IMPROVEMENTS ESSENTIAL FOR MONITORING AND EVALUVATION SYSTEMS IN STAGES OF ROAD CONSTRUCTION PROJECTS IN SRI LANKA

Luvie Dhanamjaya Aruna Shantha Rupasinghe

(188727X)

Degree of Master of Science in Construction Project Management

Department of Civil Engineering

University of Moratuwa
Sri Lanka

September 2022

IMPROVEMENTS ESSENTIAL FOR MONITORING AND EVALUVATION SYSTEMS IN STAGES OF ROAD CONSTRUCTION PROJECTS IN SRI LANKA

Luvie Dhanamjaya Aruna Shantha Rupasinghe

(188727X)

Thesis was submitted in partial fulfilment of the requirements for the Master of Science in Construction Project Management

Department of Civil Engineering

University of Moratuwa
Sri Lanka

September 2022

DECLARATION

I declare that this is my own work, and this thesis does not incorporate, without acknowledgment, any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgment is made in the text.

Also, I hereby grant to the University of Moratuwa the non-exclusive right to reproduce and distribute my thesis/dissertation, in whole or in part in print, electronic, or another medium. I retain the right to use this content in whole or part in future works (such as articles or books).

…… 29-09-2022

Signature: Date:

Name:L.D.A.S.Rupasinghe

(188727X)

The above candidate has carried out research for the Masters thesis under my supervision.

…….. ……

Signature of the Supervisor: Date:

Supervisor: Prof. Asoka Perera

ABSTRACT

Main reasons for the failure of construction projects in Sri Lanka are the lack of an effective Monitoring and Evaluation. Because project management is such an important component of the planning and execution of a construction project, it's critical to identify the major factors that necessitate leadership from the project team.

In this research expert interviews were conducted to develop the questionnaire survey and validate the Monitoring and Evaluation methodologies described in the literature base shortfalls and in the Sri Lankan road construction context, which was separated into three stages: pre-construction, construction, and post-construction Project Directors, Team Leaders, Project Managers, Senior Engineers, and Engineers in the Sri Lankan road construction business were sent a web-based questionnaire. Reviewing available literature and by interviewing the relevant people, 104 Shortfall factors, change the all part of matters were identified and categorized as per the stage of their occurrence. When the road construction projects are being implemented, it is important to be aware of the possible factors to mitigate the matters arises through and accordingly take suitable Monitoring and Evaluation. For all these measures, itis important to consider the ranking of these matters in a way to identify/indicate priority for higher ranked matters to minimize adverse impacts by using the Monitoring and Evaluation system in stages wise.

The research explores and analyzes the flaws in present monitoring systems, and canbe used as a guideline for selecting Monitoring and Evaluation systems for projects as well as designing training programs for project staff to improve their skills. Furthermore, this study will offer detailed insights and recommendations for improving project Monitoring and Evaluation in the Sri Lankan road construction business. Respondents' perceptions of pre-contraction stage, construction stage, and post-contraction stage rankings were also assessed and the findings revealed that strong Monitoring and Evaluation are vital throughout the construction stage of project secondary preconstruction stage and finally post construction stage.

Keywords: Project Management System, Monitoring and Evaluation, rank, execution, stage

ACKNOWLEDGEMENT

Prof. Asoka Perera has my heartfelt gratitude for his unwavering support and invaluable advice in ensuring the success of my research. I would like to convey my gratitude to Dr. Chandana Siriwaradena, the course coordinator at this level, for his guidance and encouragement in completing the MSc program in Construction Project Management at the University of Moratuwa.

I can't forget to thank my employer, Sierra Constructions Ltd, and in particular, Eng. Jagath Pathirana, for their help with the research and for refreshing my mind to get the entire associated job.

I'd want to express my gratitude to everyone who assisted with the first evaluation, as well as the completion of the questionnaire and interview; your involvement and meaningful and related input were greatly appreciated.

Finally, I'd like to express my gratitude to my wife, Dr.W.M.R.Karunarathna, for her inspiration and encouragement, as well as for freeing me from home work throughout the composition of this thesis and allowing me to devote more time to my work.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION OF RESEARCH

1.1 Background of Research

The World Bank classifies Sri Lanka as a country of middle-income, and while country is still developing, infrastructure development has been identified as critical. Central Bank Annual Report, (2017). Following a nearly thirty-year era of conflict in the country, the administrations have prioritized infrastructure development by launching a slew of construction projects across the country to close the gap. Mega projects include expressways, power plants, reservoirs, and airports, to name a few. Due to the increased demand, government organizations, local and international commercial enterprises all spend extensively in the construction industry. The successful execution of those projects is highly anticipated in terms of price, schedule, and workmanship. The public and private sectors are both investing heavily in the local economy. When a variation order is issued .Halwatura and Ranasinghe, (2013).

Road construction projects are divided into three stages based on the work involved: pre-construction, construction, and post-construction. Feasibility studies, design, tendering, and other pre-contract activities are examples of pre-construction activities. All building operations are included in the construction stage until the project is handed over to the client. In my research, which focuses on the necessity of Monitoring and Evaluation at each level, all actions after the project is turned over until the conclusion of the maintenance term, also known as the defect liability period, are classed as part of the post-construction stage.

Sri Lanka's road network, according to central bank estimates from 2017, extends 12,210 kilometers and is classified into three classes: A, B, and C highways. There are also 4662 bridges and a total length of 168.9 kilometers of expressways. The Road Development Authority has spent approximately 266.5 billion rupees on projects such as expressway and highway construction, flyover and bridge construction, and upgrading the country's current road network. Central Bank

Annual Report, (2017).

For successful project implementation, a sensitive and effective monitoring approach or system to identify constraints during the design and execution of a project is essential. It has been divided into three sections to make Monitoring and Evaluation easier. This study will provide an overview of project destructions as a result of inefficiencies in monitoring systems used at each stage of a construction project, categorize which stages require strong monitoring with ranks, and contribute valuable suggestions for necessary improvements, particularly in Sri Lankan road constructions.

1.2 Problem Statement

The majority of clients, consultants, and contractors in the construction sector today appreciate the importance of developing an effective monitoring system for projects. However, many projects continue to experience delays, cost overruns, pollution, and poor quality performance, all of which may be traced back to faulty identification and treatment of limitations as a result of the project's need for planning and monitoring.

. In general, all projects adhere to engineering and technical agendas and processes in order to achieve their objectives; nonetheless, cost increases or requests for time extensions may occur (EOT). Although the project management team may be able to keep track of the project from the beginning in a well-planned manner, this is not the case for most ventures. If you accept it, there's a potential the project will have quality difficulties.

Based on the prior premise, the project stakeholders are ineffective in maximizing the project's benefits. Government officials, community members, laborers, and project team members such as clients, consultants, and contractors are all stakeholders who have a direct or indirect impact on the project's final outcome.

1.3 Research objectives

The primary objectives of this study are to:

1. Determine the Shortfalls (attributes /weaknesses) of a Monitoring and

Evaluation system in Sri Lankan road construction projects at three stages: pre-construction, construction, and post-construction.

2. Examine necessary improvement approaches for the monitoring system in order to mitigate project failures specially cost, time and quality according to project stages.
3. To provide a comprehensive examination of Shortfalls that includes stage-by-stage Monitoring and Evaluation requirements identify which stage monitoring and evaluation is vital with ranking in road construction project in Sri Lanka.,
4. Vital improvement essential characteristics for monitoring and evaluation systems in road construction projects.

1.4 Research Question

What are the primaries factors influencing the effectiveness of a Monitoring and Evaluation system in Sri Lankan road construction projects and which stage is vital?

Which stage strong Monitoring and Evaluation base on shortfalls are required to identification?

1.5 Limitations of the study

Road Construction projects are primarily concerned with upgrading infrastructure amenities, which can contribute to the country's long-term development as well as stimulate the minds of its citizens. Construction projects, on the other hand, are complicated and challenging due to the huge level of uncertainty around political elements and financial, as well as pressure from interested parties. As a result, engineers and workers must deal with both unavoidable and important changes.

The significance of this research is centered on the factors that can lead to project failures and the repercussions of insufficient Monitoring and Evaluation systems in road construction projects. The project's functions will primarily focus on road development projects executed in Sri Lanka, as the primary causes for the poor construction project monitoring system.

1.6 Structure of the dissertation

There are five sections to the research.

Chapter 1- Introduction; this chapter explains the study's context, goal, objectives, scope, and limitations.

Chapter 2- is devoted to a review of the literature. The investigation's theoretical foundation is described in. It includes earlier studies on monitoring and assessment, primarily in road construction projects nationally and globally.

Chapter 3- Describes research methodology, including methods and restrictions for sampling, data gathering, and statistical analysis, method.

Chapter 4- Data Analysis and Research Findings; this chapter examines the data from the questionnaire survey that was used in this investigation.

Chapter 5- Conclusion and Suggestions this chapter concentrates on the study's summary conclusion and recommendations. This research is organized into five sections.

CHAPTER 2

LITERATURE REVIEW

2.1 Monitoring and Evaluation

A project is a short-term endeavor that aims to produce a one-of-a-kind product, service, or outcome. The phrase "temporary" refers to a project with a defined end date, whereas "unique" refers to a product or service that stands out in some manner from its competitors. Despite the fact that some aspects of many project deliverables are similar, each project is unique in some manner. On the other hand, any ongoing work that follows a company's established protocols is a repeatable process that is not categorized as a project Jayasundara, Jayawickrema, and Sivaganathan, (2013).

For a variety of causes, road construction projects can experience time and expense overruns at any point in their lifespan. Course of a road construction project, as specified, a variety of challenges and disagreements will surely develop this year Syed and Buchan (2016). Following are the deficiencies identified by Buchan and Syed, (2016), in order of their influence on the project.

i. The contractor failed to complete the task on schedule due to a lack of information during the pre-construction phase.
ii. Inadequate planning work in the early stages of the project;
iii. Lack of commitment to the project as a result of time extensions being granted.
iv. Quote too low prices or inaccurate in order to win the tender for the project pre construction stage
v. Hardship to provide detailed planning of the project cost and potential for significant wastage due to inaccurate calculation of the prices in construction stage
vi. Fail to determine the reasonable time of completion of the project and fail to identify the problems that may arise in construction stage
vii. Contractors rely too much on subcontractors and do not provide perfect monitoring technique as in construction stage.

2.2 Techniques and Tools for Project Management

Project management tools and techniques can relate to project management software in some circumstances, but they can also refer to a systematic procedure or practices followed by project managers in order to create specific project management outcomes. The Project Management Institute has defined twelve project management knowledge domains. Both venture and general management employ project assessment methodologies such as Return on Investment (ROI), payback period, cost/benefit analysis, strengths, weaknesses, opportunities, and threats (SWOT) analysis, flow charts, cause-and-effect diagrams, and risk management. Additional project management tools and approaches include Work Breakdown Structures (WBS), Earned Value Management (EVM), Critical Path Analysis (CPA), Programme Evaluation Review Technique (PERT), and Graphical Evaluation and Review Methodology (GERT) Jayawickrema, Sivaganathan, and Jayasundara (2013).

As a result of the deployment of Enterprises Resource planning (ERP) systems, many contractors now use and store analog data during pre-construction, construction, and post-construction stages. Regardless of the numerous advantages of Enterprise Resource Planning (ERP) for the construction sector, many firms remain unwilling to implement ERP systems. This could be linked to the construction industry's long-standing practice of ad-hoc activities AADAJ Perera, FST Hewavitharana (2019).

2.3 Factors that influence project success

2.3.1 Capabilities of management

As stated by Jayasundara, Jayawickrema, and Sivagananathan (2013). The project manager's competency and appointment, according to Belassi & Tukel (1996), Sayles & Chandler (1971), and Locke (1971), is a critical success factor for projects . The project manager's management style, as well as his or her job and responsibility assignments, all have a significant impact on the project's final outcome.. According to study, there are three types of people: Jayasunadara,

Jayawikrema, and Sivagananthan (2013). The project manager's leadership style, according to Muller and Turner (2007), has an impact on the project's success. The competency school of leadership was also utilized to evaluate leadership styles, according to the poll. Furthermore, the qualities of the responsible person are crucial. The team members' abilities, as well as teamwork, are critical to the project's success. During the pre-construction, construction, and post-construction phases, data and analysis are important.

2.3.2 Affective commitment

According to Jayasuriya, Jayawickrema, and Sivagananthan (2013), affective organizational commitment is defined as voluntary participation in and emotional attachment to the organization.. Affective commitment is also a work-related attitude that benefits both the company and the project. It was also a big problem that needed to be closely monitored.

2.3.3 Project complexity

Affective organizational commitment, according to Jayasuriya, Jayawickrema, and Sivagananthan (2013), is characterized as voluntary engagement in and emotional attachment to the organization. Furthermore, affective commitment is a work-related attitude that benefits both the company and the project. It was also a big problem that needed to be closely monitored.

Public sector firms are more likely to be supplied late, according to Furumo et al (2006), Jayasuriya, Jayawickrema, and Sivagananthan, (2013). In addition, the study found that increased monitoring, as well as the many stakeholders and decision-makers involved in the public sector, had an impact on project delays. The public sector's management structure looks to be a complex, dynamic system with multiple stakeholders, communication and resource flows, inertia, and multiple feedback loops.

2.4. Monitoring and Evaluation

2.4.1 Monitoring

Monitoring is a continuous internal activity that gathers data on a program's

activities, outputs, and results to track progress Kusek, et al, (2004). Monitoring collects data against specified indicators in a systematic manner at each stage of the program's/life project's cycle. As a result, at every stage, evidence-based reporting on program progress in regard to Targets and outcomes for each group are available. Furthermore, as a result of the preceding monitoring, a detective tool is continuously producing data that allows program managers to make changes during the program/project implementation phase. Hardlife and Zhou, (2013).

As a result, the tool must be well-designed and well-functioning in order to provide accurate, dependable, and consistent information to program administrators. Monitoring and Evaluation systems that are poorly designed or inadequate will be poor predictors of program success. Problem areas will go unnoticed, and as a result, critical changes will not be made. A good monitoring system should, in certain ways, provide program managers with continuous streams of current, valid, and timely data, aiding their day-to-day operations activities on the Hardlife and Zhou projects, respectively (2013).

According to Sepeti,(2016) monitoring, assessment, and control are critical management duties for ensuring that project objectives are met and the project stays on track . Monitoring is defined as the routine gathering and analysis of data to assess progress against set plans and ensure compliance with established standards, according to the Monitoring and Evaluation Department (PED) of the International Federation of Red Cross and Red Crescent Societies' M&E Handbook, (2016).

If the project deviates from the original plan, the information gathered during monitoring aids in the resumption of the project through the controlling process. Controlling involves three activities, according to Mwangu & Iravo (2015), quoted in Mwangu & Iravo (2015). Sepeti,(2016). These duties include rescheduling activities, reallocating resources, and modifying project objectives. Because they are both sequential and closely connected project management roles, monitoring and control are often treated as a single activity.

Monitoring is a crucial part of project management since it provides the information needed to keep track of the project. "Monitoring provides information on the current

state of a policy, program, or project. It can provide a "snapshot" of the current state of a situation or a program Sepeti, (2016). Knowing how the project is advancing toward its objectives is critical in project management. Information on the status of various project operations must be readily available for the proper implementation of complex projects such as power transmission line projects. Installing a sound monitoring system can provide this information. Monitoring aids in progress tracking and can alert management when something goes wrong, allowing them to implement corrective measures.

2.4.2 Evaluation

According to the OECD (2002:21), an evaluation is a thorough and objective assessment of a current or concluded project, program, or policy. The objective is to determine out how effective, efficient, and impactful development is, as well as how relevant and achievable goals are.. The evaluation process reveals why specific goals, objectives, and outcomes were achieved or not. Furthermore, by identifying the key factors in each case study, the concept answers concerns of causality for both program success and failure, enabling for organizational learning and positive performance repetition. As a result, every successful evaluation system must provide justifications for any type of program result, whether it is poor, good, or mediocre. This functionality, however, is not available in all assessment systems. However, because of a variety of issues, such as structural challenges, implementation errors, and resource limits, not all assessment systems generate such results Hardlife and Zhou, (2013). As Sepeti (2016: p.10) points out:"Once all of the project duties have been done, the target is what is desired." As a result, this objective is subject to assessment. The term "evaluation" refers to a comparison of what has been accomplished versus what was expected. Assessment investigates or measures 'what we've accomplished,' as opposed to monitoring, which focuses on 'what we're doing.' In an evaluation, the differential contribution of a project to achieving the targeted transformation is also looked at." Given particular time limits, a competent evaluation can assist in anticipating when project objectives will be met.

