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Analyzing Project Cost Control Mechanisms Utilized in the Construction Industry: A Case Study of Namwala 33kV Overhead Construction Lines, Zambia

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Abstract

The Zambian construction sector has been considered to be among the drivers of the economy, hence the proper utilization of cost control methods lead to the successful completion of construction projects. However, cost overrun is a major hiccup which main contractors meet. Hence effective cost control techniques are important in order to solve the problems of cost and time overruns in the construction industry. Therefore, the purpose of this study was to try and analyze the effective project cost control mechanisms utilized in the construction industry using a case of Namwala 33kV construction overhead lines. This study adopted a descriptive research design coupled with purposive sampling technique. In order to have an in-depth understanding, both quantitative and qualitative approaches were included in the questionnaires which were used as the main tool of data collection with a sample size of 50. Primary data collected were coded and analyzed with the help of micro soft excel and stata 14 as the data analyzing tool to ascertain the relationship between the project cost control mechanisms and project success. The established cost control mechanisms included Building Information Modelling-6% enhances the reduction of errors and improves cost estimation accuracy, Cost and Budget Estimations-24% improves project planning and resource allocation, Earned Value Management-26% suggesting its importance in project performance, Risk Management-6% helps to identify and mitigate risks, Value Engineering -18% for optimizing project value and reduces costs without compromising quality, Work Breakdown Structure-16% for decomposing project into manageable tasks thereby enhancing cost estimation, and Supply Chain Management-4% improves material procurement. The findings revealed that these cost control mechanisms are valuable tools which are effective for cost control, however, the study also analyzed challenges which affect the proper utilization of established cost control techniques which included challenges such as poor communication-24%, complexity in project scope-18%, lack of clear project objectives-16%, unforeseen site conditions-34%, changes in government policies-30%,and economic fluctuations-12%.

1. Introduction

1.1 Background

Project cost control has so many definitions from different scholars to lucidly mean maintaining project completion within the budgetary limits by continuously monitoring the performance of the project and putting the required series of action in place to manage expenses in a well-organized and competent way so as to maintain costs at a sustainable level. Thus, Project cost control helps the contractor to do away with losses during the course of project life cycle. Cost control is of the utmost importance to the profitability of any project. Majority of the contractors have seen the importance of cost control techniques in the practical context.

Despite the fact that reviewed literature has proved that project cost control techniques are important for the successful completion of projects, the same literature has shown that most of the projects are still not being completed according to budget and schedule. Cooray *et al* (2018) [24] observed that the construction industry of Sri Lanka is constantly facing various uncertainties. Because of these uncertainties, construction projects are difficult to manage such that projects cost keeps on

increasing such that projects are not successfully delivered according to budget and schedule. Chilongo (2017) [19] observed that, the construction industry was a key sector in the development and economic growth of Zambia, he however noted that, the construction industry in Zambia has not escaped the challenges facing other countries worldwide in terms of delivering construction projects on time as stipulated in the contracts. Nalishebo (2019) [4], in his study in Pemba of southern Province in Zambia, reviewed that the contractors and consultants agreed that the actual cost of the projects that were executed was more than the estimated costs. These challenges underscore the need for robust cost control methods tailored to the Zambian construction landscape.

1.2 General Objectives
The main objective of this study is, to analyze the project cost control mechanisms utilized in the construction industry. A case study of Namwala 33kv Power Line Construction.

1.2.1 Specific Objectives
1. To establish cost control methods used in the construction industry.
2. To examine the effectiveness of cost control techniques used in construction industry.
3. To analyze the challenges of cost control techniques in the construction industry.

1.3 Research Questions
In order to achieve the stated objective, the questions are as follows.
1. What cost control techniques are used in the construction industry?
2. What are effective cost controlling techniques used in construction industry?
3. What are the challenges of cost control techniques in the construction industry?

1.4 Conceptual Framework
It is conceptualized that the practice of cost control mechanisms plays a big role in as far as the success of construction projects is concerned. This conceptual framework is constructed to try and analyze cost control mechanisms and see how they relate to the successful completion of projects in the construction industry.
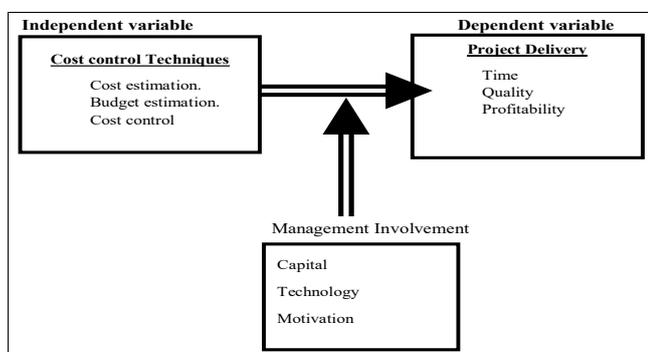
Source: Author, 2024

