

**IMPACT OF PROJECT MANAGEMENT PRACTICES ON SCHEDULE
PERFORMANCE: A CASE STUDY OF TAKORADI MALL PROJECT**

By

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DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any degree or diploma at Kwame Nkrumah University of Science and Technology, Kumasi or any other educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

Completion of projects on time is having a heavy toll on several construction organisations. Even though it is the contractor's utmost desire as well as the project owners to complete projects on time, it does not usually happen as expected. Several factors influence the untimely completion of projects. Here in Ghana, time overrun is no new thing. Most projects especially public-sector projects usually experience time overrun and hence face the accompanying effects. This study outlines the factors that contributed to schedule performance as well as the project management practices adopted during the Takoradi mall construction to investigate the impact of these practices on the schedule performance. It is an undeniable fact that project management practices vary from one organisation to the other due to the nature and purpose of the project and in particular, the degree of performance required. Nonetheless, the performance of the results is what that makes a practice ideal. The quantitative and qualitative approaches were adopted in this study. A questionnaire was distributed to personnel from owners, consultants, and contractors as well as subcontractors involved in the project. Besides, five project managers were interviewed to identify the project management practices implemented. In all, fifty (50) questionnaires were received from the respondents and then analysed. The data obtained for the study were subjected to analysis using SPSS which adopted both the descriptive and correlational analysis. The result of the analyses indicates that the project management practices implemented had a major influence on schedule performance. The study recommends further research into the investigation on how the project management practices identified impacted the cost and scope of the project.

KEYWORDS: Project Management Practices, Schedule, Performance.

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DEDICATION

I wish to dedicate this piece of work to my Dear husband, Mr. Ebenezer Sekyi Parker and my adorable daughter Eliana Efua Parker.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In this present quick paced infrastructure development environment, clients are progressively setting more prominent requests on projects to be finished in record time. This is on the grounds that time is critical for clients in accomplishing 'first in the market' advantage over contenders. Clients will no doubt endure the loss of anticipated benefits as an immediate consequence of delays in placing the product into operation. As a result, contractors face liquidated damages for late delivery of the project. To put it plainly, neither the contractor nor the client benefits from poor schedule performance (Kog et al. 1999).

The practice of Project Management is widely recognized as the best way for projects to curb schedule overruns. According to Project Management Institute (2017), Project schedule management offers an extensive plan that outlines how and when the project will deliver its outputs characterized in the project scope and aids in communication, management of the expectations of stakeholders and to assist in the work performance reports.

Project management practices are employed by a number of companies to deliver projects on time, set realistic timelines, properly assign resources and assist in the achievement of goals outlined for the project. All these aforementioned benefits of project management in turn, results in cost reduction and improved customer satisfaction.

This topic, Impact of project management practices on schedule performance: A Case Study of Takoradi Mall project, Ghana, would seek to identify and analyse the project management schedule techniques employed to complete the Takoradi Mall project on time.

1.2 Problem Definition

As it is well known, the construction sector contributes in great measure to Ghana's economic growth. It provides job opportunities and improvements to the citizen's personal satisfaction by offering vital socio-economic infrastructure, such as schools, workplaces, shopping malls, roads, etc. However, most construction projects delay generating extra project expenses and other negative impacts.

Chan and Kumaraswamy (2002), clarified that construction delays happen in numerous nations, particularly, on state governed infrastructure projects which is awful for construction, since schedule performance alongside cost, quality and value-for-money, is one of the fundamental criteria used to assess the success of a project.

Nonetheless, it is a known fact that most foreign construction firms in Ghana, perform better in terms of schedule as compared to the local firms. This thesis seeks to identify the critical factors that impacted their schedule performance.

For that purpose, the Takoradi Mall project constructed by WBHO, a South- African based construction firm, and supported by other local subcontractors like Ben Appah Electricals, Legna Construction Works, Alutrade, External Works Ltd just to name a few. The total cost for the project was 25 million dollars which covered 75 shops with a total leasing area of 17,000 m², 1 anchor shop which is the Shoprite office space, 3 banking space areas and 1 play store with a play area as well as external parking lots.

What is of most significance to this study is the time performance of the project. Even though the project was expected to be completed within 11 months, the effective project management practices employed led to the accomplishment of the project within 10 months and 2 days thus commencing in 21st January 2018 and finishing on 23rd November 2018.

Since the assurance of project schedule has been considered as an important indicator of project success, and factors associated with project schedule have been recognized to be critical to project success (Hwang et al. 2013). Hence, the need to identify the critical elements that contributed to the schedule performance of the Takoradi Mall project.

1.3 Research Questions

The following research questions were curated to carry the main aim as well as stated objectives throughout the study.

1. What critical factors affect the schedule performance of construction projects?
2. What project management practices were implemented on the Takoradi Mall Project?
3. How does the project management practices impact the schedule performance of the project?

1.4 Aim

The main aim of this thesis is to determine the impact of project management practices on the schedule performance of the Takoradi Mall project.

1.5 Objectives

The objectives of this thesis are;

- a. To identify the critical factors that contributed to the schedule performance of the project.
- b. To identify the Project Management Practices implemented during Takoradi Mall Project
- c. To identify the impact of the project management practices on the schedule performance

1.6 Scope

The scope of this thesis focused on the project management practices employed to deliver the Takoradi Mall project promptly. It does exclude other performance execution measurements utilized in the estimation of project performance.

The study was carried out through the utilization of questionnaire, which was delivered to the construction professionals as well as other stakeholders and granting of interview to the project managers. By the implementation of this strategy, the project management practices that contributed to the schedule performance of the project was identified.

1.7 Brief Introduction to the Research Methodology

Objective # 1: *To identify critical factors that affect the schedule performance of construction projects*

To identify critical factors that affect the schedule performance of construction projects, data was collected by distribution of a questionnaire. Personnel from main contractor, consultant and the client received questionnaire regarding this objective. Other data on the factors that affect the schedule performance was obtained the review of literature.

Objective # 2: *To identify the Project management practices implemented on the Takoradi Mall Project*

To achieve this objective, structured interview format was adopted to gather data on the PM practices that were implemented at all stages of the construction of the mall. For each of the project management practices, the interviewee was required to give a detailed approach to the implementation strategy with reasons for adopting such strategies.

Objective # 3: *To determine the impact of the project management practices on the schedule performance*

The instrument employed in the collection of data to determine the impact of the project management practices on the schedule performance was a questionnaire. Similar to the first objective, a questionnaire was issued to the construction workers to enquire about their view on the impact of the project management practices by considering certain variables.

1.8 Significance of Study

The time constraint attached to the construction of the mall, and the project management practice adopted by the project management team to deliver the project before the known deadline are the elements that led to the selection of this topic.

In that regard, discovering the impact of project management practice on schedule performance as exhibited on the Takoradi Mall project would seek to enlighten the business sector on the advantages of incorporating project management techniques in all endeavours.

Additionally, another significance of this study would be the knowledge that would be acquired to facilitate the improvement of scheduling techniques employed on other projects.

1.9 Organisation of Thesis

This thesis outlines the impact of project management practices on the schedule performance of the Takoradi Mall project. The organization of this thesis is as follows. Chapter 2 presents some relevant information about the study area as well as a review of work previously done by others. First of all, the concept of project management and its practices are adequately discussed. This includes the various project management process namely; initiation, planning, execution, monitoring and control, and closure. This laid the foundation for narrowing down on project schedule management tools and techniques, schedule performance, factors that affect schedule performance, as well as benefits of schedule management. Before summarising the chapter on literature review, a look at the impact of project management practices on schedule performance was also considered. Chapter 3 presents a detailed outline of how the study will be conducted. This includes the research design, research approach, research method, population sampled, the sample frame, sample size, sampling techniques, sources of data, data collection instrument, and the analytical tools and procedures employed. In Chapter 4, the researcher analyses the primary data collected through the administration of questionnaires and interview. The analysis comprised both statistical and inferential analysis. Chapter 5, which is the final chapter, provides a summary of this study as well as discusses directions for future work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Project management has been proven to be the most effective method of delivering products within cost, schedule, and resource constraints. The implementation of project management practices by various organisations contribute significantly to the success of projects.

This chapter reviews literature concerning the project management practices and how these practices contributed to the schedule performance of a project.

2.2 Project Management Practices

As stated by the Project Management Institute (2017), a project is a temporary endeavor carried out to create a unique product, service or result. Project management on the other hand as explained by the Association of Project Management - APM (2019), is about the utilisation of knowledge, skills, tools and techniques so that the project can be defined, planned, monitored, controlled, and delivered to achieve its agreed benefits.

Project management practices are the tools, techniques and methods used in the execution of a project. Organisations have different management practices but the result of the performance is the reflection of these practices. Good practices yield good results and bad performances also yield bad results. Project management practices vary from one organisation to the other and the performance of the results is the thing that makes a practice ideal (Bryde, 2003). The reason for variety in the PM practices may not be just because of

the sort of association yet additionally the nature and purpose of the project and in particular, the degree of performance required.

According to Hammond (2018), the multiple regression model was utilised to address the connection between project management practices adopted by Metropolitan, Municipal and District Assemblies (MMDAs) and project success. Results from the regression model 1 uncover that every one of the factors of project management practices was decidedly identified with the success of the project.

Wiegers (2007) in his book, practical project initiation: a handbook with tools, outlined 21 project management practices based on his personal experience from both well managed and challenged projects that can help projects deliver on expectations. He organized the 21 practices into five categories as indicated in table 2.1 below:

Table 2. 1 Project Management Practices

Laying the Foundation	Planning the Project	Estimating the work	Tracking your Progress	Learning for the future
Define Project Success Criteria	Write a Plan	Estimate based on effort not calendar time	Record actuals and estimates	Conduct project retrospectives
Identify Project Drivers, Constraints and Degrees of Freedom	Decompose Tasks to inch-pebble granularity	Don't over-schedule multitasking people	Count tasks as complete only when they are 100% complete	
Define Project Release Criteria	Develop Planning worksheet for common large tasks	Build training time into the schedule	Track Project status openly and honestly	
Negotiate Achievable Commitments	Plan to do rework after a quality control activity	Record estimates and how you derive them		
	Manage Project Risks	Use estimation tools		
	Plan time for Process improvement	Plan contingency buffers		
	Respect the learning curve			

Source: Wiegers (2007)

2.2.1 Project Initiation

After the project team has been selected and a project brief is delivered and after determining the overall methodology, the next stage is the initiation of the project. Ray (2018) defines project initiation as the first phase of a project's life cycle. It is at this point where the opportunity or reason for the project is identified and a project is developed to take advantage of that opportunity. In this stage, the present or imminent project manager put together a proposal, which contains a description of the previously mentioned matters. Instances of this sort of project proposal include business plans and grant applications. The imminent sponsors of the project assess the proposal and, upon endorsement, offer the needed funding. The project formally commences at the period of endorsement.

In addition, Lawal et al. (2017) pointed out that project initiation involves the establishment of project intentions, scope and preliminary execution period, formation of business case, project charter and lastly the acquisition of authorization to develop the project.

2.2.2 Planning

Succeeding the initiation stage is the planning stage. At this stage, the project is planned to the desired level. The primary objective of project planning is to plan the schedule, cost and assets sufficiently to evaluate the work required and to successfully manage risk during the execution stage. Similarly, as with the Initiation process group, an inability to sufficiently plan significantly diminishes the project's likelihood of effectively achieving its goals.

Project planning for the most part comprises of deciding how to plan, generate the scope statement, appoint the planning crew, find deliverables and generate the work breakdown structure, determine the activities required to complete those deliverables and network the

activities in their logical sequence, estimate the resource requirements for the activities, estimate time and cost for activities, building up the schedule, generate the budget, risk planning, acquisition of official approval to commence work (Lawal et al., 2017).

According to OpenLearn (2019), projects have to be planned. This involves the way towards developing a sorted-out strategy for accomplishing something which is to be finished. In the book, as stated, Projects do not occur in confinement rather they have a situation which brings forth them and with which they communicate for the rest of their lives.

OpenLearn (2019) again establishes that when it comes to planning, the first and foremost task is collating information regarding the environment within which the organization functions. This would mean having in-depth understanding about the organization and its products' present market and forecasting the market that upcoming and revised products and services would have.

2.2.3 Execution

Project execution seeks to develop the product or service for which the project was set up to deliver. Ordinarily, this is often the lengthiest phase of the project management lifecycle, involves the extensive application of resources. Project Execution exploits all the plans, strategies, schedules and layouts that were arranged and foreseen during earlier stages. However, unforeseen occasions and circumstances will definitely be experienced, and the Project Manager and Project Team would be required the ability to manage them while limiting effect on the project's cost, scope, schedule and quality. This phase is completed when the product or result is entirely developed, tried, accepted, employed and handed over to the Performing Organisation. It is also recommended to keep accurate records all

through this stage since they fill in as a contribution to the last stage which is project closeout.