As indicated in Sepeti, (2016: p.10). Chandurkar & Sen (2014: p.59) claim that an assessment delivers answers to a number of interconnected questions, like as:

- Appropriateness: whether the project's logic is sound.
- Productivity: the degree to which inputs are converted into outputs.
- Effectiveness: the extent to which the project's objectives were achieved.
- Outcomes: the extent to which the project's short-, medium-, and long-term goals have been met. have been met;
- The project's impact is the incremental change that can be attributed to it.
- Long-term viability: how long will the change last?

The distinction between monitoring and evaluation is hazy at best. Monitoring and assessment have comparable purposes, according to the United Nations Development Programme (2009), cited in Sepeti (2016): to provide information to facilitate decision-making, improve performance, and achieve desired outcomes. Monitoring and evaluation are clearly focused on supporting projects in meeting their deadlines. There are some differences, though, between monitoring and evaluation.

2.5 Monitoring and Evaluation systems for the project

Hardlife and Zhou (2013) described the impact of a program or campaign finally; the toolkits assist businesses in evaluating their operations' success, failure, relevance, efficiency, and effectiveness. As a result, Monitoring and Evaluation systems must be well-designed, functional, and implemented in order to produce successful results. Any deterioration in any component will inevitably stymie the program's and project management's progress. Monitoring and Evaluation systems provide critical information on a program's or project's progress. That is, whether or not long-term businesses, projects, or policies will prosper. Decision-makers can utilize these systems as a long-term management tool to boost performance and demonstrate results.

These systems were created to track and assess at all levels: macro, meso, and micro,

which correspond to policy, program, and project levels. Data from the Monitoring and Evaluation System is an important management tool for achieving certain goals and outcomes. Managers need this kind of information to know where they stand in terms of progress, performance, and problems. Hardlife and Zhou(2013, p. 73), for example, are working toward a common goal Because they alert project management to prospective or actual difficulties early on, these strategies can be regarded one of the "techniques" for controlling program / project execution. When issues develop, it's natural to wonder about the assumptions and techniques that drive a program or project. They assist development managers in making decisions such as selecting projects and programs to operate, for example. Monitoring and evaluation systems can be used by businesses and governments to encourage more transparency and accountability Hardlife and Zhou, (2013).

2.6 Monitoring and Evaluation are compared

Table 2.1 : Monitoring and Evaluation Comparison

As dimension	**As Monitor**	**As Evaluation**
As frequency	That it happens on a regular basis.	Occasional \function
Function	Monitoring/supervision	Purpose of Valuation
Purpose	Provide data for reprogramming to improve results.	To improve performance, increase efficiency and provide data for reprogramming.
Focus	Inputs, outputs, procedures, and work plans are all examples of inputs and outputs.	Efficiency, importance, influence, and cost-effectiveness are all words that come to mind when thinking about efficiency.
Methods	Review of reports, registries, administrative data bases, and field	Complex and intense research design that is scientific and rigorous.

	observations on a regular basis	
Information source	Field observation reports, progress reports, fast evaluation, and program review meetings are all part of the routing or surveillance system.	In addition to population-based surveys, vital registration, and special research, the same source is used for monitoring.
Cost	Costs of recruitment are consistent and spread out across the duration of the project.	Occasionally, usually during the middle and conclusion of the implementation phase.

Source: Sepeti (2016)

2.7 Purpose of Monitoring and Evaluation

During the implementation phase, a project must be closely monitored and reviewed in order to succeed. Monitoring and review give the data that program and project managers demand. Making the right decisions to fulfill the program's and project's goals and objectives is at the heart of program and project management. Good program planning (including setting realistic goals and objectives and ensuring that program activities are aligned with them), good program implementation (including meeting timelines and ensuring program quality), and good resource management, according to the Global Aids Program (GAP), are all important aspects of program management (GAP).

You might say if you want to be more formal. The first and possibly most essential guiding idea for all Monitoring and Evaluation efforts, according to Sepeti (2016), is that data should be collected with the goal of being used for program development. As stated in Sepeti (2016) in the Monitoring and Evaluation of ICT in Education Projects Hand book, the purpose of Monitoring and Evaluation is to present credible options based on the best available facts to support one or more decisions (2005). The objective of evaluation is often a combination of learning, direction, and

responsibility, according to Kim et al. (2013), referenced in Sepeti (2016) in the Study of Monitoring and Evaluation in Six Norwegian Civil Society Organization assemble information from a number of sources to determine what worked and why contributors and beneficiaries were satisfied.

Data exchange across many stakeholders is further facilitated by the availability of Monitoring and Evaluation data. Monitoring and Evaluation data is collected to justify the use of program resources based on progress made and objectives met, according to Peersman & Rugg (2010), referenced in Sepeti, (2016).. This information is especially important for program funders since it is frequently necessary for a program to demonstrate exact levels of success in order to maintain the support of the funder. Program participants are frequently interested in the efficacy and cost-effectiveness of the services they are receiving. Monitoring and Evaluation is a terrific management method that supports in enhancing project performance and achieving project objectives, as the examples above demonstrate Sepeti (2016).

2.8 Monitoring and assessment requirements

Simple and easy-to-use monitoring and assessment methods are required. A monitoring system, according to Sepeti (2016), should include outcomes that are enjoyed and understood by a wider audience. Simplicity, usability, and ensuring that systems contribute to employee confidence are all goals that should be pursued by effective results frameworks. The technique for monitoring and assessing should be straightforward and adaptable. Simple and easy-to-use monitoring and assessment methods are required. According to Sepeti (2016), a monitoring system should incorporate outcomes that are enjoyed and understood by a larger audience. Simplicity, usability, and ensuring that systems contribute to employee confidence are all goals that should be pursued by effective results frameworks. The monitoring and assessment technique should be simple and adaptive.

In project management, the importance of well-planned initiatives cannot be emphasized. Project planning is a crucial aspect of project management and evaluation, and it can make a huge difference in whether the process succeeds or

fails. The strategy, tactics, and procedures for achieving project goals are established through planning. The technique for doing Monitoring and Evaluation should be included in the project plan. The Monitoring and Evaluation framework should be specified in broad terms throughout the project design phase. It is significantly more difficult to build a good Monitoring and Evaluation system when planning is weak or non-existent. It's tough to conduct Monitoring and Evaluation on a project that hasn't been well-planned. The mechanism for monitoring and evaluating a project should be established as part of the execution strategy Sepeti, (2016).

Monitoring and assessment necessitate the creation of a logical structure from the start of the project. A logical framework is a project planning, management, and evaluation technique. A change plan must be prepared to ensure that the project accomplishes its objectives. This involves a thorough analysis of the project logic's roots and consequences, commonly referred to as establishing the "theory of change." A written declaration of the desired change and how it will be achieved as part of the Sepeti(2016) project is known as a "theory of change".

It serves as a road map for the intended change, outlining the essential and sufficient conditions for change to occur in a specific situation. Regardless matter whether the theory of change is referred to as "impact routes," "logic model," or "results framework," all of these models and frameworks have one thing in common: they all identify change pathways utilizing solid cause-and-effect reasoning. The theory of change is a conceptual map of the project's change terrain that lays forth a causal pathway or direction for how the project will achieve the desired results. A well-written theory of change can help in identifying the change roadmap, explaining assumptions and assertions, and building the causal chain from inputs to outputs from start to finish. Sepeti (2016).

Roles and duties for employee monitoring and evaluation should be clearly established. Employees should be well-informed about their roles and duties. The role of Monitoring and Evaluation staff in any organization or project should be clearly defined. On a variety of levels, the development results are monitored. National, program, outcome, and project output are the four levels. While project

monitoring tasks should be assigned to project team members, monitoring responsibilities at the outcome and higher result levels should be shared, according to the UNDP (2009), cited in Sepeti (2016). The best monitors are those who are involved in the day-to-day implementation of project operations. This is due to the fact that they have the most information of the activities that have been planned and are now being carried out.

As a result, while the project manager supervises the project, project team members should keep an eye on it. In order to set up and deploy Monitoring and Evaluation procedures, senior managers in any organization must be on board. Because they are essential decision makers in a firm, management commitment is critical when it comes to Monitoring and Evaluation adoption. The implementation of successful learning and improvement Monitoring and Evaluation systems requires the support of senior managers and trustees. As a result of senior managers' involvement, the support that Monitoring and Evaluation units require is likely to improve. As a result, senior executives must be educated on the need of Monitoring and Evaluation Sepeti(2016).

Another important aspect of Monitoring and Evaluation is resources. Monitoring and Evaluation necessitates both human and monetary resources. Staff capacity is crucial for the successful implementation and long-term sustainability of Monitoring and Evaluation, both in terms of numbers and skills. Project team members must have a basic understanding of Monitoring and Evaluation in order to implement the project. Members of the project team should be able to gather information on the project's status and compare it to the implementation plan to see if the goals are being accomplished. The lacks of experience project managers have with Monitoring and Evaluation systems has an impact on project Monitoring and Evaluation. As a result, project managers and their teams must have the necessary skills to conduct Monitoring and Evaluation. Management and leadership talents should be a part of this. People doing Monitoring and Evaluation will squander time if they lack basic Monitoring and Evaluation abilities.

As a result, it's critical to determine what information is most critical for making program-related decisions. It is critical to involve stakeholders in Monitoring and

Evaluation Monitoring and Evaluation. Stakeholder representation is important in a good Monitoring and Evaluation team. Stakeholders will assist them in obtaining the information they require. Determine the types of data required by determining what stakeholders want to know about the program and, as a result, how the data will be used. Resources are wasted on obtaining irrelevant data while vital data is overlooked. Another challenge in the Monitoring and Evaluation process is a lack of time and financial resources. "There are several aspects of the software about which one could want to gather information. However, every data collection incurs a time and, in certain situations, monetary cost " Sepeti, (2016: p. 13-16).

2.9 Monitoring and assessment system categories

2.9.1. Monitoring and Evaluation systems that are focused on implementation

Monitoring and evaluating how well a project, program, or policy is implemented is the focus of implementation-focused Monitoring and Evaluation systems. "Implementation-focused Monitoring and Evaluation systems are intended to manage compliance – the "did they do it" question," as expressed by Hardlife and Zhou,(2010) according to Kusek et al, (2013). Were they able to secure the resources they required? "Did they carry out and finish the agreed-upon tasks?" "Did they achieve the desired results?" One of the strategy's shortcomings is that it does not offer information on the success or failure of projects, programs, or policies to legislators, program managers, or stakeholders. One of the key causes for the method's downfall in both development and management circles appears to be this.

Implementation-focused Monitoring and Evaluation systems are concerned with Monitoring and Evaluating how successfully a project, program, or policy is implemented. According to Kusek et al. (2004), "implementation-focused Monitoring and Evaluation systems are intended to manage compliance – the "did they do it" question," as articulated by Hardlife and Zhou (2013). Were they successful in obtaining the resources they required? Did they carry out and complete the agreed-upon tasks? "Did they obtain the results they hoped for?" One of the strategy's flaws is that it does not provide legislators, program managers, or stakeholders with information on the success or failure of initiatives, programs, or

policies. This looks to be one of the main reasons for the method's demise in both development and management circles As a result; the discipline has embraced Results-Based Monitoring and Evaluation Systems, which have dominated the sector since the turn of the century. As a result, since the turn of the century, the discipline has adopted Results-Based Monitoring and Evaluation Systems, which have dominated the sector.

2.9.2. Results-based Monitoring and Evaluation systems

Results-based Monitoring and Evaluation systems are tools for regulating and tracking program and project progress. In contrast to Implementation-Focused Monitoring, Results-Based Monitoring and Evaluation Systems collect information on the success or failure of development programs in reaching intended outcomes, and there is systematic reporting on progress toward outcomes. The goal of outcomes monitoring system is to help with questions likes "What are the organization's goals?" Is achieving them even possible? What evidence do you have that you succeeded? Zhou and Hardlife (2013)

Results-based Monitoring and Evaluation systems are tools for regulating and tracking program and project progress. In contrast to Implementation-Focused Monitoring, Results-Based Monitoring and Evaluation Systems collect information on the success or failure of development projects in reaching desired outcomes, and there is systematic reporting on progress toward outcomes. The goal of outcomes monitoring system is to help with questions like "What are the organization's goals?" Is achieving them even possible? What evidence do you have that you succeeded? Hardlife and Zhou (2013)

2.10 Factors affecting project performance in terms of Monitoring and Evaluation

2.10.1 Financial Allocation

Specific and appropriate expenditures for Monitoring and Evaluation operations should be included in the project budget. To give the monitoring and evaluation function the prominence it deserves in project management, a Monitoring and Evaluation budget could be specifically defined within the total project budget. It is

recommended that a budget for Monitoring and Evaluation of 5–10% of the total budget be set aside. Stakeholders must be aware of the project budget allocation for Monitoring and Evaluation in order for it to be successful Minjiku, (2015).

The Constituencies Development Act (2003), according to Minjiku(2015), distributes a maximum of 3% of each constituency's annual allocation to administration, 15% to an education bursary scheme, 2% to sports activities, and 25% to environmental activities at the constituency level . Despite the notion that the CDF does not cover ongoing expenses, the CDF Act allows recurring expenses to be compensated with 3% of the constituency's annual contribution because vehicles, equipment, and machinery are considered development projects. It's worth noting that only 2% of the funds will be utilized to track and evaluate existing programs and capacity-building initiatives. The budget for Monitoring and Evaluation should be in the range of 5% to 10% of the total budget Minjiku, (2015).

2.10.2 Information system for management

In Monitoring and Evaluation and, by extension, in measuring project performance, an information system is essential. An information system can be made up of a computer and software program, but only if the software program is designed to assist an organization in achieving a certain project goal. In order to improve company decision-making and control, an information system is a set of interconnected components that acquire, retrieve, process, store, and distribute project data. Project managers and workers can utilize information management systems to solve problems, illustrate complex concepts, and establish new themes inside the company or in the surrounding world. Regardless of whether monitoring and reporting are included, all data is critical. The same principles apply to all information systems Minjiku, (2015).

Entering data into the IS (input), updating and changing data in the IS (data processing), receiving information from the IS (output), and storing data and information are the four essential processes (storage). Feedback is required in addition to the four fundamental processes to return the product to the right individuals or activities inside the company for evaluation and progress Minjiku,

(2015).

Management activities are now handled as a face-to-face, personal art rather than a remote, global coordinating method in traditional project management settings. In and of itself, information was not considered a useful project asset. The bulk of the company now understands the value of data in project success. Meanwhile, information systems are widely used in projects to assist with problem solving and decision-making.

At the management level of an organization, two types of information systems are used: the Management Information System (MIS) and the Decision Support System (DSS), both of which are critical in Monitoring and Evaluation. Management Information Systems (MIS) aid management by providing reports and, in some cases, internet access to a company's current and historical performance data Minjiku, (2015).

The vast majority of the systems were nearly entirely dedicated to internal project events, rather than external or environmental ones. For planning, management, and decision-making, MIS is frequently used at the management level. MIS summarizes and reports on an organization's most important functions. TPS data is regularly compressed and incorporated into full Monitoring and Evaluation reports. Data from inventory, production, and accounting is transmitted to MIS files, which are subsequently used to generate management Monitoring and Evaluation reports. Critical information will be overlooked if managers do not use information management to make judgments. The year 2015 Minjiku,(2015). It's also used to gather, store, and modify information Minjiku, (2015). Project managers who want to work on a weekly, monthly, or, MIS is typically used to track annual results rather than day-to-day project operations Singh and Ramesh, (2013). Because they are designed to respond to planned, known-ahead-of-time demands, MIS systems are rigid and have limited analytical capabilities. To evaluate project effectiveness, most MIS uses simple processes such as summaries and comparisons rather than complicated mathematical models or statistical approaches Minjiku, (2015).).