2. Literature Review
2.1 Establishing cost control methods used in the construction industry
Value engineering (VE) by Ali *et al*. (2019) [2], Building Information Modelling (BIM) by Azhar *et al*. (2015) [21] and earned value management (EVM) by Wong *et al*. (2017) [3] are some of control techniques used in Malaysia which enable real-time cost monitoring throughout the project lifecycle and enhance cost estimation accuracy and minimizes cost overruns and identify cost variances early in the project lifecycle. In Kenyan construction sector, earned value management (EVM) have gained prominence seen in a study conducted by Oluwoye and Chan (2017) [7], EVM enables project managers to measure project performance and progress objectively. Building Information Modelling offers unprecedented capabilities for cost estimation, resource allocation, and project scheduling. Chileshe and Dzomonda (2016) [8], conducted surveys and interviews to establish cost control methods used in the construction industry. The results of this study were that, traditional methods like cost planning, budgeting, and cost monitoring are commonly utilized by construction firms in Zambia. Mwansa *et al*. (2018) [9] explored the adoption of Earned Value Management (EVM) as a cost control technique in Zambian construction projects.

2.2 Examining the effectiveness of cost control techniques used in construction industry
Ahmad *et al*. (2018) [10] value engineering, earned value management (EVM), and target costing were commonly used in Malaysian construction projects. Ajayi and Ogunlana (2018) [11] revealed that projects employing well-established project management techniques demonstrated better cost control outcomes. Oyedele *et al*. (2020) [14] revealed that the adoption of BIM technology enhances collaboration among project stakeholders, improves decision-making processes, and reduces errors, ultimately leading to better cost control outcomes in Nigeria. Value engineering focuses on optimizing the value of a project (Murage and Rege 2017) [13], Chanda and Siame (2020) [15] investigated the impact of Building Information Modelling (BIM) on cost management in construction projects. Their study indicated that projects incorporating BIM experienced enhanced collaboration, improved accuracy in cost estimates, and reduced instances of rework. A study by Tembo and Mwale (2017) [16] explored the relationship between procurement practices and cost performance in construction projects. The research emphasized the significance of strategic procurement decisions in achieving cost efficiency. Projects that employed procurement strategies aligned with the specific needs of the project and engaged in collaborative relationships with suppliers demonstrated improved cost control outcomes.

2.3 Analyzing the challenges of cost control techniques in the construction industry
One of the foremost challenges in cost control within the construction industry pertains to inaccurate cost estimation practices. According to Lim *et al*. (2018) [18], inaccurate cost estimates at the project outset often lead to significant cost overruns and financial strains. Furthermore, Yusof *et al*. (2019) [27] emphasized that the reliance on inaccurate cost estimates hampers effective resource allocation.
Othman and Daud (2017) [25] highlighted that approximately 80% of construction projects in Malaysia experience variations in scope or design changes during execution. In addition to that, the complexity nature of supply chain management presents a formidable challenge to cost control techniques in the construction sector. As noted by Abdul-

Rahman *et al.* (2019) [17], the construction industry in Malaysia relies heavily on a diverse network of suppliers, subcontractors, and vendors. However, the lack of transparency and coordination across the supply chain often results in delays, quality issues, and cost overruns. Furthermore, the volatility of material prices and currency exchange rates presents a significant challenge to cost control techniques in the Malaysian construction industry. According to Tan *et al.* (2019) [26], fluctuations in global commodity markets and currency exchange rates exert a profound impact on project costs and profitability. One significant challenge confronting cost control techniques in the Zimbabwean construction industry is the volatility of the economic environment. According to Moyo (2018) [5], Zimbabwe has experienced severe economic instability characterized by hyperinflation, currency.

Moreover, political instability exacerbates the challenges of cost control in Zimbabwe's construction industry. Research by Chigunwe and Kusena (2019) [6] highlights the adverse impact of political unrest, corruption, and bureaucratic red tape on construction projects. Within the Zambian construction industry, Mwanza and Chileshe (2017), observed that economic uncertainties pose a significant challenge to cost control in construction projects. Operational inefficiencies further compound the challenges of cost control in Zambian construction projects. According to Mwila and Daka (2020) [28], poor project planning and inadequate resource allocation are significant contributors to cost overruns.