The following practices are carried out under the execution stage: Orientation of New Team Members, Review Project Planning Outcomes, Commence Project Execution and Control, Manage Project Scope, Management of the Project Schedule, Carry out Quality Control, Monitor Risks, Control Risks, Monitor Impact on Cost Schedule Scope and Quality, Change Control Process management, Implement Communications Plan, Acquire Acceptance Signature from Project Sponsor and many more. (Pataki et al., 2003).

2.2.4 Monitoring and control

The purpose of Project Monitoring and Control is to provide an understanding of the project's progress in such a way that appropriate corrective actions can be taken when the project's performance deviates significantly from the project plan. A project's documented plan is the basis for monitoring activities, communicating status, and taking corrective actions (Kumar and Bansal, 2010).

Villafiorita. A (2014) outlined monitoring and control processes to be used on a regular basis as follows:

- a. Acquire records on the present status of the project.
- b. Compare with baseline plan, mark any deviation, make estimates dependent on current data acquired
- c. Agree as to whether it is essential to undertake corrective actions. Provided that this is true, plan, document, and perform the corrective actions.

2.2.5 Closure

Project closure is undoubtedly the final stage of a project, which involves the handing over of the project outputs to the stakeholders. Also inclusive at this stage is dealing appropriately with all contractual agreements, and records put away for future reference. The fundamental objectives of project closure are to guarantee that products, results or services can be utilized and also guarantee that there are not incomplete requirements (Villafiorita, 2014).

However, some project close normally, prematurely, perpetually, while others failed totally and some close due to changed priority. In whichever case, when implementing a project closedown, the project manager should, first of all, get delivery acceptance from the customer; second, shutdown resources and release them to new uses; third, evaluate the team and reassign them; fourth, close accounts and paying all bills; fifth, deliver the project to the customer; and last but not least, create a final report (Larson and Gray, 2014).

2.3. Project Schedule Management

Scheduling forms part of the primary concerns of a project manager. Quite a number of great engineering firms perform projects of high quality – delivered too late. Time costs money. These late projects are costly to the customer, the contractor or both. To help guarantee that a project is finished on schedule, it is important to set up a comprehensive schedule of each activity within the project and monitor progress against this schedule. Nonetheless, preparing and then monitoring a detailed schedule is not sufficient by themselves to guarantee that a project will complete on time (Field and Keller, 1998).

Relatively, schedule management incorporates the procedures required to guarantee the timely completion of the project. However, before the development of a project schedule,

a project manager should outline a work breakdown structure (WBS), estimation of effort for every activity, and a list of resources that indicates each resource's availability. Since a schedule by itself is an estimation, it is generated by engaging a consensus-driven estimation method. Each date in the schedule is estimated and would not be accurate if those estimated dates do not have the buy-in of the individuals who will perform the activities (Project Management for Development Organizations, 2015).

Project Management Institute (2011), characterized project scheduling as the use of skills, techniques, and intuition gained through information and experience to create effective schedule models. In order to improve the chance of successful project completion within the baseline duration, the schedule model then integrates and logically arranges several project components, such as activities, resources, and logical relationships.

According to Mubarak (2015) project scheduling is of great importance to all stakeholders in any project; though varying standpoints. In outlining the importance of project scheduling to the contractor, Mubarak mentioned that contractors require project scheduling to:

- determine the end date of the project
- determine the start and end of a particular activity
- coordinate activities among subcontractors
- Forecast as well as calculate the cash flow
- Work efficiency enhancement
- Evidence to claims on delay
- Very effective tool for project control

- Assess the effect of changes

2.3.1. Scheduling tools and techniques

Before starting a construction project, proper planning and scheduling are needed to bring out the construction activities in a sequential manner. Even though it was clear that internal and external issues are likely to impact the actual achievement of the schedule

Various tools and techniques are employed by the project management team in the development of work schedules and the performance measurement of their projects. Of all the processes, project scheduling is one of the most essential process that incorporates time, costs, tasks and resources in a project. Baskerville (2015) says, to develop, monitor and control project schedules, project managers can use a variety of tools and techniques. Interestingly lots of these tools can be applied digitally through the use of Information Technology programme like Excel, Microsoft Project and others. Here are some tools and techniques that can be applied in project scheduling:

GANTT chart

A Gantt chart is a graphical representation of project activities within a period. Usually drawn as a bar chart, Gantt chart is spread across a calendar grid. With a network diagram in place, a Gantt chart is very easy to produce. A network diagram can be developed from a table that has a list of activities with their durations and predecessor(s) (Baskerville 2015). According to Mubarak (2015), due to their simplistic nature, ease of preparation and comprehension, the Gantt chart has become utterly accepted and popular. A few advantages associated with the use of this tool is the fact that it is time-scaled. This implies that by mere observation of the chart, an impression of the duration of each activity, as well as the project in a whole, can be envisaged. An alternative advantage of Gantt chart is that

owing to its simplistic nature, it is appealing to individuals of any technical know-how. The final advantage of Gantt chart is its collapsible nature. That is the capacity to roll down or up a schedule. This gives it the advantage of displaying the schedule in detail to a technical person or in summary to a layperson.

Network Diagram

When scheduling a project, several project managers use network diagrams. This is a way to provide a graphical representation of the relationships that exist between the project activities. Note that the tasks in the network are derived from the WBS work packages. Hence, not some but all the tasks addressed in the WBS must be involved in the network since they have to be justified in the project schedule. In that case, omitting even one task out of the network is liable to alter the whole schedule duration of the project, estimated costs, and commitments to resource allocation (Watt, 2019).

Network Scheduling

Currently, basically, three networking techniques are engaged. These are the Critical Path Method (CPM), the Program Evaluation and Review Technique (PERT) and the Precedence Diagram Method (PDM). Notwithstanding their differences, all of these three networking techniques offer the project manager with great tools for the planning, analyzing, monitoring, and controlling the project and to effectively utilize the resources needed to complete project activities. Network scheduling techniques offer the procedure essential to undertake a methodical, controlled, and intensive evaluation of what will be required to lead and finish a project. A method of that nature is vital for huge, complex projects and at the same time suitable in managing smaller, simple projects (McDaniel, 2001).

Critical Path Method

As defined by Rouse (2019), the critical path method (CPM) is a one step at a time project management technique utilized in the planning of processes that outlines critical and non-critical activity with the object of averting time-frame issues and process congestions. The CPM is preferably fit for projects comprising of various activities that interrelate in an intricate way. On a network scheduling, the critical path of a project is the sequence of scheduled or chronological string of activities that comprises of the longest duration or takes the lengthiest sequence of tasks in the project. Generally, on the network, activities are represented by arrowed lines with circles at each end signifying milestones.

According to Karaca and Onargan (2007), a critical path is when an arrangement of interrelated activities in a sequential order amounts to the longest overall duration. This path defines the shortest possible time to finish the project. In such instance, when there is a delay of an activity on the critical path, the completion date for the project is greatly affected. In that case, it could be said that the critical path has no float. On the other hand, a project can have more than one critical path. All other paths in the network with duration shorter than the critical path is known as a non-critical path.

PERT (Program Evaluation and Review Technique)

Program evaluation and review technique (PERT) is a technique accepted by firms to examine and represent the various activities in a project as well as to exemplify the stream of events in a project. PERT is a technique to assess and estimate the time required to finish a task within due dates.

Project Evaluation and Review Technique (PERT) is a scheduling strategy initially intended to design a manufacturing project by utilizing a network of interconnected

activities, managing ideal cost and time criteria. PERT underlines the relationship between the time every task takes, the costs accompanying every stage, as well as the expected entire project completion time and cost.

PERT focuses on the idea of time and permits adaptable scheduling because of the differences in the measure of time it takes to finish one explicit section of the project. Usually, PERT network comprises of activities and events with an event characterized by the accomplishment of one program section at a specific time. Activity, on the other hand, comprises of the time and assets required to move, starting with one event then onto the next. In this way, when events and activities are distinctly characterized, progress of a program is effectively checked, and the path of the project continues toward the end. PERT requires that every previous event is finished before the successive events, and along these lines the final project, can be viewed as complete (Liu 2013).

PDM

PDM is an activity-oriented technique that was generated subsequent to PERT and CPM. The driving force behind this development was the requirement for more significant adaptability in managing relationships and limitations between project activities. The PDM method centers on program activities and the meaning of the constraints among the activities. This technique is utilized in many scheduling software applications, and it depends on similar ideas —critical path, slack time, and so forth, just as the other network scheduling techniques. Thus, it is well appropriate for use in complex projects, especially projects with several parallel activities and constraints rather than finish-to-start (McDaniel, 2001).

Schedule Compression

Schedule compression is a technique whereby the duration of a project is lessened for earlier finish and release of deliverables. Schedule compression is usually achieved through the utilization of crashing, substitution and overlapping of activities. The aspect of reducing activity period by way of adding more resource hours is known as crashing. The intention or lessening the execution time by means of changing the technique or tool through which the activity is carried out is a substitution. Overlapping is the act of carrying out the sequence of activities in parallel (Hazini et al., 2013)

Schedule compression is required in several instances an example is when the project is delayed and you are at the verge of missing vital due dates; when new elements have risen and for that matter a client's desires have to be altered or due to the realization that extra benefits are attached to the completion of a deliverable earlier than planned. In all these ways keep in mind that all approaches of schedule compressing are characterized by increased cost and risk. Therefore, prior to compressing a schedule, ensure that it is undeniably essential, and the benefits far outweigh the cost and risk that would be incurred. Supplementary reasons for compressing a schedule include, schedule plans that are not ideal, when resources are untimely delivered when there are unexpected risks and last but not least is force majeure or act of nature (Emery, 2017).

2.3.2. Schedule Performance

Schedule performance is characterized by a situation where a project is completed within the stipulated period. One way to measure how well a project performs in terms of schedule is by the schedule performance index.

As indicated by Roseke (2019), Schedule Performance Index (SPI) is a vital return from the Earned Value Management (a project control method adopted by project managers to ensure project is on schedule and within cost) that informs the project manager about the progress of the project whether ahead or behind at the moment of analysis.

Mathematically, Schedule Performance Index (SPI) is defined as the ratio of Earned Value to Planned Value. To compute the schedule performance index, the project must at first be separated into tasks with each task having a start and finish dates as well as budget.

$\text{Schedule Performance Index (SPI)} = \text{Earned Value (EV)} / \text{Planned Value (PV)}$
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Analysis of outcome

- $\text{SPI} < 1$, implies the project is behind schedule
- $\text{SPI} = 1$, implies the project is on schedule
- $\text{SPI} > 1$, implies the project is ahead of schedule
- $\text{SPI} = 0$, implies the project has not commenced
- $\text{SPI} = 0.5$ implies the project is halfway through at this point
- $\text{SPI} = 2.0$ implies the project performed two times the work it was supposed to at this point.

Schedule Variance (SV) - Measure of schedule performance on a project.
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Equation: $\text{SV} = \text{EV} - \text{PV}$

Planned Value (PV) is the approved value of the work to be completed in a given time. It is the value that you should have earned as per the schedule.

Earned Value (EV) is the value of the work actually completed to date. Earned Value will show you the value that the project has produced if the project is terminated today (Usmani, 2019).

In determining whether a project is performing behind or ahead of schedule, Walker's 1995 study cited in Mensah (2012) investigated into the construction time performance by developing a time index for measuring the time performance. In his study, Walker measured the time performance of 33 projects and developed a regression model for predicting construction duration. The time performance index formula developed by Walker is indicated below:

Time Performance Index = Planned Construction Period / Actual Construction Period

2.3.3 Factors that affect schedule performance

In her study, factors that affect the effectiveness of work schedule, Moneke (2012), having the aim of providing an outline that will assist managers to develop a dependable and cost-effective schedule which would be essential for the successful enactment and control of projects in Nigeria. The outcome of the analysis pointed out that time, material and labour force were the significant factors for effective work schedule. She did recommend a detailed time estimating and scenario analysis as well as appropriate management of resources and human capital development.

Also, in Burkina Faso, Bagaya and Song (2016) recognized the most recurrent, severe and significant cause of schedule overrun affecting public construction projects to improve upon the administrative ability of project managers. After the analysis of the outcome of data produced from the questionnaires they issued, the top five most important delays were identified and graded. These include; the contractor's financial competence, the client's financial difficulties, equipment availability of the contractor, slow payment for completed work and poor subcontractor performances by the contractor.

