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ABSTRACT

An in-depth study of the project's internal administration was conducted to understand its effect on overhaul projects performance. Priority was bestowed to Kenya Electricity Generating Company PLC, Kenya. This study was to investigate the influence of planning, inventory, overhaul resource management and team execution management on the performance of overhaul projects. The research utilized the competence theory, contingency theory, and theory of constraints. The study's methodology was based on a descriptive survey, employing a sample population consisting of thirty-one overhaul projects. The study targeted 112 respondents. The data collection mode was via open and closed-ended questionnaires. Before commencing the actual data collection, the researcher piloted this study on eight respondents. Cronbach alpha, yielded reliability values of above 0.7 for all the constructs. Data analysis followed using multiple regression. From the regression analysis, planning, inventory management, overhaul resource management, and team execution management had a positive effect on the performance of overhaul projects. The results demonstrated that the independent variables had a statistically profound effect on the performance of overhaul projects. The study recommends power plants implement energy efficiency measures through effective project planning for overhauls to gain a competitive advantage. Power-generating facilities, particularly those owned by the government, should employ direct procurement and framework contracting strategies to effectively handle spare parts inventories and collaborate with suppliers. To improve resource management, power-producing plants should employ plant-based planners who possess the ability to identify, anticipate, and plan for the necessary resources in advance. Kenya's power stations should increase the capacity of their overhaul project teams by employing specialized workforce teams.

Key words: *Planning, Inventory, Overhaul Resource Management, Team Execution Management*

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INTRODUCTION

The global market for power plant maintenance reached a valuation of $20.7 billion in 2021. With a projected CAGR of 4.8% from 2022 to 2031, the value will reach $33.2 billion by 2031 (Allied Market Research, 2023). Based on the power plant type, global power plant maintenance has been classified into hydropower, nuclear, thermal, renewables, combined cycle, and others. In 2021, half of the global power plant maintenance, about 51.7%, was dominated by thermal power plants. (Transparency Market Research, 2022). Failing equipment can have disastrous effects ranging from decreased plant electricity production to complete outages. An example is a 40-MW biomass-fired power plant in Michigan, where several critical components and systems did not function as designed, resulting in a catastrophic failure of the steam turbine (Power Magazine, 2021). The breakdowns in the South African state-owned power plant, Eskom, breakdowns led to a loss of 19,052MW in 2022 (Antony, 2022). That is equivalent to about two-fifths of the generating capacity, hindering economic growth. Several other surveys conducted in industries globally have found that 70% of equipment failures result from maintenance personnel failing to follow what is commonly termed as best maintenance practices (Fatuma, 2018). For this reason, equipment maintenance becomes a primary responsibility for power plants. Carrying out overhaul projects can be challenging in many power stations, hence the need for efficient project management. The overhaul should keep systems functioning to achieve power plant goals (Devi & Putu, 2020). This includes meeting the power plant cost considerations, productivity, availability, dependability, and maintainability. An overhaul project is a process requiring specific inputs and yielding particular outputs. From managing resources and budgets to tracking progress and ensuring smooth communication, it is effective project administration that ensures that all the gears of a project are well-oiled and working together seamlessly (Opijnen, 2023).

In order to meet operational goals and maximize performance, power plants need to strategically manage the maintenance process (Kamau, 2014). Power plants require well-kept and maintenance protocols to stay safe and continue regular operations (Frisari & Micale, 2015). Overhaul projects are resource-intensive. It is necessary to optimize overhaul projects while taking inventory, resources, and supply chain considerations like lead times into account. The project administration should be able to manage complex situations, predict task delays, and examine their effect on plant operations months in advance. The overhaul of the plant equipment may be planned according to the original equipment manufacturers' recommendations and scheduled to minimize forced outages (Ran et al., 2012).

Power stations continually strive to improve their standards of operations and maintenance. According to Fatuma, 2018, an overhaul project involves a blend of every administrative and technical steps to restore or retain an object to a functioning state. Managing projects is expected in the pursuit of improvements. In a recent study on public sector-based projects by Irfan et al. (2017), the reasons for low project performance are poor project management involving feasibility and project selection, lack of watertight specifications and technical design, incompetent human resources, lack of project planning, and control, insufficient funds and weak project supervision. These reasons reflect Stander’s (2016) sentiments that effective project management is essential. to the growth of a business.

KenGen PLC leads in electricity production in Kenya, having 24 operational power stations with a total installed capacity of 1904MW. This amounts to approximately 63% of the nation's installed capacity (KenGen website, 2023). The overhaul of machines in KenGen is meant to reduce costs associated with breakdowns and failures. They are capital intensive, involve procurement of spare parts, and have complex quality requirements. The material and labor costs for overhaul projects are capitalized on the company's balance sheet and not expensed. The overhaul projects take on different forms at the power stations. Some are based on power generating units (PGUs) running hours (Rhs) and are generally preventive maintenance services (PMS), especially for the thermal plants ranging from 12000Rhs PMS to 96000Rhs PMS with a 12000Rhs intermittent PMS. For the hydro, geothermal, and wind, the overhauls take the form of rehabilitation and upgrades of units, including 15 years of major overhauls.

Statement of the Problem

Forced outages of generating units affect the power plant reliability and the production cost of developing facilities (Firas, 2018). Power plants are always included in every nation's critical infrastructure list. As such, grid stability depends on the power plants producing adequate and stable electricity. An ideal case is to run the power plants without forced outages and emergency shutdowns. As much as the power plant is in operation over years, the equipment continues to age thus increasing the probability of forced outages. The reliability of the generation system is lowered as a result of this. Therefore, planned outages as well as machine overhaul are inevitable (Bagheri & Amjady, 2019). Numerous projects are undertaken in various power stations nationwide to ensure the smooth generation of electricity. However, the development of overhaul projects in the power sector faces many challenges. The sector has recorded low performance regarding underlying factors affecting machine overhaul performance, some of which need to be simplified.

Many researchers have been attracted by equipment maintenance of firms in the energy sector mainly because of the challenges faced and their relationship with businesses' performance and general success. Langat (2016) focused his research on methods for scheduling maintenance in Kenya's energy industry to see whether they help to remove delays, decrease plant downtime, and increase profitability. Kithinji (2016) compared maintenance practices and thermal power plant performance in Kenya. Njenga (2023) researched the dynamics of project management and the manner in which they influence the performance of KenGen projects, while Fatuma (2018) examined factors affecting the performance of repairs and maintenance projects. Because no prior studies have examined the connection between project internal administration and the success of overhaul projects in Kenyan energy companies, a knowledge vacuum has opened up in this area. This study aimed to fill this void by investigating the project's internal administration on planning, inventory management, overhaul resource management, team execution management, and their effects on the performance of overhaul projects. Comprehending this can benefit stakeholders in the energy industry to utilize project internal administration to enhance and overhaul project performance.