Senior project managers use the Executive Support System(ESS) to make decisions.,

rather than delivering a particular tool or function, aids a company in attaining its strategic goals by addressing unstructured decisions and developing a generalist computing and communications environment. Monitoring and Evaluation ESSs include data from MIS and DSS, as well as data from external occurrences. When gathering information for executives, they save time and effort by filtering, compressing, and tracking critical data. In the year Minjiku,(2015),

Deliver graphs and statistics from a variety of sources in real time to a senior executive's office or a boardroom using cutting-edge graphics technologies. Unlike other forms of information systems, ESSs aren't created to solve specific problems. ESSs, on the other hand, provide a broad range of processing and communication capabilities that can be applied to a wide range of issues. ESS isn't one of the many DSSs that promote itself as being very analytical. Because ESSs are intended for senior project/program managers who have little or no experience with computer-based information systems, they have basic graphic interfaces Minjiku, (2015).

To retrieve historical and competitive data from the project's internal business systems and external databases, workstations with menus, interactive visualizations, and communication capabilities may be employed. Data is collected and transferred into ESSs from both external and internal sources. ESS processing includes graphics, simulations, and user-system interaction, while ESS information outputs include projections and responses to enquiries. In most government agencies, poor record-keeping makes it difficult to collect not only timely information from key staff, but also project-related papers. The year 2015 is upon us Minjiku,(2015How the evaluation's lessons are developed, presented, and interpreted is influenced by the assessment team's technical ability, the organization's human resources' relevance and involvement in the policymaking process, and their willingness to influence decisions Minjiku, (2015). Human resources should be assigned to project responsibilities that are relevant to their areas of expertise, and training should be scheduled as needed. There is a necessity for ongoing and comprehensive on-site help for projects with staff deployed out in the field to carry out project activities on their own Minjiku, (2015).

2.10.3 Capacity development

The organization's technological capabilities for conducting evaluations, the relevance and participation of its human resources in the policymaking process, and their motive to influence decisions all influence how the evaluation's lessons are generated, presented, and interpreted. Human resources should be assigned to occupations that are appropriate for their project experience, and if they lack the necessary skills, training should be arranged. There is a need for regular and significant on-site help for projects with workers who are sent out into the field to carry out project operations on their own Minjiku, (2015).

It is the responsibility of those in charge of the development intervention's design and implementation. Given the context and issues with data, baselines, and indicators, determining which methods are ideal for customers' needs is critical (Minjiku, 2015). Monitoring and Evaluation are not prioritized in the majority of underperforming initiatives. One of the most crucial components of improving employee abilities and talents is a true organizational focus on the employee's potential to grow, either as a person or as a contribution to the business. The company's enhanced focus, along with the staff's higher expectations as a result of the opportunity, might lead to a self-fulfilling prophesy of increasing output Minjiku, (2015).

Despite the fact that it is handing out more money, the Constituencies Development Fund spends 2% of its budget on capacity building, which includes CDF Project Monitoring and Evaluation. The current capabilities of the Board, both in terms of human resources and readily available expertise, are insufficient to meet the demands placed on it and, by extension, the community-level groups with which it engages.

To properly Monitoring and Evaluation capacity development, one must first comprehend the goal, the capacity development providers and beneficiaries, and who one is interested in from which perspectives. A capacity-building provider may give activities (such as training or coaching) to assist a partner in improving their skills. The outcomes/impact may not be what you expect if the goal is to increase a project's performance. Conducting interviews, focus group discussions, data analysis, and report writing are all examples of data gathering skills. If the goal was

to expand the intangible core areas of vision, values, and culture, or internal organizational procedures like planning, fundraising, or human resources, it was difficult to create capacity (both beneficial and detrimental) as they appear in time and place. In these cases, the best that can be done is to document some of the changes that have occurred Minjiku, (2015).

2.10.4 Planning and scheduling

Despite the development and integration of more complex methodologies and technology into project planning and scheduling, some projects fail to meet their original objectives. One of the main causes of these failures was poor project schedule management. As a result of this issue, unanticipated process and technology constraints, such as inefficient resource management and allocation, as well as unrealistic schedules, may arise. Technical (e.g., resources and technology) and non-technical components of risk and uncertainty management (e.g., human resources).

Project planning can be influenced by factors that can act as roadblocks to good project planning. The rising importance of time in our globalized world has had an impact on the construction industry, resulting in shorter project timeframes. The time it takes to complete a task is expressed in days, weeks, or months. Because many clients value their time, project duration is usually a top priority for them. Schedule overruns, on the other hand, may be a more serious issue. 4 Project delays are regularly reprimanded in the construction business. The ability to accomplish tasks in a predictable and timely manner is a crucial factor of project success (on time). Schedule overruns (also known as time expansion) are a common source of dissatisfaction among clients. Because they make it impossible for them to use the finished product as intended Ericson and Wsternberg,(2015) n.d. power over the schedule Nasseri & Aulin, (2016).

2.10.5 Quality Management system

The Quality Management System (QMS) is the gold standard for improving and growing company and project performance, and firms use it extensively to obtain operational and commercial advantages. These goals are rarely realized, according to

studies on the impact of QMS. On the other hand, the interpretation of the ISO 9001 (QMS) standard determines a company's performance. As a result, previous research into the effects of QMS found that the vast majority of researchers thought QMS was beneficial to projects Neyestani, (2016).

According to a UNIDO (2012) research quoted by Neyestani (2016), the majority of respondents in the Philippines and a few other Asian countries believe Quality Management System (QMS) will have an amazing (57%) or good (22%), with only 3% predicting negative implications. Similarly, over 54% cited internal motives for implementing QMS in their companies (such as internal improvement and corporate or top management objectives), while 39% cited external motivations (customers, markets, or government pressure).

A Quality Management System (QMS) guarantees consistency and satisfaction in terms of procedures, suppliers, equipment, and other business components, which can help companies, meet client expectations and meet project goals.

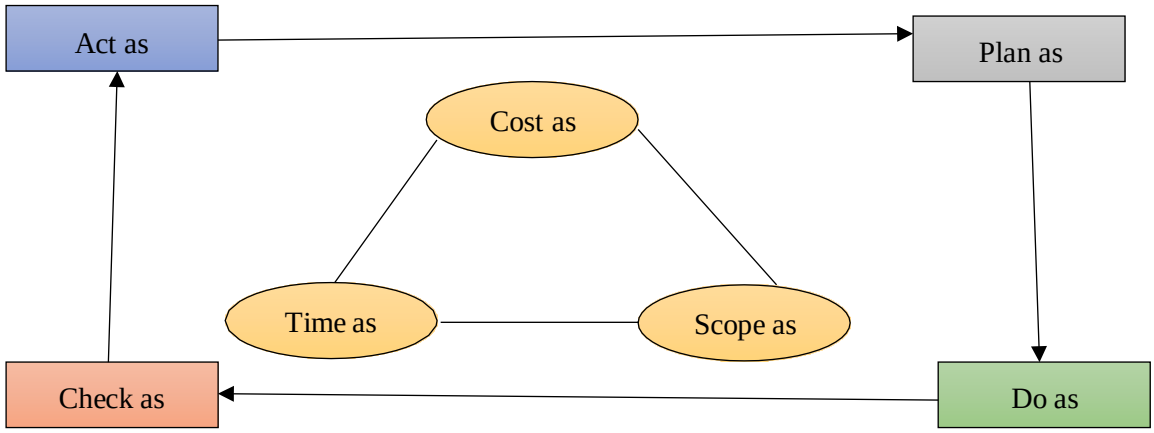


Figure 2.1 : Schematic QMS on organizational targets of project

Source: Neyestani, (2016)

The ISO ISO 9001 requirements and framework (Process approach and PDCA methodology) are included in the QMS mechanism to improve project performance because they are based on quality management principles (ISO 9000) across ISO 9004 advice to help enterprises achieve their goals and ISO 19011 audits to ensure that ISO 9001 requirements are correctly enforced. A Quality Management System

is an essential component of every project management process, from the start of the project through the final steps in the project closing phase. Using the PDCA method, these strategies can be utilized to improve project performance. In a range of industries, several research and publications have uncovered and established the benefits of QMS in improving organizational performance and market share Neyestani, (2016) If the project fails to accomplish its objectives, good schedule and cost performance are useless. Customer satisfaction is directly tied to the value of a quality concept in the construction sector. Customer satisfaction is defined as the difference between a customer's pre-purchase expectations and their post-purchase perceptions. As a result, the customer's final assessment of whether the experience was positive or bad is given. Because things are highly individualized and co-produced during the construction process, quality.. First and foremost, end-product quality relates to the users' pleasure with the finished product. Quality is a key aspect in obtaining success because it is concerned first and foremost with the users' pleasure with the final structure. It also has to do with how well the final product and its function adhere to the requirements. The second aspect of quality is the client's opinion of how project participants interact to produce the final product Ericson and Westernberg,(2010 n.d).

2.10.6 Procurement Management

When it comes to procurement-related success factors, Ericson and Westernberg (2015) treat various possibilities as independent variables. All procurement-related decisions will have an impact on the governance form's competitiveness and collaboration focus. The alternatives in the competition column will produce a competitive governance form, whereas the cooperative procurement processes in the right column will produce a cooperative governance form. Competitive alternatives exist in the midst of these opposing ideas, resulting in a governance structure that balances competition and collaboration (see table 2).

Table 2.2 : Schematic QMS on organizational targets of project

Stage of purchase	Competition-related procedure	Procedures pertaining to collaboration	Cooperation-related procurement
Design	by the general contractor (or by the client)	One side is in charge of the joint specification.	With shared obligations, a joint specification is created.
Bid invitation	Invitation to Bid Procedure for Open Bids (multiple bids)	Invitation to a limited number of bidders (a few bids)	One-on-one negotiations with a single bidder
Evaluation of bids	Price carries a lot of weight.	Price and soft parameters are given equal weight.	Soft parameters are given a lot of weight.
Sub-contractor	by the general contractor (or by the client)	One side is in charge of the joint specification.	With shared obligations, a joint specification is created.
Compensation	The cost is fixed.	Fixed price and profit sharing	Incorporating Rewards (Shared profits)
Evaluation of performance	by the general contractor (or by the client)	by the general contractor (or by the client)	by the general contractor

Source: Ericson and Westerberg, (2015)

2.10.7 Resource Management

Project resource management is the process of planning, scheduling, procuring, and managing the people, resources, and equipment needed to complete a project on time and on budget. Management has come to symbolize a deliberate approach to maximize available resources. To put it another way, a construction project manager is in charge of obtaining, deploying, and managing resources to ensure that the project's objectives are met. Construction Resource Management(CRM)is a concept for overseeing and strategically managing every physical asset in every firm department, from consumables to tools and equipment, in order to improve the company's performance. On the other side, management effectiveness is assessed by how well current resources are used and which resources are used most effectively. he potential outcomes have been delivered. in construction projects are required components. These include labor, plant, equipment, and materials. Effective resource management is necessary for a project to be completed successfully. In fact, in order to attain the desired degree of performance, any external resource must be correctly handled Chigara & Mangore, (2012).

Construction Resource Management systems vary in scope depending on the enterprise. On the other side, the purpose of having a system is to improve the organization's resource management. Construction Resource Management systems range in complexity from the most basic to the most complex enterprise-level applications. The two types of software systems are manual software systems and computerized software systems. Advanced computer software offers completely integrated, company-wide capabilities for maintaining comprehensive inventories of tools, equipment, materials, and consumables, as well as stock visibility. The ability to collect data in real time determines the system's utility.

This technique has been considerably supported by the adoption of web-based technologies capable of delivering information via mobile phones and Personal Digital Assistants (PDA) Chigara, et al. (2012).

On the other hand, resource management systems should be governed by the ability to strike a balance between economic concerns and the expected benefits of

investing in one. In any event, the greatest building resource management systems are built to scale with a business, ensuring that it has the capacity it needs now and in the future Chigara & Mangore, (2012).

2.10.8 Involved in Construction of roads

Pre-construction issues, land surveying, ground investigations and design issues, construction and contract management issues, delay in land acquisitions, resettlement of project affected persons, tree cutting, and utility shifting are some of the critical issues identified by Chawla (2010) in the Indian road construction industry. Contractors postpone mobilization and, in most cases, use the mobilization advance elsewhere since they do not have access to an encumbrance-free site during the early stages of the project. Furthermore, according to Chawla, in recent years, delays in development have resulted in a considerable discrepancy between budget allocation and actual road construction expenditure in India (2010).In recent years; delays in development have resulted in a significant disparity between budget allocation and actual road construction expenditure in India. This discrepancy has been in the range of 15-20%. Seventy percent of contracts are behind schedule, and nearly half of them have cost overruns of greater than 25%. The average contract completion time exceeded expectations by 73 percent.

Certain parameters should be addressed in the Sri Lankan context to lower the frequency of variation orders, according to the findings of a study done in Sri Lanka by Halwatura and Ranasinghe (2013). The investigations must be conducted out effectively by qualified professional workers at the outset (during the pre-construction phase), and all parties concerned must plan ahead of time before beginning work on site. Pre-construction issues, land surveying, ground investigations and design issues, construction and contract management issues, delay in land acquisitions, resettlement of project affected persons, tree cutting, and utility shifting are some of the critical issues identified by Chawla (2010) in the Indian road construction industry. Contractors postpone mobilization and, in most cases, use the mobilization advance elsewhere since they do not have access to an encumbrance-free site during the early stages of the project, planning, monitoring, controlling, and

delivering projects in a way that achieves the agreed-upon benefits." "The application of techniques, methods, knowledge, skills, and expertise to meet project goals" APM Body of Knowledge,(2006). the year APM,(2012)documentation in place."A specialized project team that understands due diligence, integrating the most appropriate technical and management methods and techniques, and developing the most effective and efficient task breakdown and implementation routes" Source: PMCC, (2002) The Project's Success: Stakeholder satisfaction, project owner benefits, and long-term consequences on the project environment can all be added to the traditional.

"Iron triangle" of time, money, and effort to define project success.cost, and quality. Radujkovi, Mladen Mladen Radujkovi, (2017).

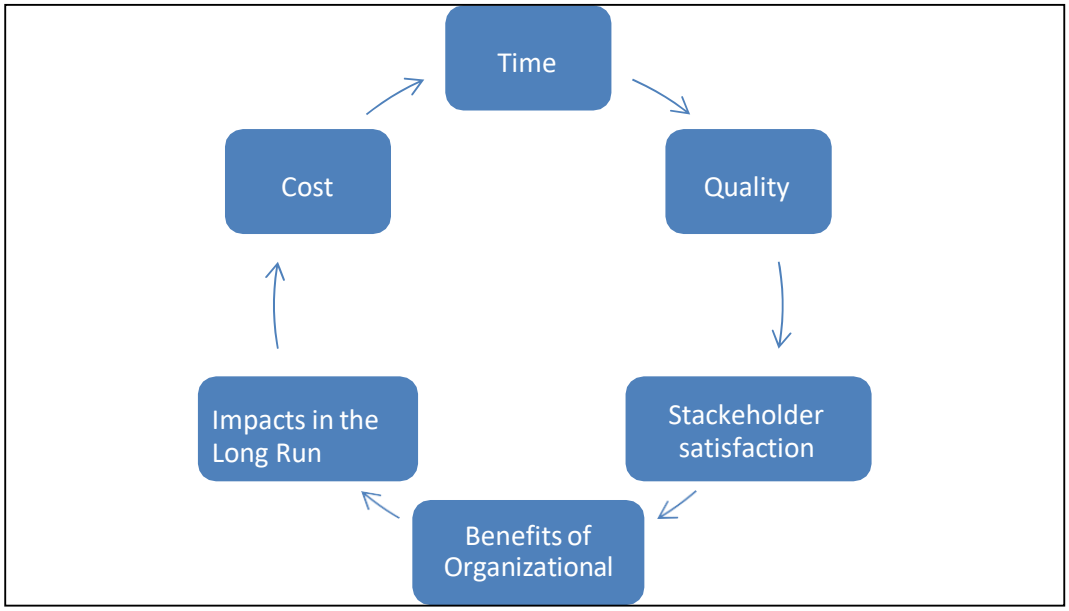


Figure 2.2 : Criteria for Project Success

When a project fails to reach its objectives in terms of time, money, quality, stakeholder satisfaction, organizational advantages, and long-term negative implications, it is referred to as a project failure.