Iyer and Jha (2006) recognized 55 traits affecting the effectiveness of projects. After the analysis of the responses from the questionnaire survey, factor analysis of collections of success elements and failure elements were distinctly grouped into six critical success factors and seven critical failure factors after which a second stage questionnaire was organized to understand better the degree of influence these factors have on the output of a construction project. This led to the conclusion that two success factors and one failure factor specifically, project participants' commitment; competency of the client; and conflict among project participants offer much importance to the enhancement of present-day performance level of the project. However, they did indicate that the degree of their influence has been detected to differ for a given level of project performance.

Considering groundwater construction projects in Ghana, Frimpong et al. (2003) conducted a questionnaire survey to identify and assess the gravity of the significant factors resulting in the delay and cost overruns in Ghana groundwater construction projects. Through their study, they discovered that the primary causes of delay and cost overruns in construction of groundwater projects included: poor contractor management; monthly payment difficulties from agencies; poor technical performances; material procurement; and

escalation of material prices. Based on these findings, the team concluded that effective project planning, controlling and monitoring should be established to augment project performance so as to decrease or elude delay and cost issues in groundwater construction projects.

2.3.4 Benefits of schedule management

An effective and efficient construction or business project entails a well-defined schedule or plan. A schedule serves to convey to your project team the works that must be carried out, the assessment to be utilized to undertake those works, and in what periods they are required to be finished. Schedules can go in intricacy from simple to complex and relies on the type of the project, its scope of work, and necessities. Notwithstanding their expected utilisation, all schedules are generated premised on a single assumption: they serve to model the intended reality of the project's implementation (Ikigai Consulting, 2015).

Some of the benefits associated with schedule management include, Increased Productivity and Efficiency, Improved communication, Reduced Financial Penalties, Improved Financial Planning, Better Resource Allocation, Managing Unexpected Changes, Right Focus and track.

2.4 Impact of Project Management Practices on Schedule Performance

The impact of project management practices on schedule performance is generally considered to be successfully applied if it comes in on-schedule, comes in on-budget, the achievement of all the goals originally set for it and is accepted and used by the customers for whom the project is intended.

Nkansah (2012) in his thesis, an investigative study of Project Management Practices in the Electricity Company of Ghana Accra, concluded that adherence to these Project Management processes was found to produce significantly high levels of project success than non-adherence to the processes. It was also observed that failure of ECG projects was attributable to factors such as lack of management support and commitment, poor communication, lack of sufficient project resources, lack of control mechanisms and poor planning.

In considering the effect of Project Management (PM) practices on building project performance: the case of three organizations, Mensah (2007) concluded that not all the significant PM practices have a positive relationship with the time performance of the projects within the Ghana Education Trust Fund organization. However, all the significant PM practices relating to time performance of the projects within the District Assemblies Common Fund organization were found to exhibit positive relationship whilst those within occurring within the Social Investment Fund organization exhibited negative relationship.

By its basic definition, a project comprises a defined time frame to completion, a limited budget, and a specified set of performance characteristics. Further, the project is usually targeted for use by some client, either internal or external to the organization and its project team. It seems reasonable, therefore, that any assessment of project implementation success should include these four measures stated above (Pinto and Slevin 1987).

In accordance with the 1994 Standish CHAOS Report, the Standish Group International (1999) outlined the top 5 success factors found in successful projects to include:

1. User Involvement

2. Executive Management Support
3. Clear Statement of Requirements
4. Proper Planning
5. Realistic Expectations

2.5 Summary

This study will help establish the fact that project management practices involve performing day-to-day management activities. These management practices may differ from one organisation to another, however, optimum practices will be determined by the level of performance of the outcome realised. The study will also help identify critical factors that affect the schedule performance of construction projects, identify the project management practices implemented on the Takoradi mall project and to determine the impact of the management practices on the schedule performance. Project Management practices impacts on project schedule performance will be the main focus of the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methods that have been used in the collection and analysis of data to achieve the aim and the stated objectives of the study. It explains the research design, sampling techniques and data collection methods used; and describes how data collected from the research has been analyzed. Both qualitative and quantitative research methods have been used in carrying out this research.

3.2 The Design of the Study

3.2.1 Research Design

According to Akhtar (2016), Research design stands for advance planning of the methods to be adopted for collecting the relevant data as well as the techniques to be used in the analysis, while considering the objective of the research and the audibility of staff, time and money. The research design aids in the organization of ideas in a form whereby it will be likely to look for faults and deficiencies.

Furthermore, Kabir (2016) indicates that usually a good research design diminishes unfairness and maximizes the reliability of the data collected and analyzed. A good research design should seek to satisfy the following four conditions namely objectivity, reliability, validity and generalization of the findings.

In research design, one has to decide the methodological approach for finding solutions to the research problem or research questions. This is about outlining the technique in which the researcher intends to realize the research objectives (Fellows and Liu 2015).

The two main types of research design are Descriptive Research Design and Correlational Research Design. The descriptive research design observes and describes without influencing and also takes into consideration the conditions and relationships that exist. On the other hand, correlational research design investigates possible relationships among variables without trying to influence those variables. That is to say, a correlational research design is interested in the degree of relationship between the variables (Adinyira, 2019).

This study employed the use of both descriptive and correlational research design to find solutions to the research questions. To explain further, the descriptive research design method was adopted in realizing the critical factors that contribute to the schedule performance of construction projects as well as the project management practices implemented on the Takoradi Mall Project. On the other hand, the correlational research design method was adopted to understand the impact of the project management practices on the schedule performance.

3.2.2 The Research Strategy

Research strategy outlines the strategy used to execute the design mention above. Fellows and Liu (2015), mentioned that the aim of research strategy is to ensure that the research enhances the likelihood of achieving its objectives. Hence, the research design must take into account the research questions, determine what data are required and how the data are to be collected and analysed.

To emphasize this, Fellows and Liu (2015) outlined five research strategies namely, Action research, Ethnographic research, Survey research, Case study research and Experimental research. They explained that action research comprises of active involvement by the researcher in the process under study, in order to recognize, promote and assess issues and

possible solutions. The ethnographic approach requires less active ‘intrusion’ by the researcher and has its origin in anthropology. In this case the researcher becomes part of the group under study and observes subjects’ behaviours, statements and so on to acquire understandings into what, how and why their patterns of behaviour happen. Surveys operate on the basis of statistical sampling; only extremely rarely are full population surveys possible, practical or desirable. Commonly, samples are surveyed via questionnaires or interviews. Surveys differ from highly structured questionnaires to unstructured interviews. Case studies encompass an in-depth study of a particular instances within the research subject. Cases may be chosen on the basis of their being representative – with similar requirements/conditions to those used in statistical sampling to achieve a representative sample, to demonstrate particular facets of the topic or to show the spectrum of alternatives. Lastly, they stated that the experimental style of research is, perhaps, suited best to ‘bounded’ problems or issues in which the variables involved are known, or, at least, hypothesised with some confidence. In this case, experiments are carried out in laboratories to test relationships between identified variables; ideally, by holding all except one of the independent variables constant and examining the effect on the dependent variable of changing that one independent variable.

The research strategy employed in this study is a case study with the object under study being the Takoradi Mall project. This is to understand the schedule performance situation better so as to know precisely the critical factors that contributed to the schedule performance of the project, to identify the Project management practices implemented and to determine the impact of the project management practices on the schedule performance.

3.2.3 Research Methods

The two main methodologies, qualitative and quantitative, were combined in this study. The quantitative approach was engaged in the generation of data in quantitative form so that it can be subjected to rigorous quantitative. On the other hand, Qualitative approach to research is concerned with the subjective assessment of attitudes or opinions (Kothari, 2004).

This study utilized both the qualitative and quantitative research methods as previously mentioned to achieve the stated objectives. Qualitative data in the form of interview was collected on the project management practices adopted while quantitative data via the use of questionnaire was used to collect data on the factors that contribute to schedule performance as well as the impact of the project management practices on the schedule performance.

3.3 Research Data

3.3.1 Data Type

Since this study employed the use of both quantitative and qualitative research approach, it made use of the numerical data and the non-numerical data. The numerical data, also known as the quantitative data, defines or expresses data as continuous that is measurable data within a certain range or discrete that is has values, whole numbers, and counts. Nevertheless, the non-numerical data, alternatively called the qualitative data classifies data as nominal that is data has no specific order or ordinal which implies that the data has a specific order (Library University of Toronto, 2019).

3.3.2 Source

To achieve the objectives of this study, primary data was collected from construction professionals of the target population through the use of questionnaires and structured interview approach. Secondary data was sourced from books, journals, conference papers amongst other prominent publications relevant to the focus of the study was consulted. This approach provided a good base of information for the study.

3.3.3 Data Collection

The questionnaire was distributed to seventy (70) construction professionals who were directly involved in the mall project. Additionally, the interview was granted to five (5) project managers separately, including the project manager for the principal contractor. The questionnaire distributed was of the close end type whereas the type of interview granted was a structured interview. The design of the questionnaire was based on information from Frimpong et.al (2003), Hwang et al., (2013) and Iyer and Jha (2006). Copies of both the interview and questionnaire are included in the appendix. As previously mentioned, the interview sort to address the second objective of this study whiles the questionnaire addressed the first and third objectives.

The collection of data was done for two (2) weeks. Out of the seventy (70) questionnaires distributed, fifty (50) were retrieved.

3.3.4 Data Analysis

The data was analyzed using the Statistical Product for Social Scientists (SPSS) data analysis tool where descriptive and correlational analysis were ran on the data collected. The data collection instrument used a Liker scale in getting the data. For this reason, the appropriate measure for effective analysis and interpretation was the median or mode.

However, the mode is the most reliable way to analyze the data collected. The information collected was presented in the form of tables and charts (Meyers et al., 2013). The correlational analysis which sought to determine the impact of the project management practices on the schedule performance, was performed by defining the time performance index of the major activities (subproject) involved in the project as well as the overall time performance index of the project. The relationship that existed between the time performance indexes and the project management practices was realised.

3.4 Population and Sample Size

A number of individuals worked on the Takoradi Mall Project, however, the use of purposive sampling technique was adopted to facilitate the distribution of questionnaires to individuals who worked on the project. Purposive sampling was also used to conduct the interviews in order to get in touch with the right people to give a credible response. A total of seventy questionnaires were sent out to respondents and five project managers interviewed

The target population for the Takoradi mall project comprised of about 150 employees. However, 70 respondents were sampled due to the dispersion of individuals after the completion of the project. These 70 respondents were selected on the basis of their knowledge in project management. The sample size of 70 was determined using published tables where precision level is $\pm 10\%$ and Confidence Level is 95%.

3.5 Ethics

All information and communication engaged with other parties in relation to this study were held in utmost confidentiality. All interactions were held without bias or prejudice, favouritism or nepotism. All activities involving other parties were executed with fairness. All other essential ethics were observed accordingly to make the study a success.

Respondents were enlightened about the purpose of this research and their consent was confirmed before answering the questionnaires.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter covers the analysis of data collected from the survey questionnaires and interview guide with respect to the research objectives. Good analysis and discussion of results can be achieved after having settled the introduction, reviewed most pertinent literature and defined the research methodology. The data analysed in this chapter was completely primary data, it was obtained from questionnaires distributed to respondents and interview guide which now forms the foundation for the analysis in this chapter. The questionnaire was in three sections A, B and C. Section A was the background of demographic pertaining to the respondents. Section B- critical factors that affect the schedule performance of the construction project. Section C to determine the impact of the project management practices on the schedule performance. In addition, five project managers interviewed to identify the project management practices implemented. Fifty (50) questionnaires were received from respondents and then analysed.

4.2 Summary Statistics of Respondents

As indicated in table 4.1 below, 32% out of the fifty respondents worked with the main contractor, 38% worked for sub-contractors, 10% worked for the client, and 20% worked as consultants. 4% of respondents were project managers, 52% were quantity surveyors, 42% were engineers, and 2% gave no response. It was realized that 90% of respondents had been in service for between 1 and 5 years, 8% being in service for between 6 and 10 years. Only 2% had experience for more than 10 years. In addition, 92% of respondents hold a Bachelor of Science Degree (BSc) and only 8% had a Master's Degree (MSc).

Finally, 92% of respondents were conversant with the concept of project management practices and 6% were very conversant, and only 2% were fairly conversant. This implies that majority of the respondents had an idea and were abreast with the concept of project management practices.

