PROJECT INTERNAL ADMINISTRATION AND PERFORMANCE OF OVERHAUL PROJECTS AT KENYA ELECTRICITY GENERATING COMPANY

APIYO CHRISTOPHER OWIYA
D53/OL/HEP/20082/2021

A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF BUSINESS, ECONOMICS AND TOURISM IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (PROJECT MANAGEMENT) OF KENYATTA UNIVERSITY

NOVEMBER 2024

DECLARATION

Declaration by candidate:

I hereby declare that this project report is my original work and has not been presented for the award of a degree at any other university

…….. ……

Signature Date

Apiyo Christopher Owiya

D53/OL/HEP/20082/2021

Declaration by supervisor:

I hereby verify that the research work was conducted by the candidate under my guidance.

…….. ……

Signature Date

Dr. Paul Kipyegon Sang (PhD)

Senior Lecturer.

Management Science Department,

School of Business, Economics and Tourism,

Kenyatta University.

DEDICATION

I dedicate this research project to all professional in the energy sector, academics and experts in the discipline of Project Management.

ACKNOWLEDGEMENT

I would like to extend my appreciation to my supervisor, Dr. Paul Kipyegon Sang, for his helpful guidance and for sharing his knowledge and experience during his supervision of this work. I am also appreciative of my KenGen engineering colleagues, especially E. Juma, P. Otieno, and E. Mbaya, for being there for me when I needed them. I would like to thank K. Okumbe and S. Ariba for their assistance throughout this study, in some form or another. All of the faculty and staff members from Kenyatta University's School of Business, Economics, and Tourism who helped me out are tremendously appreciated. Your contribution to this achievement is well appreciated.

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OPERATIONAL DEFINITION OF TERMS

Project Internal Administration: It involves activities such as developing schedules and allocating human and material resources; tracking and ensuring the availability of project materials; optimizing the use of tools, personnel, and other resources for successful project execution; and managing the team to implement the activities outlined in the project plan.

Planning: To properly manage internal processes, it means developing a thorough project plan including goals, roles, responsibilities, budgeting, specifications, scheduling, resource allocation, and deadlines.

Inventory Management: This encompasses the selection of procurement methods, the lead times for spare parts, the processing time for payments, the technical knowledge of the warehouse, tools, procedures, and metrics to monitor inventory levels, manage re-ordering, and track the movement of materials and supplies to ensure availability and minimize overstock or shortages.

Overhaul Resource Management: It involves the management of personnel and equipment required to keep the equipment up and running with the required capabilities. It

	includes ensuring timely overhaul project funding availability, conducting resource analysis to identify gaps, minimizing material waste, capitalizing on all spare parts used, and fostering transparency to avoid miscommunication.
Team execution management:	This involves assigning tasks, monitoring performance, facilitating decision-making, resolving conflicts, ensuring a shared understanding of project objectives among team members, and selecting the team based on skill strengths for task allocation.
Performance of overhaul projects:	This implies the ability of overhaul projects to attain quality deliverables such as reduced project cost, work quality, timely delivery, zero safety incidences, station efficiency, availability and reliability.

ABBREVIATIONS AND ACRONYMS

AU: Activity Unit

CAGR: Compound annual growth rate

CAK: Communication Authority of Kenya

CDF: Constituency Development Fund

EOQ: Economy Order Quantity

ERP: Enterprise Resource Planning

FRM: Finance Resource Management

FY: Financial Year

GOK: Government of Kenya

HRM: Human Resource Management

IPP: Independent Power Producers

KenGen: Kenya Electricity Generating Company

KPLC: Kenya Power Company Limited

KPI: Key Performance Indicators

KW: Kilowatts

Kshs: Kenya Shillings

KURA: Kenya Urban Roads Authority

LOTO: Lockout and Tag Out

LTI: Loss Time Injury

MRM: Material Resource Management

MTBF: Mean Time Before Failure

MW: Megawatts

OEM: Original Equipment Manufacturer

OPEX: Operations Expenses

PC: Piece

PGM: Power Generation Manager

PGAM: Power Generation Assistant Manager

PGU: Power Generating Unit

PLC: Programmable Logic Controller

PLC: Public Limited Company

PM: Project Management

PM: Plant Maintenance

PMBOK: Project Management Body of Knowledge

PMI: Project Management Institute

PMS: Planned Maintenance Service

PPA: Power Purchase Agreement

ROI: Return on investment

RHS: Running hours

SAP: System Application and Product in Data Planning

SOP: Standard operating procedure

SPSS: Statistical Program for Social Sciences

TAT: Turnaround time

TOC: Theory of Constraints

VIF: Variance inflation factor

WI: Work Instruction

WIP: Work in Progress

ABSTRACT

The overall result of an overhaul project in power stations is better electricity productivity. The severity of downtime can disrupt the entire facility. The total cost of downtime, emergency repairs, and repeat jobs in Kenya Electricity Generating Company PLC is staggering. The company is witnessing an increase in revenue leaks, close to 8% of its expected revenue, attributed to numerous equipment breakdowns. The inadequate generation also affects the reliability of the national grid and, in turn, the economy for sectors and industries dependent on electricity. Stringent power purchase agreements (PPA) impose penalties when power plants fail to generate at their declared capacity due to machine breakdowns. Usually, overhaul projects aim to minimize failures, increase their availability, and ensure the machine's useful life is attained. 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, having 24 operational power plants and a total installed capacity of 1904MW electrical power. This is equivalent to 63% of the country's total installed capacity. Four distinct aims directed the research. These were to investigate the influence of planning, inventory, overhaul resource management and team execution management on the performance of overhaul projects. The study anchored on competence theory as the leading theory as it allowed for a focus on aligning the specific skill sets and capabilities of project managers and team members with the needs of the overhaul project. A literature review summary, project internal administration and overhaul project performance conceptual framework have been presented. The study's methodology was based on a descriptive survey, with a target population of 31 overhaul projects implemented in fourteen power stations spread across Kenya Electricity Generating Company's six operational areas in Kenya-Kipevu, Western, Olkaria and Eburru, Ngong, Seven Forks and Upper Tana; and 112 overhaul projects leads at the designated power stations including power generation assistant managers, engineers, technicians, and procurement and finance officers. The sampling was done by the use of stratified sampling procedure which obtained a sample size of 87 overhaul project leads. 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 who shared similar characteristics with the primary research. The content validity was used to evaluate whether the data collection instrument gave the correct measurement. Cronbach alpha, yielded reliability values of above 0.7 for all the constructs. Data analysis followed using multiple regression to assess the degree of consensus among the participants on the study's specific objectives. The findings showed that planning, inventory management, overhaul resource management and team execution positively influenced performance. Notably, inventory management had the strongest influence (β=0.425), while resource management had a moderate effect (β=0.170). The overall coefficient of determination was 0.590, indicating that 59% of the variation in project performance could be explained by internal management factors. Based on these findings, the study recommends improving planning processes, streamlining inventory management, enhancing resource allocation methods, and providing targeted training to project teams to optimize project outcomes.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

By 2021 the worldwide market for power plant maintenance will have valued $20.7 billion. Projected CAGR of 4.8% from 2022 to 2031 will help the value to reach $33.2 billion by 2031 (Allied Market Research, 2023). Global power plant maintenance has been categorised depending on the type of power plant: hydropower, nuclear, thermal, renewable, 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 government-owned South African power plant Eskom experienced failures in 2022 that resulted in a loss of 19,052 MW (Antony, 2022). That is the same as roughly two-fifths of the capacity of the power plant, so slowing down economic development. By ensuring low costs, consistent operations, and an efficient plant, overhaul projects reduce these risks; all of these are critical indicators of the plant's performance. 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). This relates to measures like timely scheduling, minimizing repeating tasks, and upholding safety standards, all of which help to guarantee better use of resources and smoother operation. For this reason, power plants start mostly depending on equipment maintenance. Many power plants find overhaul projects difficult, thus effective project management is quite

important. The overhaul should maintain systems operating to achieve power plant goals (Devi & Putu, 2020). This aligns with the performance goals highlighting adherence to budget and improvements in reliability as critical metrics. 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 budget and resource management to monitoring development and guaranteeing seamless communication, good project management guarantees that all the gears of a project are well-oiled and working together perfectly (Opijnen, 2023). For instance, more dependability of power stations fits world goals for preserving operational efficiency in power plants.

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 (Kerzner (2017). 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). The power generation managers (PGMs) must use unique, finite, and clearly defined objectives involving many interrelated projects, including overhaul projects, to ensure successful project performance. Attention should be given to the internal administration of projects to ensure the project is well managed to complete its listed goals and deliverables successfully. Inadequate project internal administration in power plants results in

consequences including bad image, project cost delays and overruns, and project implementation team demotivation. The organization is also be subjected to sustainability risk.