Project Success Influencing Factors: The project manager's, project team's, and organizational competency, as well as project management methodology, methods,

tools, and techniques, and the monitoring system, are all considered success criteria Radujkovi & Sjekavica,(2017).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the procedure of completing the research project. As a result, this chapter includes the conceptual model, hypothesis, operationalization, research design, sample selection strategy, and data analysis techniques.. The study's scope was limited to road improvement projects in Sri Lanka, and the following was the research methodology:

i. Document Review- To detect gaps (Shortfalls) in Sri Lankan road construction projects, monitoring and assessment were identified nationally, worldwide, and validated by studying relevant literature. It is very serious matter not evaluated in stages of construction and which stage is impotent, vital not discuss.

ii. Interview: In order to identify Monitoring and Evaluation in road building projects in Sri Lanka, interviews were conducted with relevant personnel in the road construction business, including Employers, Consultants, and Contractors.

iii. Questionnaire Survey- A questionnaire survey was conducted among relevant road construction personnel. Employers, Consultants, and Contractors in the road construction sector were surveyed to determine the Monitoring and Evaluation levels necessary in the pre-construction, construction, and post-construction stages.

An online questionnaire survey was used to collect data, which was based on a thorough literature review of journals, books, and internet articles base shortfalls in Monitoring and Evaluation. A pilot study was conducted before the questionnaire was distributed to ensure its completeness and validity in the Sri Lankan context. A questionnaire was issued to project managers in the Sri Lankan road construction industry who are presently working as project managers or have previously worked as project managers. The data was analyzed using the relative significance index and

descriptive analysis methods.

3.2 Formulation of Questionnaire

Monitoring and Evaluation issues shortfalls discovered in the literature were divided into three categories: pre-construction, construction, and post-construction, and were confirmed by expert interviews conducted throughout the pilot research. The questionnaire is divided into four pieces. The first component of the questionnaire was used to collect demographic information from respondents, followed by sections for pre-construction stage Monitoring and Evaluation work, construction stage Monitoring and Evaluation work, and post-construction stage Monitoring and Evaluation work. Table 3.1 summarizes the questionnaire's components.

Table 3.1 : Shows the number of questions in each competency test

Questionnaire	No of Questions
Respondents Details	07
Pre-construction Stage shortfall in Monitoring and Evaluation work	15
Construction Stage shortfall in Monitoring and Evaluation work	76
Post construction stage shortfall in Monitoring and Evaluation work	13

The results of the questionnaire survey can be found in Appendix B. On a Likert scale, respondents were asked to rank the competency based on their personal experience.

The following five scale responses were included in the questioner because five-point scale responses produce higher-quality data than seven- and eleven-point scale responses Revilla, Saris, & Krosnick, (2014).

1. Disagree strongly
2. Disagree
3. Neither
4. Agree
5. I wholeheartedly concur /firmly agreed

The Relatively Important Index (RII) was used to rank the level of M&E that was necessary

$$\textit{Relative Importance Index (RII)} = \sum w = \frac{5n5 + 4n4 + 3n3 + 2n2 + n1}{AN \qquad 5N}$$

Where w is the respondent's weighting for each element on a scale of 1 to 5 ('1' means strongly disagree,'5' means strongly agree), A is the highest weight (5 for the study), and N is the total sample size. The number of very disagreeing respondents is n1, the number of disagreeing respondents is n2, the number of disagreeing respondents is n3, the number of disagreeing respondents is n4, the number of respondents who chose neither is n5, and the number of strongly agreeing respondents is n5.

The Relatively Important Index is a 0 to 1 scale, with 0 indicating considerable disagreement and 1 representing complete agreement. The poll was generated and hosted on Google's survey site, and it's possible that it'll be used in the future. From both groups, a total of 72 completed questionnaires were collected.

3.3 Pearson correlation analysis

The link between three essential aspects was investigated using Pearson correlation analysis. Graph 3.1

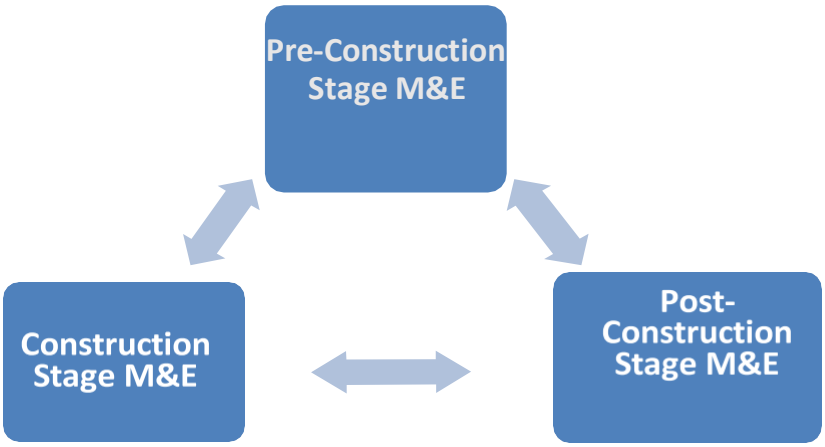


Figure 3.1 : Important relations

The relative score of each respondent was calculated using the formula below.

$$\text{Relative Score} = \frac{\Sigma qi}{AN}$$

Where qi is the competency score each respondent provided. The number of questions is N. A has the most weight in terms of competency elements (5 for the study) (There were 15 for pre-construction, 76 for construction, and 13 for post-construction in this study.)

The following hypotheses were put to the test to examine if there was a link between each respondent's monitoring and evaluation preferences. Hypotheses were tested.

Ho = There is no substantial association between the essential categories of monitoring and assessment.

H1 = There is an important relationship between monitoring and evaluation. Significance 0.05 interval.

Table 3.2 : Pearson Correlation Interpretation

Size of Correlation	Strength of Correlation
0.90 to 1.0	Very high
0.70 to 0.90	High
0.50 to 0.70	Moderate
0.3 to 0.50	Low
0.00 to 0.30	Negligible

3.3.1 One-way ANOVA analysis

In Minitab software, a one-way ANOVA analysis was performed to see how respondent experience affected their ratings in each stage monitoring and evaluation category. The following hypotheses were tested to see if there was any significance in the mean.

Ho = There are no significant differences in the means of the experience categories.
H1 = There is a difference in at least one mean. Interval of Significance = 0.05

CHAPTER 4

DATA ANALYSIS AND RESEARCH FINDINGS

4.1 Introduction

The descriptive analysis of the data received from the questionnaire survey reported in the previous chapter is presented in this chapter. An online poll of 80 engineers from both the public and commercial sectors of Sri Lanka's road construction business was sent out. Eighty participants were given questionnaires, and seventy two of them responded. The final sample size for this study was 66 because the response rate was 83%. (For more information, see Appendix B.)

Figure 4.1 depicts the distribution of respondents' employment positions in the construction sector's major managerial divisions. The majority of comments came from project managers, with no answers from project directors or higher-level officials.

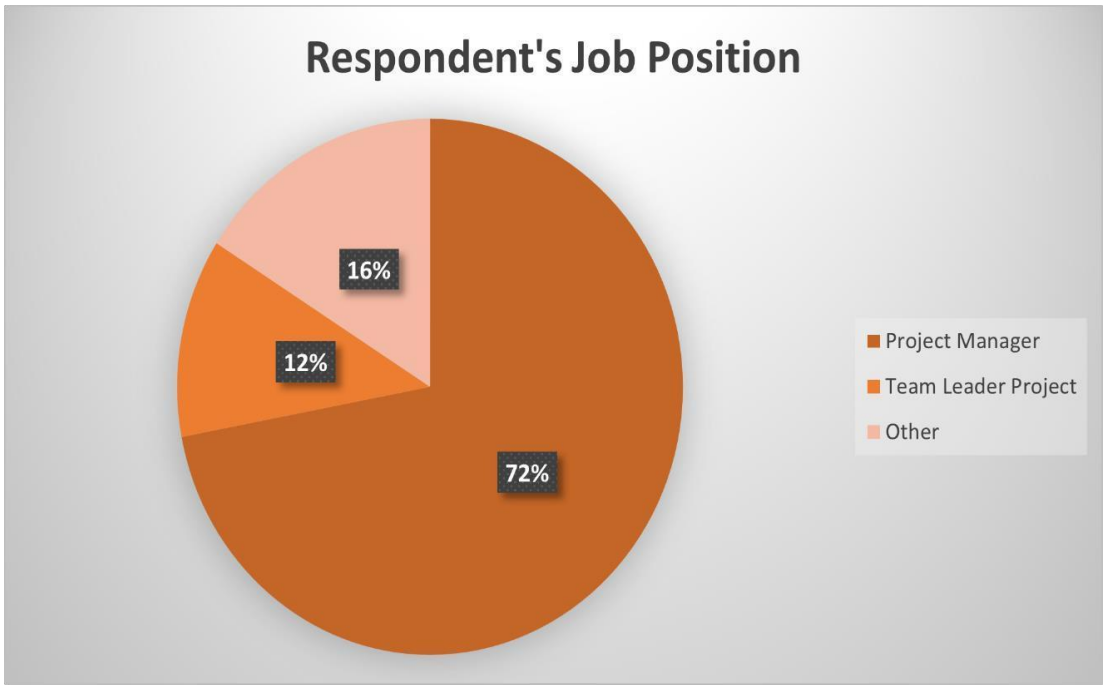


Figure 4.1: Job titles of respondents

Figure 4.2 shows the distribution of project management experience across respondents. The bulk of respondents have worked in the road construction industry for 4 to 9 years, with 77 percent having worked for 5 years or more.

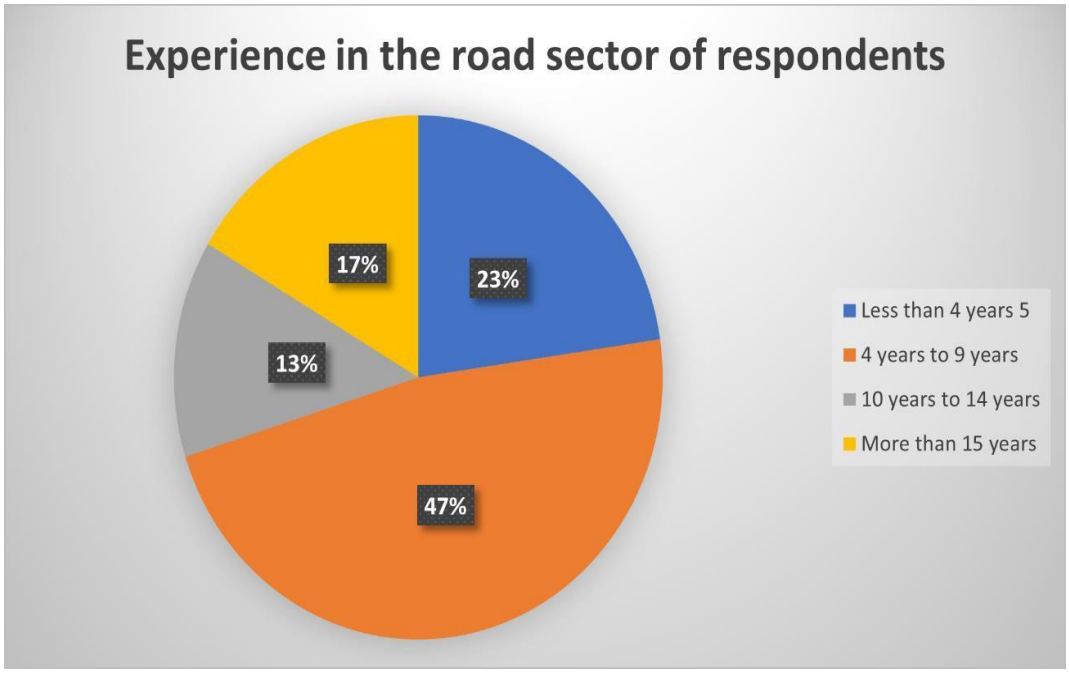


Figure 4.2 : Experience in the road sector of respondents

Figure 4.3 depicts respondents' educational backgrounds, with 52 percent holding bachelor's degrees and 23% holding master's degrees.

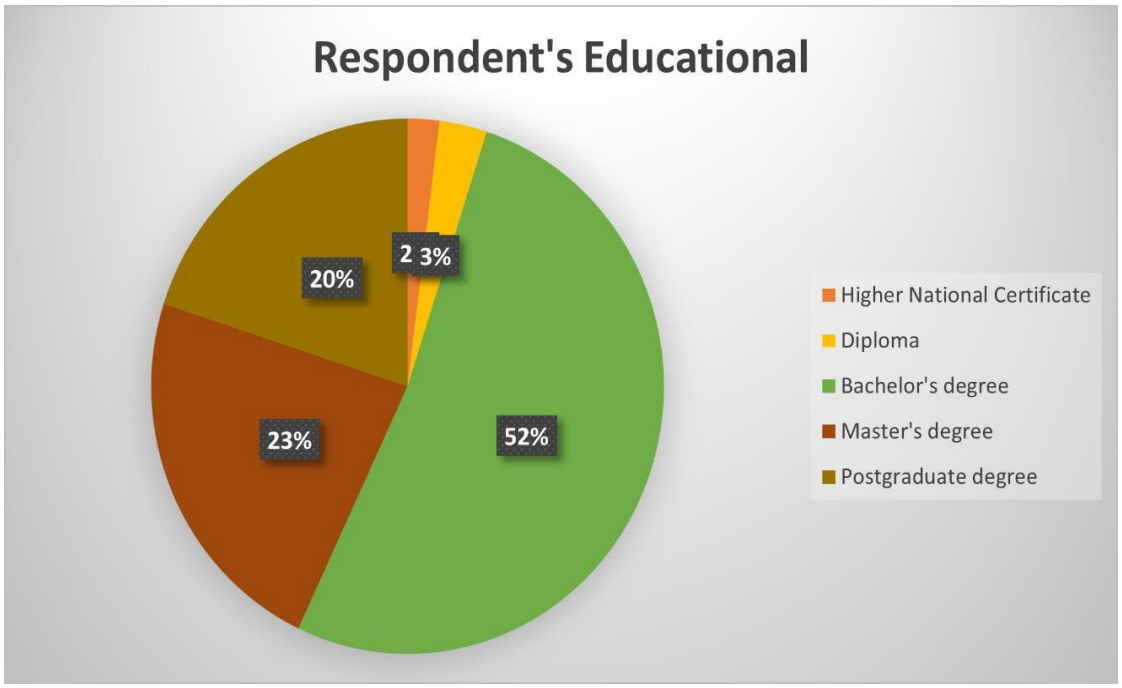


Figure 4.3 : Educational Background of Respondent

The graph depicts the gender distribution of the respondents. Women are underrepresented in the construction business, as can be seen. The findings of the questionnaire replies are shown in Tables 4.1, 4.2, and 4.3.