2.4 Personal critique
One of the primary critiques of project cost control mechanisms is their inherent reliance on traditional approaches and outdated practices. Many construction firms still rely on manual methods and spreadsheet-based systems for cost estimation, budget tracking, and financial reporting. Such approaches are prone to errors, lack real-time visibility, and inhibit data integration across different project phases. In an era dominated by technological advancements and digital transformation, the persistence of archaic cost control practices underscores the industry's resistance to change and innovation. Moreover, the fragmented nature of cost control mechanisms poses challenges to collaboration, additionally, the efficacy of project cost control mechanisms is often undermined by external factors beyond the control of project teams, such as regulatory constraints, market volatility, and geopolitical risks. Uncertain economic conditions, fluctuating material prices, and geopolitical tensions can significantly impact project costs and profitability, rendering traditional cost control mechanisms insufficient and reactive in addressing emerging challenges.

2.5 Establish the research gap
One significant research gap pertains to the contextual applicability and effectiveness of cost control mechanisms in different construction environments and project settings. While existing studies offer insights into best practices and theoretical frameworks for cost control, there is limited research that examines the practical implementation and outcomes of these mechanisms across diverse construction projects. Factors such as project size, complexity, location, and stakeholder dynamics can significantly influence the efficacy of cost control measures, yet empirical studies exploring these contextual nuances are relatively scarce.

Moreover, there is a need for longitudinal studies that examine the long-term sustainability and resilience of cost control mechanisms in the face of evolving industry trends, economic uncertainties, and regulatory changes. While short-term assessments provide valuable snapshots of cost performance and project efficiency, longitudinal research can offer deeper insights into the durability and adaptability of cost control strategies over extended project durations and market cycles.

3. Research Methodology
3.1 Research Design
The Research design used in this research was descriptive research design which refers to a plan that describes how, when and where data are to be collected and analyzed to get an overall for answering the research question or testing the hypothesis. In this study, both quantitative and qualitative approaches to analyses the data were employed to study the effects of project cost control mechanisms utilized in the construction industry. Questionnaires were used as the main tool of data collection because of its advantages which include cheapness even on large population, free from interviewer biases, more time for the respondents to give well thought answers.

3.2 Target Population
The Population of this study constituted of 300 professionals both from the contractors side and client side in Namwala District. Therefore, the sample size of 50 was used.

3.3 Sampling Design
The study used a survey method, a survey, which can either be a census or sample survey. Census means that every member of the universe will be included in the study whereas a sample survey involves which only a portion of the whole universe been included in the study.

3.4 Sample Size Determination
The sample size of 50 was used. Sample size refers to the number of participants or observations included in a study. This number is usually represented by n. The size of a sample influences two statistical properties: 1) the precision of our estimates and 2) the power of the study to draw conclusions.

3.5 Data Collection Methods
A structured questionnaire was used to collect the data from the respondents; the questionnaires were administered by the researcher. Price. Closed questionnaires control respondents from giving irrelevant information. In-depth Interviews were also used. The researcher used primary sources to collect data for this study due to its nearness to truth and ease for control over errors.

3.6 Data Analysis
Primary data collected was coded and analyzed with the help micro soft excel and stata. The results were presented using tables, pie charts and bar charts for ease of understanding. Secondly, the data were coded and keyed in stata, to analyze the relationship between the independent and dependent variables as fore stated. The collected data were analyzed using descriptive statistics such as frequencies and percentages. Descriptive statistics allowed the generalization of the data so as to give an account of the

characteristics of the population as represented by the sample. Analyzed data were presented in tables. The use of tables will allow orderly arrangement of data.

3.7 Triangulation
Triangulation refers to the use of multiple methods or data sources in qualitative research to develop a comprehensive understanding of phenomena Triangulation also has been viewed as a qualitative research strategy to test validity through the convergence of information from different sources.

4. Presentation and Interpretation of the Findings
4.1 Presentation of results on background characteristics of respondents
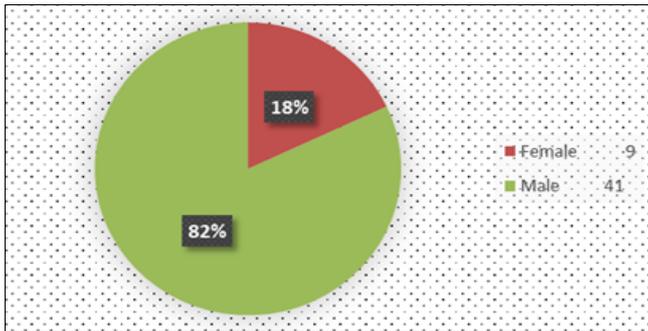
Source: Field Survey, 2024

