

**EARNED VALUE MANAGEMENT PRACTICES IN THE DISTRICT
ASSEMBLIES (MMDA'S)**

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 other 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

The success of every construction project depends heavily on the effectiveness and prudent application of project management tools. The purpose of project management is to foresee or predict as many of the dangers and problems as possible and to plan, organize and control activities so that projects are completed successfully in spite of all the risks. This substantiate the need for an effective project management tool. The main purpose of this study was to assess the application of Earned Value Management practices among Municipal and District Assemblies in Ghana with the focus on Hohoe Municipal Assembly. The study specifically, looked at Earned Value Management Systems awareness levels, other project management tools used aside EVM and finally, the challenges and problems hindering the practice of EVM. In other to achieve these objectives the researcher adopted survey design approach for the study, using quantitative methods and research questionnaire as data collection instrument. A total of sixty-seven respondents were sampled across different areas of expertise using non-probability sampling technique. Using the Relative Important Index (RII) analysis findings from the study revealed that, majority of respondents were unaware of the Earned Value Management practices as a project management tool, representing eighty-five-point one percent of the sampled population, this was attributed to lack of training and formal education on the application of EVMS. On the usage of other project management tools by the Municipal Assembly's aside EVM, findings revealed that, a significant number of respondents use Work Breakdown Structure (WBS) ranked first (1st) using Relative Important Index (RII) of ninety-eight point two percent, the second most familiar project management tool was the Line of Balance (LOB) with an (RII) of eighty-nine point five percent etc. finally, findings revealed that, the challenges facing the application process of EVM were lack of expertise and experience of staff, political interference, level of professionalism, corruption among others. Based on these findings the researcher recommends efforts should be made to abandoned political infiltration into project management at MMDAS to help them implement effective project management tools that will ensure value for money on every government project commissioned.

KEY WORDS: Project Management, Construction Project, Earned Value Management

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DEDICATION

This work is dedicated with Love and Affection to my mother Selina Kini, to my siblings and to all my friends for their support and love in helping me achieve this work.

God bless you all!!!!

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

According to Avlijas (2015), the purpose of project management is to execute projects within the stipulated time frame with consideration of available budget for project and scope. Hasseb (2011) opined that, for a successful project delivery, a lot is dependent on how it meets the set goals, and a lot of management commitment is needed to achieve this goal. One of the most important steps in this process is development of the effective performance monitoring system, (Avlijas, 2015). Project teams strive to control three key performance indicators (KPIs) related to construction projects, that is cost, time and scope. The successful completion of construction projects is by means of staying within defined scope, budget and time frame (Dhanashree, 2015).

According to Padalkar and Gopinath (2015), regardless of many decades of the practice and academic attention of the project management, performance of projects remains problematic, Empirical evidence suggests that projects do not achieve their scope, planed schedules and cost budgets. Klynveld Peat Marwick Goerdeler (2015) noted that, as construction projects continues to expand, they involve more complex processes. The uncertainty and difficulty levels of construction projects substantiate the reasons to look for more tools and techniques for “performance and development of project (Candido, et. al., 2014).

It can be seriously challenging when it comes to construction project monitoring without selecting suitable methodology. According to Jainendrakumar B. (2015), EVMs serves as a project performance measure which makes use of time, scope, and cost data. Lukas (2008), indicated that, earned value management systems afford for easy EVM usage at the

organizational level. Padalkar and Gopinath (2015), the EVM concept is a classical procedure used to manage project Performance as well as for monitoring purpose.

Humpherey (2014) opined that, the fundamentals of EVM Process in the construction industry is in a sequential order as follows. First and foremost, the process is the definition of the project objectives that includes a universal explanation of the technical requirements of the project, the time allocation for start to completion and the budgetary allocation (Humpherey, 2014). Secondly, the scope of the project is defined. Work breakdown structure (WBS) is one of the best tools to segregate the work into manageable components.

Another usage is for performance measurement and Earned value determination. NDIA (2015) this is also used to accomplish Earned Value techniques, which is a key concept of the complete Earned Value Management process. By making available an insight to what has been achieved as against to what the target was in order to have a fair idea of the state of project for schedule position and cost. Determination of the assigned cost variance and scheduled variance, this variance can help to make decision and take corrective action whether rebase line.

Whereas Earned value goes further other methods such as traditional will only discuss plans and cost. This offers management a clear picture and enables him/her to create risk mitigation plans. It also helps to display unforeseeable problems at beginning before they are escalated to uncontrollable proportions. Avlijas (2015), Earned Value Management System consist of guiding principle that guide a company's management control system. The researchers aim is to reducing the widen gap between theory and practice to significantly contribute to the Ghanaian construction industry and Africa at large by considering MMDAS as a case study.

1.2 Statement of the Problem

Heseb (2011) construction projects across the world has generally, experienced delays. Jrade and Lessard (2015), revealed that, a construction project may suffer from scheduled time inconsistencies to budget overruns. Also, Warhoe (2013) revealed in his study that, managing multiple projects is an evergreen problem to construction project delivery time as well as cost. Ghana is no exception to these problems notwithstanding the continuous efforts by development partners and stakeholders to put together institutions with the sole responsibility of foreseeing project performance success. It is usually the case that, the very common problems are performance of scope, cost performance and time. “Construction projects cost overrun is over 100% and time by over 150% in Ghana” (Lema, 2015).

The unavailability of uniform decision tools and strategy to measure performance indicators for both government and private sector construction projects is a problem in Ghana. Such challenges may upsurge specially, with contractors making demand for contract time extension with cost compensation due to project performance contract failure. Time for project completion is usually forecasted by contractors using traditional methods. This technique creates uncertainty, resulting in disputes between affected parties and ends up affecting the project and relationships. Warhoe (2013), statistics shows that, a little over US\$32 million in the year 2011 was paid as construction dispute cost. The Ghanaian construction industry needs a reliable technique for line performance control. According to Candido et al., (2014), unlike the traditional measurement like PERT, EVMS goes step further by using quantitative parameters to facilitate effective decision making by project management team.

1.3 Research Questions

The research seeks to make available answers to the following questions.

- i. What is the awareness level of Earned Value Management practices among MMDAS?
- ii. What other project management tools are used by MMDAS aside EVM?
- iii. What are the challenges and problems that hinders the application process of EVM among MMDAS?

1.4 Research Objectives

This study sought to investigate Earned Value Management Systems application and practices among the Municipal and District Assembly's in Ghana.

1.4.1 Specific Objectives

- i. To assess the awareness level of earned value practice among MMDAS
- ii. To identify other project management tools used by the MMDAS aside EVM and
- iii. To identify challenges and problems that hinders the application process of EVM among MMDAS.

1.7 Justification of the Study

According to Valle & Pereira (2008) project schedule and cost overrun remain a significant challenge facing the construction industry when it comes to project execution and related matters. This leads to project delays and possible cash flow problems which most times hinders the quality of project done. For these problems to be solved, there's the need for significant amount of efforts pumped in to get a better result.

1.6 Significance of the research

The study will be an avenue for project management teams and stakeholders to easily determine or measure the progress of a project and also served as an early warning sign to

projects that seem out of reach and possible measures to restore the project. Which will help reach project schedule time frame and cost performance in addition.

It is believed that, the current study shall provide standardized methods for measuring project performance as a management tool for consultants, contractors and client. This leads not only the creation of value for money for project but also honesty, trust and the culture of openness. Identify the project problem by analyses data capture and help to make critical project decisions based on actual budget cost vs. variance, trend and predict the future performances, rebase line for cost and schedule.

1.7 Scope of the Study

This current study encompassed on the application of EVM practices for construction projects in the Municipal and District Assemblies (MMDAS) in Ghana; the study took a duration of three months. Thus, June to September, 2019. The geographical scope of Hohoe Municipal Assembly was selected due to the many factors such as; the availability of several government projects that are at various stages of completion and also uncountable number of uncompleted and abandoned projects. These evidences gave the researcher an opportunity to explore the subject matter with convenience.

1.8 Research methods

The study made used of both primary and secondary information. Other sources of information were from books, journals, pertinent articles, and published and unpublished dissertations of students. Self-administered questionnaires were used for the gathering of the primary data. Consultants, contractors and the municipal project management team was contacted for their expert contribution. The questionnaire incorporated the use of close ended questions and a Likert scale to rate and answer questions pose to respondents. SPSS version 20.0 was used to analysed the data collected from the field.

1.9 Organization of the research

The study is organized into five chapters; chapter one presented the background to the study, problem statement, research objectives as well as research questions etc. the second chapter presented the review of literature, the theoretical and conceptual framework which established the need for the study. The third chapter spelt out the methodological steps that the researcher used to gather and analysed data to make inferential interpretation. The fourth chapter presented the data analysed. Finally, chapter five presented summary of findings, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter contains scholarly review of previous works on the subject matter, it considers other different ways in which scholars have dealt with similar topics with much focus on the technicalities and other relevant theories on the Earned value management systems in Ghana and beyond. The theoretical perspective, empirical, conceptual framework as well as knowledge gap reflected.

2.2 The definition of Project

According to PMBOK (2008) project is defined as “temporary endeavor undertaken to produce unique product, service or results”. “A project can be considered to be any series of activities and task that have specific objective to be completed within certain specifications”, with a defined starting point to an end point influenced by a budget. According to Parks (2007), “project is set of interrelated group of activities with the aim to achieve specific goals”. He further noted that “a project must have a confirmed scope, work steps, deliverables, responsibilities, time and financial plan, as defined in assignment Charter. According to Kerzner (2009), most definitions focuses on the fact that “Project done at once and clearly defines starting and ending date if repetitive is not a project”, he further opined that “the project manager functions to come with solution from stakeholder problem”.