Objectives of the study

The primary aim of the study is to assess how project internal administration affects KenGen’s overhaul project performance. The study is guided by the following specific objectives;

- To examine how planning affects the performance of overhaul projects at KenGen PLC, Kenya
- To assess the effect of inventory management on overhaul projects performance in KenGen PLC, Kenya.
- To investigate how resource management during overhauls project influences their performance at KenGen PLC, Kenya".
- Establish the influence of team execution management on overhaul projects performance in KenGen PLC, Kenya.

LITERATURE REVIEW

Theoretical Literature Review

Competency Theory

According to the authors of Competence Theory, McClelland and McBer (1980), competence is the ability of an individual to give the desired output in an organization. Hence, the organization's performance is enhanced if we have competent individuals. The authors described competency as broad-spectrum encompassing knowledge, motives, personality traits, self-images and social roles. Since then, various project management institutes have created several competency frameworks.

Contingency Theory

Classical organization theories propounded by Taylor (1947), Fayol (1949), and Weber, 1947, address formal structures and ideas to improve management effectiveness. All of them contributed substantially to the advancement of classical organization theory. While classical theory maintains that monetary compensation soley motivates employees, modern views are founded on the idea that an organization is a system that needs to adjust to environmental changes. Contingency Theory, propounded by Fiedler (1964), is a modern theory that asserts that the best management style varies depending on the circumstances and that no one management technique works for all organizations. By applying contingency theory, organizational learning, which applies experience as a template for present circumstances, ensures that mitigation measures are accepted (Mwangi, 2019).

Theory of Constraints

Propounded by Goldratt and Cox (1984), the methodology used in theory of constraints (TOC) determines a critical limiting factor which prevents an objective from being accomplished. The limiting factor (i.e., constraints) is then systematically improved until it is no longer the limiting factor. Goldratt considers focusing on the essence of TOC. The three questions TOC empowers a project manager to answer for any constraint are what should be altered, what should be accommodated, and how to alter. Goldratt and Cox (1984) assumed that organizations could be assessed and managed by operations expense (OPEX), throughput, and inventory variations. At its core, TOC concepts consist of five steps: According to Goldratt and Cox (1984), the steps are (i) extract system's constraint (ii) choose how to make use of the limitation, (iii) subject every other element to the decision in (ii), (iv) Check and increase the system's constraint and (v) go back to step (i) if constant breaks in any previous steps. From this approach, emphasis is given to maximizing each system component's efficiency rather than the whole system.

Empirical Literature Review

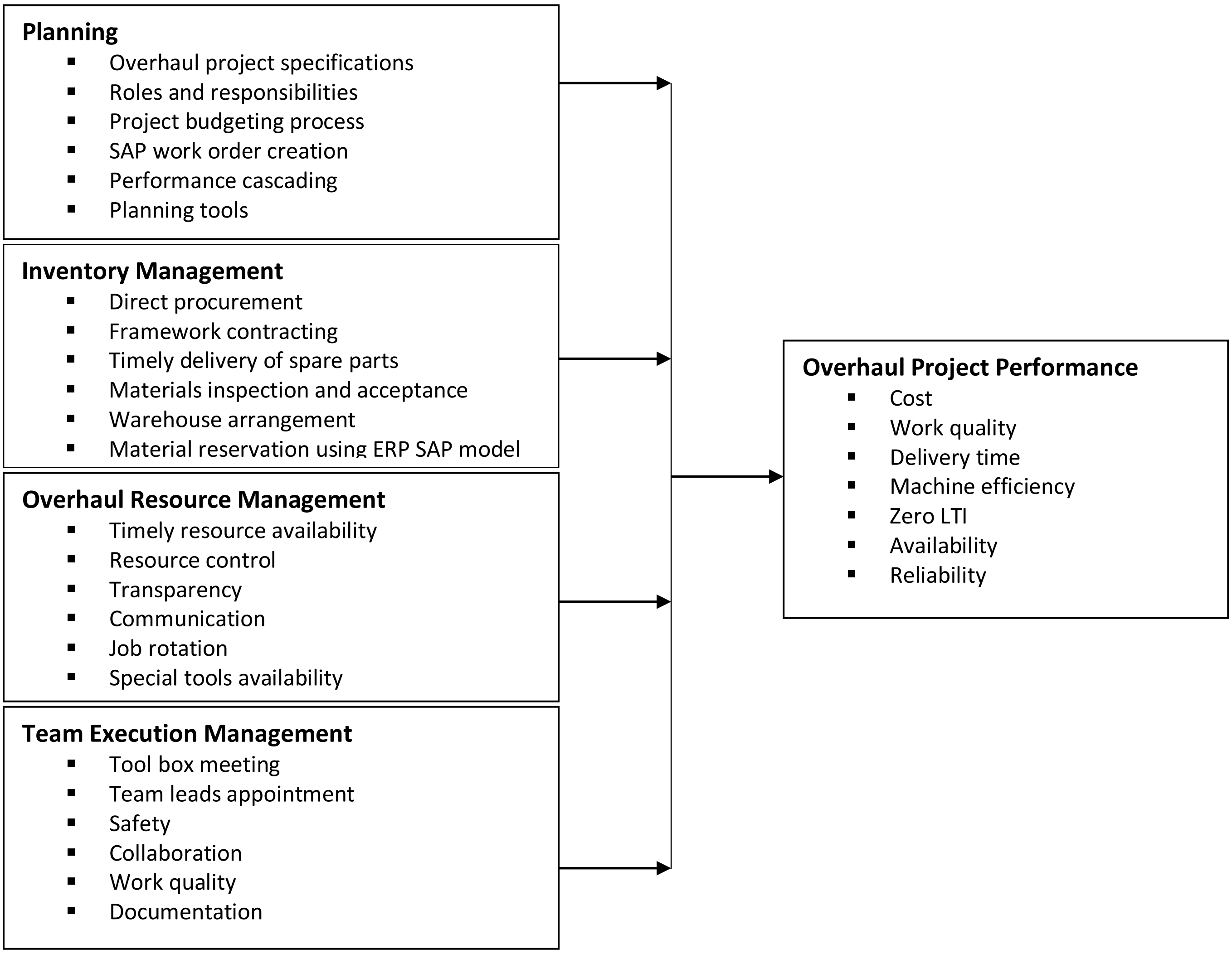
Planning is linked to an organization needing to deliver service effectively and efficiently. A study on the planning phase principle and its influence on the construction industry's project performance in Abuja, Nigeria was conducted by Usman et al (2014). Data was obtained using explanatory and descriptive approaches from professionals and completed project files from the building industry. Completed projects and qualitative data were selected using stratified and purposive random samplings for analysis. The findings show that planning phase principles are required to be adopted to avoid poor project management, needless project execution haste, insufficient planning, and limited financial resources, and costly project execution. Project performance and reduced cost and time overruns could improve if the planning phase principle is employed.

Tarus and Kihara (2018) studied Kenya Power and Lighting Co. Ltd., seeking to assess the influence of inventory management procedures on project performance in the organization. Specifics of the study included an examination of the role of inventory control systems, inventory forecasting, and inventory turnover. Employees in inventory management and operations defined the study population. A census technique was adopted. The study found that KPLC used these inventory management techniques to differing degrees, with industry-focused tactics being the most used and inventory turnover being the least.