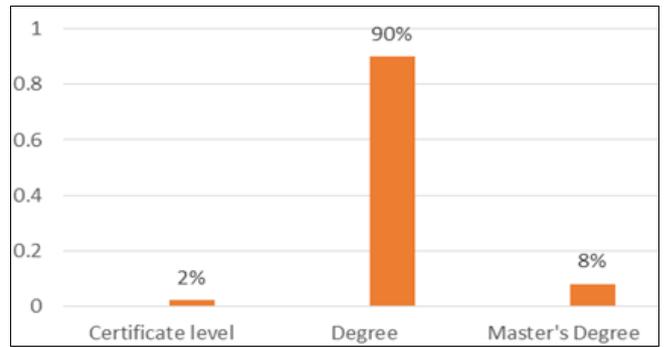**Fig 4.1.1:** Percentage distribution of sex of respondent

The questionnaires were distributed to 50 purposively selected respondents and all the 50 completed and returned the questionnaire. The study requested respondents to indicate their gender. Among the participants, the majority of respondents, such as 82 % of the total, were male, while 18 were female. This means that the majority of the respondents were male according to Figure 1 above.
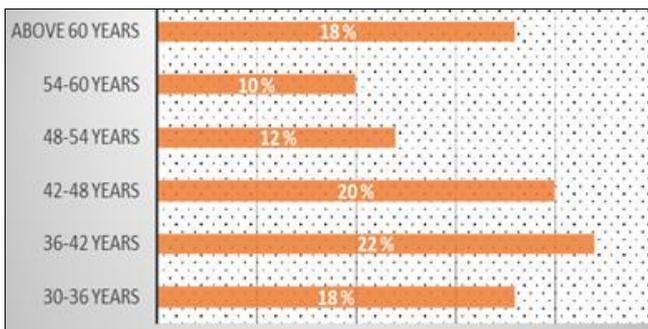
Source: Field Survey, 2024

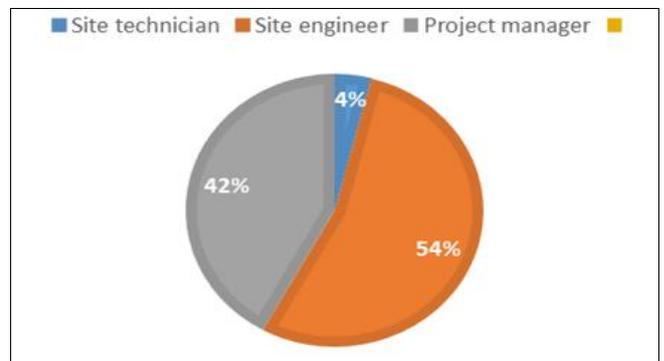**Fig 4.1.2:** Percentage distribution of age of respondent

The study requested respondent to indicate age. 18 % of the majority respondent were age between 30 to 36 years, 20 % of the respondent indicated age between 36 to 42 years, 18 % of the respondent indicated age between 42 to 48 years, 10 % of the respondent indicated age between 48 to 54 years, 14 % of the respondent indicated 54 to 60 years, 6 % of the respondents indicated 66 to 72 years as shown in the fig above.

Source: Field Survey, 2024

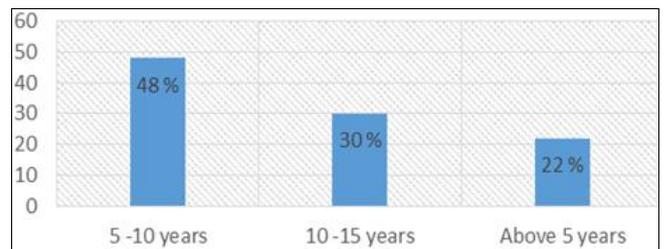**Fig 4.1.3:** Percentage distribution of education level of respondent

On participants' level of education, the results revealed that the majority of the respondents representing 90%, have degree certificates, 8% of the respondents have master's degrees certificates representing 8% and only 2 % of the respondents have a certificate.

Source: Field Survey, 2024

Fig 4.1.4: Percentage distribution on what is your role in the organization

On participant work in industry, 42 % of the respondents hold the position of project managers, 54 % hold a position of site engineer, while only 4 % hold the position of site technician.

Source: Field Survey, 2024

Fig 4.1.5: Percentage distribution of respondent work experience

The study requested respondents to indicate their years of work experience. The results revealed that the majority of the respondents, constituting, 48 have been working for 5 to 10 years in the construction industry. Similarly, another 30 % of the respondents have been working in the construction industry for 10 to 15 years. Furthermore, a notable 22 % of the respondents reported to having been working for above 15 years as shown in the chart above.