With clear objectives, the power station's operational performance, characterized by its availability, reliability, and efficiency, among other KPIs, is positively affected through the right project internal administration. With the continuous supply and availability of electricity in our outlets, many of our societal functions would function properly (Johan & William, 2019). The necessity of power has grown due to the rising global population and urbanization for economic, social, and environmental activities (Vijay & Samprit, 2022). Overhaul project performance, which enhances power station availability and efficiency directly support this objective by ensuring that power plants meet the demands of an expanding economy. Kenya's broad and abundant energy resources put it in a unique position to fulfill its economic objectives through the strategic development of the energy industry. In 2013, the Kenyan government shifted the universal access to electricity target from 2022 to 2030 in order to accelerate the achievement of the Kenyan legislators' goal. Despite its achievements, Kenya's energy sector must continue to progress due to ongoing challenges. Due to the uniqueness of the overhaul projects in various power stations, the significance of project internal administration has increased daily. The power generation managers (PGM) must manage the station's equipment's operations and maintenance processes well. Neglecting one adversely affects the other one. Employing run-to-fail equipment could cost up to 10 times as much as a regular maintenance program (Sarah, 2018). The overhaul project’s focus on minimizing recurring jobs and ensuring timely schedules reflects the value of proactive maintenance in reducing operational costs and enhancing efficiency. With the proper project execution, power plants spend less money. As one

of the project's administration processes, project managers need to create a robust project plan and adhere to it in order to succeed. Project managers monitor progress to achieve objectives as the organization pursues its goals (Anyim, 2020). Critical roles like cost management and safety adherence in meeting performance objectives resonate with the need for robust project execution plans to prevent failures and ensure resource optimization. These factors resonate with the need for robust project execution plans to prevent failures and ensure resource optimization. Project managers and teams can put much hard work into projects but will only sometimes be successful. Planning an overhaul project is more complicated than planning standard manufacturing operations. PGMs should be strategic while planning and team execution when pursuing an overhaul project completion. This gives the project manager an operational mindset.

By addressing these problems, power plants can help a developing country like Kenya reach its more ambitious social and economic targets as well as help to save equipment from breaking down. (KenGen's Strategic Plan, 2018). The project performance also depends on individual skill levels and individual commitment. Project managers can improve performance by understanding the fundamentals of project management, including quality assurance and delivery schedules (Bloch et al., 2012). In engineering, technical skills and project administration knowledge are applied to plan and execute projects to achieve higher productivity (Meredith & Mantel, 2017). With the possibility of developing an effective project administration to increase the mean time before failure (MTBF) and lifetime extension, it could be possible to extend the lifetime of the machinery and minimize costs associated with breakdowns and low efficiencies **(**Harris & Pham, 2017). As part of the overhaul project process, timely completion helps the power stations increase their generation performance. According to Crespo (2018), identifying specific administration required to deliver projects efficiently has limited

information even though organizations can use the McKinsey 7S framework to measure project improvements. Power stations must identify the proper internal administration for the project that might influence the overhaul performance.

The success of overhaul projects depends on a careful balance of several important factors, such as keeping costs low, sticking to schedules, making sure safety rules are followed, and improving dependability, efficiency, and availability (Kerzner, 2017). Keeping costs under control is important for staying on track with your finances and making sure the project succeeds. By addressing recurring jobs, projects can run more smoothly and efficiently. Effective scheduling not only improves operational efficiency, but it also increases stakeholder trust (Gray & Larson, 2017). Safety adherence is critical to project success, as it aligns with best practices and reduces costly incidents. Furthermore, operational efficiency is critical for optimizing resource output, whereas availability guarantees consistent operational capacity and production continuity (Heizer et al., 2017)**.** Finally, reliability stands out as a critical performance driver, with a direct correlation to the project's success.

1.1.1 Project Internal Administration

Effective overhaul project management depends on planning, which also significantly helps to raise operations and maintenance standards in power plants. Power stations always aim to raise their operational and maintenance standards. According to Fatuma, an overhaul project combines every administrative and technical action to either restore or preserve an object in a working state. Managing projects is expected in the pursuit of improvements. Effective planning ensures that these measures are executed systematically and efficiently. In a recent study on public sector-based projects by Irfan et al. (2017 identified poor planning, along with inadequate feasibility studies, weak

technical design, and insufficient project control, as major contributors to low project performance in public sector projects. These reasons agree with Stander's (2016) ideas that strong project management based on thorough planning is necessary for an organization to grow. Power plants can reduce risks, make good use of resources, and improve the overall success of their overhaul projects by putting detailed planning and control at the top of their list of priorities. In the power generation sphere, project internal administration is quite the same. When planning, the schedule and deadlines are defined, and the responsible teams are identified (Nyakundi, 2015). The identification and subsequent appointed are formalized through a project implementation team. The power generation manager (PGM) might have to plan a project that fits with the goals of the company. In real life, project planning is usually done by setting standards for performance, having the project team compare these standards during the execution phase, and making any necessary changes (Hazir, 2015). The final comprehensive plan (PMI, 2013) lays out how the project will be carried out, monitored, controlled, and ended.

The inventory management theory entails making choices that are without compromising a firm objectives, costs, and other constraints (Mathuva,2013). Murat and Kadir (2016) stated that inventory management is crucial in maintenance, repair, and overhaul to reduce turnaround time (TAT). Inventory comprises the consumables and materials needed for overhaul project activities in a typical overhaul environment. Like other types of project management, inventory management’s goal is to perform each activity of buying, storing, using, and replenishing as efficiently and economically as possible so that the business has the proper inventory at the right time and cost. We manage inventory in a time-consuming and complex way because organizations may need to buy and store hundreds or thousands of items. Implementing the right inventory

management software for example, the Enterprise Resource Planning (ERP), eases the scenario by raising scalability, dependability, and efficiency streamlines and improves inventory control. Using such systems will help companies to have better control over their inventory, so lowering delays and expenses and guaranteeing project success.

Overhaul resource management is a fundamental aspect of ensuring the success of an overhaul project. Project administration should integrate timely delivery, resource management, and budgetary goals that match the project's scope (Crespo, 2018). A well-defined project is also expected to give a clear path for decision-making and resource allocation. In the context of overhaul projects, overhaul resource management is vital in bolstering asset performance in a firm (Cahyo et al., 2014). Before an overhaul is started, several tools—not only spare parts—are needed. Under changing circumstances, preparing for an overhaul maintenance can be difficult (Saputra et al, 2023). Ensuring that power-generating managers (PGMs) may efficiently coordinate resources and maintain their teams in line with the objectives of the project depends mostly on communication. According to a poll spanning workers in many different sectors, 86% of respondents say inadequate teamwork and poor communication lead to workplace breakdowns. An employer's whole structure should incorporate job leveling (Sarah & Mitchelle, 2023). Job leveling can be greatly influenced by the start of job rotation during an overhaul. Staff can experience different machines while reducing the physical strain because of the enhanced workforce. This flexibility allows for better utilization of human resources, contributing to a more efficient overhaul process. The overhaul projects also need components and tools on hand that can be used to overhaul the machines quickly. The tools and procedures utilized throughout project execution influence its progress (Tae et al., 2020). Workload distribution, activities timelines, and schedules of various activities needed for a project require organization (Nyabera,

2015). This ensures that all tasks are completed efficiently, minimizing delays and optimization of resource usage. Overall, overhaul resource management necessitates careful planning, effective communication, job levelling, and strategic tool and personnel deployment to improve an overhaul project's performance and success.

Team execution management is a critical element in the success of overhaul projects, ensuring that all aspects of project implementation are handled efficiently, safely, and collaboratively. Opijnen (2023) claims that project administrators collaborate closely with project teams to ensure success. In an overhaul project, team management may include ensuring work quality, providing daily briefs, collaborating, documenting and reporting, and keeping safety in mind. Taryn et al.(2018) found that more team member trust results in more cooperation, so raising the possibility of project success. Overhaul projects involving difficult tasks and coordination depend on team members developing trust and cooperation. The performance of the overhaul project could rely on the PGM uniting teams and giving them a complete knowledge of the project objectives. Additional in power industries, overhaul equipment is subject to safety requirements. In a typical power generation environment, overhaul project safety aspects include isolation, lockout and tag out (LOTO), standard operating procedure (SOP), and WI (work instruction) execution as per the original equipment manufacturer (OEM) manual. Careful management of this factor during team performance is crucial to ensuring the safety of both the machine and the people using it. To ensure the project progresses smoothly and achieves its goals, team execution management in overhaul projects requires strong leadership, open communication, trust-building, cooperation, and a continuous focus on safety. Maintaining tight control over these factors is crucial to the overhaul's success, which in turn optimizes team performance and ensures everyone's safety.

1.1.2 Overhaul Projects Performance

A performing overhaul project results in better productivity, availability, efficiency, and improved safety of the power stations. According to Kim (2010), the overhaul is considered successful if no mishaps are encountered while undertaking the tasks, whether productivity has increased, whether the budget and every detail of the overhaul plan is adhered to, whether no work has to be redone, and whether all the requirements set forth during the planning stage have been met. An overhaul lengthens the life of equipment and reduces its failure rate (Ngatia, 2013), thus making the equipment more reliable. The power plant and equipment's efficiency and availability for power generation rely on following the schedules for planned maintenance services and equipment overhauls. Otherwise, the power plant can experience higher fuel oil consumption, increased higher forced outages and their associated costs. The equipment's work schedule varies depending directly on the machine being overhauled. An organization's performance is assessed based on how well its internal operations are run (Ondari, 2022). According to Elbatran et al. (2015), who investigated hydropower turbines and technologies, found that hydroelectric efficiency, decreased environmental effects, lower capital costs, higher household connections, and dependable operation expenses (OPEX) are the metrics utilized for evaluation purposes for hydropower systems performance. The choice of the project's internal administration can significantly influence the performance of the power stations. A firm's critical operational performance measures are maintainability, reliability, efficiency, availability, and production per unit cost. (Kamau, 2014).