Overhaul resource management deals with managing, scheduling and purchasing maintenance services and supplies for organizations. The success of an overhaul project relies on having proper resources. A practical project internal administration should integrate on-time delivery, resource management, and monetary goals in line with the project's scope (Akiner, 2014). Power Generation Managers (PGM), with the assistance of maintenance planners, carry out the overhaul resource management. Depending on the power plant, the overhaul resource management has a broad range of tasks. Decision-makers in charge of organizing resources may likely have incomplete knowledge of the significance of every resource (Denrel et al., 2003).

Mutua (2018) studied various aspects affecting the performance of housing projects belonging to Kenya police in Kiambu, Kenya. The team member competency effect on performance of the projects formed one of the author's objectives. The author adopted a descriptive survey research layout to explain how these factors affect the effectiveness of particular police residential projects in Kenya. The study concluded that team competency during project execution was the second most influential factor after project planning. The regression analysis results showed that the project team's competency significantly affects how well police housing projects perform. From the study, it is clear that competency is critical for team execution for completion of tasks. The study, however, needed to identify the management of team execution while undertaking a project to ensure certain factors like safety and work quality are achieved.

Conceptual Framework



Independent Variables **Dependent Variable**

Figure 1: Conceptual Framework

Source: Researcher 2023

METHODOLOGY

A descriptive survey research design was used for this study. The researcher carried out a multiple linear regression analysis to evaluate the influence of project internal administration on overhaul project performance in KenGen, Kenya. The relationship between the variables was analyzed by the researcher with the use of multivariate regression analysis on data which was collected and took the following form:

$$\mathbf{Y} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1\mathbf{X}_1 + \boldsymbol{\beta}_2\mathbf{X}_2 + \boldsymbol{\beta}_3\mathbf{X}_3 + \boldsymbol{\beta}_4\mathbf{X}_4 + \boldsymbol{\varepsilon}$$

Where $\mathbf{Y}$ is the dependent variable representing the overhaul projects performance and $\mathbf{X}$ is the independent variable representing the project internal administration. These are $\mathbf{X_1}$ representing planning, $\mathbf{X_2}$ represents inventory management, $\mathbf{X_3}$ represents overhaul resource management and $\mathbf{X_4}$ representing team execution management. The constant $\boldsymbol{\beta}_0$ is the model's value when the values of all other variables are zero. It is the overhaul project performance when there is no presence of project internal administration and environmental concerns. $\boldsymbol{\beta}_1$, represents co-efficient of planning, $\boldsymbol{\beta}_2$ the co-efficient of inventory management, $\boldsymbol{\beta}_3$ the co-efficient of overhaul resource management and $\boldsymbol{\beta}_4$ the co-efficient of team execution management, and $\boldsymbol{\varepsilon}$ is the error of margin.

The population of this study, is 31 overhaul projects that have been implemented in 14 power stations spread across KenGen's six operational areas in Kenya- Western, Kipevu, Olkaria and Eburru, Upper Tana, Seven Forks and Ngong. The study targeted 112 respondents.

This study used a stratified sample method through creating homogeneous subgroups within the population. The strata in this study comprised of power generation assistant managers, engineers, technicians, and procurement and finance officers. The standard formula for the sample size was given by:

$$n = [z^2 * p(1-p)]/e^2 \,/ 1 + \{z^2 * p(1-p)\}/e^2 * N$$

Where:

N = population size

z = z -score

e = margin of error

p = standard of deviation

Using a standard deviation of 50%, a margin of error of +/- 5%, a confidence level of 95%, and a z score =>1.96 with a target population of 112, then sample size n was 87

A custom-made questionnaire was employed for this research to collect primary data. The pilot study was done on eight respondents from Kipevu 1 Power Station with similar characters to the ones in the primary research before data collection. This represents 10% of an existing study sample size of 87 respondents. The questionnaire's content was evaluated through the input of my supervisors and peer reviews. The process facilitated the assessment of its validity by scrutinizing the contents of the questionnaire and verifying its compliance with all the objectives' requirements.
All constructs in this study must maintain a Cronbach's alpha value of 0.7 or higher for the composite reliability.

Descriptive statistics was used to analyze the quantitative data to provide frequencies, means, standard deviations, and percentages. Homoscedasticity, multi-collinearity and normality was diagnosed using the regression model. Normality was tested using the numerical method, the Kolmogorov–Smirnov test, because the sample size n is more than 50. Where a significant level P > 0.05, the data was deemed normally distributed.

RESULTS

Responder rate

The study concentrated on 31 overhaul projects. These projects were carried out in 14 power stations in six operational areas of KenGen in Kenya: Ngong, Western, Kipevu, Olkaria, Upper Tana, and Seven Forks. The study included a cohort of 87 staff members who serve as leaders in the implementation of major renovation projects at the designated power stations. Of the 87 possible participants, 84 completed their questionnaires. The result was a response rate of 96.55%. A response rate exceeding 70% is deemed high when compared to conventional benchmarks, as stated by Brooks et al. (2022). Consequently, the response rate of 96.55% can be considered exceptional for data analysis and reporting. Phone calls helped respondents complete the questionnaires.

Descriptive Statistics for the Study Variables

Performance of overhaul project analysis

Table 1: Descriptive Analysis of Overhaul Project Performance

No	Statement	N	Sum	SA	A	N	D	SD	Mean	Std. dvt
E1	Project costs are within set budget	84	367	40 (47.6%)	38 (45.2%)	4 (4.8%)	1 (1.2%)	1 (1.2%)	4.37	0.741
E2	There are no repeat jobs	84	357	32 (38.1%)	43 (51.2%)	8 (9.5%)	0 (0%)	1 (1.2%)	4.25	0.726
E3	Project schedule is delivered with specified time	84	371	42 (50%)	37 (44%)	4 (4.8%)	0 (0%)	1 (1.2%)	4.42	0.698
E4	Zero loss time injury (LTI) are recorded	84	367	37 (44%)	43 (51.2%)	3 (3.6%)	0 (0%)	1 (1.2%)	4.37	0.673
E5	Power generating unit efficiency is increased	84	364	39 (46.4%)	36 (42.9%)	8 (9.5%)	0 (0%)	1 (1.2%)	4.33	0.750
E6	Power station availability is increased	84	366	41 (48.8%)	36 (42.9%)	5 (6%)	0 (0%)	2 (2.4%)	4.36	0.801
E7	Power station reliability is increased	84	374	45 (53.6%)	32 (38.1%)	7 (8.3%)	0 (0%)	0 (0.0%)	4.45	0.648
	Composite								**4.363**	**0.340**

Source: Research Data (2024)

Seven statements assessed the overhaul project's performance. The statement (1) 'project costs are within the set budget' averaged 4.37. Among the 84 respondents, 40 individuals, accounting for 47.6% of the total, expressed strong agreement that costs are within budget. This suggests that the assertion average of 4.37 was slightly higher than the composite's 4.36. This indicates that the project costs are within budget, potentially enhancing the overhaul project's performance. The 0.741 standard deviation higher than the composite, 0.340, indicated opinion divergence. The study supports Bulle and Makori (2015), who found that properly allocated resources guarantee project-set costs.