Table 4. 1 Summary Statistics on Respondents

Item	Percentage
Role of company on project	
Main contractor	32%
Sub-contractor	38%
Client	10%
Consultant	20%
Position of respondent	
Project manager	4%
Quantity surveyor	52%
Engineer	42%
Blank	2%
Years of service at position	
1-5yrs	90%
6-10yrs	8%
Above 10yrs	2%
Level of education	
MSc	8%
BSc	92%
Conversance with the concept of project management practices	
Very conversant	6%
Conversant	92%
Fairly conversant	2%

Source: Author's Survey Data, 2019

4.3 Critical Factors That Affects the Schedule Performance of Construction Project

A number of factors were identified as critical factors that are potential to impact the schedule performance of the construction project. Below is a discussion of the ratings by respondents on a scale of 1 to 5 (very low to very high). The data was collected using a 5-point Likert scale. According to McLeod (2019), the response categories in Likert scales have a rank order, but the intervals between the values cannot be presumed equal. Therefore, the mean (and standard deviation) are inappropriate for ordinal data. Following this, the statistics that can be used are: summarize using a median or a mode (not a mean as it is ordinal scale data); the mode is probably the most suitable for easy interpretation. A summary output is shown in table 4.2 below which describes the individual critical factors identified in relation to its median (midpoint value) and mode (most occurring value) derived from the frequency distribution of the responds.

Table 4. 2 – Statistics of Respondents’ Data

Critical Factors	Number of Response		Median	Mode
	Valid	Missing		
Site Management And Supervision	50	0	5	5
Experience Of Contractors	50	0	5	5
Appropriate Construction Methods	50	0	5	5
Effects Of Subsurface Conditions	50	0	5	5
Bad Weather	50	0	4	3
Availability Of Laborers On Site	50	0	4	4
Availability Of Material In The Market And At Site	50	0	4	4
Imported Material	50	0	4.5	4
Availability Of Equipment	50	0	4	4
Late Delivery Of Materials And Equipment	50	0	4	4
Frequent Breakdowns Of Construction Plant And Equipment	50	0	4	4
Availability Of Site To Allow Movement Of Material, Labour And Equipment	50	0	3	3
Increase In Scope Of Work	50	0	4	4
Difficulties In Obtaining Work Permits	50	0	3	3
Exceptionally Low Bids	50	0	3	3
Delays In Work Approval	50	0	3	3
Delays In Inspection And Testing Of Work	50	0	3	3
Mistakes During Construction	50	0	3	3
Difficulties In Obtaining Construction Materials At Official Current Prices	50	0	3	3
Experience Of Consultants	50	0	4	4
Design Changes	50	0	4	4
Conflict Among Project Participants	50	0	3	3
Speed Of Decision Making Of Owners	50	0	4	4
Progress Payments By The Owner	50	0	4	4

Design Changes By Owners During Construction	50	0	4	4
Design Changes	50	0	4	4
Conflict Among Project Participants	50	0	3	3
Speed Of Decision Making Of Owners	50	0	4	4
Progress Payments By The Owner	50	0	4	4
Design Changes By Owners During Construction	50	0	4	4
Experience Of Owners	50	0	3	2
Client-Initiated Variations	50	0	3	3
Swiftness Of Decision Making On Project	50	0	4	4
Involvement Of Project Team In Decision Making	50	0	4	4
Clearly Defined Goals	50	0	4	4
Proper Planning	50	0	4	4
Effective Communication Between Project Manager And Senior Management	50	0	5	4
Effective Communication Between Project Manager And Project Team	50	0	5	4
Effective Communication Between Project Group And Owner	50	0	5	4
Regular Meetings	50	0	5	4
Ability Of The Project Team To Quickly Identify Risks	50	0	4	4
Adequate Management Of Identified Risks	50	0	4	4
Preparation Of Scheduled Plans And Updates	50	0	4	4
Sufficient Resource Allocation	50	0	4	4
Schedule Control Process	50	0	4	4
Feedback Capabilities	50	0	4	5
Technical Tasks	50	0	4	5
Change Management	50	0	4	5
Conflict Management	50	0	4	4
Availability Of Staff To Manage Projects	50	0	4.5	4
Proficiency Of Project Manager	50	0	5	5
Proficiency Of Project Team	50	0	5	5
Client Acceptance	50	0	5	5
Trouble-Shooting	50	0	4	4
Lessons Learned Sections	50	0	4	4

Source: Author's Survey Data, 2019

From the summary data shown in Table 4.2 above, all the factors used have at least a medium effect on the project's schedule performance. Subsequent sections discuss the result a little further.

Site Management and Supervision

From figure 4.1 below, the nature of site management and supervision obviously had an effect on the schedule performance. 78% rated it 'very high' while 22% rated it 'high'

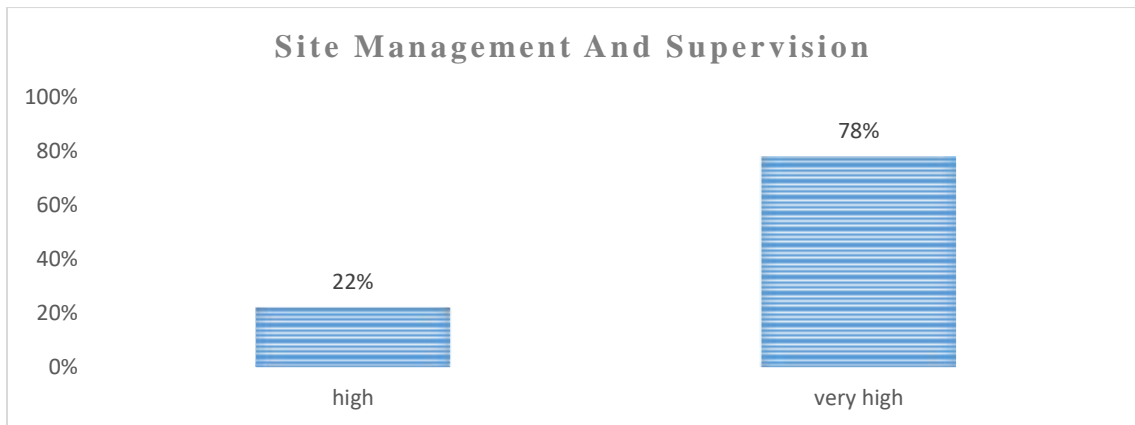


Figure 4.1 – Site Management and supervision chart. *Source: Author's survey, 2019*

Experience of Contractor

As shown in Figure 4.2, the experience of contractors on a project affected schedule performance of the construction of the Takoradi Mall. 76% of respondents' rate experience of contractors 'very high' while 24% rated it 'high'

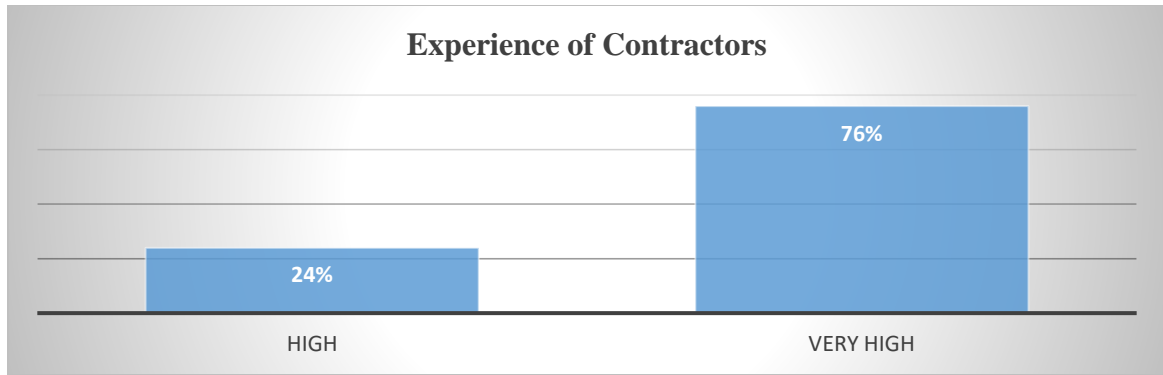


Figure 4.2 – Experience of Contractors. *Source: Author’s survey data, 2019*

Appropriate Construction Methods

According to respondents, as shown in figure 4.3, appropriate construction methods affected the schedule performance of the Takoradi Mall project. 66% of respondents rated it very high, 32% rated it high while only 2% rated it as medium.

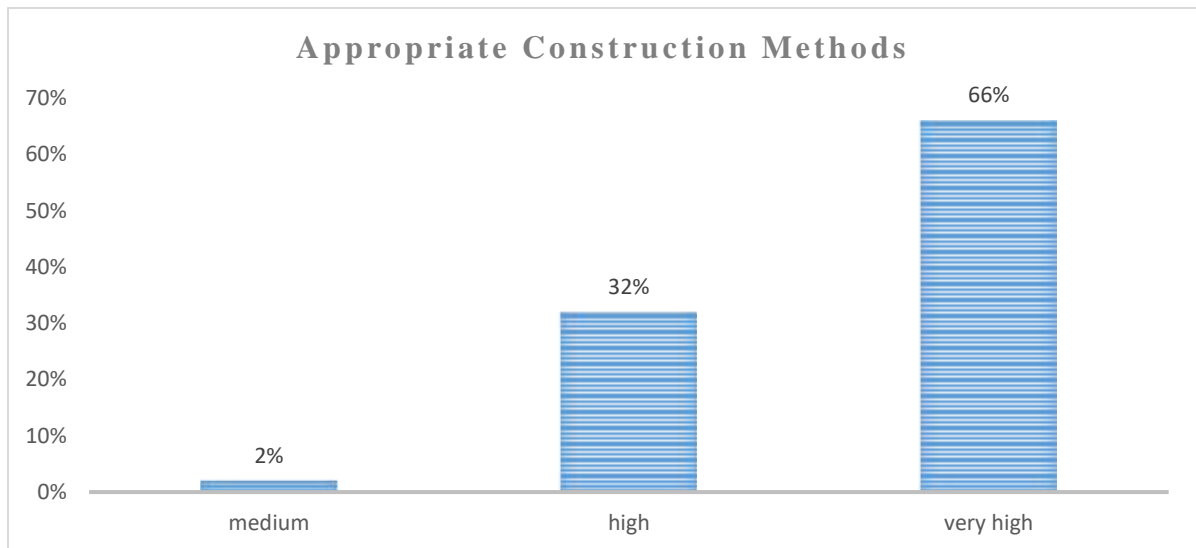
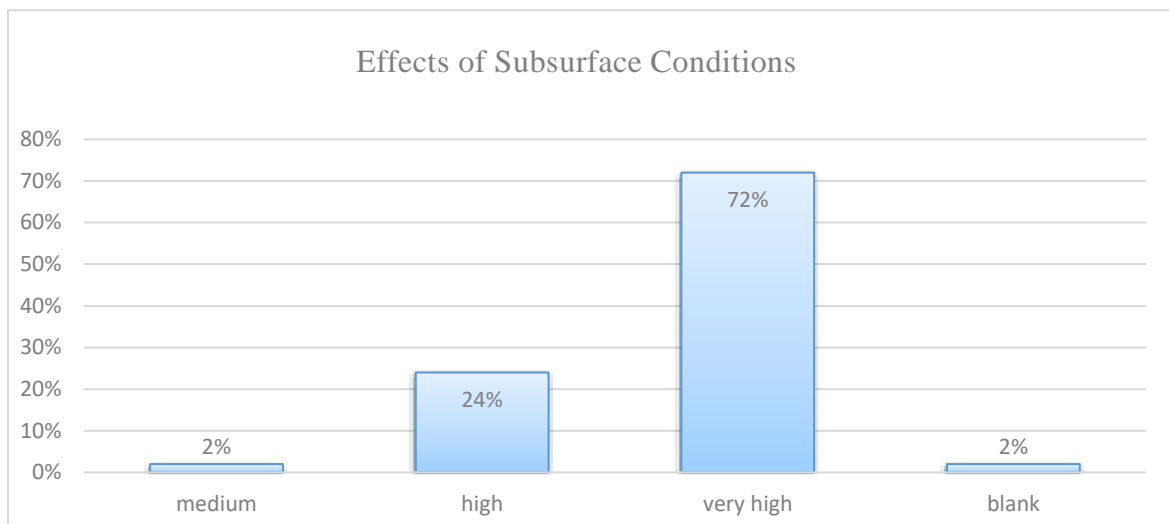


Figure 4.3 – Appropriate construction Methods. *Source: Author’s Survey Data, 2019*

Effects of Subsurface Conditions

With the effects of subsurface conditions as one of the critical factors, 72% rated it ‘very high’. 24% rated it ‘high’ while medium rating was 2%. 2% failed to provide a response. This means that effects of subsurface conditions had a very high impact on the schedule project performance as shown in figure 4.4

Figure 4.4 – Effects of Subsurface Conditions. *Source: Author’s Survey Data, 2019*



Bad Weather

On the issue of bad weather, ratings were scattered from medium to very high with both medium and very high rating 34% as shown in figure 4.5. This implies that there are varying views on how bad weather impacted on the project’s schedule performance.