Before the subsequent overhaul is due, it is essential to prevent unplanned and expensive power plant shutdowns as this may bring about grid disturbance and national blackout. (Kim, 2010). Planning of these overhauls must, therefore, start several months

in advance since they are substantial projects. A generating unit forced outage could have a solid and considerable effects on operation and maintenance costs, such as decreased plant efficiency, production loss, and the requirement for replacement parts. (Mukhongo et al.,2020). The current study measured overhaul projects' organizational performance, which comprises cost, work quality, safety, delivery time, power generating unit efficiency, availability, and reliability.

1.1.3 Overhaul Projects at KenGen

KenGen PLC is the leading electricity generation company in Kenya, with a combined installed capacity of 1904MW and 24 operational power stations. This accounts for approximately 63% of the nation's installed capacity (KenGen website, 2023). It is anticipated that the breakdown and failure costs of KenGen's machines will be reduced through the overhaul. 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 overhaullprojects 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.

1.2 Statement of the Problem

Planned outages as well as machine overhaul projects are inevitable (Bagheri & Amjady, 2019). According to Velayutham and Firas (2018), the technical and support teams often handle the overhaul projects for the power systems, developing the maintenance schedule based on their hands-on field experience and knowledge.

Operating expenses for KenGen have increased dramatically over three straight financial years: Kshs 12,488 million (FY 2021), Kshs 15,742 million (FY 2022), and Kshs 38,786 million (FY 2023). Rising plant running and maintenance expenses, compounded by regular machine breakdowns and depreciation of the Kenya Shilling (KenGen audited results for the year ended 30th June, 2023, 2022 & 2021), help to explain this trend. This goes against KenGen's operational and excellence strategic pillar aimed at optimizing maintenance practices and reducing operating and overhead costs. Globally, machinery breakdowns account for nearly 28% of major insurance losses in high-risk industries like power generation (FM Global, 2018). Cases of poor performance in overhaul projects are being witnessed due to factors relating to resource coordination and prolonged lead time delays while procuring critical spares (Magenda, 2017). For KenGen, these breakdowns have resulted in revenue leaks amounting to nearly 8% of its expected earnings. Notwithstanding regular overhaul initiatives, equipment failures show weaknesses in maintenance plan strategies, inventory management, resource management, team and overhaul project management. To meet these challenges, maximise operational efficiency, and lower growing costs in the face of rising grid dependability demands, strong planning, simplified maintenance practices, and effective resource management are absolutely vital. This translates to a loss of both capacity and energy revenues and an increase in breakdown costs for the company. The latest 36000 Rhs overhaul projects for units 7, 3 and 6 at Kipevu 3 were done in 2018, 2019, and 2022, respectively. Units 7 and 3 are yet to yield the required performance due to the numerous breakdowns associated with high exhaust gas temperatures, amongst other breakdowns, bringing down the average monthly mean time before failure (MTBF) to below 200 hours. Unit 5 overhaul project surpassed the original budget cost by over 60%, with the execution of the project delaying by six

months while awaiting spare parts delivery. Other examples are the Masinga protection system overhaul in 2017, which had a cost overrun of about 43%, and the Olkaria IV unit I overhaul in 2019, which had a complete breakdown of the machine coupling as a result of an omission of the maintenance of lubrication system power back-up during the overhaul planning phase. Similar circumstances are being experienced in other areas, so affecting the availability and efficiency of machinery or units. Further aggravating the financial load is KenGen's failure to satisfy availability criteria set in Power Purchase Agreements (PPAs), which demand an availability of above 85%. Notwithstanding regular overhaul initiatives, equipment failures show weaknesses in maintenance plan strategies, inventory management, resource management, team and overhaul project management. To meet these challenges, maximize operational efficiency, and lower growing costs in the face of rising grid dependability demands, strong planning, simplified maintenance practices, and effective resource management are absolutely vital.

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. A knowledge vacuum has developed in this field since no previous studies have investigated the link between project internal administration and the success of overhaul projects in Kenyan energy

companies. This study sought to close this gap by looking at internal project administration on planning, inventory control, overhaul resource management, team execution management, and how these factors affected the performance of overhaul projects. Understanding this will help energy sector stakeholders to apply project internal management to improve and redesign project performance.

1.3 Objectives of the Study

1.3.1 General Objective

The primary aim of the study is to assess how project internal administration affects KenGen's overhaul project performance. The general objective should mirror the research topic of the study.

1.3.2 The Specific Objectives

i. To examine the influence of planning on the performance of overhaul projects at KenGen
ii. To assess the effect of inventory management on the performance of overhaul projects at KenGen.
iii. To analyze the influence of resource management on the performance of overhaul projects at KenGen.
iv. To determine the influence of team execution management on the performance of overhaul projects at KenGen.

1.4 Research Questions

i. What is the influence of planning on overhaul projects performance at KenGen ?
ii. How does inventory management influence the performance of overhaul projects at KenGen?
iii. What is the effect of overhaul resource management on overhaul projects performance at KenGen?

iv. How does team execution management influence the overhaul projects performance at KenGen?

1.5 Significance of the Study

Knowledge of project internal administration regarding planning, inventory management, overhaul resource management, and team execution management is generated from the study. Future researchers looking into relevant topics in this field can find the ideas, models, research techniques, and discoveries helpful in creating new knowledge. The power producers can learn their areas of improvement during an overhaul project. Additionally, the study shall benefit other power utilities, manufacturers, and all those who use electricity as an energy source. The power generation managers at KenGen, who are the project managers, will benefit from this study in ensuring the overhaul project achieves their set objectives and the plant availability and reliability are well maintained at the power stations.

1.6 Scope of the Study

The study centered on thirty-one (31) overhaul projects in KenGen power stations located in five primary business regions, i.e., Kipevu, Western, Olkaria, Eburru, Ngong, Seven Forks and, Upper Tana. The study was limited to planning, inventory management, overhaul resource management, and team execution management and their effect on overhaul project performance. The performance of overhaul projects has been adopted as project cost, work quality, delivery time, machine efficiency, zero loss time injury (LTI), plant availability, and reliability.

1.7 Limitation of the Study

Some of the responders failed to provide information about past initiatives because KenGen as a state firm, works on sensitive projects. Some project team members involved in previous projects might have shied away from disclosing the challenges

encountered during project execution with the feeling of being part of the failures or delays. Convincing some staff to provide information took some time, given that they were engaged in their regular duties. However, the researcher sought authorization from the human resources manager to engage staff in providing the necessary information. The introductory letter from the university also gave assurance to the respondents.

1.8 Study Organization

The research context was introduced in the first chapter of the study, that is the issue being addressed, the research goals, inquiries being investigated, the importance of the study, the extent of the research, and the obstacles that the researcher anticipated. Chapter two provided a literature review that included a conceptual framework. Chapter three discussed the researcher's methodology including the study's design, the number of participants and their selection, the tools and processes used to collect data, together with the strategies employed to analyze the data. In chapter four, the researcher presented the findings and analysis while chapter five, on the other hand, offered a concise overview of the research results, deductions, and suggestions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two covered the theoretical underpinnings and summaries of findings from other scholars researching the similar topic. Additionally, this section covered empirical literature pertinent to the study's specific objectives.

2.2 Theoretical Literature Review

Academics and researchers have developed comprehensive theories relating to project management. This section, therefore, delved into the views pertinent to project internal administration and their effect on overhaul projects performance. Specifically, the chapter reviewed theories of competency, constraints and contingencies.

2.2.1 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, competence in strategic and operational planning ensures effective project execution. The organization's performance is enhanced if it has 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.

Procurement and contracting competencies are advantageous for organizational complexity, while project engineering competency are beneficial for addressing technical complexities in supply systems (Silva et al., 2019). According to Blom et al. (2023), professional competency in project management results from knowledge acquired via training and the application that follows together with other abilities acquired during employment. As Rezende and Blackwell (2019) point out, a project

manager's capacity to monitor inventory procedures, predict material needs, and minimise delays results from both professional knowledge and practical experience.

As electricity generation projects are carried out in Kenya, their performance is vital in ensuring the nation’s grid stability is stable. Competence theory has a lot of applicable lessons towards their performance, especially regarding competencies to look for or develop among project implementation teams. To control the complexity, it is imperative to know the relevant management competencies of project managers, claims Khattak and Mustafa 2019 Dealing with daily project needs, project implementation teams need competencies to satisfy top management objectives.

Various reasons may lead to poor performance in power stations. These include a lack of knowledge about undertaking a given maintenance procedure, a lack of executive commitment, and a lack of knowledge on how to proceed. A knowledge gap exists in project management (PM) as some of the maintenance managers have never studied Project Management Body of Knowledge (PMBOK) and have no professional background in PM. With the performance overhaul projects at KenGen, the competency theory is significant in this study as power generation managers (PGMs) can align the workflow to the project's specific objectives. As such, the Competency Theory is the leading theory in which this study is underpinned to show how it applies to improve overhaul management while dealing with project internal administration in power plants. Project management competency is a crucial qualification that great project managers have. PGMs can use these qualifications during the overhaul activities to scope out work required for each activity, estimate spare parts and labor costs, and mitigate risks associated with safety during maintenance together with teams.