The statement (2), which indicates that there are no repeat jobs, averaged 4.25. Out of the 84 respondents, 43 (51.2%) concurred that there are no recurring jobs. The results show that the average score was 4.25, which was lower than the composite, 4.36. This suggests that the presence of recurring tasks could potentially have an adverse effect on the efficiency of overhaul projects. The statement's standard deviation (0.726), exceeds the composite, 0.340, indicating opinion divergence.

Statement (3) shows that 42 (50%) of the 84 participants consistently met the project schedule on time. The average score was 4.42, compared to composite scores of 4.36. Failure to deliver project schedules on time may have a detrimental effect on overhaul projects performance. Its standard deviation (0.698) exceeds the composite (0.340), indicating divergence of opinions. The study confirms Nyabera's (2015) observation that workload distribution, activity timelines, and project task scheduling require organization.

Planning and Performance of Overhaul Projects analysis

This analysis section focuses on planning and overhaul project performance. The planning effect was reviewed using the five key statements, as shown below.

Table 2: Descriptive Analysis of Planning and Performance of Overhaul Projects

No	Statement	N	Sum	SA	A	N	D	SD	Mean	Std. Dev
B1	All project team members participate in overhaul project specifications.	84	348	31 (36.9%)	40 (47.6%)	9 (10.7%)	2 (2.4 %)	2 (2.4 %)	4.14	0.880
B2	The project team members have project specifications technical abilities	84	353	29 (34.5%)	45 (53.6%)	9 (10.7%)	0 (0%)	1 (1.2%)	4.20	0.724
B3	There is timely delivery of accurate overhaul project specifications by the project team.	84	348	31 (36.9%)	41 (48.8%)	8 (9.5%)	1 (1.2%)	3 (3.6%)	4.14	0.907
B4	The roles and responsibilities of project team members are well defined during the planning of the overhaul project.	84	358	38 (45.2%)	32 (38.1%)	13 (15.5%)	0 (0%)	1 (1.2%)	4.26	0.808
B5	The project team members are well versed in the budgeting process of the overhaul projects during planning.	84	346	31 (36.9%)	34 (40.5%)	18 (21.4%)	0 (0.0%)	1 (1.2%)	4.12	0.827

B6	Spare parts and material cost estimation for the equipment overhaul project are accurate.	84	355	40 (47.6%)	31 (36.9%)	9 (10.7%)	0 (0.0%)	4 (4.8%)	4.23	0.986
B7	The budgeted amount for an equipment overhaul project is usually approved in full by the board of directors.	84	356	36 (42.9%)	34 (40.5%)	13 (15.5%)	0 (0.0%)	1 (1.2%)	4.24	0.801
B8	ERP SAP PM module is used for the work order creation for the overhaul project during the planning stage.	84	351	32 (38.1%)	41 (48.8%)	8 (9.5%)	0 (0.0%)	3 (3.6%)	4.18	0.880
B9	There is automated SAP work order scheduling for overhaul projects for planning purposes	84	358	37 (44.0%)	36 (42.9%)	9 (10.7%)	0 (0.0%)	2 (2.4%)	4.26	0.838
B10	ERP SAP systems are proficiently used by project team leads.	84	352	34 (40.5%)	36 (42.9%)	12 (14.3%)	0 (0.0%)	2 (2.4%)	4.19	0.857
B11	The overhaul project objectives are usually included during performance cascading	84	356	34 (40.5%)	36 (42.9%)	14 (16.7%)	0 (0.0%)	0 (0.0%)	4.24	0.722
B12	The project team leads use planning tools, e.g., Gantt charts, to navigate the equipment overhaul projects	75	365	40 (47.6%)	33 (39.3%)	11 (13.1%)	0 (0.0%)	0 (0.0%)	4.35	0.703
B13	There is strict adherence to equipment overhaul projects' due dates according to the approved procurement plan.	75	359	36 (42.9%)	36 (42.9%)	11 (13.1%)	1 (1.2%)	0 (0.0%)	4.27	0.734
Composite									**4.217**	**0.400**

NB. B-14 (Planning statements)

Source: Research Data (2024)

The study used thirteen items to in order to assess the results of planning on overhaul project performance. Statement (1), ‘All project team members participate in overhaul project specifications’ averaged 4.14. Out of 84 respondents, 40 (47.6%) agreed that all project team members participate in overhaul project specifications. The 4.14 average, lower than the overall score of 4.22, indicates that not all project team members participate in overhaul project specifications, which may negatively affect project performance. Its standard deviation (0.880) compared to the composite (0.340) indicated a difference in opinions

Statement (2), 'The project team members have project specifications and technical abilities', possessed 4.20 and 0.724 average and standard deviation respectively. Forty-five (45), (53.6 %) out of 84 respondents concurred that the project team's project specifications and technical skills. The 4.21 average, which was slightly lower than the composite’s 4.22, indicates that the project team members' project specifications and technical skills abilities had a moderate influence on the performance of the overhaul project. Its standard deviation (0.724) compared to the composite (0.340) indicated a difference in opinions

Statement (3) ‘There is timely delivery of accurate overhaul project specifications by the project team’ averaged 4.14. The data indicates that out of the 84 participants, 41 individuals (48.8%) expressed agreement that there is timely delivery of accurate overhaul project specifications by the project team. The 4.14 average, was slightly lower than the 4.22 aggregate average, an indication that timely delivery of accurate overhaul project specifications by the project team slightly affects how well overhaul projects perform. Its standard deviation (0.907) exceeds the composite (0.340) suggested a greater divergence of opinions.

Inventory Management analysis

The study implemented the second project's internal administration variable, which focused on inventory management. The study of the collected responses is presented in the table below.