2.2.1 Projects Classification

Gower (2007), indicated that, projects are classified into four main areas these are construction Projects, Management Project (IT system, regulation and marketing), Manufacturing Projects (i.e. equipment, automotive and drink), and scientific related projects. The current study looks at the construction project management.

2.3 The construction industry

A study by Windapo (2013) cited by Ameir (2017) stated that, “A construction is series of Action embark on by a construction firm and Consultants which produce or alters building or infrastructures”. Verma & Pathak (2014) cited CDM, (2015) explained that construction Project “includes all planning, design and management work involved in a project until the end of the construction phase” and satisfy customer’s needs.

2.3.1 Major Types of Construction Project

Verma & Pathak (2014) revealed that, the main categories of Construction Industry are “Residential Housing Construction, Construction and Infrastructure, Specialized Industrial, Institutional or Commercial Building, and Heavy Construction projects”.

2.3.1.1 Residential Housing Construction

“Residential housing construction includes small houses and high-rise apartments”. Elbeltagi (2009) cited by Hassan (2017) stated that, designs performed by Engineers and Architects and work accomplished by builder with the aid of subcontracting for mechanical and electrical parts.

2.3.1.2 Institution and Commercial Building Construction

“This encompasses a great variety of project types and sizes, such as schools and universities, medical centers and hospitals, sports facilities, shopping centers, warehouses and light manufacturing plants, and skyscrapers for offices” (Elbeltagi 2009). The industry has a high cost and complex in comparative with residential building, the construction takes more time.

2.3.1.3 Specialized Industrial Construction

“Specialized industrial construction involves very large scale projects with a high degree of technological complexity, such as oil refineries, steel mills, chemical processing plants and

coal-fired or nuclear power plants”. “This type’s projects can be affected by the state economy and long range demand forecasting is the most important factor” (Elbeltagi 2009).

2.3.1.4 Infrastructure and heavy construction

“Infrastructure and heavy construction include projects such as highways, tunnels, bridges, pipelines, drainage systems and sewage treatment plants. Most of these projects are publicly owned and therefore financed either through bonds or taxes the engineers and builders engaged in infrastructure construction are usually highly specialized” (Elbeltagi 2009).

2.4 Project Management

“Project management is application of knowledge, skills, tools, and techniques to project activities to achieve project requirements”. “Project management is accomplished through the application and integration of the project management processes” according to PMBOK (2008) cited by Amier (2017).

2.4.1 Construction Project

From the study of Gower (2007) and cited by Hassan (2017), “the purpose of project management is to foresee or predict as many of the dangers and problems as possible and to plan, organize and control activities so that projects are completed successfully in spite of all the risks”. Verma & Pathak (2014) further, argued for the need for “early planning before resources committed there is need of organization to have management system, and the process must continue until all work is finished”. “Earned value management system to an organization may be able to help the organization”. Kerzner (2009), state that “the project manager must control company project resources within time, cost, and performance and Most companies have six resources those are Money, Manpower, Equipment, Facilities, Materials and technology”. According to Heagney (2012) cited by Hunter H. et. al., (2014) stated that, “the role of the project manager is to help the team get the work completed”. Olaf,

(2009) also stated that, “project management now a day gives high priorities to all companies whether small or large, by using tools and techniques to solve the project problem, the project management is done under the executive phase to watchfully eyes of the project”.

2.4.1.1 The construction project management process

According to Project PMBOK, (2008) and cited by Williams (2008) and Bower, (2007) “in order to meet the requirement of the project, project management process accomplished through the following sequential and intergraded project phase, Initiating, Planning, Executing, Monitoring and Controlling and close out”. They further entreated that, “the projects Manager Role to deliver the project while balancing the requirement of the project scope schedule and budget”.

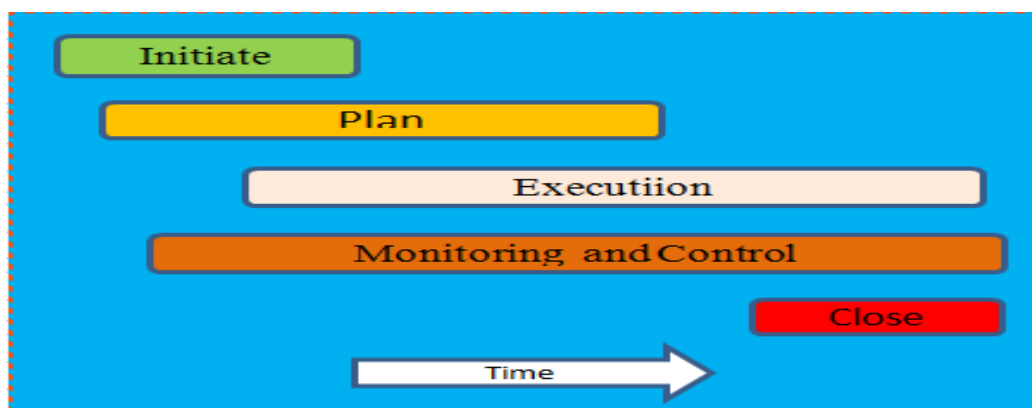


Figure 2.1: Construction Project Management Process

Source: PMBOK (2008)

2.5 The Trends of Construction Project Management

According to NASA, (2013), Projects and project management are not new concepts. The whole time history, the records of projects of different magnitudes have been creatively undertaken on generations. He cited very good examples of historical projects such as; the Pyramids of Egypt, Great Wall of China. Gower (2007) noted that, Projects Management earliest time to 1900 were generally managed by the creative architects and engineers

themselves. There was no standard professional for project management, people study by working practices at site, the job done with only commonsense. According to Hunter H. et. al., (2014), they are however, some few skilled and generous persons like French Engineer Henry Fayol (1841 – 1925), Fayol and hence revealed that every manager can perform on five management functions those are planning, organizing, commanding, coordinating and controlling. Hussein (2018) also indicated that the second pilot Henry Gantt (1861 - 1919) was an American engineer, He is famous for developing the Gantt chart and still in use in today as tool in a project manager's toolkit. A study by Weave (2007) noted that other historical people contributing on project management are Joseph Priest in 1765 developing Bar chart. Weave (2007) further, indicated that, Flow line scheduling in the 1930s was used to schedule the construction of the Empire State Building in record time. In 1956 Kelly and Walker had developing 'Activity-on-Arrow' a method of critical path scheduling. In 1957-1958 US air force developed CPM/PERT, both focuses to deliver the project on time and cost. And in 1969 Dr Martin Barnes (UK) described the 'iron triangle' of time, cost and scope for project performance (Weaver, 2007).

The key professional bodies were established from 1960 to 1979 according Hunter H. et. al., (2014). First project management Association is Institute of Project Management Associations (IPMA), in 1965, and four years later in 1969 Project Management Institute (PMI) were established which is primarily based in the U.S. now is commonly known as the publisher of The Project Management Body of Knowledge (PMBOK) Hunter H. et. al., (2014). "In 1975 Project, Resource, Organization, Management and Planning Technique (PROMPT) was developed by a British company called Simpact Systems Ltd. and 1979 PROMPTII was adopted by the UK Central Computer and Telecommunications Agency (CCTA) Weaver, (2007). According to Gower (2013), the present day Construction Project management is considered as separate branches form others industrial like IT. There is wider

and welcome acceptance that managing company changes as projects can bring faster and better results and more interest on project risk. Well-regarded professional qualifications awarded by universities, follow the appropriate training and can demonstrate competence.

2.6 Issues facing the construction industry

According to Muir (2005) cited by Verma & Pathak (2014) the world amazing project as mentioned earlier were all constructed using slaves without any complex technological tool and yet completion was within project time frame unlike today's projects with all the sophisticated technology time and cost overrun remains a key challenge in the construction industry. These challenges can be classified into external and internal factors Darnall (2012).

2.6.1 Management challenge (External factors)

External issues are said to be the very issue that naturally, establishes at the beginning of the project including but not limited to project cost, size and time. Project stakeholders are responsible to determine the size of project (scope), time and cost for the size of the needs of projects (Okoye, et al, 2015). Among the contributory factor to project failure the project sponsor dictates the project manager to finish the project by certain time, budget and get a magnitude of scope while achieving a specified performance level (Heagney, 2012).

2.6.2 Internal Attributes

2.6.2.1 Project Objectives Clarity and Stakeholders Agreement

Project definition and objective should be clearly defined and every stakeholder understands. The project team will come with the one common objective, "The greater the confusion for the project teams on the goals and objectives of the project, the greater the impact on the complexity of the project, and often there is more than one major stakeholder in the project". Darnal and Prestone (2012) revealed that when there is an increased number of stakeholders

in a project level has an influences on its complexity. They further argued that, “project works depends on how project stakeholders agree about the project on scope, time and cost”.

2.6.2.2 Technological

Technology has had its own consequences on the failure of construction industry in the developing world as compare to the developed world. Muir (2005) indicated that, Although today’s project is more complex but technology support construction project management that will increase the cost efficiency of the projects, time saving, less energy and material wastage, safety in construction and sharing the information compared the late years. They cited example such as Microsoft project, Primavera etc. which supports accurate data management, budget and schedule.

2.6.2.3 Legal Issues

According to Darnal and Preston (2015) due to the complex and risky nature of today’s business accountability is necessitated because of legal implications. They further argued that, the introduction of fire ‘safety law’, ‘social safety law’, and permit requirements, contractor licensing and other regulations through construction code. “State and local municipalities adopt model codes such as the Basic National and International Building Code, these codes provided for quality, safety issue, and standard Uniform Building Code on Construction industry” according to Hunter H. et. al., (2014). These cause the industrial having the number of stakeholders and complicated process and each stakeholder have an authority to stop the construction works and works independent.