2.2.2 Contingency Theory

Classical organization theories propounded by Taylor (1947), Fayol (1949), and Weber, 1947, address formal structures and ideas to improve management effectiveness. Taylor's focus on task specialization can contribute to efficient team execution by ensuring that team members are assigned roles based on their expertise. For instance, those from Fayol stress how important structured processes like planning are as a basic management task. Fiedler's (1964) Contingency Theory, on the other hand, says that planning needs to be flexible enough to adapt to different situations. For renovation projects, this means making the planning process fit the specific problems that come up with each one, like the technology needed, the environment, and the way the business works (Darwish et al., 2018). According to the Contingency Theory, inventory management must also change based on what's going on, like when supply chains are unstable or when repairs need to be done right away. For example, KenGen's inventory systems might need to be changed depending on how often there are forced outages or what kind of machinery is being fixed.

By applying contingency theory, organizational learning, which applies experience as a template for present circumstances, ensures that mitigation measures are accepted (Mwangi, 2019). The technology used, for example, has an effect on the organization's effectiveness, degree of environmental volatility, size, design, features, and information system utilized (Kihara, 2021). The contingency theory asserts that administration is entirely dependent on the specific circumstances within the management cycle and that management functions ought to be customized for the unique situations that an organization faces (Chepkoech, 2016). The PGMs are responsible for both operations and maintenance of the power stations. Since an overhaul project is novel, it requires a different, contingent approach on each instance simply because it is not a regular plant

operation. Therefore, this theory is significant as the PGM can effectively employ other project administrations to develop the best approaches to overhaul. The power stations within KenGen are like small organizations. Hence, the PGM can control the project's internal processes more because of their adaptability and more straightforward modification. This is acknowledged by the contingency theory, which tries to determine the project administration that best suits the distinct requirements of various projects.

2.2.3 Theory of Constraints

Propounded by Goldratt and Cox (1984), the methodology used in theory of constraints (TOC) determines a critical limiting factor, bottleneck, 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. 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.

The limitation in the manufacturing process, commonly known as a bottleneck, becomes a critical theory focusing in identifying the chain’s weakest link(s) serving as bottlenecks and tries to find the relationships among these bottlenecks (Rahadi et al., 2020). To maximize system performance, TOC stresses the need of spotting and fixing congestion. Within the framework of overhaul projects at KenGen, good planning entails acknowledging constraints including bureaucratic delays, time limits, or resource availability. These days TOC finds use in manufacturing planning, control, scheduling, and factory bottlenecks. According to this view, TOC applied correctly

could result in better project performance as well as employee output. Using current staff, TOC is a proven approach to lower inventory and work-in-progress and increase dependability and quality (WIP), late deliveries and overtime (Sunil et al., 2013). Project work and overhaul and maintenance in the power generation industry are comparable (Rahadi et al., 2020). An overhaul project is an improvement of the machine in a broader scope, and they are often performed at predetermined intervals based on the running hours. It covers several interlocked activities and must follow the three "iron triangles" of time, cost, and scope. Rahadiiet al. (2020) stated that identifying the limitation, exploiting it, subjecting it to exploitation, improving system performance, and carrying out a repeat on the process are the five fundamental processes of TOC to remove project restrictions. Applying TOC will help KenGen improve team dynamics. For example, fixing issues with projects' timeliness and quality helps to improve both. The overhaul project must adhere to the specified specifications, planned costs, and scheduled completion date, as is the case with any other project. The project's success criteria have been updated to include the concept of a "iron triangle" since 2015, with time, money, and quality remaining the primary factors in determining the project's success (Sanchez & Terlizzi, 2017).

To the current research, this theory provided a consistent management theory for running an organization involved in overhaul projects, such as power stations. Some benefits of this theory are reduced overtime, repeat jobs, increased throughput, reduced lead times, prioritizing, and project finishing on time or ahead of schedule. For instance, much overtime is being incurred during overhauls at KenGen because of delayed execution of works, extended project timelines and repeat jobs. Another bottleneck this theory can overcome is the government bureaucracies that KenGen has to follow in procuring goods and services. KenGen can remove inventory delays including those

resulting from government procurement processes by using TOC ideas to rank the availability of key components and speed procurement (Fatuma, 2018). Through concentration on constraint-driven inventory control, KenGen can reduce downtime and prevent project delays brought on by material shortages. Therefore, the unavailability of all materials may limit the project's ability to be completed within the allotted timeframe (Fatuma, 2018). This can be fixed by prioritizing the availability of essential components and streamlining procurement by putting TOC principles into practice. KenGen reduces downtime and prevents project delays caused by a material shortage by prioritising constraint-driven inventory control. The enhancement of team performance is contingent upon the prioritisation of activity improvement by TOC. KenGen can enhance team dynamics by employing TOC to identify execution-related constraints, such as unclear communication channels or skill gaps.Resolving misaligned team roles or inadequate training can help to improve the quality and timeliness of projects, for example. The TOC method ensures that teams focus on fixing the most important problems, so enhancing teamwork and enabling timely project completion (Rahadi et al., 2020). Also, sourcing the correct equipment, spares, and specialized services from the OEM takes much work while following the procurement act. An attractive feature of TOC is its inherent prioritization of activity improvement, which can be instrumental in ensuring the overhaul projects undertaken are successful.

2.3 Empirical Literature Review

Power stations have their nomenclature for maintenance projects. Because of its potential, the area of project internal administration and its effect on overhaul project performance has drawn more attention from academics and management professionals. The researcher expects this interest to increase soon since overhaul projects are critical for ensuring the efficiency and safety of machines, delivering

performance improvements, and providing a reliable supply of electricity to support system security. This section discusses earlier studies undertaken.

2.3.1 Effect of Planning on Project Performance

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.

Planning effects on success of public sector projects in Rwanda was studied by Tuyishime and Nyambane (2021). The research utilized the casual research design. The Rwanda Utilities Regulatory Authority's 145 respondents were the target population. Yamane formula as used by the researcher determined the sample size of 106 employees. Data for the study were gathered using a structured questionnaire and basic random sampling techniques. To guarantee validity, the data gathering tool underwent pre- and post-testing. Correlation and regression analysis were used to validate the link, which showed a positive, significant linear correlation exists between project performance and planning. According to the study's findings, planning procedures affect project performance.

Owuor et al. (2022) investigated Kenyan universal service projects and how project planning served as an instrument for their performance. The Communication Authority of Kenya's (CAK) voice infrastructure and broadband connectivity projects for education were the subjects of the study. Purposive sampling was also used in the study. The interview schedule and the questionnaire were both used to gather data. The study's conclusion was that universal project success is influenced by project planning. This study is relevant to the overhaul project performance of KenGen as it focuses on the project's level of estimation, the composition of the team working on it, project priorities, and its technical specifications. Like any other project, the planning aspect of an overhaul is becoming a priority as power plants endeavor to cut expenses, abide by regulatory requirements, and improve machine performance.

2.3.2 Effect of Inventory Management on Project Performance

Jusoh and Kasim (2017) reviewed material management implications on the project's performance. The material management processes dimension was represented through purchasing, warehousing, expediting, shipping, material take-off, supplier inquiries, and project planning. Time efficiency, financial savings, quality enhancement, increased productivity, and waste reduction represented the project performance dimension. The study was undertaken using a desk review of existing literature from journals, books, and conference papers. The study revealed that supplies affects time, quality, productivity, and performance. The study also revealed that adequate documentation and inventory systems effect waste performance and time. This study is significant as inventory management is becoming necessary for survival rather than a competitive edge in the power sector.

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.

A research study on resource management techniques influence on Nairobi City County's commercial housing projects' performance in Kenya was conducted by Makori (2021). Material, financial, and human resource management were examined as independent variables. The survey employed a descriptive research design. Forty commercial housing complexes in Nairobi City County, Kenya, that were completed between 2017 and 2020 were the primary focus. Top housing project managers, supervisors of housing projects, and owners of housing projects in these particular projects comprised the responders. Since the 40 completed commercial housing projects distributed in four sub-counties in Nairobi being targeted are manageable, a census was conducted. The results showed that commercial housing projects performed better when inventory was managed throughout the whole process, from planning to ordering to controlling. However, a literature gap still exists in inventory management and project performance in the energy industry.

2.3.3 Effect of Overhaul Resource Management on Project Performance

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).

Bulle and Makori (2015) studied the Kenya Urban Roads Authority projects and explored the role of resource allocation in their performance. The researchers used a descriptive study approach to compile their findings. Utilizing the sampling method, a census was carried out and information was gathered via questionnaires. Publications such as periodicals, reports, magazines, and journals were the source of secondary data. The study found that projects' performance is influenced by the financial, material, and human resources allocated to them. Allocating resources influence the project's delivery speed and quality while guaranteeing that the project plans' cost criteria were followed. The study focused on how resource allocations are necessary to improve and maintain project performance. Superior project outcomes are guaranteed when resources are used and allocated effectively, resulting in both efficient and practical projects. However, this study's contextual backdrop is centered on projects undertaken by Kenya Urban Roads Authority (KURA), this project highlights overhaul performance in KenGen.