Table 3: Descriptive Analysis of Inventory Management and Overhaul Project Performance

No	Statement	N	Sum	SA	A	N	D	SD	Mean	Std. dev
C1	Direct procurement methods are used for critical equipment Spares	84	372	34 (40.5%)	49 (58.3%)	1 (1.2%)	0 (0.0%)	0 (0.0%)	4.43	0.749
C2	Direct procurement methods reduce the cost of procuring spare parts	84	364	16 (19.0%)	26 (31.0%)	36 (42.9%)	6 (7.1%)	0 (0.0%)	4.33	0.734
C3	Framework contracting methods are used for procuring parts	84	375	15 (17.9%)	49 (58.3%)	18 (21.4%)	2 (2.4%)	0 (0.0%)	4.46	0.685
C4	There is timely delivery of spare parts.	84	362	10 (11.9%)	40 (47.6%)	33 (39.3%)	1 (1.2%)	0 (0.0%)	4.31	0.791
C5	Inspection and acceptance committees are formed on every warehouse delivery.	84	361	23 (27.4%)	48 (57.1%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.30	0.741

C6	There is timely processing of payment of spare parts delivered for overhaul projects	84	363	21 (25.0%)	50 (59.5%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.32	0.809
C7	The spare parts arrangement at the warehouse is in order of the materials coding for ease of access.	84	367	9 (10.7%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.37	0.636
C8	There is enough space in the warehouse for receiving spares for overhaul projects.	84	368	20 (23.8%)	51 (60.7%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.38	0.693
C9	Warehouse personnel have the technical knowledge of parts and materials.	84	358	28 (33.3%)	51 (60.7%)	5 (6.0%)	0 (0.0%)	0 (0.0%)	4.26	0.838
C10	The ERP SAP module's use for reserving and issuing warehouse spare parts and consumables is well adopted.	84	358	13 (15.5%)	65 (77.4%)	6 (7.1%)	0 (0.0%)	0 (0.0%)	4.26	0.679
C11	Team leads reserve the rights of reservation of overhaul spares for accountability purposes	84	362	15 (17.9%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.31	0.658
C12	Minimal time is incurred in issuing spare parts and consumables by warehouse personnel	84	367	10 (11.9%)	50 (59.5%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.37	0.655
C13	The project team leads monitor the spare parts and consumable reserved quantities on a daily basis	84	356	23 (27.4%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.24	0.754
Composite									**4.33**	**0.401**

NB C1-13 are the statements of inventory management

Source: Research Data (2024)

The influence of inventory management on overhaul projects was assessed using 13 statements. The statement (1), "We use direct procurement methods for critical equipment spares," averaged 4.43. Forty-five (53.6%) of the 84 respondents firmly agreed that direct procurement should be the preferred method for purchasing critical equipment spares. The average score of 4.43 was greater than the composite's 4.22, suggesting that direct procurement improves spare part availability, thereby positively influencing the overhaul project performance. The standard deviation, 0.749, which is greater than the composite's 0.40, suggests a significant difference in consensus among the respondents.

Statement (2) shows that direct procurement reduces spare part acquisition costs. The statement's averaged 4.43. Direct procurement reduces spare part costs, according to 38 (45.2%) of the 84 respondents. This suggests that direct procurement methods have a positive effect on reducing spare part costs and improving overhaul project performance. The statement averaged 4.43 while the composite averaged 4.33. Compared to the composite's 0.40, the 0.749 standard deviation is higher indicating variation in respondents' opinions.

The third statement shows that framework contracting methods are used for part procurement. This statement's mean value is 4.46. The finding implies that out of the 84 respondents, 45 (53.6%) agreed that framework contracting methods are utilized for the procurement of parts. This finding's average score of 4.46, which was greater than the average score of 4.33 for the composite. This implies that framework contracting methods have a positive effect on parts procurement, which in turn favorably affects performance of overhaul projects. The standard deviation, 0.685, stands out from the composite's 0.401, indicating that there was a significant difference in consensus among the respondents.

Overhaul Resource Management analysis

Table 4: Descriptive Analysis of Overhaul Resource Management and Overhaul Project Performance

No	Statement	N	Sum	SA	A	N	D	SD	Mean	Std. Dev
D1	There is timely availability of required funding for the required resources for an overhaul project	84	349	30 (35.7%)	42 (50.0%)	8 (9.5%)	3 (3.6%)	1 (1.2%)	4.15	0.829
D2	Resource analysis is done to identify missing resources for the execution of an overhaul project.	84	348	28 (33.3%)	43 (51.2%)	11 (13.1%)	1 (1.2%)	1 (1.2%)	4.14	0.778
D3	The funding of overhaul projects is got from internal sources	84	368	39 (46.4%)	38 (45.2%)	7 (8.3%)	0 (0.0%)	0 (0.0%)	4.38	0.638
D4	There is elimination of spare parts and material waste	84	332	17 (20.2%)	46 (54.8%)	21 (25.0%)	0 (0.0%)	0 (0.0%)	3.95	0.675
D5	All spares parts used during overhaul are	84	378	46 (54.8%)	34 (40.5%)	4 (4.8%)	0 (0.0%)	0 (0.0%)	4.50	0.591

	capitalized									
D6	All procured parts for the overhaul projects are installed	84	345	21 (25.0%)	52 (61.9%)	10 (11.9%)	1 (1.2%)	0 (0.0%)	4.11	0.640
D7	There exists a maintenance planner in my power station who assists in coordination of personnel and available resources	84	359	30 (35.7%)	47 (56.0%)	7 (8.3%)	0 (0.0%)	0 (0.0%)	4.27	0.608
D8	Transparency helps prevent avoidable miscommunication mishaps between team members	84	355	45 (53.6%)	29 (34.5%)	10 (11.9%)	0 (0.0%)	0 (0.0%)	4.23	0.647
D9	There is job rotation utilization to enable resource levelling	84	350	45 (53.6%)	27 (32.1%)	11 (13.1%)	1 (1.2%)	0 (0.0%)	4.17	0.691
D10	Physically strain is reduced through job rotation	84	369	39 (46.4%)	39 (46.4%)	6 (7.1%)	0 (0.0%)	0 (0.0%)	4.39	0.621
D11	Appropriate special tools are provided to carry out overhaul projects	84	366	36 (42.9%)	42 (50.0%)	6 (7.1%)	0 (0.0%)	0 (0.0%)	4.36	0.614
D12	Cooperation exists between power plants on borrowing missing special tools.	84	354	29 (34.5%)	44 (52.4%)	11 (13.1%)	0 (0.0%)	0 (0.0%)	4.21	0.660
D13	Only calibrated tools are used on the overhaul projects	84	357	30 (35.7%)	46 (54.8%)	7 (8.3 %)	1 (1.2%)	0 (0.0%)	4.25	0.656
Composite									**4.24**	**0.368**

NB D1-13 are the statements of overhaul resource management

Source: Research Data (2024)

Thirteen statements were used to assess the effects of overhaul resource management on the performance of overhaul projects. The statement (1) "there is timely availability of required funding for the required resources for an overhaul project" averaged 4.15. Forty-two (50.0%) of 84 respondents agreed to the statement. Comparing the average score (4.15) to the composite's 4.23 suggests that timely funding improves resource acquisition and consequently has a moderate effect on overhaul project performance. The standard deviation, 0.829, indicates that respondents held differing opinions, as it is greater than the composite's 0.368.

According to Statement (2), resource analysis is used to identify resource gaps for overhaul projects. This statement averaged 4.14. Forty-three (51.2%) of the 84 respondents agreed that resource analysis identifies deficient resources for an overhaul project. The 4.14 average score was slightly below the 4.23 composite. The standard deviation, 0.778, indicates that respondents held differing opinions, as it is greater than the composite's 0.368. The study results align with Cherotich's (2017) findings, which suggest that resource management knowledge led to more successful project implementation.