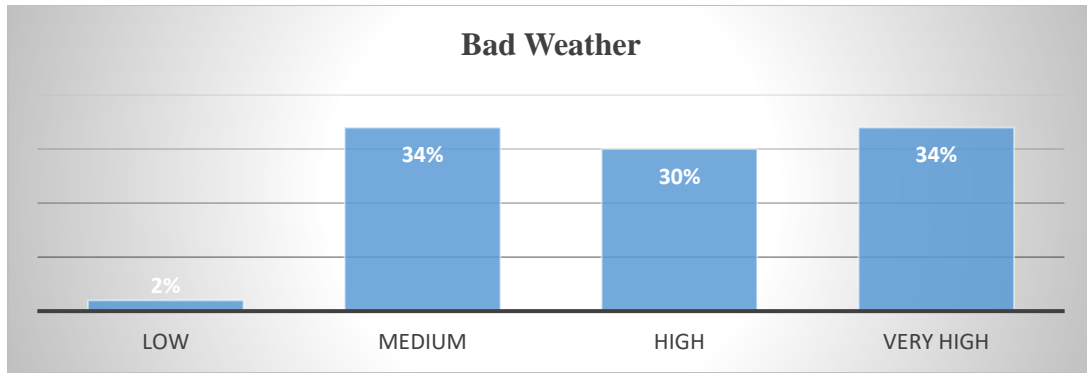


Figure 4.5 – Bad Weather. *Source: Author’s Survey Data, 2019*

Availability of Laborers on Site

Figure 4.6 shows a chart of ratings on how availability of laborers on site affected the project’s schedule performance. 74% of respondents rated it as ‘high’, 24% of respondents rated it as ‘very high’ while only 2% rated it as medium. This implies that averagely, having laborers on the project site at all times, in other words when laborers lodge at the project’s site, it highly possible to affect schedule performance.



Figure 4.6 – Availability of laborers on site. *Source: Author’s Survey Data, 2019*

Availability of Materials

Materials are very essential to the completion of projects. Without material, the project cannot be undertaken. Materials may be available on the local market, from contractor's stock or imported. Availability of materials in the market and on site has a fairly high impact on the project's schedule performance. As shown in table 4.3, with a 48% rating for high and 32% rating for very high, it could be implied that the availability of material on the market and on site affected the schedule performance. In addition, if materials are imported, a delay in import may negatively affect the projects schedule performance.

Table 4. 3– Availability of Materials

Availability of Material in The Market and At Site	
	Percent
Medium	20%
High	48%
very high	32%
Imported Material	
	Percent
High	50%
very high	50%

Source: Author's Survey Data, 2019

Availability of Equipment

As shown in figure 4.7, 86% rated availability of equipment needed for the project as having a high impact on the schedule performance. This implies that when equipment needed for the project are available, the project can be complete in time as scheduled.

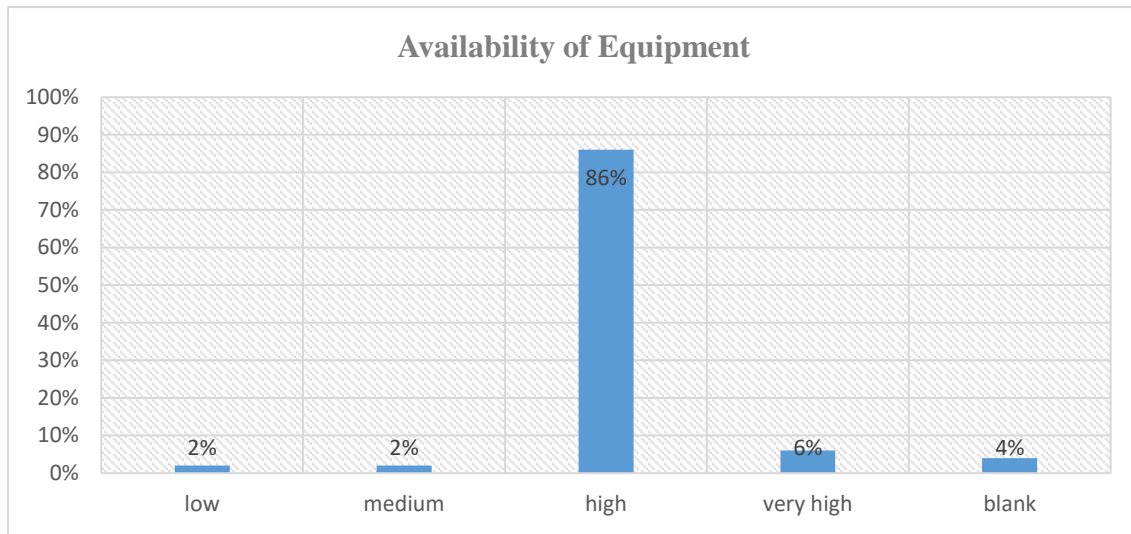


Figure 4.7 – Availability of Equipment. Source: Author's Survey Data, 2019

Frequent Breakdowns of Construction Plant and Equipment

From Figure 4.8 below, 92% of respondents rated frequent breakdowns of construction plant and equipment a 'high' score on its impact on the projects schedule performance. Breakdowns impedes smooth operations; hence a frequent breakdown of construction plants and equipment may negatively affect schedule.

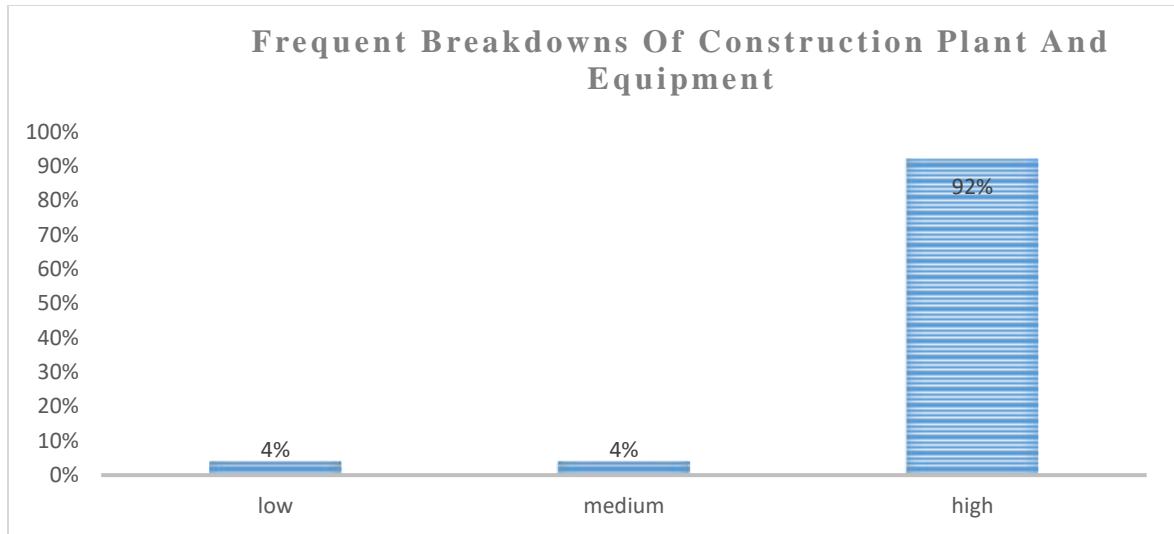


Figure 4.8 – Frequent Breakdowns of Construction Plant and Equipment. Source: Author's Survey Data, 2019

Increase in Scope of Work

According to figure 4.9, 38% of respondents rated an increase in scope of work as having low impact on the project's schedule performance. 46% rated it as having a high impact on schedule performance. However, 'high' and 'very high' ratings cumulatively sum up to 52% giving it a higher score. This implies that an increase in scope of work has a fairly high impact on schedule performance.

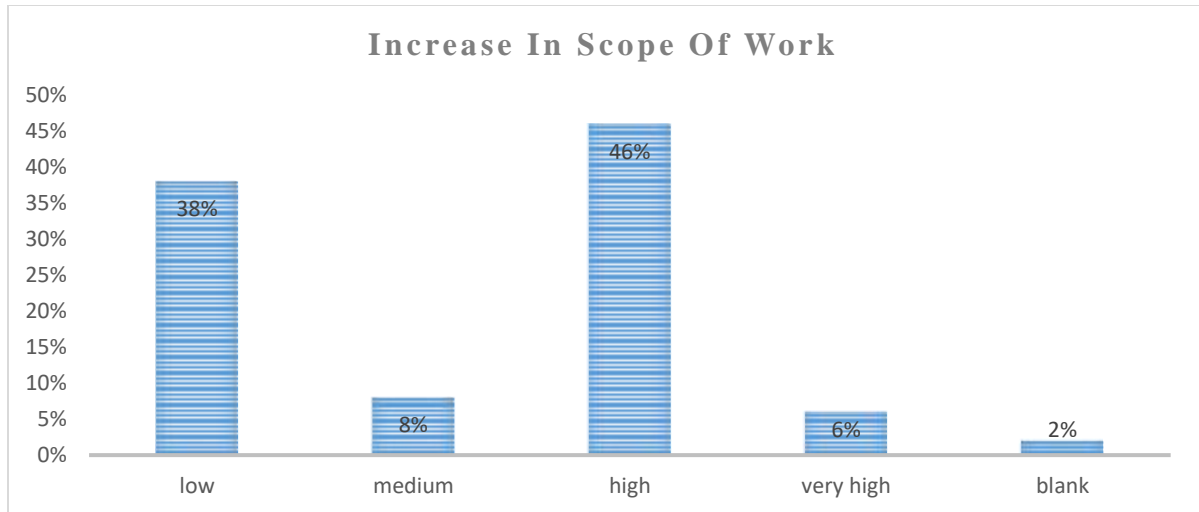


Figure 4.9 – Increase in Scope of Work. Source: Author’s Survey Data, 2019

4.4 Project Management Practices Implemented on the Takoradi Mall Project

Table 4.4 summaries the data collected based on the project management practices implemented by the five (5) project managers interviewed. As shown below, it could be inferred that each manager had a different but similar approach to project management practices. This shows that, though there are recommended practices, these managers adopted to the practices most suitable to the circumstance at hand.

The information gathered which was in the form of qualitative data was quantified and analysed using the SPSS tool. The descriptive analysis on the interview response as summarized in the frequency table, table 4.4, also shows the varying kinds of practices and the number of managers who adopted such practices. For instance, with regards to tools and techniques employed at the planning stage, out of the five (5) project managers, 3 project managers engaged in drawing of project plan and project budget, 1 project manager in resource optimization and critical path method and the other offered to properly adjust schedules to meet deadlines.

Table 4. 4 – Interview Responds

Tools and Techniques implemented at planning state	Frequency
resource optimization and critical path method	1
drawing of project plan and project budget	3
properly adjusted schedules to meet deadlines	1
Total	5
Decision making technique	
	Frequency
autocratic	4
consultative	1
Total	5
Influence in selection of project team	
	Frequency
no	4
n/a	1
Total	5
Other qualities considered in project team selection that affected schedule	
	Frequency
previous experience	2
knowledge of project management principles	1
ability to work within time constraint	1
n/a	1
Total	5
Communication Channels used	
	Frequency
roundtable meetings, e-mails, phone calls, formal written documents	3
daily meetings	1
n/a	1
Total	5
System	3
	8
Client Involvement	
	Frequency
actively involved	4
timely payment of claims	1
Total	5
Identified risks on project	

	Frequency
delay in imported materials	4
no	1
Total	5
Risk Management Technique	
	Frequency
crashing, fast tracking and overtime	4
n/a	1
Total	5
Team Management - Motivation	
	Frequency
bonus for meeting deadlines	2
celebrate team success	1
encourage collaboration, recognition and reward	1
well-structured management and salaries paid on time	1
Total	5
Team management – Conflict management	
	Frequency
forcing	2
n/a	3
Total	5
Team management – Ensuring good communication	
	Frequency
adapting virtual teams	1
closeness to virtual teams	1
n/a	3
Total	5
Tools and Techniques employed in Liaising with Key Stakeholders	
	Frequency
effective communication	3
regular meetings	1
timely dissemination of information	1
Total	5
	8
Work Coordination	
	Frequency
daily interactions and activity plans with emails	2
weekly reports	2
lead and lags	1
Total	5

Conflict Resolution Approach	
	Frequency
force	2
situational	1
compromise	1
project management meetings	1
Total	5
Challenges that Affected Schedule	
	Frequency
variations to design	3
delay in delivery of imported materials	2
Total	5
Frequency of Budget Review	
	Frequency
was not involved	4
no	1
Total	5
Tools Used in Planning, Managing and Control of Project Schedules	
	Frequency
regular monitoring and control	1
setting up milestone and achieving daily targets	3
lead and lags	1
Total	5
Formal way instituted for Noting, Estimating and Carrying out Approved Changes	
	Frequency
change request	3
setting up a change control board to agree changes before implementation	1
emails and site instructions	1
Total	5
Suggestions to Improve Schedule Performance	
	Frequency
effective monitoring on site	1
implementing the project management practices	1
rapid acquisition of materials	1
expert judgement should be sought	2
Total	5