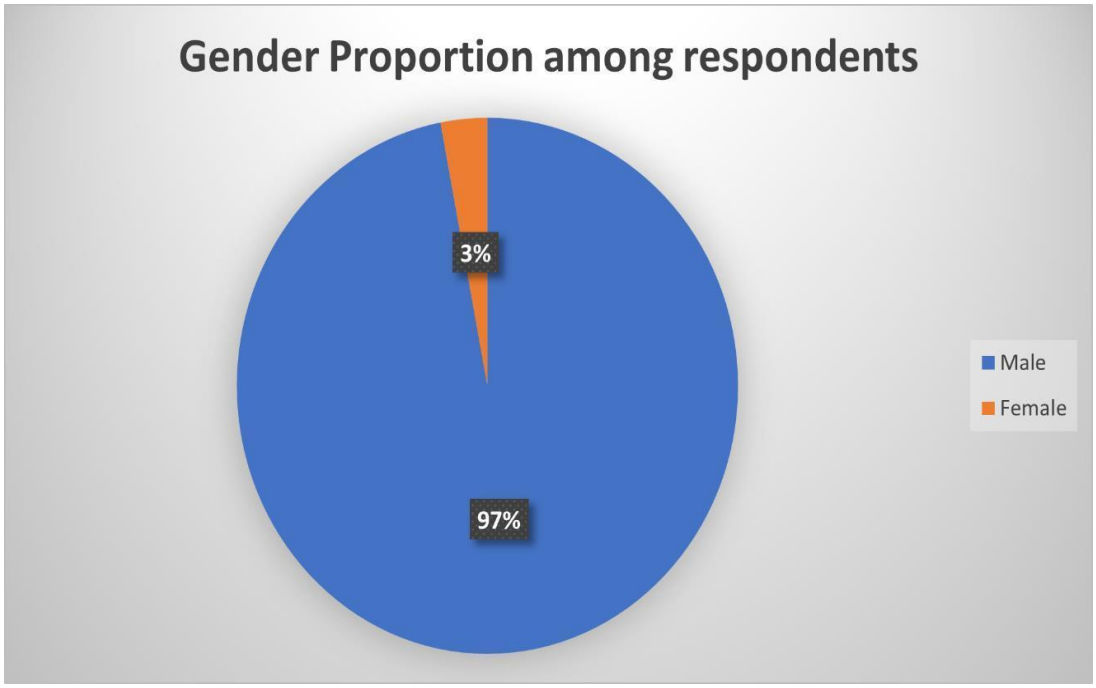


Figure 4.4 : Gender breakdown of respondents

Table 4.1 : Rating for Pre Construction Stage

No	Pre-Construction M&E work	1	2	3	4	5
1	Incorrect selection of the contractors (No adequate capacity of the contractor)	2%	12%	9%	27%	27%
2	No adequate fund allocations to contract	2%	18%	14%	33%	9%
3	No proper coordination between parties to prepare Designs, BOQs, Tender documents etc	0%	9%	18%	41%	6%
4	No adequate investigations for Designs.	0%	6%	8%	48%	14%
5	No adequate studies (Env & Social etc.)	0%	8%	20%	35%	14%
6	Lack of qualified staff for the Employer	3%	17%	26%	23%	8%
7	No adequate time durations have been allocated to the contracts	0%	24%	15%	30%	6%
8	Typical designs are used for preparation of BOQs	0%	5%	17%	45%	9%
9	QS who prepare the BOQs, doesn't aware the site conditions	2%	11%	15%	42%	6%
10	Contractors don't clearly go through the tender documents before tendering.	0%	12%	15%	35%	12%
11	Confusing requirements of clients when finalizing the project scope	0%	11%	42%	21%	2%
12	Supremacy of the Employer	0%	15%	41%	15%	3%
13	Insufficient survey works and data collections before designs	0%	5%	15%	47%	9%
14	Project/ Contract size	3%	11%	38%	23%	2%
15	No proper mechanism to recheck the designs and BOQs before tendering	0%	12%	12%	38%	14%

Table 4.2 : Rating for Construction stages

No	Construction M&E work	1	2	3	4	5
16	Delay of land acquisitions	0%	3%	8%	35%	48%
17	Delay of some authority approvals (CEA, GSMB, DS etc)	0%	5%	9%	64%	17%
18	Poor planning of construction works by the contractor	0%	0%	14%	58%	23%
19	Designs errors	0%	3%	12%	58%	21%
20	Design changes after awarding the Contract	0%	2%	11%	64%	17%
21	Inadequate or excess BOQ quantities	0%	14%	32%	41%	8%
22	Payments delays to contractors	0%	6%	18%	55%	15%
23	Unforeseeable soil conditions	0%	8%	29%	48%	9%
24	Underground utilities (No pre awareness)	0%	6%	15%	62%	11%
25	Inadequate investigations/Surveys (Site/terrain conditions etc)	0%	9%	15%	58%	12%
26	Delay of approvals for variations	2%	11%	23%	56%	3%
27	Existing base failures	0%	12%	39%	36%	6%
28	Inadequate skill labour of the Contractor	0%	11%	20%	47%	15%
29	Poor public awareness	2%	14%	45%	29%	5%
30	Carelessness of the workmen and officers	0%	12%	32%	47%	3%
31	Designs not comply with the existing ground conditions	0%	18%	15%	50%	11%
32	No adequate time for design works at construction stage	2%	21%	35%	29%	8%
33	No adequate time for Environment and Social surveys at construction stage	0%	24%	45%	18%	5%
34	Difficulty in getting permits for material transport (Sand, gravel etc)	0%	3%	15%	50%	26%
35	Shortage of some construction materials	0%	9%	11%	47%	27%
36	Delay of utility relocations	0%	2%	6%	59%	27%
37	No proper coordination with other authorities/ Stakeholders (NWS&DB, Telecom, CEB, etc)	0%	14%	23%	52%	6%
38	Contractors' works are not with the programme. (Work in ad-hoc manner)	0%	6%	36%	42%	9%
39	No adequate involvement of the Employer for getting permits,	3%	24%	32%	32%	3%

	licenses etc.					
40	Inadequate resource allocations of the contractors	0%	8%	18%	50%	18%
41	Quantity increases of BOQ (Due to new works)	0%	8%	35%	44%	8%
42	Adverse weather conditions	0%	12%	12%	30%	39%
43	Price escalations (Not covered in some contracts)	6%	14%	39%	30%	3%
44	Some regulations of funding agencies	0%	9%	47%	35%	3%
45	Contractor's Poor knowledge on specifications	2%	24%	23%	39%	6%
46	Contractor's Poor knowledge on contract conditions	3%	23%	24%	33%	9%
47	Scope changes	0%	8%	15%	45%	26%
48	Political influences on scope of works	2%	12%	44%	21%	15%
49	Contractors are not employing qualified staff,	3%	26%	15%	38%	12%
50	Lack of experience of the Contractors'	8%	15%	23%	33%	15%
51	Delays in approvals from the consultants	2%	9%	41%	33%	9%
52	Lapses in the dispute resolving mechanisms	3%	26%	36%	21%	5%
53	Less attention on social and environmental issues	3%	20%	45%	24%	2%
54	No adequate attention of the Contractor for safety measures	0%	17%	45%	24%	8%
55	No progress monitoring adequately	0%	15%	23%	47%	9%
56	Delay in issuing instructions by the Consultant	2%	9%	38%	38%	8%
57	Delay in submission of interim claims by the contractors	11%	41%	24%	14%	5%
58	No adequate materials stocks of the contractors	0%	11%	14%	65%	5%
59	No adequate test equipment of the contractors	0%	20%	35%	38%	2%
60	Delay in some test results	0%	18%	45%	26%	5%
61	Review meetings are not effective	2%	24%	29%	38%	2%
62	No practicable solutions from the consultants	2%	18%	50%	20%	5%
63	No clear procedure for evaluation of time extensions	5%	39%	27%	18%	5%
64	Poor cash flow maintenance of the contractors	0%	14%	30%	41%	9%
65	Excessive change orders	0%	17%	29%	33%	15%

66	Contract conditions are not clear	2%	18%	35%	35%	3%
67	Site access difficulties.	0%	29%	36%	26%	2%
68	Difficulty in works with existing traffic flow	5%	14%	35%	38%	2%
69	Unbalance risks of the Contractor	2%	24%	48%	12%	2%
70	Some outside works of the Employers (Given to the Contractors)	2%	29%	48%	11%	3%
71	Public protests	2%	15%	50%	21%	5%
72	Conflicts in documents (Between the designs and BOQs)	2%	8%	29%	53%	2%
73	Lack of communications	0%	17%	42%	30%	3%
74	Some Government regulations	0%	8%	33%	48%	3%
75	Environmental hazards	0%	8%	26%	29%	30%
76	Contractors delay to commence the works	2%	11%	15%	56%	9%
77	High competition in bids (Hard to proceed works with low rates)	6%	11%	32%	29%	14%
78	Change of site topography after design	3%	20%	35%	30%	5%
79	Inadequate review by the Employer	2%	21%	53%	11%	6%
80	Change of subcontractors	2%	23%	39%	26%	3%
81	Ineffective delay penalties	3%	29%	41%	18%	2%
82	Improper construction method of the contractor	0%	14%	24%	50%	5%
83	Inflexibility of the Consultants	2%	18%	53%	14%	5%
84	Inadequate facilities to workmen	0%	26%	38%	24%	3%
85	Terrain conditions of the site area	3%	18%	23%	44%	2%
86	Road length and width	8%	17%	42%	23%	0%
87	Traffic intensity increases suddenly	6%	15%	35%	33%	2%
88	Climatic conditions	0%	15%	11%	36%	29%
89	Drainage problems	0%	11%	35%	44%	2%
90	Involvement of more no of parties	2%	17%	50%	21%	2%
91	Inadequate time duration for construction activities	0%	18%	8%	47%	18%

Table 4.3 : Rating for post construction Stage

No	Post-Construction M&E work	1	2	3	4	5
92	No proper mechanism to address additional works after completion of the contract	0%	9%	21%	39%	3%
93	Delay in final bill certifications	2%	20%	35%	15%	2%
94	Inadequate defect liability period	5%	36%	12%	18%	2%
95	No proper monitoring on defect rectifications	2%	20%	24%	24%	3%
96	Employers less capacity to do maintenance	2%	9%	32%	24%	6%
97	No project allocation for the maintenance	2%	5%	12%	26%	29%
98	No capacity of the Employer to identify the defects properly	2%	14%	38%	14%	6%
99	No involvements of the consultant after completion the constructions	2%	5%	18%	38%	11%
100	No proper As-built drawings	5%	21%	20%	20%	8%
101	Delay in submit the final documents by the contractors	2%	14%	30%	24%	3%
102	Delay in taking over by the Employer	5%	18%	29%	17%	3%
103	Employers involvement towards the consultants unnecessarily.	0%	17%	36%	14%	5%
104	Contractor's less attention on maintenance works.	2%	3%	20%	45%	2%

4.2 Relative Importance Index

This section analyzes monitoring and assessment with respect to the pre-construction, construction, and post-construction categories. Each attribute was graded on a five-point Likert scale by respondents. Based on the Relative Importance Index and mean, the obtained ranks are provided in Tables 4.4, 4.5, and 4.6..

Table 4.4 : Rating for construction Stage

No	Construction Stage M&E work	Mean	RII	Rank	Standard deviation
16	Delay of land acquisitions	4.11	0.821	1	0.77
17	Delay of some authority approvals (CEA, GSMB, DS etc)	3.74	0.748	8	0.69
18	Poor planning of construction works by the contractor	3.85	0.770	3	0.62
19	Designs errors	3.79	0.758	5	0.70
20	Design changes after awarding the Contract	3.73	0.758	5	0.60
21	Inadequate or excess BOQ quantities	3.24	0.648	30	0.84
22	Payments delays to contractors	3.61	0.721	11	0.77
23	Unforeseeable soil conditions	3.41	0.682	19	0.77
24	Underground utilities (No pre awareness)	3.59	0.718	13	0.71
25	Inadequate investigations/Surveys (Site/terrain conditions etc)	3.55	0.709	15	0.80
26	Delay of approvals for variations	3.30	0.661	27	0.80
27	Existing base failures	3.18	0.636	37	0.80
28	Inadequate skill labor of the Contractor	3.44	0.688	18	0.88
29	Poor public awareness	3.03	0.606	46	0.82
30	Carelessness of the workmen and officers	3.23	0.645	32	0.76
31	Designs not comply with the existing ground conditions	3.35	0.670	23	0.93
32	No adequate time for design works at construction stage	3.02	0.603	48	0.94
33	No adequate time for Environment and Social surveys at construction stage	2.80	0.561	64	0.82
34	Difficulty in getting permits for material transport (Sand, gravel etc)	3.80	0.761	4	0.76
35	Shortage of some construction materials	3.74	0.748	8	0.90
36	Delay of utility relocations	3.94	0.788	2	0.62
37	No proper coordination with other authorities/ Stakeholders (NWS&DB, Telecom, CEB, etc)	3.32	0.664	25	0.82
38	Contractors' works are not with the programme. (Work in ad-hoc manner)	3.36	0.673	22	0.76
39	No adequate involvement of the Employer for getting permits, licenses etc.	2.89	0.579	57	0.93
40	Inadequate resource allocations of the contractors	3.61	0.721	11	0.83
41	Quantity increases of BOQ (Due to new works)	3.33	0.667	24	0.76

42	Adverse weather conditions	3.79	0.758	5	1.04
43	Price escalations (Not covered in some contracts)	2.89	0.576	60	0.96
44	Some regulations of funding agencies	3.14	0.627	40	0.70
45	Contractor's Poor knowledge on specifications	3.06	0.612	43	0.97
46	Contractor's Poor knowledge on contract conditions	3.36	0.600	49	2.83
47	Scope changes	3.71	0.742	10	0.88
48	Political influences on scope of works	3.18	0.636	37	0.96
49	Contractors are not employing qualified staff,	3.12	0.624	41	1.11
50	Lack of experience of the Contractors'	3.15	0.630	39	1.17
51	Delays in approvals from the consultants	3.21	0.642	36	0.86
52	Lapses in the dispute resolving mechanisms	2.73	0.542	70	0.96
53	Less attention on social and environmental issues	2.83	0.567	61	0.82
54	No adequate attention of the Contractor for safety measures	3.05	0.609	45	0.84
55	No progress monitoring adequately	3.32	0.664	25	0.88
56	Delay in issuing instructions by the Consultant	3.23	0.645	32	0.84
57	Delay in submission of interim claims by the contractors	2.42	0.485	76	1.03
58	No adequate materials stocks of the contractors	3.45	0.691	17	0.74
59	No adequate test equipment of the contractors	3.03	0.606	46	0.80
60	Delay in some test results	2.98	0.597	50	0.80
61	Review meetings are not effective	2.95	0.591	53	0.88
62	No practicable solutions from the consultants	2.89	0.579	57	0.82
63	No clear procedure for evaluation of time extensions	2.61	0.521	73	0.98
64	Poor cash flow maintenance of the contractors	3.27	0.655	29	0.86
65	Excessive change orders	3.29	0.658	28	0.97
66	Contract conditions are not clear	2.97	0.594	51	0.86
67	Site access difficulties	2.77	0.555	65	0.82
68	Difficulty in works with existing traffic flow	2.95	0.591	53	0.89
69	Unbalance risks of the Contractor	2.52	0.503	75	0.74
70	Some outside works of the Employers (Given to the Contractors)	2.62	0.524	72	0.78
71	Public protests	2.89	0.579	57	0.81
72	Conflicts in documents (Between the designs and BOQs)	3.23	0.645	32	0.74

73	Lack of communications	2.97	0.594	51	0.78
74	Some Government regulations	3.24	0.648	30	0.70
75	Environmental hazards	3.59	0.718	13	0.97
76	Contractors delay to commence the works	3.38	0.676	20	0.87
77	High competition in bids (Hard to proceed works with low rates)	3.06	0.612	43	1.09
78	Change of site topography after design	2.91	0.582	55	0.93
79	Inadequate review by the Employer	2.76	0.552	68	0.83
80	Change of subcontractors	2.83	0.567	61	0.85
81	Ineffective delay penalties	2.64	0.527	71	0.83
82	Improper construction method of the contractor	3.23	0.645	32	0.81
83	Inflexibility of the Consultants	2.74	0.548	69	0.79
84	Inadequate facilities to workmen	2.77	0.555	65	0.83
85	Terrain conditions of the site area	2.91	0.582	55	0.92
86	Road length and width	2.59	0.518	74	0.88
87	Traffic intensity increases suddenly	2.82	0.564	63	0.93
88	Climatic conditions	3.52	0.703	16	1.05
89	Drainage problems	3.09	0.618	42	0.72
90	Involvement of more no of parties	2.77	0.555	65	0.75
91	Inadequate time duration for construction activities	3.38	0.676	20	1.01