An investigation into the resource management and the execution of projects at the Tea Research Foundation in Kericho Country, Kenya, was carried out by Cherotich (2017). This was achieved by explicitly investigating knowledge management, physical resource management, financial resource management, and human resource

management. The implementation dimension was represented by funding of the project, distribution of tea clones to farmers, information on tea clones and project implementation. Descriptive and casual research designs embodied the author's research. The target population was 54 projects conducted by the Tea Research Institute between 2008 and 2020. The study utilized both semi-structured and multiple-choice close-ended questionnaires. Correlation and multiple linear regression analysis were utilized as deductive statistics. Based on the findings, management of knowledge, physical resource, human resource, and financial resource positively influenced the implementation of Tea Research Institute Projects in Kericho County. This study is significant as overhaul projects also require financial, human and physical resource management. Austerity measures are currently being taken by the Government of Kenya (GOK), leading to budget-slashing in some departments, including the electrical power directorate. Therefore, the financial resources must be carefully managed to ensure that all overhaul projects in KenGen are undertaken successfully. However, the factors that led to the adoption of resource management in maintenance received little attention. Also, the study adopted both descriptive and explanatory research design as opposed to the current study.

Kizito (2019) carried a study on Rwanda’s government-funded projects trying to establish a connection between resource management planning and the projects performance. The study's target group included 500 respondents, who were mostly residents of Nyamata in Rwanda's Eastern Province, and its employees. The author used a cross-sectional study methodology incorporating qualitative and quantitative methods. A sample size consisting of 50 respondents was obtained through purposive sampling by the author. Questionnaires were used to get quantitative data, and group discussions and an in-depth interview guide were employed to collect qualitative data.

Inferential statistics was also applied to evaluate the association between research variables. According to the data findings analyzed, if zero is assigned to all other independent variables, an increase of one unit in human resource management (HRM) will increase project performance by 0.754; an increase of one unit in material resource management (MRM) will cause a rise in in project performance of 0.568; and an increase of one unit in finance resource management (FRM) will increase to 0.879. Given a 5% level of significance and a 95% level of confidence, the level of significance shown by MRM was 0.0013, and HRM was 0.002. In contrast, FRM showed a 0.005 significance level. Relating this study to overhaul project performance in KenGen, there exist both contextual, since the study targeted communities, and methodological gaps since it embraced utilizing both questionnaires and group discussion to collect qualitative and quantitative data.

2.3.4 Effect of Team Execution Management on Project Performance

Several overhaul projects in power stations could have performed better despite the many strategies for project execution. One of the main barriers to a successful overhaul performance is poor team execution. The managers must work with the project team to minimize shifting and conflicting priorities (Deb, 2016). Akira and Simba (2017), in their research on the variables influencing Kenya Ports Authority projects, realized that the number of projects executed at a go is numerous. Nevertheless, the capacity needs to be improved, which affects how fast and well they are being executed. The study also revealed that a specialized workforce team executing a project is critical to organizational performance.

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.

Public secondary schools in the Kiharu Constituency of Muranga County were the focus of Wachira's (2018) research on the performance of CDF projects. The author's main objective was to assess the influence of management teams on their performance. The author used data from 25 schools with infrastructure CDF development projects for the last five years and incomplete projects. The results established that the technical proficiency of the management team significantly predicted the prompt completion of initiatives to develop school infrastructure projects. The results also show that insufficient technical proficiency among teams has impeded the accomplishment of school infrastructure improvement initiatives. While agreeing with the importance of technical expertise in project completion, the study needed to capture the aspect of training staff to enhance their participation in projects. Project teams must have the necessary abilities to increase performance in an increasingly complex environment (Remington, 2011). The approach and contextual framework utilized in the study are different from what would be used in this one.

2.4 Summary of Literature Review and Research Gaps

Prior research on projects and their outcomes show that various factors, not a single factor, determine performance. Project internal administration of an overhaul project in a power station is one such factor that is perceived to influence its performance. This chapter examined related literature on planning, inventory management, overhaul resource management, team execution management, and overhaul project performance. Several conceptual, methodological, contextual, and other research gaps arising from theoretical and empirical reviews have been summarized in the table below.

Table 2.1: Summary of Literature Review and Research Gaps

Author (year)	**Focus**	**Findings**	**Study Gaps**	**How the current study fills existing research gaps**
Sunil, Pradeep & Dinesh (2013)	Synchronizing of Overhaul Activities Using Theory of Constraints.	With current employees, TOC is a reliable technique that can improve quality and dependability while lowering inventory, WIP, late deliveries, and overtime.	Though the study was elaborate on linking TOC to overhaul activities, it has failed to articulate issues of project administration	This study bridged the gap between the project internal administration and its effect on overhaul projects.
Usman, et al (2014).	An investigation into the effects of planning phase concepts on project performance in Abuja, Nigeria's building sector	The findings show that the reasons why planning phase principles were not implemented include poor project management, a needless hurry to complete projects, insufficient planning and budgeting provisions, and expensive project execution.	The results were obtained within the building industry projects and cannot be generalized for all sectors including energy sector where there could be a contextual difference.	Replication of planning phase relating to overhaul projects and its effect within the energy sector is helpful in establishing whether energy sector projects are affected in the same pattern as the building sector.

Bulle and Makori (2015)	Influence of strategic planning on performance of urban road projects in Kenya; A case of Kenya Urban Roads Authority	Allocating resources influence the project's delivery speed and quality while guaranteeing that the project plans' cost criteria were followed. Superior project outcomes are guaranteed when resources are used and allocated effectively, resulting in both efficient and practical projects.	The study's contextual backdrop is centered on projects undertaken by Kenya Urban Roads Authority (KURA), this project highlights overhaul performance in KenGen.	This study included the factors affecting overhaul projects performance. It built on only one case study to assess how planning affect the overhaul projects performance at KenGen PLC.
Cherotich (2017).	Resource management and implementation of projects at the Tea Research Foundation in Kericho Country, Kenya	The Tea Research Institute Projects in Kericho County were implemented more successfully as a result of effective financial, human, physical, and knowledge resource management.	Only tea projects were considered in the study. The factors that led to the adoption of resource management in maintenance received little attention. Also, the study adopted both descriptive and explanatory research design as opposed to the current study.	This study adopted the driving factors of overhaul projects performance at KenGen including overhaul resource management. The study design adopted the descriptive survey research
Jusoh and Kasim (2017)	Reviewed material management implications on the project's performance in Malaysia	The study found that time, quality, productivity, and performance are all affected by the availability and sufficiency of materials and equipment. The study also showed that time and waste performance are influenced by effective inventory systems and documentation.	There are both methodological and contextual gap as the study was conducted in the corporate and developed worlds. The study relied solely on secondary data.	Descriptive research design used instead in this study rather than a desk review and is conducted in the context of a project in a growing economy.

Akira & Simba (2017)	Factors affecting project performance of Kenya Ports Authority.	Authority realized that the number of projects executed at a go is numerous, yet the capacity needs to be improved, which affects how fast and well they are being executed. The study also revealed that a specialized workforce team executing a project is critical to organizational performance.	Apart from the capacity and specialization of the workforce there is a need to look more into safety of the project team as well as the equipment as safety mishaps can be very costly to the organization. Work quality and collaboration are other checks to be considered when looking at the capacity	This study narrowed down team execution management effects on project performance.
Wachira (2018)	The effect of the management team's proficiency on the completion of CDF (constituency development fund) projects in Kiharu Constituency public secondary schools	Teams' technical proficiency has an affected on how quickly school infrastructure improvement projects are finished.	This study's contextual setting is different because it focuses on CDF projects.	This study gave focus on overhaul projects performance at KenGen.
Mutua (2018)	Elements influencing the effectiveness of particular police housing project performance in Kiambu County	The study concluded that team competency during project execution was the second most crucial factor after project planning that affects how well Kiambu County's police housing projects operate. According to the research, the	Although in concurrance with the approach employed in the study, there remains a fundamental absence of context as the study exclusively	This study focused on overhaul projects in KenGen.

		competence of the project team has a substantial impact on the success of police housing projects.	concentrated on housing projects.	
Kizito (2019).	Planning for resource management's and its effect on the effectiveness of government-funded initiatives in Rwanda	Results demonstrated that with all other independent variables set to zero, project performance rose by 0.754 percentage points for every unit increase in human resource management (HRM), a unit increase in material resource management (MRM) improves project performance by 0.568, while an increase of one unit in financial resource management (FRM) improves project performance by 0.879.	Relating this study to overhaul project performance in KenGen, there exist both contextual, since the study targeted communities, and methodological gap since it adopted the use of both questionnaires and group discussion to collect qualitative and quantitative data.	This study adopted the use of semi-structured questionnaires. The focus was on overhaul projects in KenGen power stations.
Tuyishime & Nyambane (2021)	Planning influence on project performance in Rwanda's governmental institutions	The relationship was verified through regression and correlation analysis, which demonstrated a significant, positive linear relationship between planning and project performance.	Though the study was done on public institutions in Rwanda, where KenGen is also a public entity in Kenya, there still exists a contextual gasp as it targeted the communication sector whereas this study targets the energy sector. The methodology used also is casual research design which	The present investigation dealt with this through descriptive research to generate data from KenGen power plants overhaul projects which are entities in the energy sector.

			differs with the current study.	
Makori (2021).	The effect of methods for managing resources on the success of commercial housing developments in the County of Nairobi, Kenya.	The performance of housing developments for commercial entities is positively affected by managing all inventories from the planning, ordering, and regulating stages, according to the study's findings.	The research was conducted in an urban setting only. A literature gap also exists in inventory management and project performance in the energy industry.	Contextual gap bridged by linking the inventory management practices to the overhaul projects performance
Owuor et al. (2022	Project Planning as a tool for performance of universal service initiatives in Kenya	The study discovered that project success was positively affected by USF governance project planning efforts.	This study's contextual background focuses on ICT projects, whilst the project itself emphasizes KenGen's overhaul project performance. Also, there exists a methodological gap as the paper employs purposive sampling which might lead to researcher bias.	This study included the factors affecting overhaul projects performance. It built on only one case study to assess how planning affect the overhaul projects performance at KenGen PLC. Stratified sampling was used in this study as it provides greater precision and eliminates researcher bias.
Njenga (2023)	Project management dynamics effect on performance of Kenyan Electricity Generating Company Projects	The study revealed only finance dynamics had statistically significant effect (βI= 0.532, p = -0.001 and less than 0.05).	The study has both conceptual and methodological gap. Only the financial dynamic influence on project performance	This study focused on employees with or without a formal project management appointment as with majority of employees

			was realized. The study focused on only employees with a formal project management appointment.	in the power stations.