2.6.2.4 Political Pressures

The acceptance of and construction industry is largely influence by perceptions and attitudes of political systems. Top management support is very necessary for the implementation of any construction project. Socio-Political affects both public and private sector. It turns to very

difficult if not nearly impossible for project implementation without political influence according to Muir, (2005).

2.6.2.5 Cultural

A human being as a member of the society exhibit qualities such as; morals, knowledge, believes, customs and many other competences defined as culture. And by definition people who live in an environment where projects are executed is term as society. “In project all stakeholder of the project are very important to have interest, support and bring any change for the project that will enhance the project to run smoothly” according to Darnal and Prestone (2012). The resistance of stakeholder to a project makes it non-existence according to Muir (2012).

2.7 Contribution of the construction industry

2.7.1 Global contribution of the construction industry

The construction industry is the largest industry in the world, it's integrates political, Economic and social (Elbeltagi, 2009). Construction sector and construction activities are considered to be one of the major sources of economic growth and can be regarded as a mechanism of generating the employment to millions of unskilled, semi-skilled and skilled work force” according to Rangelova (2015). It supplements the foreign exchange from the trade of construction material and engineering service the activities. The industry has great significance to the achievement of national socio-economic (Rangelova, 2015).

Rangelova (2015) revealed that, European countries except German economic grow was slow in 2012 due to fallen badly construction output, with a slight growth in 2013 and 2014. In 2010, the construction industry in US contributed \$511.6 billion (3.5%) to the total Gross Domestic Product (GDP). The whole economy of UK declined in 2012, 2008 and 2009 due to fallen badly the Output in the construction sector. In 2014 the UK construction contributed

£103 billion in economic output equal to 6.5% of the total income, and 2015 offering 2.1 million jobs equal to 6.2% of the total (Rangelova, 2015). Australia in 2011 real GDP grew by 2.7%, the economic development in Austria slowed down considerably in 2012 growth amounted to merely 0.8% expected to pick up during the second half of 2013 (Rhodes, 2015).

2.8 Construction projects performance indicators

In the work of Chan and Hiap (2012), they stated that, to weigh the performance of the construction industry over a variety of its activities, an appropriate set of Key performance indicators (KPIs) is required so that the stakeholders can monitor the industry's progress towards achieving its goals. In this sense on the identification of key performance indicators (KPIs) as it can help decision makers on the performance levels of projects. Washington (2014) indicated that, mainly we measure the variances of the current cost and schedule from plan and predict final costs and schedules at any point of time during contract duration. Key Performance Indicator (KPIs) According to Elshakour, (2012) et al. cited in Campbell K. (2013) defines (KPIs) as Benchmark of the continuous process of measuring products, services, and practices.

According to several studies by Construction Industry Institute (CII) in the USA, the Department of Environment, Transport, and the Regions (DETR) and the Department of Trade and Industry (DTI) in the UK, and the Corporation for Technical Development (CTD) in Chile, have embraced the foundation base for KPIs for construction industry at the project level are cost, time scope, quality and safety Elshakour et al. (2012). According to Daniel and Joseph (2012), KPIs in construction project include Mutual trust between project partners, Client's satisfaction on quality of completed work (scope), and Time performance, cost not exceeding the final contract target or guaranteed maximum price value, and Magnitude of disputes and conflicts. The Study conducted by (NAO, 2010) for road work on Tanzania

showed that the key performance indicator on road construction is Time, cost and (scope) quality (constrain of the project). On construction project we measure the progress of the works packages that scope, Budget cost and works schedule, Performance measures are based on data, and tell a story about whether an agency or activity is achieving its objectives, and if progress is being made toward achieving policy or organizational goals. The objective of performance and progress measure is used to measure or check how healthy we are doing the project (SPAR, 2008).

2.9 Construction project performance measurements tools and techniques

PMBOK (2008) stated that, generally the project manager has to apply the knowledge, skill, tools, and techniques to drive the project activities in order to meet the desired performance of the project. It implies that, the path to the achievement of a project depend on the proper way of the selection and apply of the tools and technique.

2.9.1 Organizational breakdown structure (OBS).

The organizational break down structure is the primary tools used by the project manager for forming the project team. The purpose of OBS is to identify each organizational unit required to support the project according to Stretton A. (2013). Similar to organization chart but this consist project manager and individual who require delivering the project. The project is categories into various departments and each expertise is assigned to the project team. Examples for house construction can be divided into civil works, electrical work and mechanical works (Stretton, 2013).

2.9.2 Work Breakdown Structure (WBS)

The project WBS is a hierarchical classified according to criteria into successive levels listing and grouping of the project activities required producing the deliverables of the project. The WBS represents a breakdown of the project into components that encompass the entire scope

of the project. Each level of the WBS hierarchy represents a more detailed explanation of the project work so that the highest level represents broad categories, and the lower levels represent increasing amounts of detail (Darnal and Prestone, 2012). WBS breaking the project into manageable chunks from which work can be allocated to departmental managers and other members of the project organization (Heagney, 2012).

The advantages of WBS is the primary tool for measure project scope performance that deals with the client's requirements, the project scope is a document that defines the parameters of the project, what work is done within the boundaries of the project, and the work that is outside the project boundaries, Show all works involve in creating the product of the projects (Darnal and Prestone 2012). Work becomes better defines, subdivide project works into smaller more explicitly and manageable (Hakkinen, 2015).

Scope performance is measure by evaluated the progress from all task (activities) planned to undertaken by contactor (as Baseline for performance measure to control) versus actual works performed by contractor to determine scope verification as seen on figure 2.5 (BIS, 2009).

Scope Variation and Change; during the implementation of the project, the work scope may change due to instructions from owners, design modifications, unforeseen site conditions, and value engineering exercise (BIS, 2013). "Don't fear for change" accept and manage it. Laid down the corrective action if necessary revised baseline, this will help to deliver the project on time, budget and quality (Heagney, 2012).

2.9.3 Critical Path Method (CPM)

According to PMBOK (2008) cited by Verma & Pathak (2014), Critical Path Method is a schedule networks analysis technique, also called activity on arrow project network diagrams. It is an arithmetical algorithm used to monitor the progress of a multitasked project and

determine the minimum total project duration, earliest possible finishing date of the project. The earliest start and finishing are calculated by forward pass while the latest start and finish are determined by backward pass. It is an effective tool of calculate and predict the project completion time and, designed in graphics or chart form to facilitate easy tracking of the tasks according to PMBOK (2008). Activities are represented by arrows, Nodes or circles are the starting and ending points of activities (PMBOK, 2008). CPM too harbors advantages as well as inadvertently nurtures disadvantages. The weakness of (CPM) can only show finish to start dependencies.

The Advantages of Implementation CPM

- i. The charting in a CPM also enables the managers to determine start time, end time, slack time and float time associated with each activity of the project.
- ii. Assist project managers to construct a team and generate human network for efficient handling of a multitasked project.
- iii. Help to estimate exact time and to monitor the direct and indirect costs associated with the project.
- iv. Charting in a CPM makes it easier to handle delays and critic the outcome of a task, assists the managers in decision making to address the issue quickly.

The Disadvantages of Implementation CPM

- i. In a big project, a CPM can become extremely complicated and difficult to fathom for the new recruits to the project team.
- ii. If the project is too bulky and lengthy, CPM requires software to monitor plan.
- iii. The allocation of resources cannot be properly monitored.
- iv. The critical path of the CPM of a big project is not always clear. The project managers have to spend a lot of time to calculate it carefully.

2.9.4 Precedence Diagramming Method (PDM)

PMBOK (2008) stated that, PDM is a method of constructing a project schedule network diagram. The Activities are represented by boxes and arrows show relationships between activities, popular better than CPM method because better at showing different types of dependencies and used by project management software. Its can link the task by defining dependence between there start to finish, finish to start, start to start and finish to finish

2.9.5 Program Evaluation and Review Technique (PERT)

BSI (2013) stated that Program Evaluation and Review Technique (PERT) is best for estimate duration for each activity of the project, PERT is a network analysis technique used to estimate project duration when there is a high degree of uncertainty about the individual activity duration estimates. PERT uses algebra mathematical calculation and by taking consideration probabilistic time estimates based on using optimistic, most likely, and pessimistic estimates of activity durations (BSI, 2013).

Then using critical path method or PDM establish network diagram based upon established data, and Forward pass and backward pass for calculations of early start dates and late start finish dates, Total float and project critical path (BIS, 2013).

PERT offers the following advantages over the CPA method. These include Provides a weighted estimate of the completion time, taking into account optimism, actual experience and a pessimistic view, can provide a probability of completing before a given date. It tends to underestimate project completion time, especially if delays cause the critical path to shift around.

2.9.6 Gantt charts

Gantt charts provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format or graphic display to add more reality to the project timing according to Petersen (2013). In the typical bar chart, schedule activities or work breakdown structure components are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars (Petersen, 2013). Petersen, (2013) further stated that, the advantages of using Gantt chart are, they give a very quick visual view to what should be happening at any stage in the project and Shows how long a project should take for completion Resources required for tasks can be linked to the tasks on the chart. Disadvantages using Gantt chart are they too simplistic do not provide enough detailed manageable information for complex projects, and must be estimated the time before the chart completed while also difficult show Critical paths of project according to Petersen, (2013).

2.9.7 Time Chainage Chart

Qureshi R. (2014) explain Time Chainage Chart as a method of showing planned, forecast or actual progress in chart form using distance (or chain age) on the horizontal axis and time on the vertical axis. Unlike bar charts (Gantt Charts), they revealed that, time chain age charts show location and 'rates' of progress in addition to start and end dates. This makes time chain age charts enormously useful when planning or examining a construction project. Also known as time-location charts and time -distance charts. Time chain age charts are frequently used on linear construction projects such as roads, pipelines and tunnels, railways.