Table 4.5 : Rating for pre-construction Stage

Attribute No	Pre-Construction M& E Work	Mean	RII	Rank	Standard deviation
1	Incorrect selection of the contractors (No adequate capacity of the contractor)	2.97	0.597	1	1.07
2	No adequate fund allocations to contract	2.58	0.515	10	1.05
3	No proper coordination between parties to prepare Designs, BOQs, Tender documents etc	2.67	0.533	9	0.81
4	No adequate investigations for Designs.	2.97	0.594	2	0.78
5	No adequate studies (Env & Social etc.)	2.82	0.564	5	0.88
6	Lack of qualified staff for the Employer	2.42	0.485	12	1.03
7	No adequate time durations have been allocated to the contracts	2.45	0.491	11	1.00
8	Typical designs are used for preparation of BOQs	2.70	0.573	4	0.74

9	QS who prepare the BOQs, doesn't aware the site conditions	2.68	0.536	8	0.91
10	Contractors don't clearly go through the tender documents before tendering.	2.70	0.539	7	0.95
11	Confusing requirements of clients when finalizing the project scope	2.41	0.482	13	0.69
12	Supremacy of the Employer	2.29	0.458	15	0.76
13	Insufficient survey works and data collections before designs	2.88	0.576	3	0.73
14	Project/ Contract size	2.36	0.473	14	0.82
15	No proper mechanism to recheck the designs and BOQs before tendering	2.80	0.561	6	0.95

Table 4.6: Rating for post -construction Stage

Attribute No	**Post Constrction M&E work**	**Mean**	**RII**	**Rank**	**Standard deviation**
92	No proper mechanism to address additional works after completion of the contract	2.545	0.509	4	0.77
93	Delay in final bill certifications	2.136	0.427	11	0.81
94	Inadequate defect liability period	1.939	0.388	13	1.00
95	No proper monitoring on defect rectifications	2.258	0.452	8	0.93
96	Employers less capacity to do maintenance	2.424	0.485	5	0.88
97	No project allocation for the maintenance	2.939	0.588	1	1.01
98	No capacity of the Employer to identify the defects properly	2.273	0.455	7	0.89
99	No involvements of the consultant after completion the constructions	2.697	0.539	2	0.87
100	No proper As-built drawings	2.227	0.445	9	1.12
101	Delay in submit the final documents by the contractors	2.318	0.464	6	0.87
102	Delay in taking over by the Employer	2.091	0.418	12	0.96
103	Employers involvement towards the consultants unnecessarily.	2.197	0.439	10	0.83
104	Contractor's less attention on maintenance works.	2.561	0.512	3	0.71

The most critical aspect of Monitoring and Evaluation was land acquisition, which was followed by utility relocation delays, the contractor's poor planning of construction works, and the difficulties in obtaining licenses for material transport (Sand, gravel etc.). Table 4.7 shows the mean attribution of the first ten competences in each phase; it can be observed that the construction stage received the highest score. Pre-construction stage and post-construction stage monitoring and assessment were ranked second and third, respectively.

Table 4.7 : Relative score and Rank of monitoring and evaluation

Monitoring and Evaluation	Relative Score	Rank
Construction stage	3.18	1
Pre-Construction stage	2.66	2
Post Construction stage	2.35	3

4.3 Pearson Correlation Analysis

Pearson correlation was used to determine the link between three competency categories.

Table 4.8 : Correlation Analysis

Competency	Pearson correlation	Strength of Relationship	P- Value
Construction vs Pre -Construction	0.820	High	<0.05
Pre-construction vs post construction	0.971	Very High	<0.05
Construction vs Post construction	0.758	High	<0.05

For all groups, the P-value is less than 0.05. As a result, we may reject the null hypothesis (H0) and conclude that each skill group has a link. Scatter plots were

created to show the strength of each competency group's association. Figures 4.5, 4.6, and 4.7 are examples of this. The findings of this study reveal that there is a strong relationship between construction and pre-construction, as well as very strong relationships between pre-construction and post-construction and strong relationships between construction and post-construction.

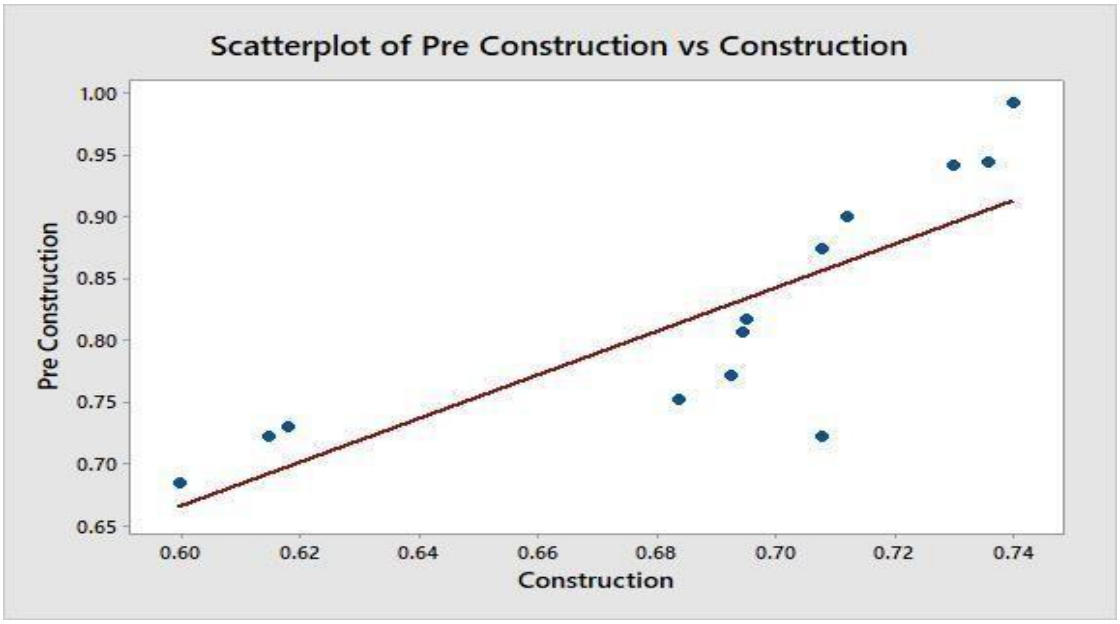


Figure 4.5 : Construction vs. Post Construction

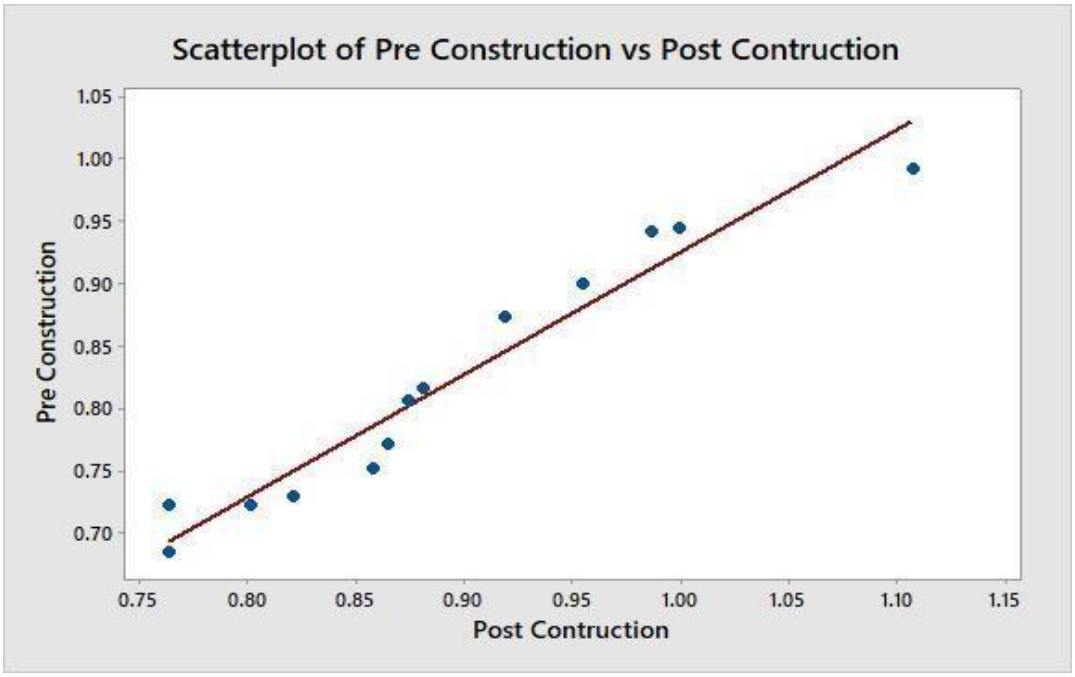


Figure 4.6 : Pre Construction vs Post Construction

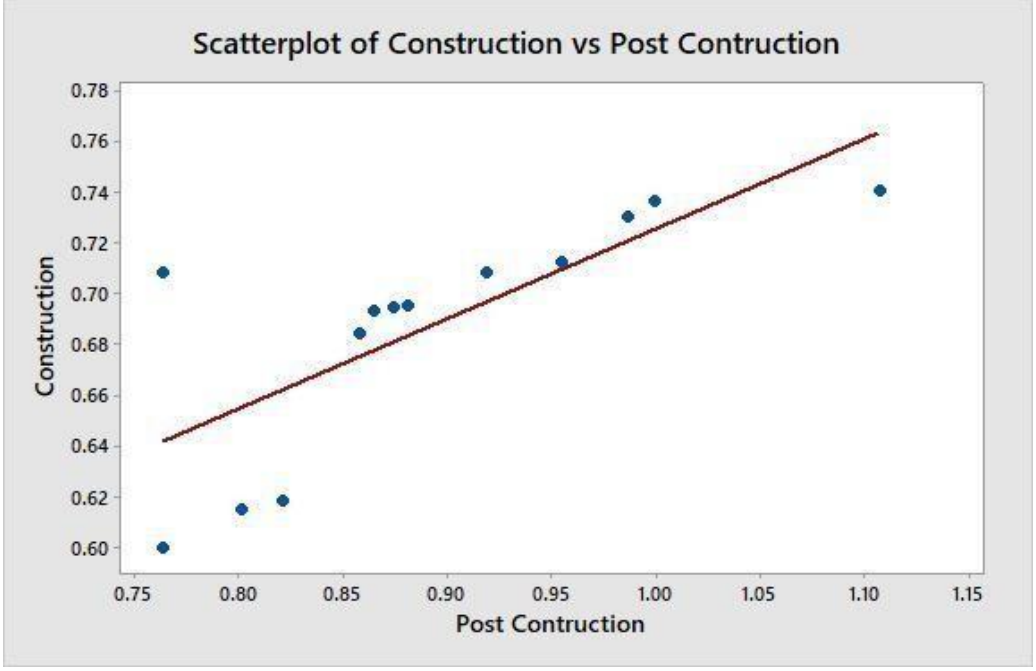


Figure 4.7 : Construction vs Pre Construction

4.4 One-way ANOVA analysis

The purpose of the analysis was to see if the respondents' job experience had an impact on the ratings of each competency category. The association between respondent experience and Pre-Construction stage rating was tested using hypothesis testing. Table 4.8 summarizes the findings.

Table 4.9 : Pre Construction vs Experience

Overall Experience	No of Respondents	Mean	Standard Deviation	95% Confidence Interval	P-Value
Less than 4 years	15	0.9121	0.0934	(0.8744, 0.9589)	P = 0.463 > 0.05
5 years to 9 years	31	0.9151	0.0754	(0.8917, 0.9466)	
10 years to 14 years	9	0.8922	0.0575	(0.8425, 0.9551)	
more than 15 years	11	0.9312	0.0726	(0.8925, 0.9897)	

We do not reject the null hypothesis because the P-value is greater than 0.05. (H0). As a result, at a 5% significance level, there is no significant change in mean Technical rating with respondents' experience. Figure 4.8 shows the 95 percent confidence intervals.

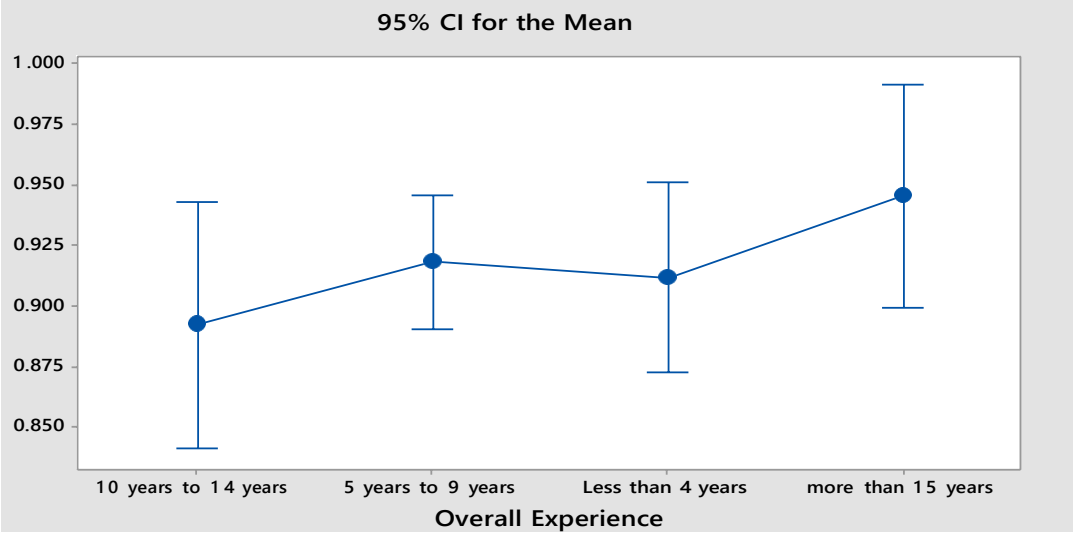


Figure 4.8 : 95% CI mean Pre Construction stage rating with experience

A hypothesis test was run to see if there was a link between respondent experience and their rating of the Construction stage. Table 4.9 summarizes the findings.

Table 4.10 : Construction Stage vs Experience

Overall Experience	No of Respondents	Mean	Standard Deviation	95% Confidence Interval	P-Value
Less than 4 years	15	0.8391	0.0712	(0.7822, 0.8739)	P = 0.562 > 0.05
5 years to 9 years	31	0.8672	0.0702	(0.8225, 0.8718)	
10 years to 14 years	09	0.8545	0.0764	(0.8302, 0.8811)	
more than 15 years	11	0.8301	0.0531	(0.7833, 0.8722)	

We do not reject the null hypothesis because the P-value is greater than 0.05. (H0). As a result, we may conclude that there is no statistically significant difference between the mean of the Construction stage and the respondents' experience. Figure 4.9 shows the 95 percent confidence intervals.

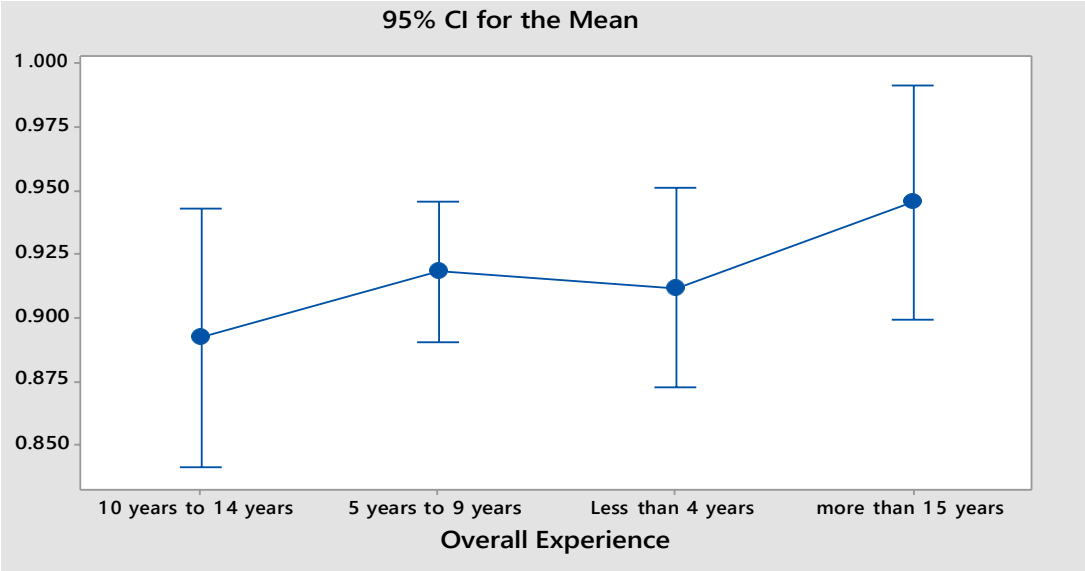


Figure 4.9 : 95% CI mean Construction Stage rating with experience

The association between respondent experience and Post Construction Stage rating was tested using a hypothesis test. Table 4.10 summarizes the findings.