Source: Reviewed Empirical Studies (2023)

2.5 Conceptual Framework

The variables proposed for the study and their relationships with the dependent variable are represented by a conceptual framework. This study's independent variables are planning, inventory management, overhaul resource management and team execution management. The dependent variable is made up of overhaul project performance. Project internal administration and its effect on overhaul project performance are conceptualized to be related, as in Figure 2.1.

Topic: Project Internal Administration and Overhaul Projects Performance at KenGen**.**

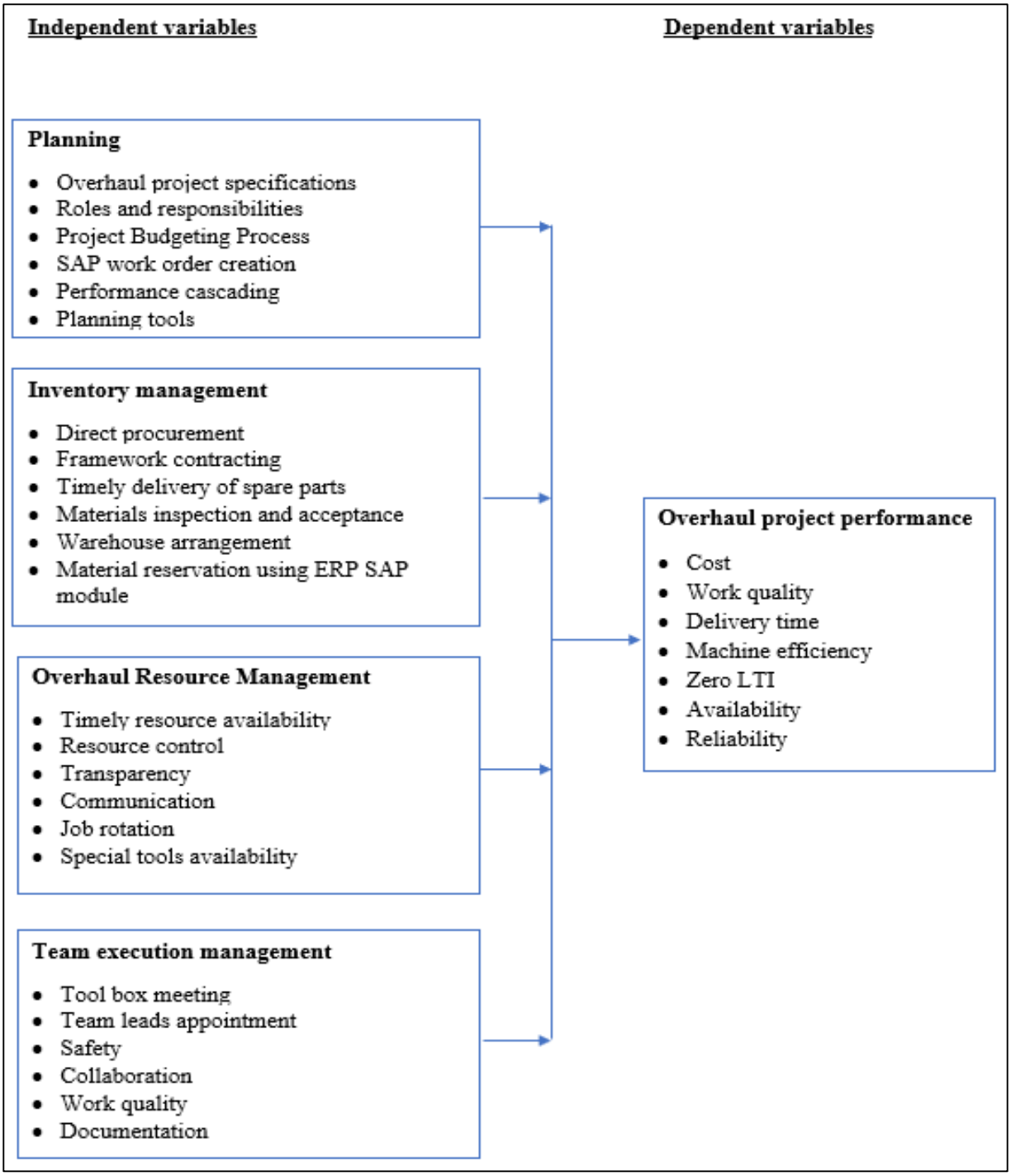

Figure 2.1: Conceptual Framework

Source: Researcher 2023

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In order to address the research questions, this section laid out the methodology that was utilized in the research. It comprises the study's target population, the sampling frame, and selection protocols of respondents, data collection and analysis strategies applied. This chapter also dealt with reliability, validity, data presentation technique, ethical aspects, and the operation of the study's variables.

3.2 Research Design

A descriptive survey research design was used for this study. This design fits where a study problem can be organized so that there is a verifiable study of approach or blueprint strategy (Kothari, 2019). According to Cathy (2023), descriptive studies frequently advance conceptual understanding and offer answers to pressing problems. It illuminates current issues or problems through a data collection process (Fox et al., 2007). The current issues under this study are planning, inventory management, overhaul resource management, team execution management, and their effect on overhaul project performance. The researcher also engaged KenGen staff who have implemented overhaul projects. Since descriptive survey design puts the participants at the heart of the study's goal, it was a valid method for research in this study. Using descriptive survey research allowed for cheap and faster data collection from a larger population with questionnaires, resulting in conclusive findings. According to Cathy (2023), descriptive survey design entails using a questionnaire to collect data from a large number of respondents.

3.3 Empirical Model

The empirical model does not rely on theory; it does so on observation. The empirical model chosen focused on describing the data while making relatively few assumptions about the data under analysis. The researcher carried out a multiple linear regression analysis to evaluate the influence of project internal administration on overhaul project performance in KenGen. 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:

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

Where **Y** is the dependent variable representing the overhaul projects performance and **X** is the independent variable representing the project internal administration. These are **X_1** representing planning, **X_2** represents inventory management, **X_3** represents overhaul resource management and **X_4** representing team execution management. The constant **β_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. **β_1,** represents co-efficient of planning, **β_2** the co-efficient of inventory management, **β_3** the co-efficient of overhaul resource management and **β_4** the co-efficient of team execution management, and **ε** is the error of margin.

3.4 Target Population

Kindy et al. (2016) description of the population focused on individuals, events, and organizations as the total number of units. The definition guarantees the homogeneity of the chosen population. At KenGen, the operation and geothermal department undertake overhaul projects, which are capitalized at the end. The procurement department facilitates acquiring the project requirements, while the finance department

facilitates project finance and accounting. The population of this study, that is, the actual population to which the findings was generalized, is 31 overhaul projects (Appendix II) 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 who are leads in implementing overhaul projects at the designated power stations. Thus, the population included power generation assistant managers (PGAM), technical team leads comprising engineers and technicians, and support staff comprising procurement and finance officers.

Table 3.1: Target Population

Electricity Generation Type	Number of Overhaul Projects	Number of Responders
Thermal	7	8
Hydro	16	64
Geothermal	7	32
Wind	1	8
Total	**31**	**112**

Source: KenGen 2023

3.5 Sampling Design

This study used a stratified sample method through creating homogeneous subgroups within the population. Comparing stratified sampling to random sampling yields higher precision. Because of the precision, a smaller sample can be employed, potentially lowering the cost of data collection. (Nyakundi,2015).

3.5.1 Sampling Size

A subset selected from a particular population to conduct research is referred to as a sample size according to Kothari and Garg (2014). The study's strata consisted of the overhaul project leads, including power generation assistant managers, engineers, technicians, procurement officers, and finance officers. Stratified random sampling

provides a representative sample by ensuring that each sub-group member has an equal chance of inclusion. Given that the population size of 112 respondents is moderate, 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 and a population size of 112, then total sample size n was 87. Using proportional allocation, calculating the sample size for each stratum ensured representation mirrored the population structure:

$$n_i = \left(\frac{N_i}{N}\right) * n$$

Where:

n_i = sample size for stratum i

N_i = population size of stratum i

N = total population size

n = total sample size

By assigning each individual a unique identifier and using a random number generator, the required number of respondents from each stratum was selected.