Statement (3), 'funding for overhaul projects obtained from internal sources', averaged 4.38. Out of 84 respondents, 39 (46.4%) agreed that internal sources fund overhaul projects. The average score 4.38, compared to 4.23 for composite scores suggested that overhaul projects receive adequate internal funding, which positively affects their performance. Since the difference between the composite (0.368) and the statement (0.638) standard deviations are significance, it indicates that respondents had divergent views. The study supports Cherotich's (2017) findings that knowledge, physical, human, and financial resource management improve project performance.

Team Execution Management Analysis

Table 5: Descriptive Analysis of Team Execution Management and Overhaul Project Performance

No	Statement	N	Sum	SA	A	N	D	SD	Mean	Std. dev
E1	Tool box meetings are held on daily basis before embarking on the project tasks	84	366	34 (40.5%)	49 (58.3%)	1 (1.2%)	0 (0.0%)	0 (0.0%)	4.36	0.816
E2	The project execution team have a shared understanding of what needs to be done	84	373	16 (19.0%)	26 (31.0%)	36 (42.9%)	6 (7.1%)	0 (0.0%)	4.44	0.683
E3	Experienced technical staff are appointed as team leads	84	384	15 (17.9%)	49 (58.3%)	18 (21.4%)	2 (2.4%)	0 (0.0%)	4.57	0544
E4	Division of project execution team groups is done according to skill strengths	84	359	10 (11.9%)	40 (47.6%)	33 (39.3%)	1 (1.2%)	0 (0.0%)	4.27	0.700
E5	Team leads perform on-site training during overhaul project execution	84	371	23 (27.4%)	48 (57.1%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.42	0.605
E6	There is inclusion of safety briefs in the tool box meetings	84	371	21 (25.0%)	50 (59.5%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.42	0.585
E7	Isolation, lock out and tag out are performed fully on isolated	84	369	9 (10.7%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.39	0.581

	components									
E8	There is strict adherence of SOP, work instruction and OEM manual during project execution.	84	367	20 (23.8%)	51 (60.7%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.37	0.617
E9	Work permits are signed before commencement of any work	84	359	28 (33.3%)	51 (60.7%)	5 (6.0%)	0 (0.0%)	0 (0.0%)	4.27	0.647
E10	Collaboration exists between the project execution team and their supervisors	84	358	13 (15.5%)	65 (77.4%)	6 (7.1%)	0 (0.0%)	0 (0.0%)	4.26	0.661
E11	Team leads perform quality checks at every stage of the overhaul project.	84	358	15 (17.9%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.26	0.642
E12	Overhaul progress is detailed in formal written reports by project team leads	84	359	10 (11.9%)	50 (59.5%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.27	0.647
E13	Records of past inspection and the servicing of equipment are used during overhaul project execution	84	359	23 (27.4%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.27	0.683
Composite									**4.35**	**0.386**

NB E1-13 are the statements of team execution management

Source: Research Data (2024)

Thirteen statements examined the team execution management effect on the overhaul project's performance. The statement (1) indicates there are daily toolbox meetings before project tasks, averaged 4.36 with a 0.816 standard deviation. Compared to the overall score of 4.35, the statement average score was 4.36, signifying that effective team execution management has a positive effect on overhaul project performance. The 0.816 standard deviation is greater than the composite's 0.386 which suggests a difference in opinion among respondents.

The results of statement (2), project execution team understands the tasks averaged 4.44 with a 0.683 standard deviation. This study suggests that 46 (54.8.9%) of 84 respondents strongly agreed that the project execution team understands the tasks. The average score for the statement was 4.44, which was higher than the composite's 4.35. This suggests that the project execution team understands the tasks, which improves overhaul project performance. Because the composite is 0.386 and its standard deviation is 0.683, it's clear that respondents had different opinions. The study confirms Bloch et al.'s (2012) discovery that project managers can improve performance by understanding project management fundamentals.

Statement (3) indicates that appointment of experienced technical staff as team leads results had an average of 4.57 surpassing the overall average score of 4.35. From a sample of 84 respondents, 50 individuals (59.5%) strongly agreed that team leads should be experienced technical staff. The higher standard deviation (0.544), compared to the composite (0.386), indicates that there was a significant difference in opinion among the respondents. Velayutham and Firas (2018) assert that the technical and support teams frequently undertake the task of overhauling power systems, creating a maintenance schedule based on their practical field experience and expertise, which the discovery corroborates.

Inferential Statistics

Correlation Analysis

At the 0.05 level of significance, the Pearson correlation coefficient was used to investigate the relationship between overhaul project performance and project internal administration. Table 6 displays the outcomes that were achieved.

Table 6: Correlation Analysis of the variables

		Performance of Overhaul Projects.	Planning	Inventory Management	Overhaul Resource Management	Team Execution Management
Performance of Overhaul Projects.	Pearson Correlation	1				
	Sig.(2-tailed)					
	N	87				
Planning	Pearson Correlation	0.514*	1			
	Sig.(2-tailed)	<000				
	N	84	84			
Inventory Management	Pearson Correlation	0.615**	0.240*	1		
	Sig.(2-tailed)	<000	.028			
	N	84	84	84		
Overhaul Resource Management	Pearson Correlation	0.470**	0.311**	0.288**	1	
	Sig.(2-tailed)	<000	.004	.008		
	N	84	84	84	84	
Team Execution Management	Pearson Correlation	0.485**	0.244**	0.360**	0.441**	1
	Sig.(2-tailed)	<0.001	<0.025	<0.001	<0.001	
	N	84	84	84	84	84

NB * correlation significant at 0.05 level (2-tailed)

****correlation significant at 0.01 level (2-tailed)**

Source: Research Data (2024)

The analysis indicated a robust and statistically significant correlation (r = 0.514, P-value = 0.000<0.05) between the planning and performance of overhaul projects. The performance of an overhaul project can be influenced by planning principles, and there is a significant and positive relationship between planning and project performance. This is consistent with findings Usman et al. (2014) finding, which suggest that adhering to planning phase principles is crucial in order to avoid poor project performance, rushed project execution, insufficient planning, limited financial resources, and costly project implementation. Owuor et al. (2022) and Tuyishime and Nyambane (2021) discovered a statistically significant positive correlation between planning and project performance, which is consistent with the findings.

The study findings revealed a statistically significant positive correlation (r = 0.516, P-value = 0.000<0.05) between inventory management and the performance of overhaul projects. Makori (2021) carried out a meticulous research and discovered a reliable empirical association between inventory management and the achievement of project objectives. Tarus and Kihara (2018) discovered a direct relationship between inventory management variables and project performance at a different site. The correlation analysis demonstrated that all variables positively influenced project performance. The enhancement of variable quantities resulted in improved project performance. The effect was substantial, as all p-values were less than 0.05. This suggests that they have the ability to anticipate variations in overhaul project performance at any given moment.

The study revealed a strong correlation (r = 0.470, P-value = 0.000<0.05) between the management of resources during an overhaul and the performance of the project. Kizito (2019) discovered that proficient resource allocation enhanced project results. Nevertheless, the study placed the highest importance on the management of financial resources. The correlation analysis conducted by Bulle and Makori (2015) revealed strong positive correlations between performance and resource management.