Source: Author's Survey Data, 2019

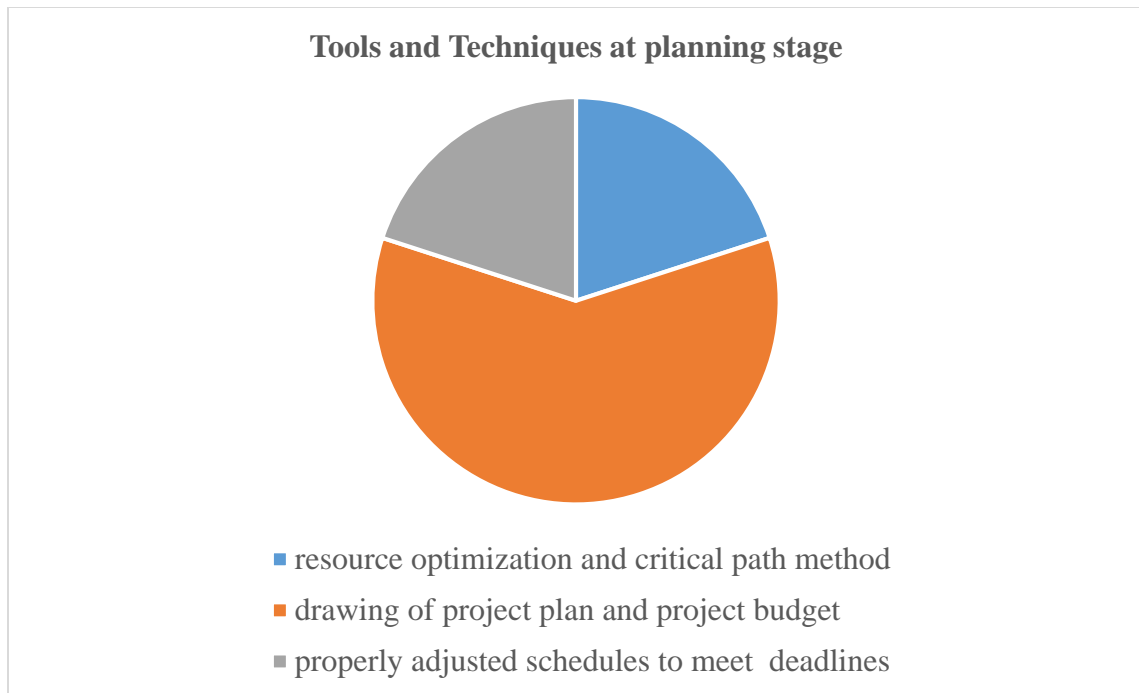


Figure 4.10 – Tools and Techniques at planning stage

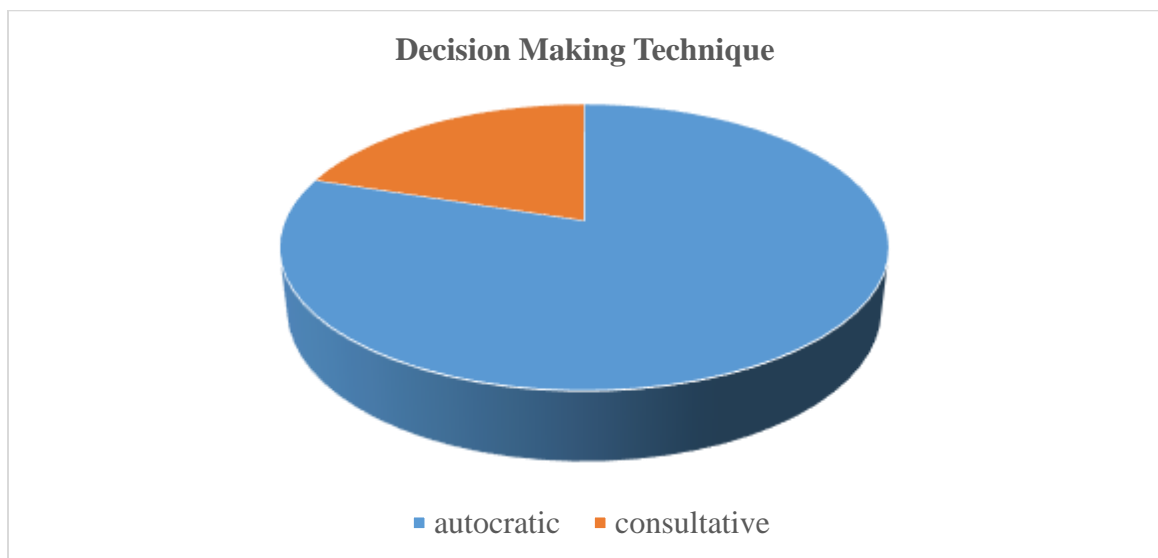


Figure 4.11 – Decision making technique

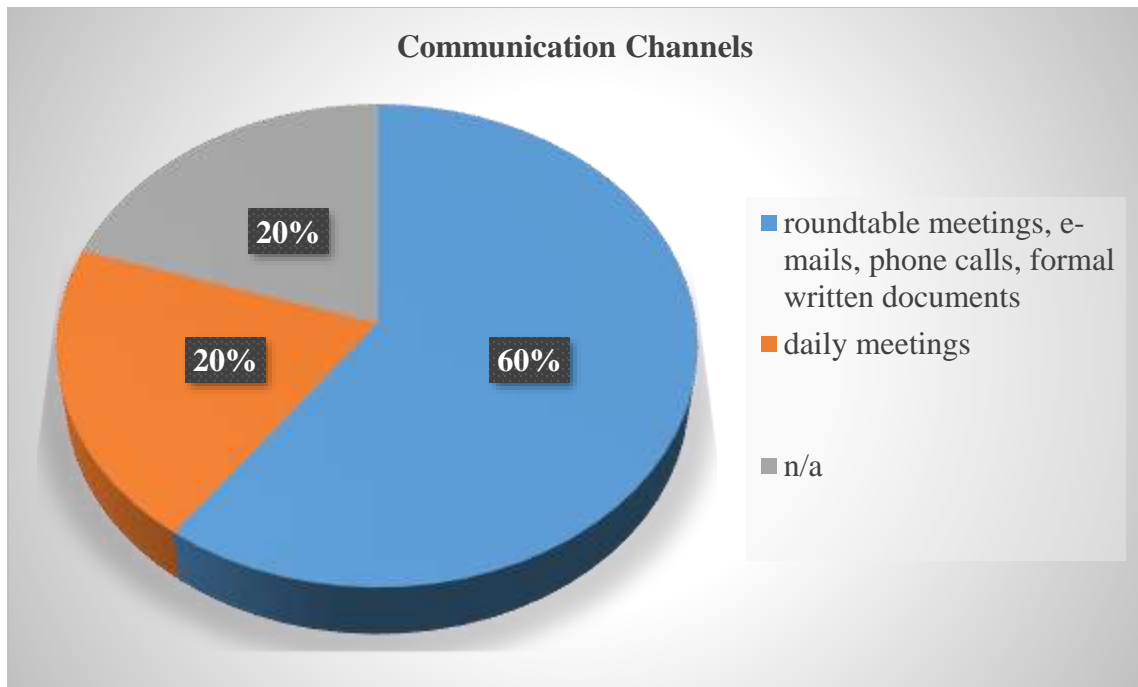


Figure 4.12 – Communication channels employed

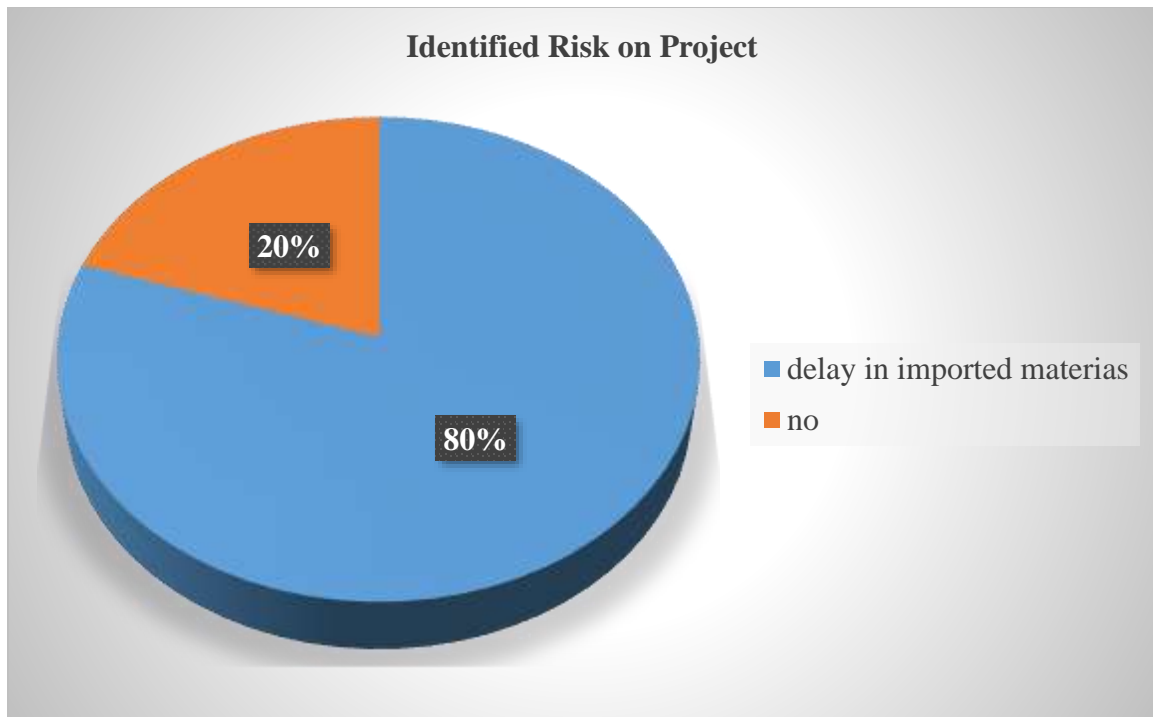


Figure 4.13 – Risks identified

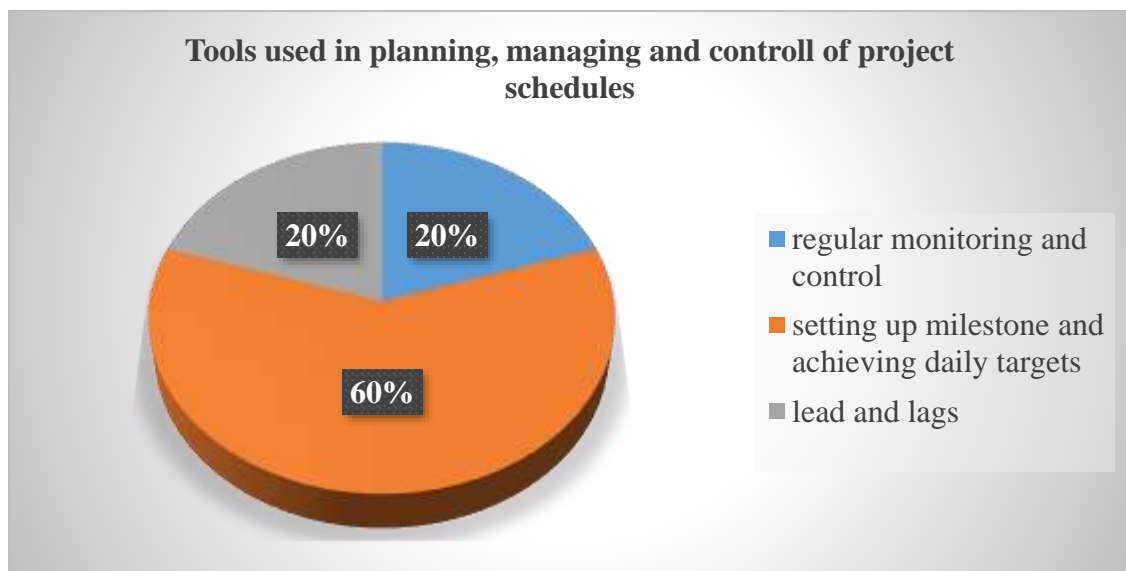


Figure 4.14– Tools and techniques used in controlling the schedule

4.5 Impact of the project management practices on the schedule performance

The project was divided to subprojects managed by separate project managers, the time performance indexes for 4 subprojects were determined in addition to the overall project time performance index. These 4 subprojects comprised of the Electrical works, Road works, External works and Tiling works.

To determine the time performance index, the planned construction period was divided by the actual construction period. This provided an overall project time performance index of 1.1, owing to the fact that the actual construction period for the project was 10 months and 2 days as against a planned period of 11 months. The 4 subprojects aforementioned also produced varying time performance indexes of 1, 0.9, 1.05, and 1.2 respectively as a result of the periods allocated to them.