4.2 Presentation of results based on cost control techniques used in construction industry

Source: Field Survey, 2024

Fig 4.2.1: Percentage distribution on what cost control methods does your organization use in construction project
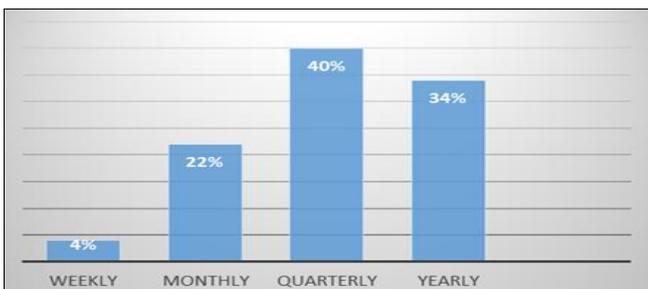
The study inquired participants to indicate what cost control methods does your organization use in construction projects. The findings reviewed that 6 % of the respondents indicated that they use Building Information Modelling, while 24 % of the respondents indicated that they use cost and budget estimations, 26 % of the respondents indicated that they use earned value management, another 6 % of the respondents indicated that they use risk management and moreover 18 % of the respondents indicated that they use value engineering, 16 % of the respondents indicated that they use work breakdown structure. Only 4 % of the respondents indicated that they use supply chain management.
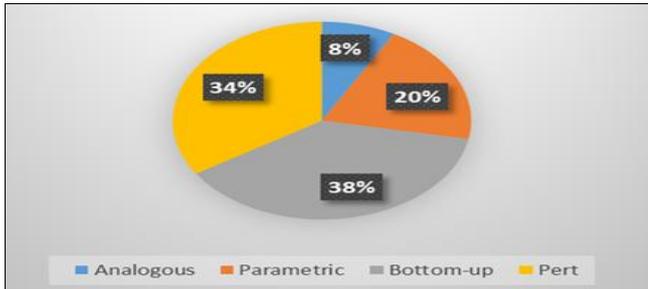
Source: Field Survey, 2024

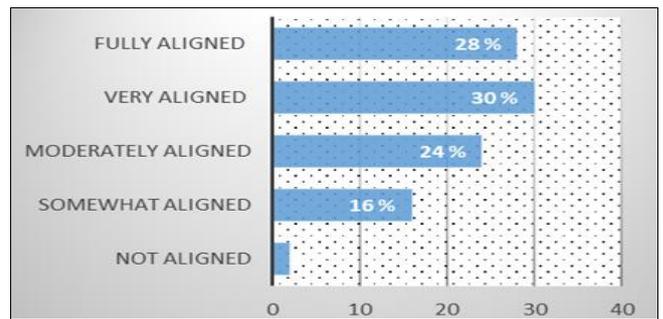**Fig 4.2.2:** Percentage distribution on what method do you use for cost & budget estimations

The study inquired participants to indicate the method they were using for cost and budget estimations. The findings reviewed that 38% of the respondents use bottom up, while 34% of respondents use Program evaluation & review Technique, 8 % of the respondents use analogous and 20 % of the respondents use Parametric as shown above.

Source: Field Survey, 2024

Fig 4.2.3: Percentage distribution on often you review and update cost control methods is done

The study inquired participants to indicate how often do you review and update your cost control methods? The findings reviewed that 40 % of the respondents indicated that they review and update the cost control methods quarterly, while 34 % of the respondents indicated that they review and update the cost control methods yearly, 22 % of the respondents indicated that they review and update the cost control methods monthly, while only 4 % of the respondents indicated that they review and update the cost control methods weekly as shown above. "40% of the majority respondents mentioned that the reason of conducting cost control quarterly was because of the fact that the project time frame is one year. So it is good practice to usually monitor quarterly to see if project is moving according to plan before the end of the project implementation period".

Fig 4.2.4: Percentage distribution on how aligned are cost control objectives with project goals

The study inquired participants to indicate how aligned are cost control objectives with project goals. The findings reviewed that 30 % of the respondents indicated very aligned, while 28 % of respondents indicated fully aligned, 24 % of the respondents indicated moderately aligned,16% of the respondents indicated somewhat aligned and only 2 % of the respondents indicated not aligned as shown above. "The majority respondents put an emphasis that cost control objectives are aligned with project goals because these objectives help to meet the set project goals".