The study found a strong correlation (r = 0.485, P-value = 0.000<0.05) between the management of team execution and the performance of overhaul projects. Akira and Simba (2017) demonstrated through empirical research that enhancing the skill development of project management teams leads to improved project performance. In Wachira's (2018) study, a robust positive correlation was discovered between project performance and the competence of the management team.

Basic tests for Statistical Assumption

Assumption of Normality

The study employed the Kolmogorov-Smirnov test, a numerical method, to assess the normality of the data distribution for all predictors and dependent variables. The sample size (n) exceeding 50 hence prompted this action. Data is deemed to conform to a normal distribution when p value is greater than 0.05 (P>0.05). The results showed that each independent variable investigated; planning, inventory management, overhaul resource management, and team execution management, had a P-value that exceeded 0.05. This denotes that the chosen samples displayed a normal distribution pattern. The results of the Kolmogorov-Smirnov statistical test are presented in Table 7.

Table 7: Normality Test

	Kolmogorov-Smirnov[a]		
Variables	**Statistic**	**df**	**Sig.**
Planning	0.075	84	0.200*
Inventory	0.078	84	0.200*
Overhaul Resource Management	0.088	84	0.162
Team Execution Management	0.074	84	0.200*

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Source: Survey Data (2024)

Test for independent errors in the model

In regression analysis, the research made use of the Durbin-Watson test, a predominant method for assessing autocorrelation. The Durbin-Watson statistic is always bounded by the values of 0 and 4. The absence of autocorrelation in a sample is indicated by a value of 2.0. Autocorrelation is considered positive when its values range from 0 to less than 2, and negative when they range from 2 to 4. The study discovered that the multilinear regression model (which represents the regression model for independent variables) had values close to 2

Table 8: Independence test of errors

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Durbin Watson
1	0.768[a]	0.590	0.570	0.22370	1.507

Source: Survey Data (2024)

Homoscedasticity Assumption

This study used Levene's test to determine homoscedasticity, with a P>0.05 significance level. Levene's test measures variance homogeneity in dependent variable scores when independent variables are manipulated. This test examined whether overhaul project performance variance was consistent across predictor variables. The results are tabulated below.

Table 9: Homoscedasticity Assumption

Project Internal Administration		Levene Statistic	df1	df2	Sig.
Planning		1.716	17	62	0.064
Inventory Management	Based on mean	0.498	16	64	0.939
Overhaul resource management	Based on mean	1.360	14	64	0.199
Team execution management	Based on mean	1.583	16	63	0.100

Source: Survey Data (2024)

The results indicated that the Levene statistics demonstrated that the homogeneity of variances was not violated as all the variables had P value greater than 0.05.

Examining Multicollinearity

The Variance Inflation Factor (VIF) was employed to assess the presence of multicollinearity among the predictor variables, using a threshold of 10. The findings, as depicted in Table 10, indicate that all the tolerances are greater than 0.2 and all the VIF values are less than 10. Consequently, all the study variables are considered suitable for analysis since they do not demonstrate multicollinearity

.

Table 10: Multicollinearity results

Variable	Tolerance	VIF
Planning	0.872	1.147
Inventory Management	0.833	1.200
Overhaul resource management	0.751	1.332
Team execution management	0.741	1.349

Source: Research Data (2024)

Regression Analysis

The study looked into the effect of project internal administration on overhaul projects at KenGen, Kenya, through the use of multiple linear regressions. Multiple regression models were used to evaluate the effect of predictor variables on the dependent variable. Table 11 displays the results.

Table 11: Model Summary

Model	R	R square	Adjusted R Square	Std. Error of the Estimate
1	0.768[a]	0.590	0.570	0.22370

a. Predictors: (Constant), Project Internal Administration

Source: Research Data (2024)

The summary of the model shows that there is a robust positive correlation (R = 0.768) between the internal administration of projects and the performance of overhaul projects, as anticipated by the regression model. Additionally, the internal administration of the project explains 59% (R2 = 0.590) of the variation in the performance of overhaul projects.

ANOVA output

The study investigated the suitability of the regression model in predicting the performance of overhaul projects following the implementation of project internal administration. Table 12 displays the outcomes of the regression analysis using ANOVA.

Table 12: An ANOVA outline

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.696	4	1.424	28.456	<0.001[b]
	Residual	3.953	79	0.050		
	Total	9.649	83			

a. Dependent variable: Performance of Overhaul Projects.

b. Predictors: (Constant), Team Execution Management, Planning, Inventory Management, Overhaul Resource Management.

Source: Research Data (2024)

The ANOVA results (F 4,79) = 28.456 indicate statistical significance at a P-value of 0.000<0.05. This suggests that, to a considerable extent, the regression model is highly efficient in making accurate predictions of the overhaul projects performance.

Coefficients for Regression

Project internal administration's effect on overhaul project performance was the intended focus of the research. Table 13 displays the results of the regression coefficients.

Table 13: Coefficients for the Regression

Model		Unstandardized	Coefficients	Standardized Coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	0.307	0.390		0.789	0.432
	Planning	0.268	0.066	0.315	4.082	<0.001
	Inventory Management	0.361	0.067	0.425	5.387	<0.001
	Overhaul Resource Management	0.157	0.077	0.170	2.041	0.04
	Team Execution Management	0.160	0.074	0.181	2.163	0.03

a. **Dependent Variable: Overhaul Projects Performance**
Source: Research Data (2024)

The coefficient results from multiple linear regression indicated that project internal administration is significantly related to the performance of overhaul projects, given a P-value of 0.00<0.05. The model was. The model shows that planning, inventory management, overhaul resource management, and team execution management proved to exhibit statistical significance with p-values less than 0.05. When it comes to overhaul project performance, the best predictor was inventory management ($\beta 2=0.361$), followed by planning ($\beta 1=0.268$), followed by team execution management ($\beta 4=0.160$), and then overhaul resource management ($\beta 3=0.157$).

The findings showed a regression $\alpha = 0.307$. The coefficients of the variable planning, $\beta 1 = 0.268$, Sig = 0.001<.05, that a shift in planning can cause a shift of 0.268 in the performance of overhaul projects. Irfan et al. (2017) found similar results, suggesting insufficient project planning results in subpar project performance. Usman et al. (2014) concluded that the adoption of planning phase principles determines project performance.

Further findings indicated that inventory management was also significant ($\beta 2 = 0.361$, Sig =.001<.05). This finding agrees with Murat and Kadir (2016), who found that inventory management is crucial in maintenance, repair, and overhaul to reduce turnaround time (TAT). Tarus and Kihara (2018) demonstrated a consistent empirical relationship between inventory management and project performance through a comprehensive study of the role of inventory control systems, inventory forecasting, and inventory turnover. Similarly, Crespo (2018) found that project administration should prioritize resource management among other goals that match the project's scope. Makori (2021) concluded that managing all inventory during the planning, ordering, and controlling stages has a positive effect on project performance.