The calculated indexes together with the quantified response (project management practices) were input into SPSS to generate the correlation matrix. The matrix shows the relationship amongst the response but for the sake of the objective of the study, the focus was on the relationship between the index and the other variables as shown in the tables 4.5, 4.6 and 4.7.

Table 4. 5 Correlation Matrix for Schedule Performance and Planning and Initiation

Correlations						
		schedule index	tools and techniques implemented at planning stage	decision making technique	influence	other qualities considered in project team selection that affected schedule
schedule index	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	5				
tools and techniques implemented at planning stage	Pearson Correlation	-.316	1			
	Sig. (2-tailed)	.604				
	N	5	5			
decision making technique	Pearson Correlation	-.750	.791	1		
	Sig. (2-tailed)	.144	.111			
	N	5	5	5		
Influence in selection of project team	Pearson Correlation	-.250	-.791	-.250	1	
	Sig. (2-tailed)	.685	.111	.685		
	N	5	5	5	5	
other qualities considered in project team selection that affected schedule	Pearson Correlation	-.244	-.797	-.260	1.000**	1
	Sig. (2-tailed)	.692	.107	.673	.000	
	N	5	5	5	5	5
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: Author's Survey Data, 2019

Table 4.5 is a correlation matrix between the variables that measured planning and initiation and the project schedule performance which is measured by the schedule index. There is a negative correlation between all the planning and initiation variables and the schedule performance index. This implies that a change in these variables have a reverse effect on the schedule index. However, the relationship is not statistically significant since their level of significance is greater than 0.05. The correlation between the schedule performance and planning and initiation variables as follows: tools and techniques implemented at planning stage (-0.316), decision making technique (-0.750), influence (-0.685).

Table 4. 6 Correlation Matrix for Project Execution Practices and Schedule Performance

		sched ule index	communic ation channel	client involve ment	identif ied risks on projec t	risk manage ment techniqu e	team manage ment - motivati on	tools and techniqu es employe d in liaising with key stakehol ders	work cordina tion	confli ct resolut ion approa ch	challen ges that affecte d schedu le
schedule index	Pearso n Correla tion	1									
	Sig. (2- tailed)										
	N	5									
communic ation channel	Pearso n Correla tion	-.258	1								
	Sig. (2- tailed)	.675									
	N	5	5								
	Pearso n	-.750	-.240	1							

client involvement	Correlation										
	Sig. (2-tailed)	.144	.697								
	N	5	5	5							
identified risks on project	Pearson Correlation	-.750	-.240	1.000**	1						
	Sig. (2-tailed)	.144	.697	0.000							
	N	5	5	5	5						
risk management technique	Pearson Correlation	-.750	-.240	1.000**	1.000*	1					
	Sig. (2-tailed)	.144	.697	.000	.000						
	N	5	5	5	5	5					
team management - motivation	Pearson Correlation	-.514	-.508	.772	.772	.772	1				
	Sig. (2-tailed)	.375	.382	.126	.126	.126					
	N	5	5	5	5	5	5				
tools and techniques employed in liasing with key	Pearson Correlation	-.125	-.373	.250	.250	.250	-.129	1			
	Sig. (2-tailed)	.841	.536	.685	.685	.685	.837				

stakeholders	N	5	5	5	5	5	5	5			
work coordination	Pearson Correlation	.267	.798	-.535	-.535	-.535	-.871	-.134	1		
	Sig. (2-tailed)	.664	.105	.353	.353	.353	.055	.830			
	N	5	5	5	5	5	5	5	5		
conflict resolution approach	Pearson Correlation	-.063	-.557	.688	.688	.688	.450	.406	-.367	1	
	Sig. (2-tailed)	.920	.330	.200	.200	.200	.447	.497	.543		
	N	5	5	5	5	5	5	5	5	5	
challenges that affected schedule	Pearson Correlation	.000	.610	-.408	-.408	-.408	-.840	.408	.764	-.408	1
	Sig. (2-tailed)	1.000	.275	.495	.495	.495	.075	.495	.133	.495	
	N	5	5	5	5	5	5	5	5	5	5
**. Correlation is significant at the 0.01 level (2-tailed).											

Source: Author's Survey Data, 2019

A number of variables take place at the project execution stage, which calls for analysis. From table 4.6 it is realized that there is a weak negative correlation between the type of communication channel and the schedule index (-0.258) however, it is not statistically significant. The correlation between client involvement and schedule index is negatively strong (-0.750), however, it is statistically not significant. Notwithstanding, there is a weak positive relationship between work coordination and schedule performance. This implies that a very good coordination of works on the project will increase schedule performance hence timely delivery of the project. However, the relationship is not statistically significant.

Table 4. 7 Correlation Matrix for Monitoring and Control Practices and Schedule Performance

		schedule index	frequency of budget review	tools used in planning, managing and control of project schedules	formal way instituted for noting, estimating and carrying out approved changes	suggestions to improve schedule performance
schedule index	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	5				
frequency of budget review	Pearson Correlation	-.750	1			
	Sig. (2-tailed)	.144				
	N	5	5			
tools used in planning, managing and control of project schedules	Pearson Correlation	.316	-.791	1		
	Sig. (2-tailed)	.604	.111			
	N	5	5	5		
formal way instituted for noting, estimating and carrying out approved changes	Pearson Correlation	-.375	.875	-.791	1	
	Sig. (2-tailed)	.534	.052	.111		
	N	5	5	5	5	
suggestions to improve schedule performance	Pearson Correlation	.514	-.772	.813	-.729	1
	Sig. (2-tailed)	.375	.126	.094	.162	
	N	5	5	5	5	5

Source: Author's Survey Data, 2019

Table 4.7 shows the correlation between the schedule index and the monitoring and control practices. There is a strong negative correlation between then the frequency of budget review and the schedule performance (-0.75). This means that the more frequent budgetary reviews are done, the lesser the schedule performance leading to delay in delivey. There is also a negative correlation between the formalities instituted in carrying on approved changes which may refer to the level of bureaucracy. This implies, the more formal procedures are instituted to effect approved changes, the lesser the schedule performance leading to untimely delivery of project.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the results and outcomes of the study that is intended to address and answer the following research questions;

1. What are the critical factors that contributed to the schedule performance of the Takoradi Mall Project.?
2. What are the Project management practices implemented on the Takoradi Mall Project?
3. What is the impact of the project management practices on schedule performance?

The above research questions were addressed through the administration of questionnaire to the target respondents. The questionnaire was designed to answer question one and question three where a structured interview guide was designed to address the second question. Furthermore, this chapter also summarises the findings of this study and outline some recommendations based on the findings of the study.

5.2 Summary of Findings

5.2.1 Critical Factors that led to schedule performance

The study shows that critical factors such as site management and supervision, experience of contractors, appropriate construction method, effects of subsurface condition have a ‘very high’ ratings as to their contribution to schedule performance. In addition, factors such as availability of laborers on site, availability of materials in the market and at site, imported materials, availability of equipment, late delivery of materials and equipment,

frequent breakdowns of construction plant and equipment, increase in scope of work, experience of consultants, design changes, speed of decision making of owners, and progress payments by the owner have a 'high' rating concerning its contribution to schedule performance. All the remaining critical factors rated 'medium' which means that they neither have a high influence on schedule performance with the exception of experience of owners which had a 'low' score.

5.2.2 Project Management Practices

The study identified the adoption of several project management practices by the project managers to achieve their objectives. Among these were the implementation of various communication channels such as frequent round table meetings, dissemination of daily, weekly and monthly reports on activities, phone calls and emails; work coordination, involvement of the client, practices engaged in the planning, managing and controlling of the project schedule; change management as well as suggestions to improve the schedule performance. All these and many others were identified to have been implemented on the project.

5.2.3 Impact of Project Management Practices on Schedule performance

From the correlation analysis which was performed to establish the relationship between the project management practices and the schedule performance, it was deduced that tools and techniques implemented at planning stage, decision making technique, influence in selection of the project team, communication channels, client involvement and formal way instituted for noting, estimating and carrying out approved changes were identified to have a negative correlation with the schedule performance index. This implies that a change in these variables have a reverse effect on the schedule index. On the other hand, work

coordination, tools used in planning, managing and control of project schedules as well as suggestions to improve schedule performance depicted a positive correlation with the schedule performance index, implying that a change in these variables have a direct effect on the schedule index.

5.3 Conclusion

5.3.1 Critical Factors that led to schedule performance

Factors such as site management and supervision, experience of contractors, appropriate construction method, effects of subsurface condition were found to have a have a ‘very high’ ratings with regards to their contribution to schedule performance. This means that contractors should have a critical concern for these factors. Also, other factors such as availability of laborers on site, availability of materials in the market and at site, imported materials, availability of equipment and others which were rated medium implies that contractors should consider such factors as they are possible to impede schedule performance

5.3.2 Project Management Practices

All the project management practices identified during the study and used in designing the questionnaires tends to have averagely high impact on schedule performance since the minimum rating score was ‘high’ which also tends to dominate in the ratings. This implies that effective and recommended project management practices should not be ignored when dealing with schedule performance as these practices have significant impact on the schedule performance especially feedback capabilities, change management, technical tasks, proficiency of project manager, proficiency of project team, and client acceptance.

5.3.3 Impact of Project Management Practices on Schedule performance

From the analysis it can be concluded that each manager had a different but similar approach to project management practices. This shows that, though there are recommended practices, these managers adopted the practices suitable for the circumstance at hand. It was realized that, these managers communicated with each other on timely basis. Hence effective communication, work coordination and the application of efficient planning, managing and control of project schedules tools aided the successful completion of the project ahead of schedule.

5.4 Recommendations

- It recommended that to achieve greater benefits, project management practices should be engaged throughout the stages of the project. That is from the initiation to the project close out stage.
- Project managers and construction firms should involve project teams in their decision making processes. This as believed would clarify the goals of the project and promote a sense of unity and togetherness which will in turn accelerate schedule performance.
- Construction firms and project managers must ensure that labour and materials and equipment are always available on site to prevent delay and enhance good schedule performance.
- In addition to ensuring that materials are readily available on the site, long lead items should be procure on time.

5.5 Limitation of the Study

Regardless of the tireless effort shown by the researcher to arrive at the findings of this research, the following limitations have been discovered.

First and foremost, the study has been narrowed to only Takoradi mall project. This inhibit the study from broadening its target and findings. Also, although the study is for academic purposes and it is an academic requirement, the time allotted for its execution is not enough and thus, inhibits the broadening and deepening findings.

5.6 Recommendation for Further Studies

Further research is required to investigate how the project management practices identified, impacted on the cost and scope of the project through the use of the Earn Value Management technique which integrates project performance on scope, schedule, and cost to determine the work performance.

REFERENCE

- Adinyira, E. (2019) RESEARCH METHODS, *Unpublished MSc lecture notes*, Kwame Nkrumah University of Science and Technology, delivered 30 March 2019.
- Akhtar, I. (2014) *Research Design*. Available from:
https://www.researchgate.net/publication/308915548_Research_Design (Accessed: 14 September 2019).
- Association of Project Managers-APM (2019) *APM Body of Knowledge 7th edition / Book Shop*. Available from: <https://www.apm.org.uk/book-shop/apm-body-of-knowledge-7th-edition/> (Accessed 2 September 2019).
- Bagaya, O. and Song, J. (2016) Empirical Study of Factors Influencing Schedule Delays of Public Construction Projects in Burkina Faso. *Journal of Management in Engineering*, 32(5), p. 601.
- Baskerville, P. (2015) *Scheduling tools and techniques for Project Management*. Available from: <https://www.skillmaker.edu.au/scheduling-tools-and-techniques-for-project-management/> (Accessed: 31 August 2019).
- Bryde, D. J. (2003) Project Management Concepts, Methods and Application. *International Journal of Operations & Production Management*, p 23.
- Chan, D.W.M. and Kumaraswamy, M.M. (2002) Compressing construction durations: lessons learned from Hong Kong building projects. *International Journal of Project Management*, Vol. 20 No. 1, pp. 23-35.