4.3 Presentation of results based on effectiveness of cost control techniques used in construction
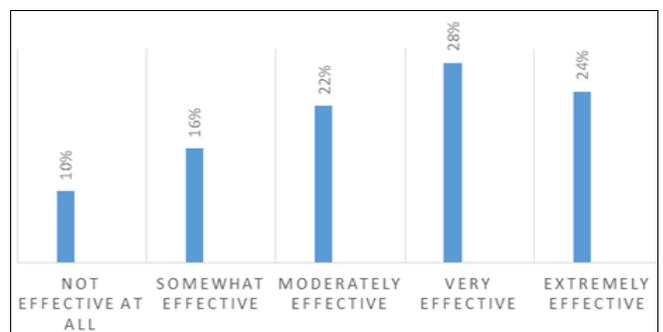
Fig 4.3.1: Percentage distribution on how do you rate your organization cost control techniques effectiveness

The study aimed to find out from respondents on how to rate the organizations cost control techniques. The results revealed that 28 % of the respondents said that cost control techniques are very effective, furthermore, 22 % of the respondents said the techniques are moderately effective and 24% said the techniques are extremely effective, and

moreover 16 % of the respondents said the techniques are somewhat effective. While small percentage of, specifically 10 % of the respondents said the techniques not effective at all as shown above.
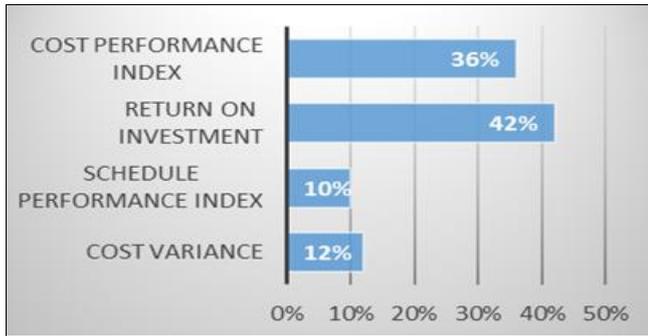
Source: Field Survey

Fig 4.3.2: Percentage distribution on what quantitative performance indicators do you use to measure the effectiveness of cost control techniques

The study aimed to examine on what quantitative performance indicators used to measure the effectiveness of cost control techniques. The results revealed that 42 % of the respondents said that return on investment as a means of measure for cost control effectiveness, furthermore, 36 % of the respondents said that they use cost performance index to measure the effectiveness of cost control techniques and 6 % said that they use cost variance to measure the effectiveness of cost control techniques, While, 5 % of the respondents said that they use schedule performance index to measure the effectiveness of cost control techniques as shown above.

Figure 4.3.3: Percentage distribution on what qualitative key performance indicators do you use to measure the effectiveness of cost control techniques

	Freq	Percent
Stakeholder satisfaction	6	12
Project team morale	14	28
Risk management	18	36
Quality standard adherence	12	24

Source: Field Survey, 2024

The study aimed to examine on what qualitative key performance indicators are used to measure the effectiveness of cost control techniques. The results revealed that 36 % of the respondents said that they use risk management as a means of measure for cost control effectiveness, furthermore, 28 % of the respondents said that team morale is used as a measure of effectiveness of cost control techniques and 24 % said that quality standard adherence is used as a measure of effectiveness of cost control techniques, While, 6 % of the respondents said that stakeholder satisfaction is used as a measure of effectiveness of cost control techniques as shown above.

Figure 4.3.4: Percentage distribution on how do you determine the effectiveness of project cost techniques

	Freq	Percent
Cost variances are within acceptable limits	9	18
Cost performance index is greater than 1	10	20
Schedule performance index is greater than 1	15	30
Return on investment meets expectations	16	31

Source: Field Survey, 2024

The study aimed to examine on how to determine the effectiveness of project cost techniques? The results revealed that 31% of the respondents said that they make sure that return on investment meet expectations, furthermore, 30 % of the respondents said that they make sure schedule performance index is greater than 1 and 20 % said that they make sure that cost performance index is greater than 1, While, 18 % of the respondents said that they make sure that cost variances are within acceptable limits as shown above.

4.4 Presentation of results based on challenges of cost control techniques used in construction
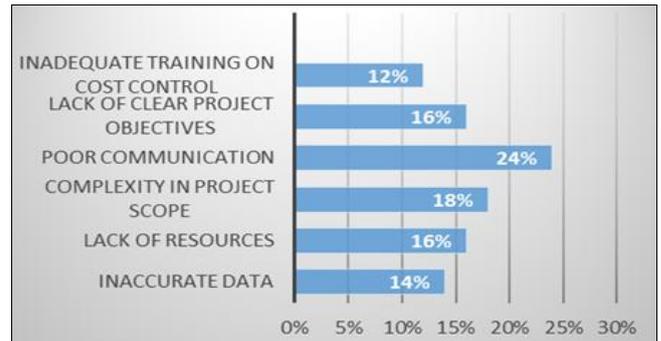
Source: Field Survey, 2024