2.9.8 Line of Balance Charts

According to Qureshi R. (2014), A line-of-balance chart is an extension of the Gantt chart used for project having repetitive tasks such as Housing project. This type of programme

allows the different rates of productivity of parts of an activity to be modeled, depending on its location on site or the period of year when the activity is carried out (2013).

“The Advantages of Line of Balance is clearly shows the amount of work at a specific time of the project and optimize the resources used for large number of repeated activities, superior presentation and visualization, Easier to modify and better managing of all the various sub-contractors on project (Qureshi R. 2014). The disadvantages are Inability to generate a clear critical path of the project schedule, relative to the one provided by CPM schedules. And Productivity rates in LOB schedule do not include the effect of crews learning curve, or if the individuals working in the crews changed (Qureshi R. 2014).

2.9.9 S-Curves

The S-Curve – represents the various expenditures of resources over the projected time of the project or as a means of charting the real-time expenditure of resources. According Darnal (2012) S-Curve Can be used to monitor the project as it progresses and compare it to the projected S-Curve to determine whether or the project is being completed within the time and budget limitations.

2.10.10 Earned value analysis (EVA)

Earned value analysis (EVA) is a very important tool for measure cost performance and cost control” according to Chowdhury, (2013). EVA is a method of comparing the budgeted cost of work scheduled (BCWS), planed value (PV) as base line and Budgeted Cost of Work Performed (BCWP), actual costs (AC) of a project periodically during the project. This will give result if project meet cost performance whether the project over spent or low spent. The technique also can estimate forecast the future cost to complete the project there is need for organization or company to have earned value management system (Darnal & Prestone, 2012).

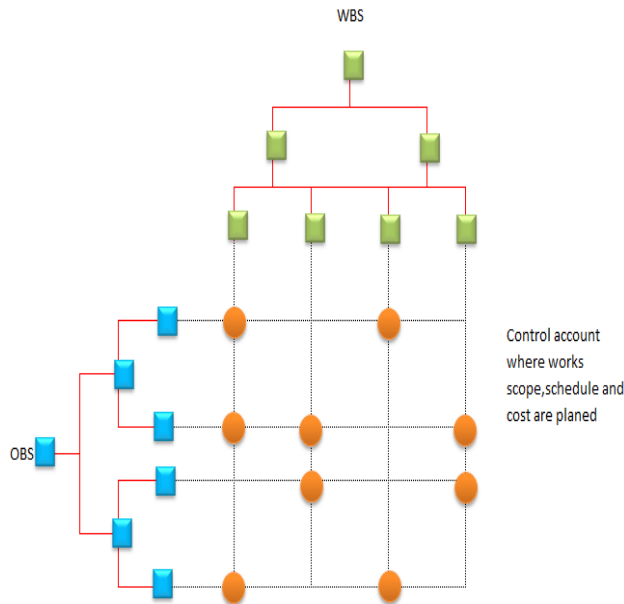


Figure 2.2: Show the OBS & WBS

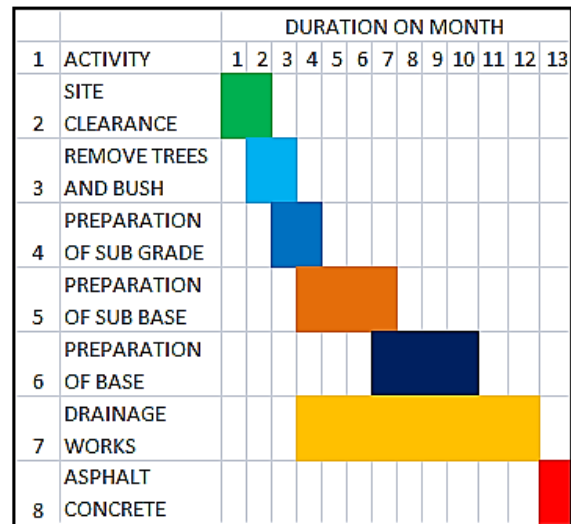


Figure 2.3: Show the Gant Chart

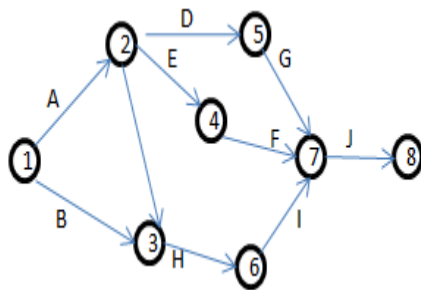


Figure 2.4: Show the CPM

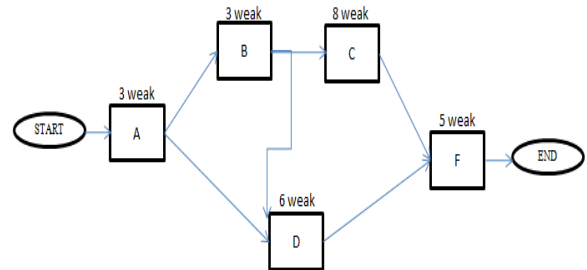


Figure 2.5: Show the PDM

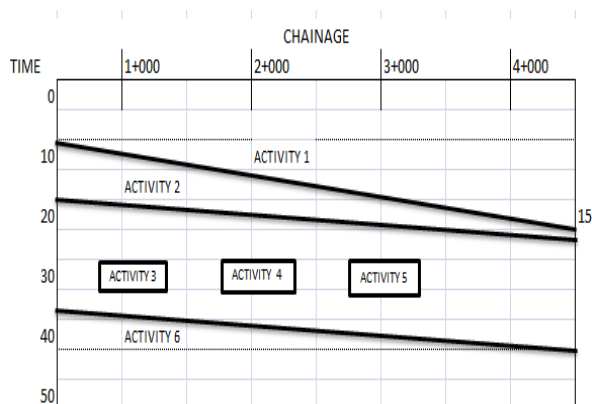


Figure 2.6: Show the Time Chain age Chart

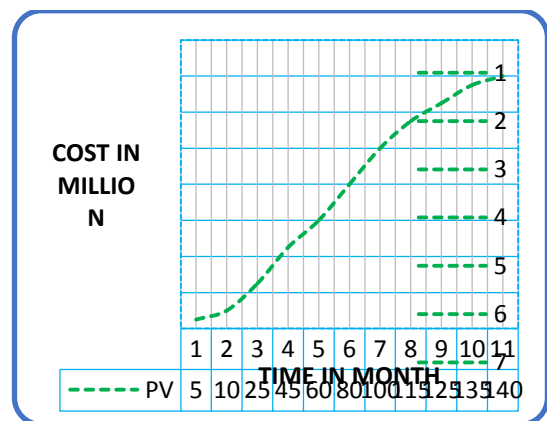


Figure 2.7: Show the S Curve

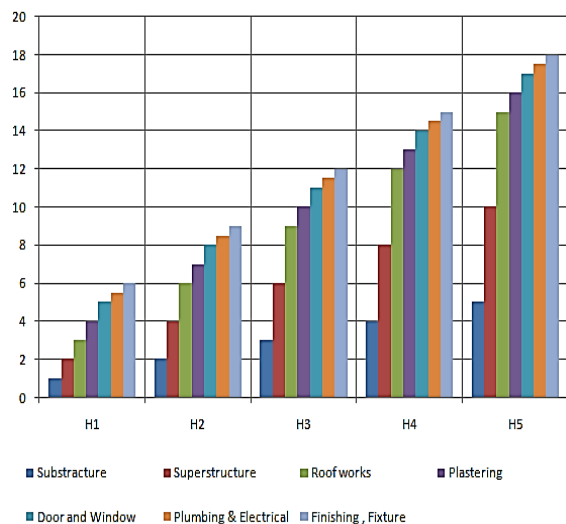


Figure 2.8: Show the Line of Balance Charts

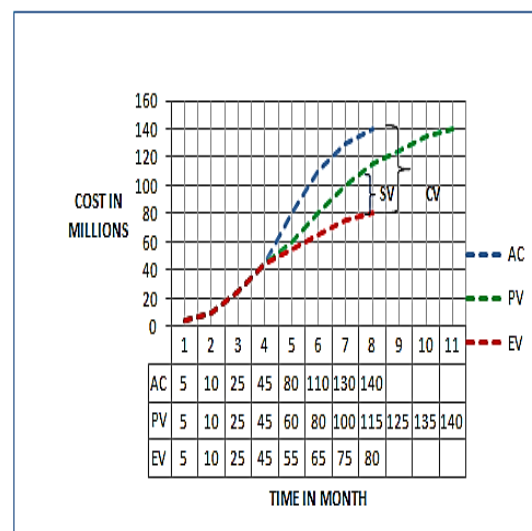


Figure 2.9: Show the Gantt Chart

2.11 Construction performance measure using Earned Value Technique

There are many Project monitoring and control techniques such as Earned value management (EVM), Line of Balance (LOB), Time chain age Technique, Work Breakdown Structure (WBS), Program Evaluation and Review Technique (PERT) according to PMBOK (2012) etc. However, EVM is one of the most popular techniques with the widest use in construction projects because of its ability to measure project performance and progress in an objective manner by measuring scope, schedule, and cost in a single integrated system (Dalibi, 2016). EVM is notable for its ability to provide accurate forecasts of project performance problems due to its significant impact on the areas of Project planning and control; and similarly, using the methodology improves both scope definition as well as the analysis of overall project performance. Performances of projects are measure though outlook the key performance indicators (Darnal & Prestone, 2012). Whenever three key parameter of the project is properly recorded on project phase, the earned value technique can able to evaluate the project performance (scope, schedule and budget performance), by comparing the value of the budgeted cost of work performed (earned) at the original allocated budget amount to both the budgeted cost of work scheduled (planned) and to the actual cost of work performed

(actual). This technique is especially useful for cost control, resource management, and production (PMBOK, 2008)

2.12 Conceptual Framework

Miles (1994) defines a conceptual framework as a visual or written product, one that explains, either graphically or in narrative form, the main things to be studied, the study will attempt to assess the level of awareness EVM, also determine factors which hinder or enhance application of EVMS in management practices at the MMDAS and finally, to identify challenges and problems inherent in the application process of EVM among MMDAS. Using EVA as the independent variables, while the performance of EVMS is the dependent variable with its Best for measure progress of project.