The research also noted a coefficient of overhaul resource management $\beta 3 = 0.157$, Sig = 0.04<0.05, which implied that a change in resource management can lead to a 0.157 change in the performance of the overhaul project. Kizito (2019) supports these results by suggesting that effective resource management, including human resource management, material resource management, and financial resource management, can enhance project performance. Cherotich (2017) also showed that knowledge management, physical resource management, human resource management, and financial resource management positively influenced project performance. Bulle and Makori's (2015) study revealed that the allocation of financial, material, and human resources to projects influences their performance.

The analysis also resulted in a coefficient of team execution management of $\beta 4 = 0.160$, Sig = 0.03<.05, which implied that a change in team execution management can lead to a 0.160 change in the performance of overhaul projects. The regression analysis results of Mutua's (2018) study demonstrated a substantial effect on the project's outcome as a result of team proficiency. Wachira (2018) further revealed that the technical proficiency of the management team significantly predicted the prompt completion of projects, hence significantly affecting their performance.

SUMMARY

Participants expressed agreement regarding the effect of planning on overhaul project performance The study revealed a significant positive correlation between the level of planning and the performance of overhaul projects. The study validates the correlation analysis conducted by Owuor et al. (2022) and Tuyishime and Nyambane (2021), which demonstrates a statistically significant positive linear association between planning and project performance.

The effect of inventory management on the performance of overhaul projects formed the second objective. Participants scale concurred that inventory management has an effect on the performance of overhaul projects. A strong positive correlation was found between inventory management and the performance of overhaul projects. This study refutes the notion that the construction industry solely employs inventory management, demonstrating its application in overhaul projects as well. Effective inventory management is becoming essential for the survival of power companies, rather than just a source of competitive advantage.

The influence of resource management on the performance of overhaul projects was the third objective of the research. Participants' responses indicated a consensus that resource management has an effect on the performance of overhaul projects. The correlation between the management of resources during an overhaul and the performance of the overhaul project was found to be positive. Providing sufficient resources for the project overhaul enhances decision-making and project implementation.

Additionally, the research endeavor attempted to examine the effect of team execution management on the performance of overhaul projects. The participants concurred that the management of team execution has a significant influence on the overhaul project performance. The study identified a substantial and positive correlation between the management of team execution and the performance of overhaul projects.

CONCLUSIONS

The research examined the effect of internal administration on the performance of overhaul projects. Multiple linear regression and Pearson correlation indicated a significant relationship between planning and the performance of overhaul projects. Extensive overhauls necessitate a substantial expenditure of both time and financial resources. To maintain efficient functioning and minimize any interruptions to power stations, such projects necessitate thorough preparation and strategic planning. Therefore, overhaul planning clearly outlines the specific tasks, timelines, and resources required.

Inventory management facilitates the procurement of equipment and spare parts during overhauls. In this context, the utilization of direct procurement and framework contracts can prove to be advantageous. Their goals are to reduce the cost of spare parts, expedite the completion of overhaul projects, and improve the reliability of power stations. In order to guarantee payment to suppliers for the delivery of project items, the power station overhaul project teams should closely oversee the procurement process, starting from the initial stages of shopping carts and continuing until the final stages of invoicing. Components should be readily accessible and, ideally, stored in warehouses in a manner that facilitates easy identification and procurement. Warehouses should utilize ERP and SAP modules to allocate and track inventory, ensuring optimal stock levels and accurate accounting.

A comprehensive resource management system in overhaul projects expedites the allocation of funding and resources to power station engineers. The team responsible for the overhaul should employ resource analysis to identify any absent resources necessary for a comprehensive project. The overhaul projects are financed from within the organization. Minimizing the amount of unused spare parts and materials decreases the need for additional spare parts. By capitalizing installed spare parts during an overhaul, the costs of the overhaul project can be aligned with the revenues generated from extended operation. Implementing effective capitalization strategies can enhance power station capacity and reduce consumer energy expenses, thereby rendering electricity production more economically accessible. In order to achieve resource levelling, the power station should adopt the practice of job rotation. Facilitating the allocation of existing resources will be crucial in guaranteeing the uninterrupted execution of the overhaul projects.

Management of team execution exerts a substantial effect on the performance of overhaul projects. Team execution management should utilize toolbox meetings as a means to elucidate project requirements. Standard Operating Procedures (SOP), work instructions, and Original Equipment Manufacturer (OEM) manuals guarantee accurate installations during project implementation, enhancing the dependability and efficiency of overhaul projects. A proficient technical team leader establishes the technical course of the project and removes any hindrances, such as addressing gaps in technical knowledge, resolving complex queries, or optimizing project operations. Organizing the project execution team into groups according to their skill strengths and providing on-site training by team leaders during overhaul projects will increase the capacity of the project team at different power stations, thereby improving the performance of the overhaul project.

RECOMMENDATIONS

Implementing cost reductions is a highly effective strategy for improving competitiveness, as the expenses related to power generation have a substantial effect on overall operating costs. The study's findings suggest that power plants can enhance their competitive edge by implementing energy efficiency measures through efficient project planning for overhauls. Power-generating facilities, especially those under government ownership, should utilize direct procurement and framework contracting strategies to efficiently manage spare parts inventories and foster supplier collaboration. This will facilitate the bypassing of procurement bureaucracies while simultaneously adhering to regulatory requirements.

In order to enhance resource management, power-generating facilities should hire plant-based planners who possess the capacity to proactively identify, anticipate, and plan for the required resources. Kenya's power stations should enhance the capacity of their overhaul project teams by recruiting specialized workforce teams. The transition from labor-intensive methods to automated and technical power plants indicates a shift towards a workforce that has improved technical skills.

To improve resource management, power-producing plants should employ plant-based planners who possess the ability to identify, anticipate, and plan for the necessary resources in advance. Kenya's power stations should increase the capacity of their overhaul project teams by employing specialized workforce teams. The shift from labor-intensive methods to automated and technical power plants signifies a transition towards a workforce that possesses enhanced technical skills.

Areas for Further Research

Researchers can undertake investigations on additional comprehensive initiatives to comprehend the influence of internal management on their effectiveness and validate the credibility and applicability of the findings. While the implementation of resource management and team execution management had a notable influence on the performance of the Kenya electricity generation project, their significance was restricted. This necessitates a more in-depth examination of the project internal management of other projects, which accounted for 41% of the overall total and were not included in the scope of the current study. Further research is required to examine the influence of project internal administration on the performance of overhaul projects, particularly in relation to the predictor variables of overhaul resource management and team execution management.

KenGen is a government-owned corporation that primarily focuses on addressing public concerns. Hence, it is imperative to expand the analysis of project internal management to include other autonomous power producers (IPPs) in Kenya. This will allow for a comparative analysis to determine whether the independent variables greatly affect the achievement of their overhaul projects. A comprehensive analysis is required to compare the KenGen overhaul projects with the overhaul projects in Eastern African energy generation, particularly in Ethiopia and Uganda, which contribute to the Kenyan grid.

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