Table 4.11 : Post Construction Stage vs Experience

Overall Experience	No of Respondents	Mean	Standard Deviation	95% Confidence Interval	P-Value
Less than 4 years	15	0.8386	0.0822	(0.8140,0.8814)	P = 0.641 > 0.05
5 years to 9 years	31	0.8398	0.0582	(0.8024,0.8586)	
10 years to 14 years	09	0.8569	0.0662	(0.8129,0.9204)	
more than 15 years	11	0.8512	0.0625	(0.8252,0.8928)	

We do not reject the null hypothesis because the P-value is greater than 0.05. (H0). As a result, we may conclude that there is no statistically significant difference between the mean Post Construction stage rating and respondents' experience. Figure 4.10 shows the 95 percent confidence intervals.

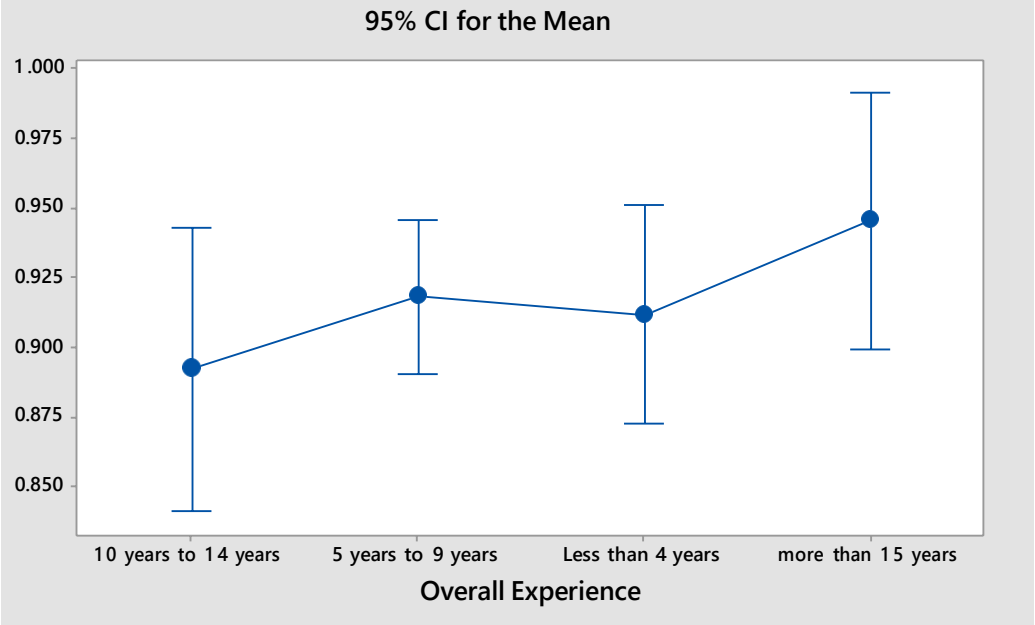


Figure 4.10 : 95% CI mean Post Construction stage rating with Experience

4.5 Discussion

Improvements are required in Sri Lanka's monitoring and assessment procedures at various stages of road construction projects, as indicated by the rankings and levels below. Table 4.11 shows the key monitoring and evaluation methods found in this study at various stages of road construction projects.

Table 4.12 : Key Monitoring and Evaluation systems

Category	**Rank**	**Monitoring and Evaluation**
Construction stage	1	Delay of land acquisitions
	2	Delay of utility relocations
	3	Poor planning of construction works by the contractor
Pre-Construction stage	1	Incorrect selection of the contractors (No adequate capacity of the contractor)
	2	No adequate investigations for Designs.
	3	Insufficient survey works and data collections before designs
Post Construction stage	1	No project allocation for the maintenance
	2	No involvements of the consultant after completion the constructions
	3	Contractor's less attention on maintenance works.

According to the perspective of Monitoring and Evaluation in Sri Lankan road projects, the highest mean score was discovered in construction stage Monitoring and Evaluation followed by pre-construction stage Monitoring and Evaluation, and finally post-construction stage Monitoring and Evaluation.

The capacity to use project management software for planning, which was further backed by the literature, was ranked third among inadequate contractor planning of construction activities. Management of legal concerns and ability to utilize computers/project management software were ranked as the least important abilities in an Australian study. Skitmore is a town in the United States (2004).

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

The study's main purpose was to figure out what improvements were needed for Monitoring and Evaluation systems at different stages of road construction projects in Sri Lanka. In regard to prior Monitoring and Evaluation studies, which were discussed in Chapter 2, a literature study was done. The goal of this questionnaire study was to identify the road construction industry's most critical monitoring and assessment shortcomings. The study methods, as well as explanations of the research objectives, were given in Chapter 3. In Chapter 4, a detailed examination of the results from the questionnaire survey was presented. This final chapter summarizes the study's research findings and suggestions.

The outcomes of this study can be utilized as a reference when choosing a Monitoring and Evaluation system for project stages. Weightage tests can be used to assess construction stage monitoring and evaluation based on the project's complexity..

During the construction phase of road construction projects, monitoring and assessment are required. However, there is insufficient Monitoring and Evaluation, which has a significant impact on the cost and time that may occur throughout the pre-construction and post-construction stages. Cost and time overruns have now become a major issue in the road construction industry, as they occur regularly and are significant. As a result, more attention should be paid to avoiding or mitigating this issue in order to ensure that contracts run smoothly and that taxpayer money is saved. Furthermore, project delays result in contract cost hikes and unquantifiable public discomfort. Therefore, more attention should be drawn to avoid or mitigate shortfalls for smooth functioning of the contracts and to save public money

Each stage, as well as this awareness, is extremely useful for paying close attention to them at every stage of their occurrence, as well as any possible mitigations. If any relevant steps are performed at the correct time ranking order of their occurrence, it

could be averted to a considerable degree. According to the whole list of questionnaires identified, there are just a few inevitable inadequacies, such as poor weather, environmental dangers, and unforeseen soil conditions, among others. In this context, it is critical for all stakeholders involved in the road sector to be aware of potential deficiencies. As a result, it's critical to use this rating to prioritize migratory actions at the appropriate stage of the project.

5.2 Recommendation

People, who employ goals, qualities, self-concept, social roles, and expertise to get things done, as well as the reality that system performances fluctuate, are expected to Monitoring and Evaluation. Because the Monitoring and Evaluation system is so important to the project's success or failure, it is recommended that it be updated and developed during the construction stage.

Because a Monitoring and Evaluation system can be achieved through training and development, it is recommended that construction businesses establish particular development programs for their employees in order to achieve the greatest results. They can also participate in suitable training programs to enhance the abilities they lack. It is recommended that associated awareness programs, training sessions, and toolbox meetings be held on a regular basis to improve the project team's management skills.

It was also suggested that more research be done into the relationship between project success and the monitoring and assessment processes used at each step. Public sector firms emphasize the importance of project Monitoring and Evaluation their state-of-the-art planning, monitoring tools, and monitoring systems by monitoring their most advanced internal transfer vision. To assess whether there is a link between monitoring practice and project performance, more research in additional industries, sectors, and countries is needed. As shown, a future research technique for coordination and assessment of adoption, implementation, challenge, barriers, project management strategy, project strategy, project process, and other industrial monitoring, management, and evaluation is necessary, as shown. Countries that decide whether or not to promote the relationship.

Many incidents have been recorded based on analog data in which projects did not perform as predicted, were completed late, did not satisfy stakeholder expectations, or exceeded budget, and so on. However, in the Sri Lankan context, there is currently no standard defining the important criteria required for a monitoring system in a road construction project. In Sri Lanka, cost is the most significant impediment to the smooth operation and timely completion of road development projects. It's exceedingly tough to accommodate, as more cost overruns have been reported as a result of building projects' tight budgets, causing a plethora of problems, including missed deadlines. Cost overruns, on the other hand, are fairly common in road building projects, with significant percentage cost overruns. This circumstance would have far-reaching consequences. This circumstance would have a substantial impact on the final outcome of the construction contracts.

5.3 The study's limitations

Extrapolating the findings to other industries and the global context may be problematic because this study was limited to the road construction industry in Sri Lanka. Due to their demanding schedules, project workers were difficult to reach and concerned with their obligations. The response rate for the questioners' surveys and interviews was usually quite low, yet acceptable.

Because the data collection period for this study was limited to the time range of the questionnaire survey and interviews, the data quality may have suffered as a result. Both the intricacy and the cost of the initiatives were significant.

By monitoring their most advanced internal transfer vision, public sector enterprises stress the importance of project monitoring and monitoring their state-of-the-art planning, monitoring tools, and monitoring systems. Future study in additional industries, sectors, and countries is required to determine whether there is a link between monitoring practice and project performance. As illustrated , similar study is required as a future research approach for coordination and assessment of adoption, implementation, challenge, hurdles, project management strategy, project strategy, project process, and other industrial monitoring, management, and evaluation. Countries that must select whether or not to promote the link between project monitoring and project outcomes.

REFERENCES

Ahadzie, D. K., Proverbs, D. G., & Sarkodie-Poku, I. (2013). Competencies required of project managers at the design phase of mass house building projects.*International Journal of Project Management* .

Alias, Z., Baharum, Z. A., & Idris, M. F. (2012). Project Management towards Best Practice . *Social and Behavioral Sciences 68*, 108 – 120.

APM. (2006). *APM Body of Knowledge 5th Ed.* Princes Risborough: Association for Project Management.

APM. (2012). *APM Body of Knowledge.* Princes Risborough: Association for Project Management.

Bértholo, J. (2013). The Shadow in Project Management. *Procedia - Social and Behavioral Sciences*, 358–368.

Boyatzis, E. (1982). *The Competent Manager: A Model for Effective Performance.* Hoboken: John Wiley & Sons.

Brière, S., Proulx, D., Flores, O. N., & Laporte, M. (2015). Competencies of project managers in international NGOs: Perceptions of practitioners. *International Journal of Project Management*, 116-125.

Brill, J. M., Bishop, M., & Walker, A. (2005). The Competencies and Characteristics Required of an Effective Project Manager A Web-Based Delphi Study.

Chabota K., Mundia M. and Kanyuka M. (2008). Cost escalation and Schedule delays in road construction projects in Zambia. Department of Civil and Environmental Engineering, School of Engineering, University of Zambia. P. O. Box 32379, Lusaka, Zambia.

Chawla H. L. (2010). Some Critical Issues Pertaining to Road Construction Industry. The World Bank on Indian Road Construction Industry: Capacity issues, constraints & recommendations.

Chigara, B. and Mangore, E. (2012). An analysis of the implication of resources management on building project performance in Harare and Bulawayo. International Journal of

Marketing & Technology, 2(9), pp.147-150

Cartwright, C., & Yinger, M. (2007). *Project management competency development framework—second edition.* Budapest: Project Management Institute.

Cheng, M.-I., Dainty, A., & Moore, D. (2006). What makes a good project manager? *Human Resource Management Journal* , 25-37.

Deist, F. D., & Winterton, J. (2007). What Is Competence? *Human Resource Development International*, 27-46.

Dias, M., Tereso, A., Braga, C. A., & Fernandes, G. (2014, January). *The Key Project Managers' Competencies for Different Types of Projects.* Retrieved from researchgate: https://www.researchgate.net/publication/281709169_The_Key_Project_Managers'_Competences_for_Different_Types_of_Projects.

Dziekoński, K. (2017). Project Managers' Competencies Model for Construction Industry in Poland. *Procedia Engineering*, 174 â€“ 181.

Ericson, P. and Westernberg, M. (n.d.). Effects of procurement on construction project performance. [ebook] pp.3-4. Available at: https://www.diva-portal.org/smash/get/diva2:1011258/FULLTEXT01.pdf [Accessed 12 Sep. 2018].

El-Sabaa, S. (2001). The skills and career path of an e active project manager.

International Journal of Project Management 19, 1-7.

Farooqui, R. U., Saqib, M., & Ahmed, S. M. (2008). Assessment of Critical Skills for Project Managers in Pakistani Construction Industry. *International Conference on Construction In Developing Countries*, (pp. 221-234).
Karachi.

Gale, A., & Luo, J. (2004). Factors affecting construction joint ventures in China.

International Journal of Project Management, 33-42.

Goodwin, R. S. (1993). Skills Required of Effective Project Managers. *Journal of Management in Engineering.*

Hasan, H. S., Ahamad, H., & Mohamed, M. R. (2011). Skills and Competency in Construction Project Success:Learning Environment and Industry Application- The GAP. *Procedia Engineering 20*, 291 – 297.

Halwatura R. U. and Ranasinghe N. P. N. P. (2013). Causes of Variation Orders in Road Construction Projects in Sri Lanka. Department of Civil Engineering, University of Moratuwa, 10400 Moratuwa, Sri Lanka.

Hardlife, Z. and Zhou, G. (2013). Utilisation of Monitoring and Evaluation Systems by Development Agencies: The Case of the UNDP in Zimbabwe. American International Journal of Contemporary Research, 3(3), p.82.

Herling, R., & Provo, J. (2000). Knowledge, Competence, and Expertise in Organizations. *Advances in Developing Human Resources* , 1-7.

Hubbard, D. G. (1990). *Successful Utility Project Management from Lessons Learned.* Pennsylvania: Project Management Institute.

Hwang, B. G., & Ng, W. ,. (2013). Project management knowledge and skills for green construction Overcoming challenges. *International Journal of Project Management 31*, 272–284.

IPMA. (2006). *International Project Management Association.* Nijkerk: Netherlands.

ISO10006. (2003). *Quality Management Systems - Guidelines for Quality Management in Projects.* New York: American National Standards Institute (ANSI).

Jałocha, B., Krane, H. P., Anandasivakuma, E., & Prawelska-Skrzypek, G. (2014). Key competences of public sector project managers. *Social and Behavioral Sciences*, 247 - 256.

Jeffrey, K. P., & Kharbanda, O. P. (1995). *Successful Project Managers: Leading Your Team to Success (Industrial Engineering).* New York: Van Nostrand Reinhold.

Jayasundara, C., Jayawickrema, V. and Sivagananathan, A. (2013). Effectiveness of Project

Management Tools used in the Sri Lankan Public Sector. Sri Lankan Journal of Management, 18(3), pp.139-160.

Katz, R. L. (1974). *Skills of an Effective Administrator.* Retrieved from Harvard Business Review: https://hbr.org/1974/09/skills-of-an-effective-administrator

Kamlesh P. B., Abhijit N.B. (2017). Problems Facing by Construction Organisation and Construction Labour. Department Of Civil Engineering, Imperial College of Engineering and Research, Wagholi, Pune-412205, India.

Kerzner, H. (2002). *PROJECT MANAGEMENT A Systems Approach to Planning, Scheduling and Controlling.* Hoboken: John Wiley & Sons, Inc.

Kozak-Holland, M. (2011). *The History of Project Management.* Multi-Media Publications.

Liikamaa, K. (2015). Developing a project manager's competencies: A collective view of the most important competencies. *Procedia Manufacturing 3*, 681 - 687.

LMD. (2018). The Current Construction Industry In Sri Lanka | LMD. [online] Available at: https://lmd.lk/the-current-construction-industry-in-sri-lanka/ [Accessed 3 Sep. 2018].

Loosemore, M., & Uher, T. (2003). *Essentials of Construction Project Management.* Randwick : University of New South Wales Press.

Loufrani-Fedida, S., & Missonier, S. (2015). The project manager cannot be a hero anymore! Understanding critical competencies in project-based organizations from a multilevel approach. *International Journal of Project Management*.

Mba, M. B., & Agumba, N. (2018). Critical Success Factors of Joint Ventures in the Construction Industry: Literature Review. *21st International Symposium on Advancement of Construction Management and Real Estat* (pp. 597-605). Springer Nature Singapore Pte Ltd.