Fig 4.4.1: Percentage distribution on what are some of the internal challenges associated with project cost control

The study aimed to ask the respondents to indicate some of the internal challenges associated with project cost control. The results show that 24 % of the majority respondents indicated poor communication, 18 % of the majority respondents indicated complexity in project scope, 16 % of the majority respondents indicated lack of clear project objectives. Moreover another 16 % of the majority respondents indicated lack of resource and 14 % of the majority respondents indicated inaccurate data, while 12 % of the majority respondents indicated inadequate training on cost control.
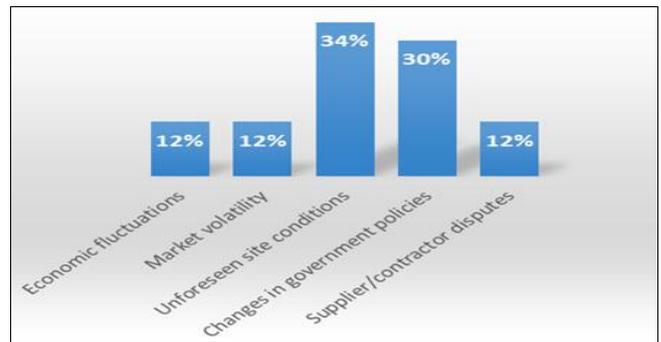
Fig 4.4.2: Percentage distribution on what are some of the external challenges associated with project cost control

The study aimed to ask the respondents to indicate some of the external challenges associated with project cost control. The results show that 34 % of the majority respondents indicated unforeseen site conditions, 30 % of the majority respondents indicated changes in government policies, and 12 % of the majority respondents indicated economic fluctuations. Moreover another 12 % of the majority respondents indicated market volatility and still another 12

576

% of the majority respondents indicated supplier/contractor disputes as shown above.
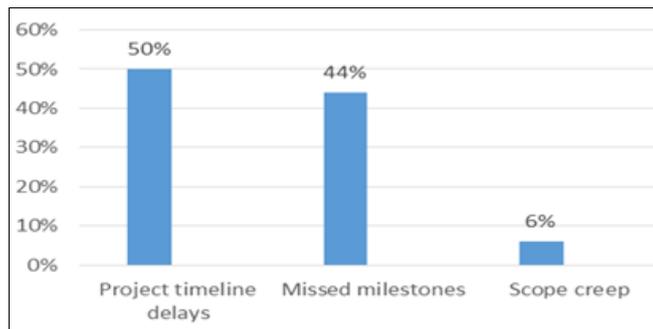
Source: Field Survey, 2024

Fig 4.4.3: Percentage distribution on what are some schedule related common signs indicating challenges affecting the proper utilization of project cost control techniques

The study requested respondents to indicate some schedule related common signs indicating challenges affecting the proper utilization of project cost control techniques. 50 % of the majority respondents indicated project timeline delays and another 44 % of the respondents indicated missed milestones, while 6 % of respondents indicated scope creep as shown above.
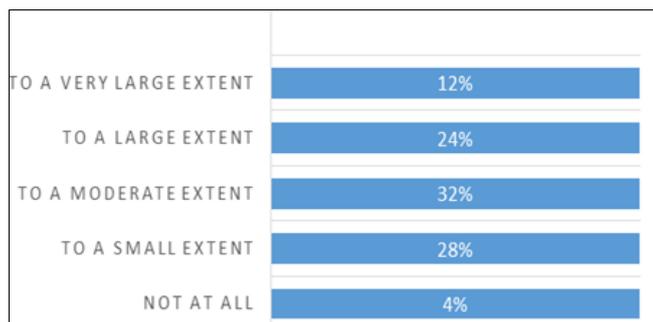

Fig 4.4.4: Percentage distribution on to what extent do internal challenges mentioned affect the proper utilization of project cost control techniques

The study requested respondents to indicate to what extent internal challenges affect the proper utilization of project cost control techniques. 32 % of the majority respondents indicated to a moderate extent, and another 28 % of the respondents indicated to a small extent, while 24 % of respondents indicated to a large extent, and 12 % of the respondents indicated to a very large extent, and only 4 % of the respondents indicated not at all as shown above.

Figure 4.4.5: Percentage distribution on what are some financial common signs indicating challenges affecting the proper utilization of project cost control techniques

	Freq	Percent
Unexpected variances	14	28
Reduced cash flow	13	26
Cost overrun	20	40
Increased debt	3	6

Source: Field Survey, 2024

The study requested respondents to indicate some financial common signs indicating challenges affecting the proper utilization of project cost control techniques. 40 % of the majority respondents indicated cost overruns and another 28

% of the respondents indicated unexplained variances in cost reports, while 26 % of respondents indicated reduced cash flow, and only 6 % of the respondents indicated increased debt as shown above.