Table 3.2: Sample Size

		PGM		Engineers		Technicians		Procurement officers		Finance officers		Total
Electricity Generation Type	**Number of overhaul projects**	Ni	ni	Ni	ni	Ni	ni	Ni	ni	Ni	ni	(n)
Thermal	**7**	1	1	2	2	2	2	2	2	1	1	8
Hydro	**16**	8	6	16	12	27	20	5	4	8	6	48
Geothermal	**7**	4	3	8	6	11	8	5	3	4	3	23
Wind	**1**	1	1	2	2	2	2	2	2	1	1	8
Total	**31**	**14**	**11**	**28**	**22**	**42**	**32**	**14**	**11**	**14**	**11**	**87**
Key: Ni-Stratum population size, ni- Stratum sample size, n-Total sample size												

Source: Researcher's compilation 2023

3.6 Data Collection Instruments

According to Mwakibuti (2019), data collection entails compiling information from all pertinent sources to find solutions to the research problem and test the hypothesis. A custom-made questionnaire (Appendix 1) was employed for this research to collect primary data. The open-ended questionnaires were meant to allow the respondent to give additional information, while the close-ended questionnaires had structured responses. This was useful in rating several attributes to obtain varied responses. Questionnaires for data collection are chosen because they are accessible and directly available. The degree of agreement scale, or five-point Likert scale, served as the basis for the closed-ended questions. The surveys were distributed using Google Forms.

3.6.1 Pilot Study

The purpose of the pilot study was to assist the research in determining whether the instrument chosen had limitations or other flaws before the survey was conducted (Kothari & Garg, 2019). This 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. According to Maina (2022), this size is considered adequate and is in line with several publications. The eight are deemed experts. Kipevu 1 Power Station was randomly selected out of the 15 power stations at KenGen and identified as having relevant information concerning overhaul projects. The piloting assisted in gauging the time needed for the respondents to fill out the research instrument and identify items that require clarification.

3.6.1.1 Validity of Instrument

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, comparing them with the operational definitions, and verifying its compliance with all the objectives' requirements.

3.6.1.2 Reliability of Instrument

All constructs in this study maintained a Cronbach’s alpha value of above 0.7 for the composite reliability. Keith (2019) states that a coefficient of 0.7 or higher demonstrates adequate consistency and reliability in the measurements.

3.6.2 Operational and Measurement of Variables

Aragon et al. 2022 defined operationalization as a measurement of an observable that cannot be measured directly even though other events imply its existence. Potter (1996) thought that theoretical ideas needed to be operationalized if they were to remain broad abstract terms devoid of connection to the actual world. The operationalization grounded on the analysis of the variables for this study.

Table 3.3: Operational and Measurement of Variables

Objectives	Variable	Indicators	Measurement Scale	Tools for data collection	Types of data analysis	Tools of data analysis
To investigate the influence of planning on overhaul project performance.	Independent: Planning	• Level of team engagement in overhaul projects specification. • Level of effectiveness of defined project roles. • Total cost of overhaul project as a percentage of revenue. • Number of SAP work order creation. • Inclusion of overhaul targets in performance cascading. • Accuracy of overhaul plan.	Ordinal Interval	Semi-structured questionnaire	Descriptive analysis. Inferential analysis	Mean, SD, frequencies, percentage. Correlation, regression analysis.
To determine the influence of inventory management on	Independent: Inventory Management	• Spare cost reduction • Total procurement costs	Ordinal Interval	Semi-structured questionnaire	Descriptive analysis.	Mean, SD, frequencies, percentage.

overhaul project performance.		• Overhaul spares lead time. • Materials inspection and acceptance time. • Ease of access to warehouse spares. • Number of material reservation using SAP			Inferential analysis	Correlation, regression analysis.
To examine the influence of overhaul resource management on overhaul project performance.	Independent: Overhaul Resource Management	• Optimization of allocated overhaul resources. • Reduction of overtime costs. • Communication channels. • Number of job rotations • Special tools availability	Ordinal Interval	Semi-structured questionnaire	Descriptive analysis. Inferential analysis	Mean, SD, frequencies, percentage. Correlation and regression analysis.
To investigate how team execution management during overhauls influences project performance at	Independent: Team execution management	• Number of tool box meetings. • Degree of team satisfaction. • Supervisor competence.	Ordinal Interval	Semi-structured questionnaire	Descriptive analysis. Inferential analysis	Mean, SD, frequencies, percentage. Correlation and regression analysis.

KenGen PLC, Kenya.		• Ease of work execution. • SOP and work instruction adherence • Rates of employee engagement and trust. • Number of repeat jobs.				
	Dependent: Overhaul Projects Performance	• Cost • Work quality • Delivery time • Machine efficiency • Zero LTI • Availability • Reliability	Ordinal Interval	Semi-structured questionnaire	Descriptive analysis.	Mean, SD, frequencies, percentage.

Source: Author 2023

3.7 Data Collection Procedure

Custom-made questionnaires (Appendix 1) was employed to collect primary data. A small-scale study, pilot testing, was conducted before the survey. This measured the study instruments, efficiency, persistence, adverse effects and increased the study design before undertaking the final research project. It also ensured that the questions asked were clear, consistent, unbiased, opinionated, and transparent, thus testing the study's validity. The researcher administered the questionnaires by using the drop-and-pick technique.

3.8 Data Analysis and Presentation

Prior to data processing, the finished surveys were reviewed for accuracy and comprehensiveness. The data was broken down into aspects affecting overhaul project performance. All variables were subjected to descriptive statistics to summarize the data, followed by regression analysis to examine the relationships between the dependent and independent variables. Data presentation took the format of tabular, graphical, descriptive, statistical summary and presentation of inferential analysis.

Homoscedasticity, multi-collinearity and normality was diagnosed using the regression model. When the residuals in a regression analysis exhibit comparable variances at every level of the predictor variable, this is known as homoscedasticity (Grim & Yarnold, 1995). In this study, homoscedasticity was tested using Levene's test, which yielded a significant level of $P>0.05$. In order to check for multi-collinearity, the variance inflation factor (VIF) was employed with a threshold of 10 on predictor values. It is preferable to rely on numerical methods if we lack good experience (Prabhakar et al.,2019). Normality was tested using the numerical method, the Kolmogorov–Smirnov test, because the sample size n is more than 50. Since the significant level P was greater than 0.05, ($P> 0.05$), the data was deemed normally distributed.

3.9 Ethical Considerations

Rules of ethics bind researchers. Any research involving human subjects must comply with ethical and legal requirements (Nijhawan et al., 2013). With this respect, approval was sought from KenGen's human resources department before interacting with the employees in this study. Kenyatta University's Graduate School Board also granted the researcher an approval letter permitting the collection of data subject to clearance with the Director General, National Commission for Science, Technology, and Innovation. In this aspect, a referral letter for research authorization from the Executive Dean, Graduate School, addressed to the commission assisted the author in getting a research license from the commission. The author sought informed consent from each respondent, with a guarantee of confidentiality to ensure ethical compliance. Saunders et al. (2012) stated the exclusion of respondents' names in the research instrument ensures the respondents' anonymity and confidentiality are preserved. The study retained impartiality to offer the outcomes a degree of credibility. The respondents were also informed that their participation in the research was entirely voluntary. Non-coercion was exercised by the researcher to avoid pressuring respondents to participate.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This section delved into the researcher's process of data collection, analysis, and presentation, which is obtained from the study objectives and research questions outlined in Chapter 1. The first step required assessing the rate of response, to find out whether there was an adequate amount of data obtained for this specific study. The study then analyzed the demographic traits of the participants, including their age, gender, educational attainment, and duration of employment. The next subsection focused on data preparation, which included the procedures of data coding, editing, and screening. The subsequent procedures included reliability analysis, normality test, homogeneity test of variance, descriptive statistics, correlation analysis, and regression analysis.

4.2 Responder Rate

The study concentrated on 31 overhaul projects, listed in Appendix II. 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 overhaul 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.

Table 4.1: Responsiveness

Feedback	Frequency	Percentage
Questionnaires reverted	84	96.55
Questionnaires not reverted	3	3.45
Summary	**87**	**100**

Source: Research Data (2024)

4.3 Demographic Information

The researcher solicited the respondents 'demography encompassing gender, age, school level, job tenure, and the count of significant overhauls performed. The study utilized data to assess the effect of planning, inventory management, overhaul resource management, team execution management, and the performance of overhaul projects at KenGen, Kenya.

4.3.1 Respondent Gender

The study inquired about the gender of the respondents and the results are shown in the diagram below.