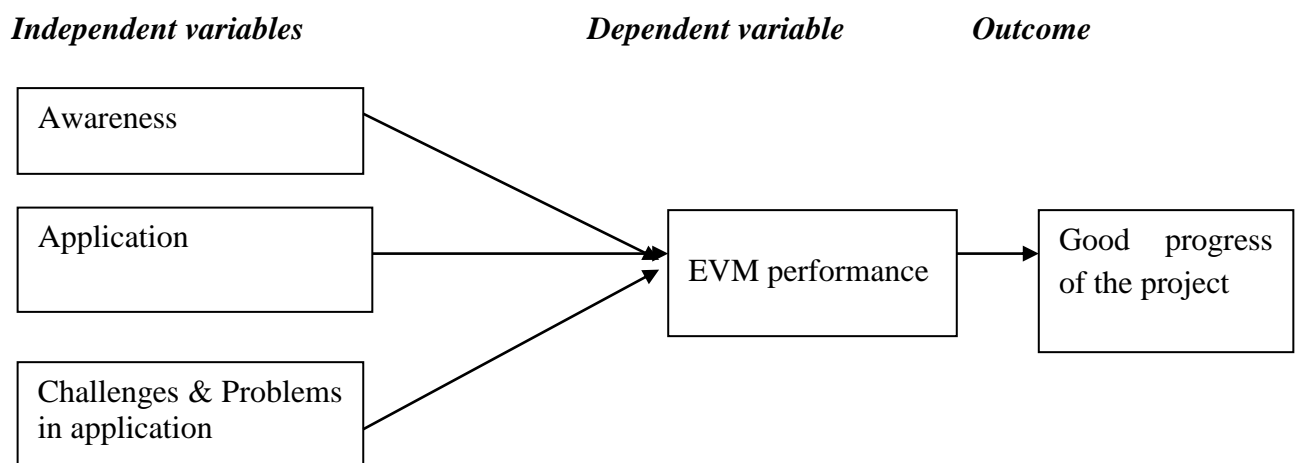


Figure 2.10: Conceptual Framework Model-independent and dependent variable

2.11 Research gap

However, despite all of the knowledge on EVM that can be learnt from the literature. None of these studies focused on the Earned Value Management practices in the Ghanaian construction industry. Therefore, it is found to be no documented EVM implementation in Hohoe construction projects. The lack of researches may discourage EVM awareness and its utilization by the construction professionals and practitioners.

Therefore all the literature is said to be from the foreign countries and most of it discussed about Earned Value Management awareness into Qualitative justification but this study will go further on quantitative approach. For that reason, this study sought to fill the gap of lack of literature and research gap by assessing the Application of Earned Value Management practices for Construction Project Performance Measure in the Hohoe municipal assemble in the Volta region of Ghana. It is believed that the application of EVM in construction projects will result in effective project monitoring and control (Hunter, et. al., 2014).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The section discussed the method used to undertake this study, it includes the study design, population, sample size, sampling technique, study area, data collection etc. it also includes method of data analysis procedures.

3.2 Research Design

The study design is purposely to establish the linkage between data gathering to conclusion of the study to make sure that, the research question or hypothesis and result is adequate and proper recommendations for making operational decision about the problem. There are various types of research design, depending upon the aims of the research (Creswell, 2014). The study adopted survey design.

3.2.1 Survey Research design

According to Maggi (2015) Survey Research design is a valuable tool for assessing opinions and trend, often it's easy, accessible information and data can be collected more than one cases at single point in time for collective both qualitative and quantitative approaches cross sectional survey was adopted for the study. On this consideration cross-sectional survey was used which in line with objective one and two. The data was collected by distributing research questionnaires to respondent by the researcher and interviewing all professionals, expertise who work on construction projects within the Hohoe municipality.

3.2.2 Case study

Case study is the field in depth study, is best method for testing weather the models, formula can be applied to the phenomena and give accurate results according to Magigi, (2015). This choice is also in line with the research objective number three. The four selected ongoing

projects will be taken as sample for case study. The projects include, class room block, Chips compound, Art and Culture center etc.

3.3 Area of the Study

The current study used the Hohoe Municipality as the study area. Hohoe Municipal is one of the 260 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana, and forms part of the 18 of Municipalities and Districts in the Volta Region GOV report (2010).

Hohoe Municipal situated in the middle of the Volta Region which has a total land area of 1,172km², which is 5.6 percent of the land area of the region. It is located in longitude 00 15'E and 00 45'E and latitude 6o 45'N and 7o 15'N and lies almost in the heart of region" according to Census report (2010). The Administrative Capital of the Municipality is Hohoe.

The Municipality Shares boundaries with Afadjato District to the north, to the south with South Dayi District, Ho Municipal and Ho West District respectively, to the east with the Republic of Togo and to the west with Kpando Municipal GoV report (2014).

3.4 Population

In any ground of investigation there is a need to constitute population. An absolute record of all the substance in the population is known as a census. A population refers to whole group of people, events or elements of interest that a researcher desires to study according to Kothari, (2014). The category and number of respondents were chosen based on importance and wide range to provide credible and valid data and other information required by researcher.

3.5 Sampling design

3.5.1 Sample Size

A sample is a small subset of the population which was chosen for study according to Kothari (2014). Maggi (2015) opined that, because of timeframe, cost and human resources and to have in-depth insight of the study phenomena the sample size considered to be small. The sample size was determining by using the formula below. Morris, (2014) proposes the formula below for the determination of sample size (n) Where N is population size, Z is the level of confidence (1 - α), if assumed the level of confidence is 95% value for Z is 1.96, the acceptable sampling error (E) will be 5%, p and q are the population proportion set each 0.5 according to Magigi, (2015).

$$n = \frac{NZ^2 pq}{(E^2(N-1) + Z^2 pq)}$$

Table 3.1: Sample of four construction projects for analysis

S/N	Project name
1	Construction of 1no. CHPS Compound with ancillary facilities at likpe Koforidua.
2	Construction of 1no. Two storey Art and Culture center at Hohoe
3	Construction of 1no. Two storey 6 unit classroom block at hohoe Adabraka Is. sch
4	Construction of 1no. 3 unit classroom Block at Hohoe experimental primary sch.

3.5.2 Sample Technique

Samples techniques can be either probability samples or non-probability samples while the probability every element has chance being included in the sample, the non-probability samples do not give every respondent the chance of being selected (Kothari, 2004). The study made use of non-probability sampling technique for the selection of respondents.

3.6 Data Collection Sources and Techniques

Generally, there are two sources of collecting the data Primary and secondary.

3.6.1 Primary data

Primary data refers to the original data collected by the researcher for the first time from the field that includes opinions of people interviewed and observations the behavior Creswell, (2014). The current study employed primary data collected from field through interview respondent through self-administered Questionnaires and sending to the respondent.

3.6.1.1 Questionnaires

The Questionnaires is designed to reflect the current capacity to answer the objective of the research (Kothari, 2014). Self-administered semi structured questionnaire was used as the research instrument. A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms (Kothari, 2014). The self-administered questionnaires cover the advantage of being flexible and hold both open and closed-ended question for gathering comprehensively information to ensure relevancy and consistency according to Creswell (2014).

3.7 Reliability and Validity

Reliability of measuring instrument is defined as the ability for measuring instrument to provide the same or consistent results and total representation of the population under the study according to Maggi (2015). If the results of the study can be produced under a similar methodology the research instrument is considered to be reliable. The questionnaires also reviewed by the research supervisor for correction and distributed. This detail explanation enhances the capability for other researcher to replicate this study and for the same condition with comparable result.

Validity of Data Collection Instruments

Validity refers to the ability of an instrument to measure what it has set out to measure, the data need not only to be reliable but also true and accurate” according to Magigi, (2015). Sekaran & Bougie (2009) explain Validity as the degree to which the researcher has measures used in the questionnaire are adequate and reflect the objective and truthfully measuring the intended concept under consideration and not something else. The study made use of construct validity and content validity. Content validity refers to the level that the instrument covers the content that it is hypothetical to measure as explained by Yaghmaie, (2003).

3.8 Data Analysis

Upon carrying out of data collection on both phase surveying and case study the processing and analysis of data take place Sekaran (2003). According to Cooper & Schindler (2011) Data analysis employ dipping accumulated data a convenient size, emergent summaries, looking for patterns and applying statistical techniques while data preparation includes editing, coding, and data entry and it’s movement that ensures the correctness of the data for study. The researcher used Microsoft excel and SPSS version 17 as data analysis tools.

CHAPTER FOUR

PRESENTATION OF RESULT

4.1 Introduction

The chapter presents the result from data analysis with discussion of the various findings emerging from the study in relation to the research object of the study.

4.2 Demographic Characteristics of Respondents

4.2.1 Educational status of respondents

The educational status of respondents are presented in table (4.1) below.

Table 4.1: Educational status of respondents

Level of education	Frequency	Percentage
Diploma	13	19.4
Degree	50	74.6
Master	4	6.0
Others	0	0.0
Total	67	100

Source: field survey, 2019

Table 4.1 above indicates respondent's educational status. The table shows that, most of the respondents from the study were diploma holders which represented about 19.4% of the study population, whereas respondents with first degree were 74.6% of the study population, also about 6.0% the respondents were said to possess a Master degree.