5. Discussion of Research Findings on the Analysis of Project Cost Control Mechanisms
5.1 Background characteristics of the respondents
The study collected data on gender distribution, which attracted both male and female participants. The majority of respondents, comprising 82 % of the total, identified as male. This indicates a higher representation of men in the study sample. On the other hand, 18 % of the participants indicated their gender as female, signifying a significant but slightly smaller proportion of female respondents. Regarding the age of the respondents, the results showed that the majority of respondents (22%) fell within the age range of 36-42 years representing middle-aged respondents. The study also inquired about the participants' educational backgrounds, and the results provide an overview of the educational diversity within the sample. The largest group of respondents, constituting 90 %, reported having a degree as their highest educational qualification. This suggests that a substantial portion of the participants had pursued higher education and obtained a bachelor's degree. Moreover, 8 % of the respondents reported achieving a master's degree, indicating that a notable portion of the participants had pursued advanced education beyond a bachelor's degree. This may imply a higher level of expertise and specialization among this subgroup. Similarly, another 2 % of respondents indicated that they held a certificate as their highest educational qualification. Certificates typically represent specialized training or vocational education, and this significant percentage highlights the importance of such qualifications in the study's context.Finally,on the background characteristics of respondents, looked at the position of respondents in the organization, where 54 % the majority of the respondents held the position of site engineers which meant the presence of highly qualified personnel on site to supervise the works, 42 % of the majority respondents held position of project managers signifying the presence of personnel who are competent enough to see the project comes to a success. Moreover 4 % of the majority respondents were site technicians signifying the presence of frontline workers in this industry.

5.2 Discussion of results based on cost control techniques used in construction industry
The findings highlighted the establishment of various cost control techniques used in the construction industry which included Earned Value management (EVM) - 26% suggesting that project managers recognize the importance of tracking project performance and measuring progress against planned costs and schedules. Cost Estimations and Budgeting - 24 % may indicates that organizations prioritize accurate cost estimation and budgeting to ensure project viability by improving project planning and resource allocation, enhances financial management and budgeting. Value Engineering - 18% reduces costs without compromising quality, enhances project efficiency. Work Breakdown Structure (WBS) - 16% decomposing projects into manageable tasks for better project organization and planning thereby enhancing cost estimation accuracy and facilitating resource allocation. Building Information

Modelling with 6 % enhances project visualization and collaboration, reduces errors thereby improves cost estimation accuracy.

Supply Chain Management with 4 % improves material procurement and logistics, reduces costs and lead times, and enhances quality control. Risk Management with 6 %, identifies and mitigates potential risks, reduces uncertainty and unpredictability, enhances project resilience.

5.3 Discussion of results on effectiveness of cost control techniques used in construction

The study aimed to examine on how to determine the effectiveness of project cost techniques. The study's results indicated that Return on Investment (ROI) (31%) is the primary criterion for evaluating project cost technique effectiveness by making sure that it meets expectations, Schedule Performance Index (SPI) > 1 (30%) and Cost Performance Index (CPI) > 1 (20%) are key indicators and Cost Variance (CV) should be within acceptable limits (18%) is also considered. The findings suggested that financial returns (ROI) drive project cost technique evaluation in as much as timely completion (SPI) and cost efficiency (CPI) are a critical success factors.

5.4 Discussion of results on challenges of cost control techniques used in construction

The study's results revealed that challenges associated with project cost control include: Unforeseen site conditions (34%) which are physical site issues, unexpected discoveries, or environmental factors. Changes in government policies (30%) which includes regulatory changes, legislation. Economic fluctuations (12%), these are macroeconomic changes, inflation, or recession. Market volatility (12%) that is fluctuations in demand, supply, or prices. Supplier/contractor disputes (12%) and conflicts with external partners, vendors, or subcontractors.

6. Conclusion

This study investigated the cost control methods, challenges, and effectiveness in construction projects. The findings revealed that the common cost control methods included cost and budget estimations, earned value management, and value engineering. Internal challenges such as poor communication, complexity in project scope, and lack of clear project objectives hinder cost control. External challenges like unforeseen site conditions, changes in government policies, and economic fluctuations also impact cost control. Financial signs of challenges include cost overruns, unexplained variances, and reduced cash flow. Schedule-related challenges include project timeline delays and missed milestones.

7. Acknowledgement

8. References

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