Mladen Radujković, M. S. (2017). Project Management Success Factors. *Procedia Engineering*, 607 – 615.

Muller, R., & Turner, R. (2007). Matching the project manager's leadership style to project type. *International Journal of Project Management*, 21-32.

Nasseri, H. and Aulin, R. (2016). Enablers and barriers to project planning and scheduling based on construction projects in Oman. Journal of Construction in Developing Countries, 21(2), pp.1-20.

Neyestani, B. (2016, December). "Effectiveness of Quality Management System (QMS) on Construction Projects".

Odusami, K. T. (2002). Perceptions of Construction Professionals Concerning Important Skills of Effective Project Leaders. *Journal of Management in Engineering*.

FST Hewavitharana, AADAJ Perera (2019) Gap Analysis between ERP procedures and Construction procedures Department of Civil Engineering, University of Moratuwa, Bandaranayake Mawatha, Moratuwa, 10400, Sri-Lanka

Omar, N. M., & Fayek, R. A. (2016). Modelling and evaluating construction project competencies and their relationship to project performance. *Automation in Construction 69*, 115–130.

Ozorhon, B., Arditi, D., Dikmen, I., & Birgonul, M. T. (2007). Effect of host country and project conditions in international construction joint ventures. *International Journal of Project Management*, 799-806.

PMCC. (2002). *A Guidebook of Project & Program Management for Enterprise Innovation.* Tokyo: Project Management Professionals Certification Center.

PMI. (2017). *A Guide to the Project Management Body of Knowledge (PMBOK Guide).* Pennsylvania: Newtown Square, PA: Project Management Institute.

Project Management Institute, P. (2013). *A Guide to the Project Management Body of Knowledge.* Pennsylvania: Project Management Institute.

Radujković, M., & Sjekavica, M. (2017). Project Management Success Factors. *Procedia Engineering*, 607 – 615.

Ramazani, J., & Jergeas, G. (2014). Project managers and the journey from good to great: The benefits of investment in project management training and education.

International Journal of Project Management.

Revilla, M. A., Saris, W. E., & Krosnick, J. A. (2014). Choosing the Number of Categories in Agree–Disagree Scales . *Sociological Methods & Research*, 73-97.

Rezvani, A., Chang, A., Wiewiora, A., Ashkanasy, N., Jordan, P., & Zolin, R. (2016). Manager emotional intelligence and project success: The mediating role of job satisfaction and trust. *International Journal of Project Management 34*, 1112–1122.

Sepeti, P. (2016). Monitoring And Evaluation Of Power Transmission Projects In ZESCO. Master of Engineering in Project Management. THE UNIVERSITY OF ZAMBIA.

Savelsbergh, C., Havermans, L., & Storm, P. M. (2016). Development paths of project managers: What and how do project managers learn from their experiences? *International Journal of Project Management*, 559-569.

Seymour, T., & Hussein, S. (2014). The History Of Project Management. *International Journal of Management & Information Systems – Third Fourth*.

Syed M. F. W., Buchan S. (2016). Delays in Road Construction Projects in the State of Perak. Faculty of Civil Engineering, University Teknologi Malaysia, Malaysia.

Sumner, M., & Powell, A. (2013). What Project Management Competencies are Important to Job Success? *Americas Conference on Information Systems AMCIS*. Chicago.

Sunindijo, R. Y. (2015). Project manager skills for improving project performance. *International Journal of Business Performance Management* , 67-83.

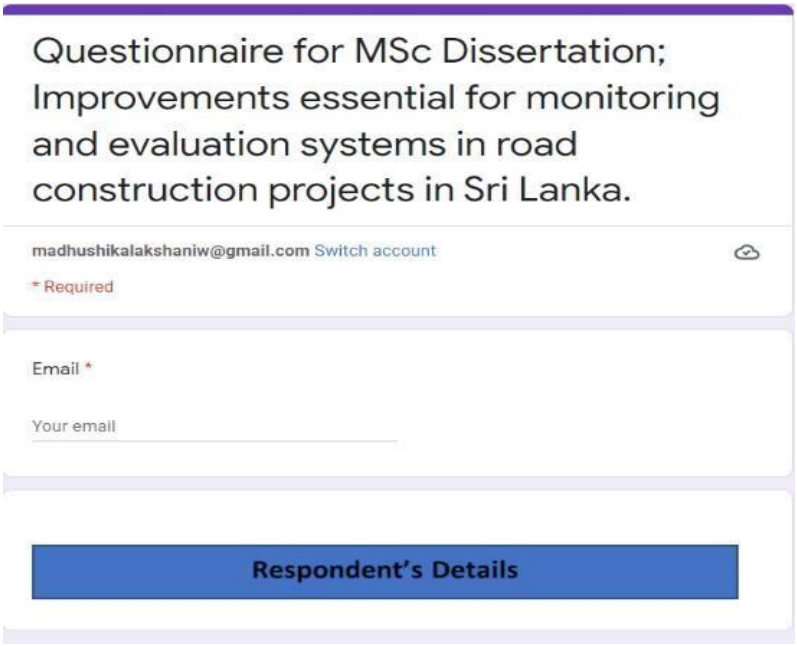
Winter, M., Smith, C., Morris, P., & Cicmil, S. (2006). Directions for future research in project management: The main findings of a UK government-funded research network. *International Journal of Project Management*, 638-649.

Winterton, J., & Delamare, L. D. (2005). What Is Competence? Human Resource.*Human Resource Development*, 27 – 46.

Wanjiku, S. (2015). Monitoring And Evaluation Factors Influencing The Performance Of Road Infrastructural Projects: A Case Study Of Nyandarua Country, Kenya. Masters in Project Planning and Management. The University of Nairobi.

Zhang, F., Zuo, J., & Zillante, G. (2013). Identification and evaluation of the key social competencies for Chinese construction project managers.

Appendix A



Questionnaire for MSc Dissertation; Improvements essential for monitoring and evaluation systems in road construction projects in Sri Lanka.

madhushikalakshaniw@gmail.com Switch account

* Required

Email *

Your email

Respondent's Details

1. Name *

Your answer

2. Age Group *

- 30-39
- 40-49
- 50-59
- 60 years or Older

3. Gender *

- Male
- Female

4. Job position *

- Team Leader
- Project Director
- Project Manager

5. Education Level *

- ◯ Higher National Certificate
- ◯ Higher National Diploma
- ◯ Bachelor Degree
- ◯ Postgraduate Degree
- ◯ Master's Degree
- ◯ Doctoral Degree

6. Value of the project that you have worked as a PM *

- ◯ Less than Rs. 1000 Million
- ◯ Rs. 1000 to 2000 Million
- ◯ Rs. 2000 to 3000 Million
- ◯ More than Rs. 3000 million

7. Overall Experience as PM *

- ◯ Less than 4 years
- ◯ 5 years to 9 years
- ◯ 10 years to 14 years
- ◯ more than 15 years

Questionnaire for MSc Dissertation; Improvements essential for monitoring and evaluation systems in road construction projects in Sri Lanka.

madhushikalakshaniw@gmail.com Switch account

Questionnaire for MSc Dissertation; Improvements essential for monitoring and evaluation systems in road construction projects in Sri Lanka.

Based on your experience, please check the importance of the following competencies;

Categorize the below competencies based on the level of importance of the factor for project management according to your view (y selecting the relevant checkbox)

1- Strongly Disagree
2- Disagree
3- Neither
4- Agree
5- Strongly Agree

Questionnaire for Pre-construction stage monitoring and evaluation

1. Incorrect selection of the contractors (No adequate capacity of the contractor).

1	2	3	4	5
○	○	○	○	○

2. No adequate fund allocations to contracts.

1	2	3	4	5
○	○	○	○	○

3. No proper coordination between parties to prepare Designs, BOQs, Tender documents etc.

1	2	3	4	5
○	○	○	○	○

4. No adequate investigations for Designs.

1 2 3 4 5

5. No adequate studies (Env & Social etc.)

1 2 3 4 5

6. Lack of qualified staff for the Employer

1 2 3 4 5

7. No adequate time durations have been allocated to the contracts

1 2 3 4 5

8. Typical designs are used for preparation of BOQs

1 2 3 4 5

9. QS who prepare the BOQs, doesn't aware the site conditions

1 2 3 4 5

10. Contractors don't clearly go through the tender documents before tendering

1 2 3 4 5

11. Confusing requirements of clients when finalizing the project scope

1 2 3 4 5

12. Supremacy of the Employer

1	2	3	4	5
○	○	○	○	○

13. Insufficient survey works and data collections before designs

1	2	3	4	5
○	○	○	○	○

14. Project/ Contract size

1	2	3	4	5
○	○	○	○	○

15. No proper mechanism to recheck the designs and BOQs before tendering

1	2	3	4	5
○	○	○	○	○

16. Delay of land acquisitions

1	2	3	4	5
○	○	○	○	○

17. Delay of some authority approvals (CEA, GSMB, DS etc)

1	2	3	4	5
○	○	○	○	○

18. Poor planning of construction works by the contractor

1	2	3	4	5
○	○	○	○	○

19. Designs errors

1	2	3	4	5
○	○	○	○	○

20. Design changes after awarding the Contract

1	2	3	4	5
○	○	○	○	○

21. Inadequate or excess BOQ quantities

1	2	3	4	5
○	○	○	○	○

22. Payments delays to contractors

1	2	3	4	5
○	○	○	○	○

23. Unforeseeable soil conditions

1	2	3	4	5
○	○	○	○	○

24. Underground utilities (No pre awareness)

1	2	3	4	5
○	○	○	○	○

25. Inadequate investigations/Surveys (Site/terrain conditions etc)

1	2	3	4	5
○	○	○	○	○

26. Delay of approvals for variations

1 2 3 4 5

27. Existing base failures

1 2 3 4 5

28. Inadequate skill labor of the Contractor

1 2 3 4 5

29. Poor public awareness

1 2 3 4 5

30. Carelessness of the workmen and officers

1 2 3 4 5

31. Designs not comply with the existing ground conditions

1	2	3	4	5
○	○	○	○	○

32. No adequate time for design works at construction stage

1	2	3	4	5
○	○	○	○	○

33. No adequate time for Environment and Social surveys at construction stage

1	2	3	4	5
○	○	○	○	○

34. Difficulty in getting permits for material transport (Sand, gravel etc)

1	2	3	4	5
○	○	○	○	○

35. Shortage of some construction materials

1	2	3	4	5
○	○	○	○	○

36. Delay of utility relocations

1	2	3	4	5
○	○	○	○	○

37. No proper coordination with other authorities /Stakeholders (NWS&DB, Telecom, CEB, etc)

1	2	3	4	5
○	○	○	○	○

38. Contractors' works are not with the programmed. (Work in ad-hoc manner)

1	2	3	4	5
○	○	○	○	○

39. No adequate involvement of the Employer for getting permits, licenses etc.

1	2	3	4	5
○	○	○	○	○

40. Inadequate resource allocations of the contractors

1	2	3	4	5
○	○	○	○	○

41. Quantity increases of BOQ (Due to new works)

1	2	3	4	5
○	○	○	○	○

42. Adverse weather conditions

1	2	3	4	5
○	○	○	○	○

43. Price escalations (Not covered in some contracts)

1	2	3	4	5
○	○	○	○	○

44. Some regulations of funding agencies

1	2	3	4	5
○	○	○	○	○

45. Contractor's Poor knowledge on specifications

1	2	3	4	5
○	○	○	○	○

46. Contractor's Poor knowledge on contract conditions

1	2	3	4	5
○	○	○	○	○

47. Scope changes

1	2	3	4	5
○	○	○	○	○

48. Political influences on scope of works

1	2	3	4	5
○	○	○	○	○

49. Contractors are not employing qualified staff,

1	2	3	4	5
○	○	○	○	○

50. Lack of experience of the Contractors'

1	2	3	4	5
○	○	○	○	○

51. Delays in approvals from the consultants

1	2	3	4	5
○	○	○	○	○

52. Lapses in the dispute resolving mechanisms

1	2	3	4	5
○	○	○	○	○

53. Less attention on social and environmental issues

1	2	3	4	5
○	○	○	○	○

54. No adequate attention of the Contractor for safety measures

1	2	3	4	5
○	○	○	○	○

55. No progress monitoring adequately

1	2	3	4	5
○	○	○	○	○

56. Delay in issuing instructions by the Consultant

1	2	3	4	5
○	○	○	○	○

57. Delay in submission of interim claims by the contractors

1	2	3	4	5
○	○	○	○	○

58. No adequate materials stocks of the contractors

1	2	3	4	5
○	○	○	○	○

59. No adequate test equipment of the contractors

1	2	3	4	5
○	○	○	○	○

60. Delay in some test results

1	2	3	4	5
○	○	○	○	○

61. Review meetings are not effective

1	2	3	4	5
○	○	○	○	○

62. No practicable solutions from the consultants

1	2	3	4	5
○	○	○	○	○

63. No clear procedure for evaluation of time extensions

1	2	3	4	5
○	○	○	○	○

64. Poor cash flow maintenance of the contractors

1	2	3	4	5
○	○	○	○	○

65. Excessive change orders

1	2	3	4	5
○	○	○	○	○

66. Contract conditions are not clear

1	2	3	4	5
○	○	○	○	○

67. Site access difficulties.

1	2	3	4	5
○	○	○	○	○

68. Difficulty in works with existing traffic flow

1	2	3	4	5
○	○	○	○	○

69. Unbalance risks of the Contractor

1	2	3	4	5
○	○	○	○	○

70. Some outside works of the Employers (Given to the Contractors)

1	2	3	4	5
○	○	○	○	○

71. Public protests

1	2	3	4	5
○	○	○	○	○

72. Conflicts in documents (Between the designs and BOQs)

1	2	3	4	5
○	○	○	○	○

73. Lack of communications

1	2	3	4	5
○	○	○	○	○

74. Some Government regulations

1	2	3	4	5
○	○	○	○	○

75. Environmental hazards

1	2	3	4	5
○	○	○	○	○

76. Contractors delay to commence the works

1	2	3	4	5
○	○	○	○	○

77. High competition in bids (Hard to proceed works with low rates)

1	2	3	4	5
○	○	○	○	○

78. Change of site topography after design

1	2	3	4	5
○	○	○	○	○

79. Inadequate review by the Employer

1 2 3 4 5

80. Change of subcontractors

1 2 3 4 5

81. Ineffective delay penalties

1 2 3 4 5

82. Improper construction method of the contractor

1 2 3 4 5

83. Inflexibility of the Consultants

1 2 3 4 5

84. Inadequate facilities to workmen

1 2 3 4 5

85. Terrain conditions of the site area

1 2 3 4 5

86. Road length and width

1 2 3 4 5

87. Traffic intensity increases suddenly

1	2	3	4	5
○	○	○	○	○

88. Climatic conditions

1	2	3	4	5
○	○	○	○	○

89. Drainage problems

1	2	3	4	5
○	○	○	○	○

90. Involvement of more no of parties

1	2	3	4	5
○	○	○	○	○

91. Inadequate time duration for construction activities

1	2	3	4	5
○	○	○	○	○

92. No proper mechanism to address additional works after completion of the contract

1	2	3	4	5
○	○	○	○	○

93. Delay in final bill certifications

1	2	3	4	5
○	○	○	○	○

94. Inadequate defect liability period

1	2	3	4	5
○	○	○	○	○

95. No proper monitoring on defect rectifications

1 2 3 4 5

96. Employers less capacity to do maintenance

1 2 3 4 5

97. No project allocation for the maintenance

1 2 3 4 5

98. No capacity of the Employer to identify the defects properly

1 2 3 4 5

99. No involvements of the consultant after completion the constructions

1 2 3 4 5

100. No proper As-built drawings

1 2 3 4 5

101. Delay in submit the final documents by the contractors

1 2 3 4 5

102. Delay in taking over by the Employer

1 2 3 4 5

103. Employers involvement towards the consultants unnecessarily

1	2	3	4	5
○	○	○	○	○

104. Contractor's less attention on maintenance works.

1	2	3	4	5
○	○	○	○	○