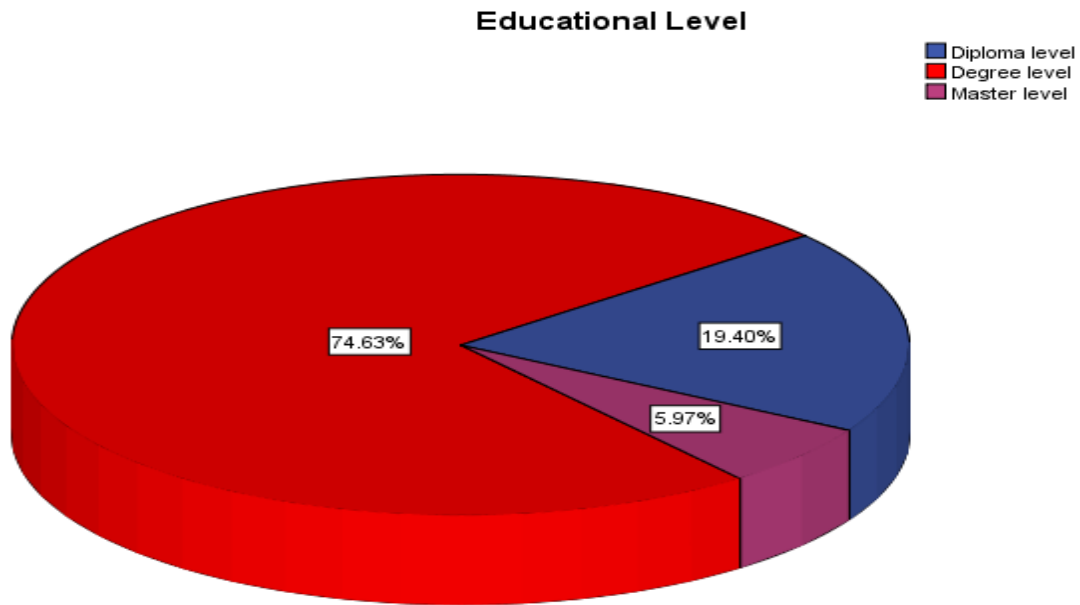


Figure 3.1: Pie chart showing respondents educational status.

Source: Field survey, 2019

4.2.2 Functional role of respondents

Respondents were task to provide their functional role at their various offices and departments. Table 4.2 gives details of respondents functional roles.

Table 4.2: Functional roles of respondents

Functional role	Frequency	Percentage
Project manager	19	28.4
Engineer	19	28.4
Architect	12	17.9
Quantity surveyor	16	23.9
Others	1	1.5
Total	67	100

Source: field survey, 2019

Table 4.2, above display the functional roles of respondents in their various offices. It shows that, about 23.9% of the respondents were Quantity surveyors, whereas Project managers and

Engineers were each 28.4% of the study population respectively. Also 17.9% of the study population were Architects with 1.5% representing other professionals other than the aforementioned.

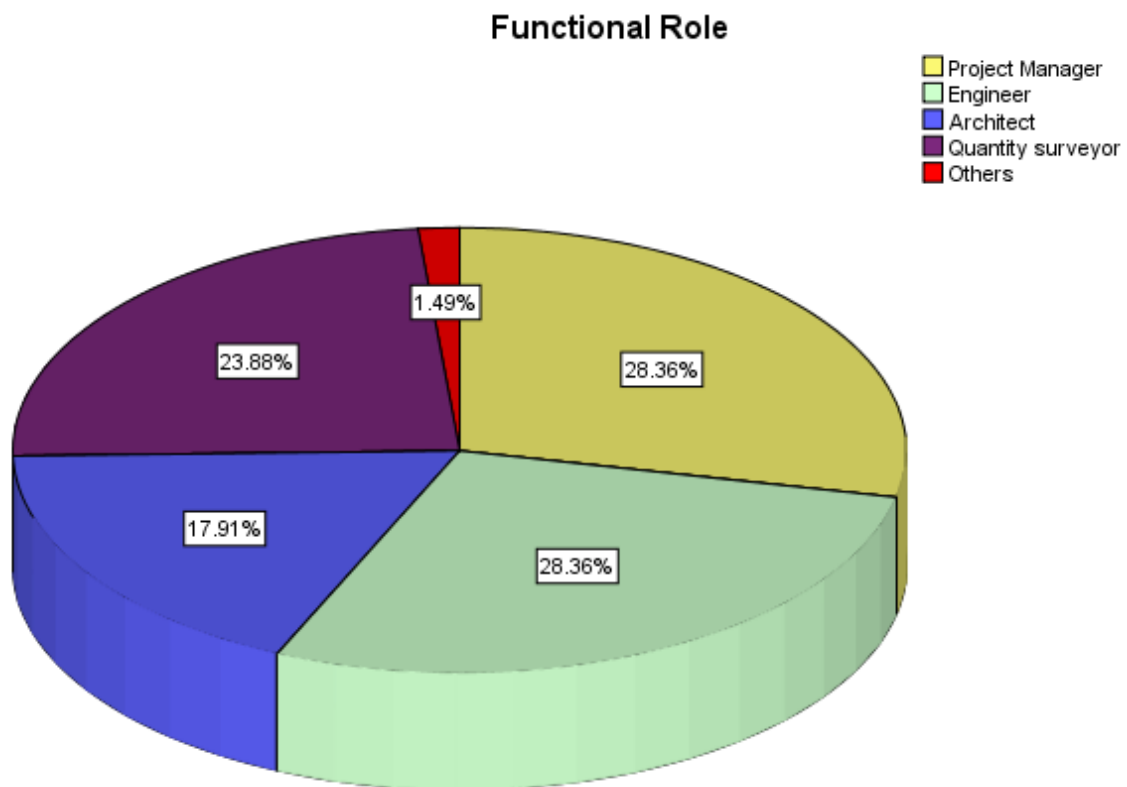


Figure 3.2: Shows pie chart of the functional representation of respondents.

Source: field survey, 2019

4.2.3 Work Experience of Respondents

The experience of respondents were measured considering the number of years they have served at their various positions. Table 4.3 present the result of respondents experience from the field survey

Table 4.3: Work Experience of Respondents

Respondents experience in years	Frequency	Percentage
1-3years	20	29.9
4-6years	27	40.3
7-10years	13	19.4
Above 10years	7	10.4
Total	67	100

Source: field survey, 2019

Table 4.3 above shows respondent's years of experience at their various positions at work. It is palpable that, most of the respondents have worked at their various roles for more than 4 years. About 29.9% of the respondents had a working experience between 1-3 years, with 10.4% having over 10years working experience. Also 40.3% were said to have about 4-6 years of experience at their various positions and respondents who have worked for 7-10 years represented some 19.4% of the study population. Figure 3.3 below shows a bar chart of respondents work experience

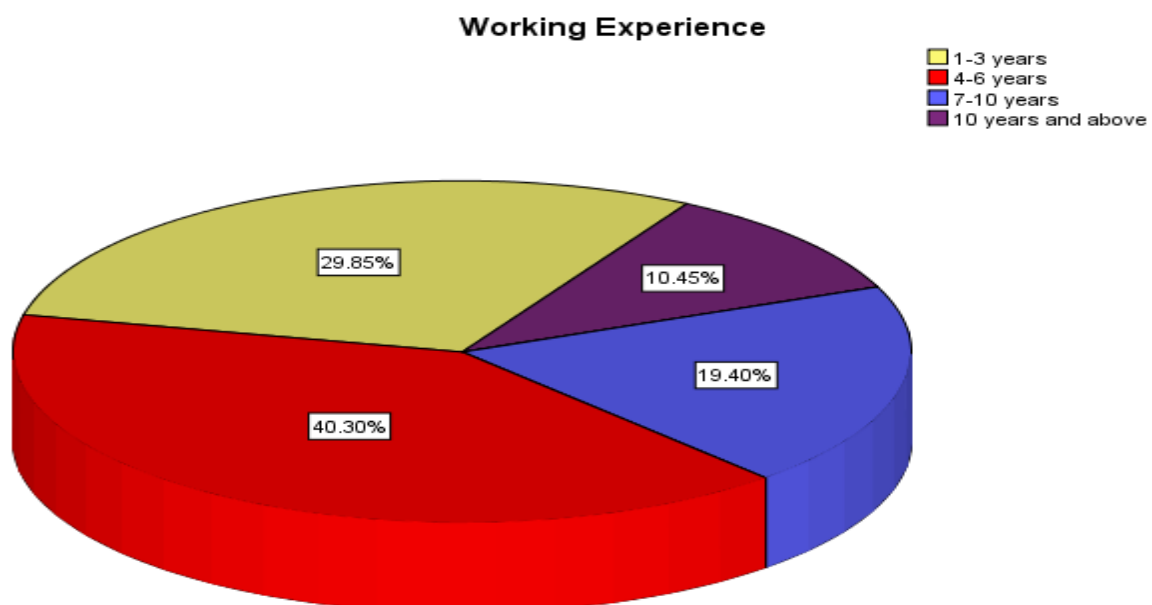


Figure 3.3: shows a pie chart of respondents work experience

Source: field survey, 2019

4.3 Further analysis

The study set out to investigate Earned Value Management Practices in the District Assemblies, specifically, the study had three research objectives, first and foremost the study was to assess the level of awareness of earned value practice among MMDA'S, secondly, the study also seeks to identify other project management tools used by MMDA'S aside EVM, and finally, the researcher wished to identify the problems and challenges hinders the application process of EVM among MMDA'S in Ghana.