- Emery, K. (2017) *Schedule Compression*. Available from: <https://www.projectmanagement.com/wikis/351582/Schedule-Compression> (Accessed 14 September 2019).
- Fellows, R. and Liu, A. (2015) *Research Methods for Construction*. 4th ed. Sussex: John Wiley & Sons, p 88.
- Field, M. and Keller, L. (1998) *Project Management*. Hampshire: Cengage Learning EMEA, pp. 181.
- Frimpong, Y., Oluwoye, J. and Crawford, L. (2003) 'Causes of delay and cost overruns in construction of groundwater projects in a developing countries; Ghana as a case study', *International Journal of Project Management*, 21(5), pp.321-326.
- Hammond, S. (2018) Project Management and Project Management Best Practices. *Dama International Journal of Researchers*, Vol. 3. (11 November 2018), p. 12.
- Hazini, K., Dehghan, R. and Ruwanpura, J. (2013) Enhancing Schedule Compression Process Using Evolutionary Optimization Techniques. *Proceedings of the New Developments in Structural Engineering and Construction*.
- Hwang, B., Zhao, X. and Ng, S. Y. (2013) Identifying the Critical Factors Affecting Schedule Performance of Public Housing Projects. *Habitat International*, Vol. 38, p. 215.
- Ikigai Consulting. (2019) *The Expected Value & Benefits Of Project Schedules*. Available from: <https://www.ikigaiconsulting.com/insights/the-expected-value-benefits-of-project-schedules> (Accessed 13 Sep. 2019).

- Iyer, K. and Jha, K. (2006) Critical Factors Affecting Schedule Performance: Evidence from Indian Construction Projects. *Journal of Construction Engineering and Management*, 132(8), pp.871-881.
- Jiang, J. J., Klein, G., & Balloun, J. (1996) Ranking of system implementation success factors. *Project Management Journal*, 27(4), 49–53.
- Kabir, S. M. (2016) *Research Design*. Available from https://www.researchgate.net/publication/325847047_RESEARCH_DESIGN (Accessed: 26 August 2019).
- Karaca, Z. and Onargan, T. (2007) The Application of Critical Path Method (CPM) in Workflow Schema of Marble Processing Plants. *Materials and Manufacturing Processes*, 22(1), pp.37-44.
- Kog, Y.C., Chua, D.K.H. and Jaselskis, E. J. (1999) Key Determinants for Construction Schedule performance. *International Journal of Project Management*, Vol. 17, No. 6, pp. 351-359.
- Kothari, C. R. (2004) *Research Methodology: Methods and Techniques*. 2nd ed. New Delhi: New Age International Ltd., p 5.
- Kumar, G. and Bansal, A. (2010) *Project Monitoring and Control (PMC)*. Available from: [https://www.researchgate.net/publication/260952275_Project_Monitoring_and Control PMC](https://www.researchgate.net/publication/260952275_Project_Monitoring_and_Control_PMC) (Accessed 10 September 2019).
- Larson, E. W. and Gray, C. F. (2014) *Project Management the managerial process*. 6th ed. New York: McGraw-Hill Education, pp. 88-90.

Lawal, K. Amoo, Z. Ngozi, B. I. and Ishola, T.O. (2017) *Project Planning Management, Monitoring and Evaluation*. Abuja: National Open University of Nigeria.

Library University of Toronto. (2019) Data & Statistical Resources at the UTM Library.
Available from:
<https://guides.library.utoronto.ca/DataResourcesUTML/DataResourcesUTML>
(Accessed: 13 September 2019).

Liu, M. (2013) Program Evaluation and Review Technique (PERT) in Construction Risk Analysis. *Applied Mechanics and Materials*, Vols. 357-360, pp.2334-2337.

McDaniel, N. (2001) *Scheduling Guide for Program Managers*. Fort Belvoir: The Defense Systems Management College Press, p 76.

McLeod, S. (2019) *Likert Scale Definition, Examples and Analysis*. Available from:
<https://www.simplypsychology.org/likert-scale.html> (Accessed 7 September 2019).

Mensah, S. (2007) *The Effect Of Project Management Practices On Building Project Performance: The Case Of Three Organizations*. Unpublished thesis (MSc), Kwame Nkrumah University of Science and Technology.

Meyers, L. S., Gamst, G. C. and Guarino, A. J. (2013) *Performing Data Analysis Using IBM SPSS*. New Jersey: John Wiley & Sons, p 108.

Moneke, U. (2012) Evaluation of Factors Affecting Work Schedule Effectiveness in the Management of Construction Projects. *Interdisciplinary Journal of Contemporary Research in business*, Vol. 3.

- Mubarak, S. (2015) *Construction Project Scheduling and Control*. 3rd ed. New Jersey: John Wiley & Sons, p 9.
- Nkansah, H. K. (2012) *An Investigative Study Of Project Management Practices In The Electricity Company Of Ghana Accra. Unpublished thesis (MSc), Kwame Nkrumah University of Science and Technology*.
- OpenLearn. (2019) *Project management: the start of the project journey*. Available from: <https://www.open.edu/openlearn/money-management/management/leadership-and-management/managing/project-management-the-start-the-project-journey/content-section-0?intro=1> (Accessed 23 August 2019).
- Pataki, G. E., Dillon, J. T. and McCormack, M. (2003) *The New York State Project Management Guidebook*. New York: The New York State Office for Technology, p 199.
- Pinto, J. and Slevin, D. (1987) Critical factors in successful project implementation. *IEEE Transactions on Engineering Management*, EM-34(1), pp.22-27. Available from: <https://doi.org/10.1109/TEM.1987.6498856> (Accessed: 27 August 2019).
- Project Management for Development Organizations - pm4dev (2015) *Project Schedule Management*. Available from: <https://www.pm4dev.com/resources/free-e-books/6-project-schedule-management/file.html> (Accessed 9 September 2019).
- Project Management Institute. (2017) *A Guide To The Project Management Body Of Knowledge (PMBOK Guide)*. 6th ed. Newtown Square: Project Management Institute Inc., p. 175.

Project Management Institute. (2011) *Practice Standard for Scheduling*. 2nd ed. Pennsylvania: Project Management Institute Inc., p 209.

Ray, S. (2018) *Project Initiation: How to Start Your Project off Right*. Available from: <https://www.projectmanager.com/blog/project-initiation> (Accessed 3 September 2019).

Roseke, B. (2019) *What is the Schedule Performance Index?* Available from: <https://www.projectengineer.net/what-is-the-schedule-performance-index/> (Accessed 11 Sep. 2019).

Rouse, M. (2019) *What is critical path method (CPM)?* Available from: <https://whatis.techtarget.com/definition/critical-path-method-CPM> (Accessed 13 September 2019).

The Standish Group International, (1999) *CHAOS: A Recipe for Success*. The Standish Group

International.

Usmani, F. (2019) *Planned Value (PV), Earned Value (EV) & Actual Cost (AC) in Project Cost Management*. Available from: <https://pmstudycircle.com/2012/05/planned-value-pv-earned-value-ev-actual-cost-ac-analysis-in-project-cost-management-2> (Accessed 11 Sep. 2019).

Villafiorita, A. (2014) *Introduction to software project management*. Florida: CRC Press.

Watt, A. (2019) *About the Book – Project Management*. Available from:
<https://opentextbc.ca/projectmanagement/front-matter/about-the-book/> (Accessed
2 September 2019).

Wiegers, K. (2007) *Practical Project Initiation: A handbook with tools*. United States:
Microsoft Press Pearson Plc, pp. 18-25.

APPENDIX

CASE STUDY - STRUCTURED INTERVIEW QUESTIONS

1	Brief introduction about yourself
	a. Name:
	b. Nationality:
	c. Academic Qualification (s):
	d. Years of experience in the field of Project Management:
	e. Years of experience as a Project Manager:
Planning and Initiation	
2	What was the duration of your project and how long did it take you to complete it?
2	What tools or techniques were implemented at the estimating and planning stage that improved upon the schedule of the project?
3	Concerning decision making, kindly indicate the techniques you and your team employed to maintain the project schedule.
4	Did you influence the selection of the project team? If so kindly state what you looked out for.

5	Aside from the technical skills criteria for the selection of the project team, what other qualities were looked at in the selection that affected the project schedule.
Project Execution	
6	Please outline the communication channels that existed between the project manager and the senior management, the project manager and the team members, as well as the project group and the client.
7	How was the client's involvement in the project
8	Were there any identified risks on the project? Kindly explain how the risks were managed and their impact on the schedule.
9	How did you manage the team in terms of motivation, managing conflict and ensuring good communication?
10	When it came to reporting to and liaising with senior management, client, regulatory bodies and everyone contributing to the project, what practices were employed.
11	How was the coordination of work done to ensure that activities are completed on time?

12	What conflict resolution approach was adopted on the project?
13	Since the path to the finish line is never without some bump along the way, kindly indicate some challenges encountered on the project that affected the schedule and how they were handled
Monitoring and Controlling	
14	How often was the budget reviewed and were there any massive budget overruns? If not, how was this avoided or what plans were put in place to avoid that.
15	What tools or techniques were put in place to plan, manage and control the project schedule.
16	Which formal way was instituted for noting, estimating and carrying out approved changes to ensure the timely delivery of the project?
Closure	
17	What do you think should be done better to improve schedule performance?

CASE STUDY QUESTIONNAIRE

Table A 1 SECTION A – GENERAL INFORMATION

1	Name of Company (Optional)
2	<p>The role of your company on the Takoradi Mall Project.</p> <p>Main Contractor – WBHO [<input type="checkbox"/>] Sub-Contractor [<input type="checkbox"/>] Client [<input type="checkbox"/>]</p> <p>Consultant [<input type="checkbox"/>]</p>
4	<p>Your Position on the project</p> <p>Project Manager [<input type="checkbox"/>] Quantity Surveyor [<input type="checkbox"/>] Engineer [<input type="checkbox"/>] Others Please</p> <p>Specify</p>
5	<p>Years of Service in that position</p> <p>Less than a year [<input type="checkbox"/>]</p> <p>1-5 years [<input type="checkbox"/>]</p> <p>6-10 years [<input type="checkbox"/>]</p> <p>Above 10 years [<input type="checkbox"/>]</p>
6	<p>What is the highest level of education you have attained?</p> <p>[<input type="checkbox"/>] PhD [<input type="checkbox"/>] M.Sc. [<input type="checkbox"/>] B.Sc. [<input type="checkbox"/>] Diploma</p> <p>Others, Please specify..... [<input type="checkbox"/>]</p>
7	<p>How conversant are you with the concept of project management practices?</p> <p>[<input type="checkbox"/>] Very Conversant [<input type="checkbox"/>] Conversant [<input type="checkbox"/>] Not Sure [<input type="checkbox"/>] Fairly Conversant</p> <p>[<input type="checkbox"/>] Not Conversant</p>

**SECTION B – CRITICAL FACTORS THAT AFFECTS THE SCHEDULE
PERFORMANCE OF CONSTRUCTION PROJECT**

One a scale of 1 to 5 as indicated below, kindly rate how the following factors affected schedule performance in respect of the Takoradi Mall Project.

1 Very Low 2 Low 3 Medium 4 High 5 Very High

(Leave a blank if the question has no answer)

		1	2	3	4	5
1	Site Management and Supervision					
2	Experience of contractors					
3	The use of appropriate construction methods					
4	Effects of subsurface conditions (the type of soil, utility lines, water table)					
5	Bad Weather					
6	Availability of laborers on site					
7	Availability of material in the market and at the site					
8	Imported materials					
9	Availability of equipment					
10	Late delivery of materials and equipment					
11	Frequent, breakdowns of construction plant and equipment					
12	Availability of site to allow for the movement of material,					

	equipment and laborers					
13	Increase in scope of the work					
14	Difficulties in obtaining work permits					
15	Exceptionally low bids					
16	Delays in work approval					
17	Delays in inspection and testing of work					
18	Mistakes during construction					
19	Difficulties in obtaining construction materials at official current prices					
20	Experience of consultants					
21	Design changes					
22	Conflicts among project participants					
23	Speed of decision making of owners					
24	Progress payments by the owner					
25	Design changes by owners during construction					
26	Experience of owners (that affected the quality and speed of their decision making, and the project schedule performance)					
27	Client-initiated variations					

SECTION C – DETERMINE THE IMPACT OF THE PROJECT

MANAGEMENT PRACTICES ON THE SCHEDULE PERFORMANCE

Please from your experience; express your opinion on the extent to which the following project management practices impacted the schedule performance of the Takoradi Mall Project. Use the following scale:

1 Very Low 2 Low 3 Medium 4 High 5 Very High

		1	2	3	4	5
1	The swiftness of decision-making on the project					
2	The involvement of the Project team in the decision making					
3	Clearly defined goals					
4	Proper planning					
5	Effective communication between the Project Manager and the Senior Management					
6	Effective communication between the Project Manager and the Project Team					
7	Effective communication between the Project Group and the owner					
8	Regular Meetings					

9	The ability of the project team to quickly identify risks					
10	Adequate management of the identified risks					
11	Preparation of schedule plans and updates					
12	Sufficient resource allocation					
13	The schedule control process					
14	Feedback capabilities					
15	Technical tasks					
16	Change Management					
17	Conflict Management					
18	Availability of staff to manage projects.					
19	Proficiency of the Project Manager					
20	Proficiency of the Project Team					
21	Client Acceptance					
22	Trouble-shooting					
23	Lessons Learned Sections					

