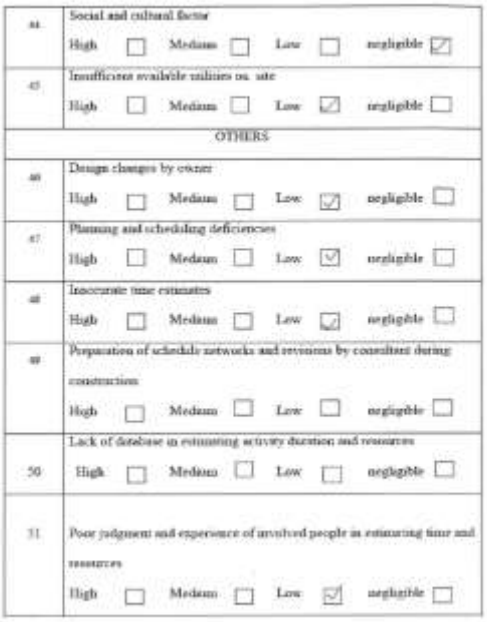
| | |
|---|---|
| NAME | Mohan Sreedharan |
| DESIGNATION | Sr Project Manager |
| NO. OF YEARS EXPERIENCE | 32+ |
| NAME OF THE CONSTRUCTION | RKK Infrastructure Ltd |
| LOCATION | Kochi |
| ADDRESS | Flat; 10 Earthen Villa, Kakkanad, Kochi |
| TELEPHONE | 7907228601 |
| EMAIL ID | sreedharanmohan@gmail.com |

GENERAL

| Sl No. | |
|---|---|
| 1 | Site area.<br>Panchayath ☐ Municipality ☐ Corporation ☑ |
| 2 | Project sector.<br>Public ☑ co-operative ☐ private ☐ |
| 3 | Level of success of the project.<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 4 | Project completion is done with in the time and estimated cost.<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| | HUMAN RESOURCE RELATED |
| 5 | Payment to Labours.<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 6 | The skill of Contractors and workers<br>High ☑ Medium ☐ Low ☐ negligible ☐ |
| 7 | Sufficient number of Staffs<br>High ☑ Medium ☐ Low ☐ negligible ☐ |
| 8 | Unrealistic owner requirement<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 9 | The contractors past history was good<br>High ☑ Medium ☐ Low ☐ negligible ☐ |
| 10 | The experience of labours and clients.<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 11 | Labour Supply for requirement<br>High ☑ Medium ☐ Low ☐ negligible ☐ |
| 12 | contractor relationship with owner and client<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 13 | Any violations done by the contractor in ethical values to make more profit<br>High ☐ Medium ☐ Low ☑ negligible ☐ |
| 14 | waiting time for approval of offset and poor inspection<br>High ☐ Medium ☐ Low ☑ negligible ☐ |
| 15 | Regular owner interference in the site<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 16 | Speed of decision making<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 17 | Site clearance difficulties<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 18 | Poor site management and supervision<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 19 | Shortage of Technical, managerial and supervisory personnel<br>High ☐ Medium ☐ Low ☑ negligible ☐ |
| 20 | Slow to give instructions<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 21 | Client initiated variations<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 22 | Unstable management structure and style of contractor<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 23 | Cash problems during construction<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| | MONEY RELATED |
| 24 | Financial unavailability<br>High ☑ Medium ☐ Low ☐ negligible ☐ |
| 25 | Funding efficiency<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| | MATERIAL RELATED |
| 26 | Material Shortage<br>High ☐ Medium ☐ Low ☑ negligible ☐ |
| 27 | Change in type & Spec.<br>High ☐ Medium ☐ Low ☑ negligible ☐ |
| 28 | Material Procurement<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 30 | Delivery of material<br>High ☐ Medium ☑ Low ☐ negligible ☐ |
| 31 | Damage in storage while needed at site<br>High ☐ Medium ☐ Low ☑ negligible ☐ |
| 32 | Delay in special manufactures from foreign country (Imported )<br>High ☐ Medium ☐ Low ☐ negligible ☐ |
| 33 | Quality of materials<br>High ☑ Medium ☐ Low ☐ negligible ☐ |
| 34 | Escalation in prices<br>High ☑ Medium ☐ Low ☐ negligible ☐ |



| | | | | | | |
|---|---|---|---|---|---|---|
| 33 | Difficulty in obtaining at official current prices | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| | EQUIPMENT RELATED | | | | | |
| 36 | Lack of acquiring new equipments | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| 37 | Equipment and tools shortage | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| 38 | Failure | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☑ | | |
| 39 | Poor productivity | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☑ | | |
| 40 | Slow supply | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☑ | | |
| 41 | Unskilled operators | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☑ | | |
| | ENVIRONMENT RELATED FACTORS | | | | | |
| 42 | Hot weather effect on construction activity | | | | | |
| | High ☐ | Medium ☑ | Low ☐ | negligible ☐ | | |
| 43 | Rain / inclement weather effect on construction | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |



| | | | | | | |
|---|---|---|---|---|---|---|
| 44 | Social and cultural factor | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☑ | | |
| 45 | Insufficient available utilities on site | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| | OTHERS | | | | | |
| 46 | Design changes by owner | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| 47 | Planning and scheduling deficiencies | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| 48 | Inaccurate time estimates | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |
| 49 | Preparation of schedule networks and revisions by consultant during construction | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☐ | | |
| 50 | Lack of database in estimating activity duration and resources | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☐ | | |
| 51 | Poor judgment and experience of involved people in estimating time and resources | | | | | |
| | High ☐ | Medium ☐ | Low ☑ | negligible ☐ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 52 | Mistakes in soil investigation | | | | | |
| | High ☐ | Medium ☐ | Low ☐ | negligible ☑ | | |
| | SIGNATURE | | SEAL | | | |

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