4.3.1 Assessing the level of awareness of earned value practice among MMDA'S

The first research objective was to determine the level of awareness of earned value management practice as a project management tool among the District Assemblies. The tables below present the result of respondent's awareness level of earned value management practice among workers of the Hohoe municipal assembly.

Table 4.4: respondent's level of awareness of earned value management practice

Item	Response	Frequency	Percentage
Are you aware of Earned Value Management	YES	10	14.9
System? (Terms, methodology tool applied, & objective of Earned value)	NO	57	85.1
Total		67	100

Source: Field Survey, 2019

It is obvious from table (4a) that, respondents were very emphatic on their level of awareness of earned value management practice at the Hohoe municipal assembly. Majority of the respondents responded "No" to the question whether or not they were aware of earned value management system (terms, methodology tool applied and objective of earned value) at the municipal assemble representing about 85.1% of the entire sampled population. Very few of

the respondents were of aware of the earned value management system and practice representing about 14.9% of the sampled population. The predominant reasons for their non-awareness of this important project management tool were varied which is presented in the following tables below.

Table 4.5: Lack of training on EVMS.

Items	Frequency	Percentage
Strongly disagree	0	0.0
Somehow Disagree	2	2.98
Neutral	0	0.0
Somehow Agree	7	10.45
Strongly agree	58	86.57
Total	67	100

Source: field survey, 2019

table (4.5) shows that, majority of the respondents representing about 86.57% indicated lack of training on the application of EVMS at the municipal level is the main reason why they are not aware of such an important project management tool, another 10.45% of the respondents however, indicated they somehow agree to the assertion with very few respondents somehow disagree to the assertion which represented only 2.98% of the sampled population.

Table 4.6: EVMS is not a building regulation in Ghana.

Items	Frequency	Percentage
Strongly disagree	1	1.49
Somehow Disagree	1	1.49
Neutral	1	1.49
Somehow Agree	7	10.45
Strongly agree	57	85.07
Total	67	100

Source: field survey, 2019

On whether or not the lack of awareness of earned value management practice is due to EVMS not being a compulsory building regulatory management tool in Ghana, table (4.6) majority of the respondents representing 85.07% stated they strongly agree to that assertion indicating that, until it becomes a compulsory tool for project management MMDA'S will continue to ignore it by using tools they are very familiar with. Also another 10.45% of the sampled population indicated they somehow agree with assertion. Very few respondents however revealed that, they are either neutral, somehow disagree or strongly disagree with the assertion.

Table 4.7: Lack of formal education on EVMS.

Items	Frequency	Percentage
Strongly disagree	0	0.0
Somewhat Disagree	1	1.49
Neutral	0	0.0
Somewhat Agree	10	14.93
Strongly agree	56	83.58
Total	67	100

Source: field survey, 2019

The last reason that seem to hinder respondent's awareness level of EVMS at the Hohoe municipal assembly is due to staff lack of formal education on the implementation and application of EVMS. Table (4.7) shows that, about 83.58% indicated they strongly agree with the assertion that, lack of formal education on how EVMS works was a major reason why they were not aware of such an important project management tool. Some respondents also stated that, they somehow agree to the assertion with less than 2% stating that, they were somehow in disagreement with the assertion.

4.3.2 Other project management tools used by MMDAS aside EVMS

The second research objective this study was to identify a possible different project management tool employed by the MMDA'S to manage the project at the district assembly level aside earned value management systems (EVMS). The researcher used important index rating (IIR) to rank the most preferred project management tool aside EVMS among the district assemblies. The table below illustrate the result from analysis.

Table 4.8: Other project management tools used by MMDA'S aside EVMS

Project management tools	Important index rate (IIR)	Rank
Work breakdown structure (WBS)	98.2%	1 ST
Line of Balance (LOB)	89.5%	2 ND
Time chain age Technique	72.9%	3 RD
Program Evaluation and Review Technique (PERT)	69.1%	4 TH

Source: Field Survey, 2019

From the table above, respondents ranked Work breakdown structure (WBS) first with an Relative Important Index (RII) of 98.2%, this is obvious preference meaning almost all respondents are familiar with this project management tool over EVMS. Work Breakdown Structure (WBS) was followed by Line of Balance (LOB) project management tool which was ranked second with an Relative Important Index (RII) of 89.5%, which implies that, if respondents are given the opportunity to choose between LOB and EVMS there is a likelihood that each respondent will choose LOB 89.5% times as compare to EVMS. The third ranked project management tool over EVMS is the Time chain age Technique with an Relative Important Index (RII) of 72.9% and forth preferred project management tool over EVMS is said to be Program Evaluation and Review Technique (PERT) with an Relative Important Index (RII) of 69.1%. Generally, respondents demonstrated adequate knowledge on the usage of Work Breakdown Structure (WBS) over EVMS with the conviction that, WBS was more convenient to use compare to EVMS and all other project management tools. Some respondents however, revealed that the lack of expertise couple with the assembly's inadequate resources accounts for their choice of WBS over EVMS.

4.3.3 Challenges and problems that hinders the application process of EVM among MMDA'S

The last research objective is to identify challenges and problems hindering the application process of EVM among the MMDA'S. The researcher once again used the Relative Important Index (RII)to ranked the identified factors from literature that are said to be a stumbling block on the implementation and application of EVMS to manage construction projects among the district assemblies. The table below illustrate the result from analysed data.

Table 4.9: Challenges and problems hindering the application process of EVM among MMDA'S

Factors	Rank
Lack of expertise and experience	1 ST
Political interference	2 ND
Level of professionalism	3 RD
Corruption	4 TH
Regulation and industrial standards	5 TH
Lack of top management support	6 TH
Poor financial planning	7 TH
Poor time estimation and management	8 TH
Market force (Inflation)	9 TH
Client capacity and expectation	10 TH

Source: Field Survey, 2019

According to Okoye et, al. (2015) challenges facing project management is an evergreen problem that needs serious steps to solving them, they further argue that, One of the factors that account for project failure is “the project sponsor dictate the project manager” and hence

suggested that, to finish the project by certain time, budget and get a magnitude of scope while achieving a specified performance level is the need to employ a better project management tool such as EVMS. However, this assertion is not the case in most of the municipal and district assemblies across the country. The researchers' interest to identify the factors that hinders the implementation and practice of EVMS among the district assemblies revealed the above. The lack of expertise and experience of staff at the district assemblies is ranked first with an important index rate of 98.5% which implies that when respondents are asked to state the factors hindering the application of EVMS there is a likelihood that, each respondent will 98.5% chose "lack of expertise and experience" as hindering factor to the successful implementation and application of EVMS. This factor was followed by political interference with an Relative Important Index (RII) of 90.1%, this is no surprising for once since every sector of economy seem to politicized, respondents indicated that politicians decides how projects are managed or run at the municipal and district level with very little consideration of professionalism and project management ethics and values hence are very determine to prevent the implementation of any project management tool that will compel them to do the right thing or observe project management principles. The level of professionalism was the third factor that hinders the application of earned value management practice at the municipal and district assemblies with an IIR of 89.6%

The fourth factor that hinders the successful application of EVMS is said to be corruption with an Relative Important Index (RII) of 83.4%, corruption has become a canker in this part of the world with important project been hindered by this disease. Respondents lament that, their superiors will never agree to the application of any potential project management tool that will expose them of their corrupt practices. Other factors mentioned by respondents with significant IIR was Regulation and industrial standards, Lack of top management support,

Poor financial planning, Poor financial planning, Market force (Inflation), and Client capacity and expectation ranked 5th, 6th, 7th, 8th, 9th, and 10th respectively.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1 Introduction

This chapter presents the summary, conclusions and recommendations of the application of earned value management practices for construction projects in the district and municipal assemblies (MMDA'S) in Ghana

5.2 Summary of Findings

The main purpose of this study was to assess the application of earned value management practice for construction projects among the district and municipal assemblies in Ghana. Specifically, the study sake to investigate the level of awareness of earned value practice among MMDA'S, secondly, to identify other project management tools used by the MMDA'S aside EVM and finally, to identify challenges and problems that hinders the application process of EVM among MMDA'S.

Table (4a) revealed that, majority of the respondents were not aware of the application of earned value management practice as a project management tool representing 85.1% of the sampled population. This emphatic level of unawareness was attributed to several factors ranging from lack of training on the application of EVMS by the municipal assemblies to lack of formal education on EVM. About 86.57% indicated that, lack of the training on the application of EVMS at the municipal level is the main reason why they are not aware of such an important project management tool. In addition, EVMS not being a compulsory building regulatory management tool in Ghana has contributed significantly to their low level of awareness which constituted about 85.07% of the sampled population. Some 83.58% of

the respondents also strongly agree to the assertion that, lack of formal education on the application of EVM could contribute to their low level of awareness shown in table (4.3.1.3).

To determine other project management tools used aside EVMS by the municipal assemblies, the researcher employed Relative Important Index (RII) method to rank the various project management tools identified in available literature. Work breakdown structure (WBS) was ranked first (1st) with an IIR of 98.2% this implied that, if respondents were given the chance to use a familiar project management tool the likelihood that a respondent would have repeatedly used WBS is 98.2%. It is obvious that almost all respondents were very familiar with this project management tool. The second most familiar project management tool was the Line of Balance (LOB) with an IIR of 89.5% as shown in table (4.3.2), this was followed by the Time chain age Technique with an important index rate of 72.9% etc. generally, respondents demonstrated adequate knowledge on the usage of WBS over EVM with the conviction that, WBS was more convenient to use compare to EVMS. Nonetheless, respondents revealed that, lack of expertise couple with the assembly's inadequate resources account for their choice of WBS over EVMS.

The final objective of the study was to identify the challenges that hinders the application of earned value management practice at the municipal and district assembly level for project management. From table (4.3.3), the findings revealed that, lack of expertise and experience by staff members is the leading challenge of earned value management practice among district and municipal assemblies with an IIR of 98.5%. Respondents argued that, for EVMS to succeed, staff would need to undergo serious training to equip themselves with the knowledge since they have no expertise or experience in the management tool. the second challenge revealed from the study is political interference with an IIR of 90.1%, respondents were very emphatic about this challenge, stating that, politicians decides how projects are

management or run at the municipal level with very little consideration of professionalism and project management ethics and values and so therefore are determine to prevent the implementation of any project management tool that will compel them to do the right thing. The level of professionalism was the third factor that hinders the application of the earned value management practice with an IIR of 89.6%.

The fourth factor that hinders the successful application of EVMS is said to be corruption with an Relative Important Index (RII)of 83.4%, corruption has become a canker in this part of the world with important project been hindered by this disease. Respondents lament that, their superiors will never agree to the application of any potential project management tool that will expose them of their corrupt practices. Other factors mentioned by respondents with significant IIR was Regulation and industrial standards, Lack of top management support, Poor financial planning, Poor financial planning, Market force (Inflation), and Client capacity and expectation ranked 5th, 6th, 7th, 8th, 9th, and 10th respectively.

5.3 Conclusion

The ultimate aim of every project management team is to reduce cost and maximize profit and hence the need to employ a project management tool that will help to achieve this important goal. According to PMBOOK (2008), “project management is the application of knowledge, skills, tool, and techniques to project activities to achieve project requirement”. The key determinant of project performance in the construction industry is therefore an appropriate set of key performance indicators (KPIs) so as to enable stakeholders monitor the industry progress towards achieving its goals. Literature has proposed a variety of project management tools that can be used for effective project management, the focus of the study was however, on how Municipal and District Assemblies apply Earned Value Management System (EVMS) into their Project Management practice. Earned value analysis (EVA) is an

important tool for measuring cost performance and cost control. (Chowdhury, 2013). “EVA is a method of comparing the budgeted cost of work scheduled (BCWS), planed value (PV) as base line and Budgeted Cost of Work Performed (BCWP), actual costs (AC) of a project periodically during the project. Chowdhury (2013) argued that EVA was one of the very effective and most popular project management tools across the globe”, interestingly however findings from this recent study showed otherwise in the Ghanaian parlance where respondents generally indicated their low levels of awareness of the EVM project management tool instead they revealed that, the very common PM tool that they are familiar with is the Work breakdown structure (WBS).

The various challenges that hinders the application of an effective project management tools ranges from lack of expertise, political interference to corruption among others as opined by Qureshi R. (2014), the recent study confirms these findings where respondent from the study were very emphatic about the challenges facing the application process of project management tools. They ranked “lack of expertise and experience” as the first and most pressing challenge facing the assemblies on the application of PM tools, this followed by “political interference” and “corruption” respectively. Based on the findings from this current study, the researcher seeks to recommend below for stakeholders and further studies on the subject matter.

5.4 RECOMMENDATION

- i. Municipal and District Assemblies should institute a training program or course to train their staff on the effective implementation and application of Earned Value management systems.

- ii. Efforts should be made to abandoned political infiltration into project management at MMDA'S to help them implement effective project management tools that will ensure value for money on every government project commissioned.
- iii. The researcher recommends a comparative study of private and government sector application and adoption process of EVM in Ghana.

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APPENDIX

SECTION A

(Background Information)

This section seeks to explore respondent's demographic characteristics.

1. Marital status: Married [], Single [], Divorced [],
Other (specify)
2. Religious status: Christian [] Muslem [] Pagan [] Traditional worshiper []
Others specify.....
3. What is your education level? Diploma level [] Degree level [] Master level. []
PhD level [] others (specify).....
4. What is your function role? Project manager [] Engineer [] Architect [] Quantity
surveyor [] other (pls mention)
5. Please state your working experience. 1- 3years [] 3- 6 years [] 6- 10 years [] 10
years and above []

BI. Level of awareness						
Are you aware of Earned Value Management System? (Terms, methodology tools applied and objective of Earned value).		<input type="checkbox"/> Yes				
		<input type="checkbox"/> No (Please go to question 2)				
		<input type="checkbox"/> Not sure (Please go to question 2)				
1	If your Answer is yes please answer the following according to your opinion (please provide your answer based on a scale of (1 to 5))	Strongly 5	somewhat agree 4	Neutral 3	somewhat disagree 2	strongly disagree 1
	a. I was well equipped with EVMS information through formal training					
	b. EVMS is part of the Building Regulations					
	c. I have written Personal Research on EVMS					
	d. I have learnt EVMS through Media Articles					
	e. I am well equipped with EVMS information through formal education					
	f. I am following orders from my manager to use EVMS					
	g. I am following orders from my clients to use EVMS					
2	If your Answer is no or not sure please answer the following according to your opinion (please provide your answer based on a scale of (1 to 5))	Strongly 5	somewhat agree 4	Neutral 3	somewhat disagree 2	strongly disagree 1
	a. I was not given any training on EVMS					
	b. EVMS is not a building regulation in our country					
	c. I was not taught EVMS in a formal education					
	d. I am never instructed to use EVMS neither with my Co-Workers nor client					
	e. I have not written a Research paper on EVMS					
	f. I have not learnt anything about EVMS through Media Articles					

SECTION B

Assessing the level of awareness of earned value practice among MMDAS

The purpose of this section is to examine the level of awareness and knowledge of officers at the Hohoe Municipal Assembly on the application of Earned Value Management Practices for construction projects in the municipal assembly.

Level of knowledge and skill						
By your assessment what is the level of skill / knowledge by the project team who supervises and participates on project management at the Assembly. please provide your answer based on a scale of (1 to 5) for the following statement		Very high	high	Moderate	Low	Don't know
		5	4	3	2	1
1	Project team understands the objective of the projects they are participating or undertaking					
2	The project team clearly defines and understand scope of works on project					
3	Project manager assigns responsibility for each person for implementation of the particular task on a project					
4	Project team Estimates costs for resources					
5	The project team establish project schedule and cost baselines					
6	Project team is responsible for the calculation of performance analysis for schedule and cost variances from these baselines for more decision marking					
7	Project team does Calculation for performance review (rebase line) on schedule and budget if the project is not finished on schedule and budget as planned before.					
8	Understanding of Work break down structure (WBS). Is it a best tool for scoping, improve task and cost breakdown, resulting in better accountability					
9	The organizational break down structure is the primary tools used by the project manager for forming the project team					
10	Understanding the use of Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Time Chain age Chart and line of balance are the tools used for estimating duration for completion of the works.					
11	Understanding Bottom-up is the most accurate engineering technique for cost estimating method. Estimate individual work items and sum them to get a total estimate. Did the project team employ the use of it?					
12	Understand the use of different Project Management Software					

SECTION C

Other project management tools used by MMDAS aside EVM

This section seeks to identify other management tools used by MMDAS aside EVM.

1. Does the assembly uses any other performance management tool aside EVMS?

YES ☐ NO ☐

2. If “YES” to question (1) which of the following could be the reason for the Assembly’s decision. A) Convenience sake ☐ B) lack of technical expertise ☐ C) Inadequate Resource for implementation of EVMS D) Others (specify).....

3. If “NO” to question (1), how will you rate EVMS? A) An excellent method ☐ B) Very good method ☐ C) Good method ☐ D) Average method ☐ E) Others (specify).....

4. There are other effective project management tools that can be employed by MMDAS. A) Strongly disagree ☐ B) Disagree ☐ C) Neutral ☐ D) Agree ☐ E) Strongly agree ☐

5. Which of these project management tools are you familiar with? A) Line of Balance (LOB) ☐ B) Time chain age Technique ☐ C) Work Breakdown Structure (WBS) ☐ D) Program Evaluation and Review Technique (PERT) ☐

6. Comparing the above mentioned project management tools in question (5) with EVMS how would you rank them in terms of their fitness for purpose. **NB: please rank them by using 1ST, 2ND, 3RD, etc.**

<i>Project management tools</i>	<i>Ranking</i>
Line of Balance (LOB)	
Time chain age Technique	
Work Breakdown Structure (WBS)	
Program Evaluation and Review Technique (PERT)	
Earned Value Management (EVM) practice	

SECTION D

Identify challenges and problems that hinders the application process of EVM among MMDAS.

This seeks to identify the challenges and problems that hinders the smooth application of EVM process at the Hohoe Municipal Assembly.

Factors that will hinder the effective application of EVMS.						
SN	Statement Please provide your answer based on a scale of (1 to 5)	Strongly agree	somewhat agree	Neutral	somewhat disagree	strongly disagree
		1	2	3	4	5
1	Do you belief that lack of expert and Experience hinder the effective application of EVM					
2	Do you belief an individual level of professionalism can hinder the effective application of EVM					
3	Do you belief that the lack of adequate research and development can be a hindering factor for the effective application of EVM					
4	Do you belief that Corruption can be a hindering factor for the effective application of EVM					
5	Do you belief that Political interference can be a hindering factor for the effective application of EVM					
6	Do you belief that General technology can be a hindering factor for the effective application of EVM					
7	Do you belief that Regulation and Industrial standard can be a hindering factor for the effective application of EVM					
8	Do you belief that lack of top management support					

	can be a hindering factor for the effective application of EVM					
9	Do you belief that Client capacity and expectation can be a hindering factor for the effective application of EVM					
10	Do you belief that Poor financial planning can be a hindering factor for the effective application of EVM					
11	Do you belief that Poor time estimations and management can be a hindering factor for the effective application of EVM					
12	Do you belief that Market force (Inflations) can be a hindering factor for the effective application of EVM					