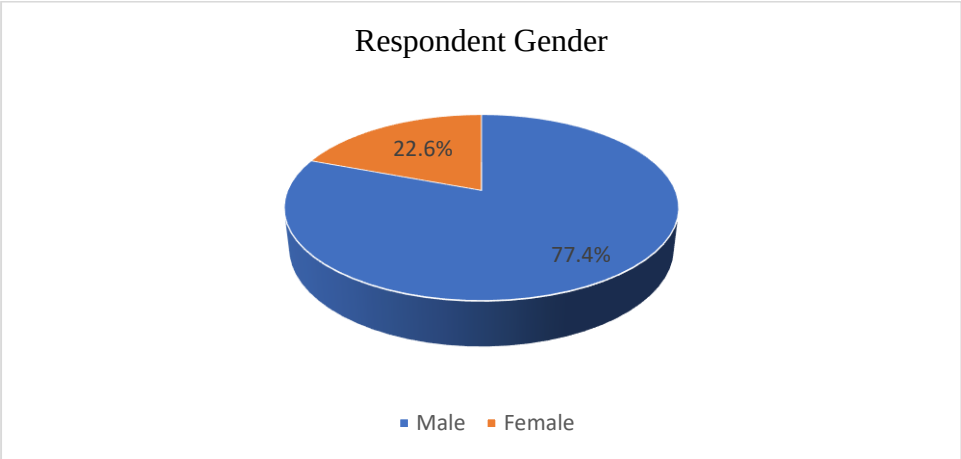

Figure 4.1: Gender of Respondents

Source: Research Data (2024)

The analysis findings revealed that 77.4% (n = 68) of the employees in question were of the male gender, and 22.6% (n = 16) were female employees. This indicated that most of the power generation assistant managers (PGAM), technical team leads (engineers and technicians), and support staff (procurement and finance officers) were

predominantly male. This highlights gender disparities within the overhaul project leadership which may influence perceptions of planning, inventory management, resource management, or team execution, which are critical variables in your study.

4.3.2 Respondent Age

The participants' age was the second demographic information sought. The following are the outcomes:

Table 4.2: Respondents Age Distribution

Age profile (years)	Frequency	Percent
26-30	4	4.8
31-35	19	22.6
36-40	22	26.2
41-44	12	14.3
45-50	12	14.3
51-55	9	10.7
56-60	6	7.1
Total	**84**	**100**

Source: Research Data (2024)

According to Table 4.2, 26.2% (n = 22) of participants were aged 36–40, 22.6% (n = 19) were aged 31–35, 14.3% (n = 12) were aged 41–44, 14.3% were aged 45–50, 10.7% were aged 51–55, 7.1% were aged 56–60, and 4.8% were aged 26–30. The National Council for Population and Development (2017) classified individuals between 18 and 34 as youth in Kenya; hence, the study results indicate the majority of the responses are passed in this age group.

4.3.3 Respondent School Level

The school level was the third demographic information sought. Figure 4.2 displays the outcomes:

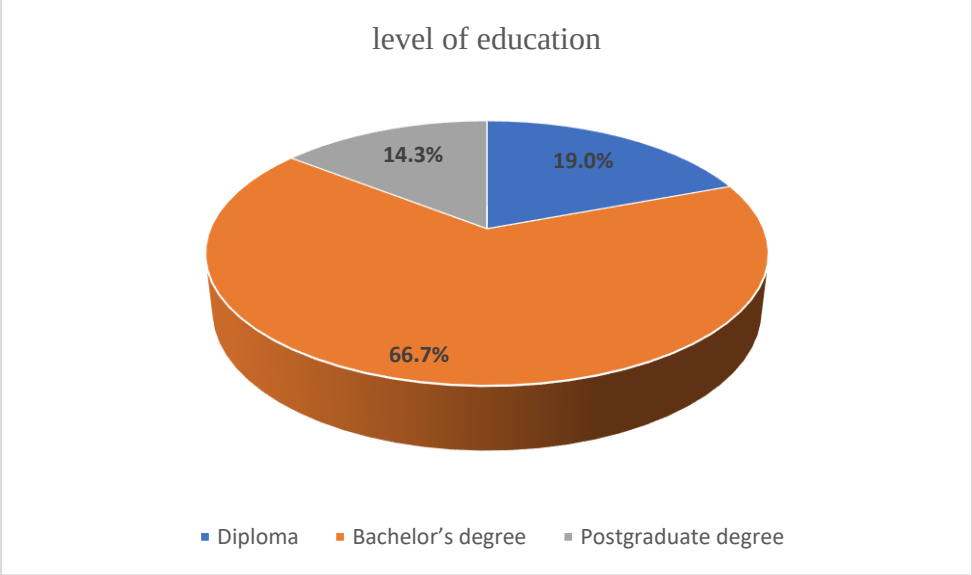

Figure 4.2: Respondents education level

Source: Research Data (2024)

Figure 4.2 indicated that 66.7% (n = 56) of the participants had completed their undergraduate studies, 19.0% (n = 16) had achieved education at the diploma level and 14.3% (n = 12) had obtained postgraduate degrees. This suggests that the employees in KenGen departments possess a high level of education, which is crucial for evaluating an individual's knowledge and abilities to conduct an overhaul. Renandi et al. (2020) performed research that demonstrated the significant effect of education on employee productivity. Moreover, the respondents possessed academic qualifications that were appropriate for their respective positions.

4.3.4 Respondent Duration of Employment

The study inquired about the duration of employment of the respondents and the results are shown in table 4.3.

Table 4.3: Number of Years the Respondents' Have Worked in the Company

Numbers of years worked	Frequency (Number of respondents)	Cumulative Percentage
1-4	15	17.9
5-10	15	35.7
11-15	26	66.7
16-20	10	78.6
21-25	10	90.5
26-30	2	92.9
30 and above	6	100
Total	**84**	**100**

Source: Research Data (2024)

Table 4.3 above displays the respondents' years of experience working for the company. The majority of the participants had a tenure of 11–15 years in the company, with the next highest groups having worked for 1–4 years and 5–10 years respectively. The table indicates that the response rate exhibited no discernible pattern. The analysis indicates that the respondents possessed significant expertise, suggesting a strong understanding of the influence of planning, inventory management, overhaul resource management, and team execution management on overhaul project performance.

4.4 Reliability of Instrument

Table 4.4: Reliability Results

Measures	Alpha value	Items Number
Planning	0.729	13
Inventory Management	0.810	13
Overhaul Resource Management	0.809	13
Team Execution Management	0.848	13

Source: Research Data (2024)

The reliability results presented indicated that all the research variables had a reliability coefficient exceeding 0.70. Therefore, they were considered reliable and suitable for analysis.

4.5 Descriptive Statistics for the Study Variables

The research looked at how project internal administration influenced the performance of overhaul projects at KenGen PLC in Kenya. The obtained responses, tabulation, and analysis were represented using frequency, mean, sum, and standard deviation.

4.5.1 Performance of Overhaul Project Analysis

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

Table 4.5: 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.

Statement (4), 'zero loss time injury (LTI) is recorded', averaged 4.37. Out of the 84 respondents, 43 (51.2%) concurred that there are no documented lost time injuries (LTIs). The statement's mean score having slightly exceeded the composite's 4.36, meant overhaul projects would perform better with zero LTI. The (0.673) standard

deviation exceeds the composite (0.340), indicates a difference in opinions. The study confirms Akira and Simba (2017), observation that the safety of the project team and equipment is more important than workforce capacity and specialization because safety incidents can be costly to the organization. When checking capacity, work quality and collaboration are also important. The efficiency of the power-generating unit positively correlates with the performance of the overhaul project.

The response to statement (5), 'Power-generating unit efficiency is increased,' averaged 4.33. Out of the 84 respondents, 39 (46.4%) said power-generating unit efficiency has increased. Compared to the overall average of 4.36, the statement's average of 4.33 suggested that an increase in the power-generating unit's efficiency is not a positive indication of the overhaul project's performance. Its standard deviation (0.750) exceeds the composite (0.340) suggests a greater divergence of opinions. The statement therefore did not support the findings of Jusoh and Kasim (2017) which concluded a positive relationship between project performance and time efficiency, financial savings, quality improvement, productivity, and waste reduction.

The statement (6) indicates that the power station's availability has increased averaged 4.36. Out of the 84 respondents, 41 (48.8%) expressed strong agreement regarding the increased availability of power stations. The average score was 4.36, which was equal to the composite's 4.36. This suggests that the availability of power stations moderately increases. Its standard deviation (0.801) compared to the composite (0.340) indicates a difference in opinions.

The statement (7) demonstrates an enhancement in power station reliability, averaged 4.45. Out of the 84 respondents, 45 (53.6%) expressed strong agreement regarding the increased availability of power stations. The result demonstrates the 4.45 average score

was greater than the composite's 4.23. This suggests a positive correlation between the enhanced reliability of power stations and the performance of overhaul projects. Its standard deviation (0.648) compared to the composite (0.340) indicates a difference in opinions. The study findings corroborate the conclusions drawn by Kamau (2014) that the essential operational performance indicators for a company are maintainability, reliability, efficiency, availability, and production per unit cost. (Kamau, 2014).

4.5.2 Planning 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 4.6: 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	75	365	40 (47.6%)	33 (39.3%)	11 (13.1%)	0 (0.0%)	0 (0.0%)	4.35	0.703

	planning tools, e.g., Gantt charts, to navigate the equipment overhaul projects									
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.

Statement (4) demonstrates that the duties and obligations of the overhaul project team are clearly defined during planning. The statement averaged 4.26. Of the 84 respondents, 38 (45.2%) expressed agreement that project team roles and responsibilities should be clearly defined during overhaul planning. Its 4.26 average score, slightly above the 4.22 aggregate implies that project team members' clear roles and responsibilities during overhaul project planning have a positive influence on overhaul project performance. Its standard deviation (0.808) compared to the composite (0.340) indicated a difference in opinions.

Statement (5) demonstrates that project team members are knowledgeable and skilled at overhaul project budgeting during planning. A 4.12 average demonstrated this. Out of 84 respondents, 34 (40.5%) agreed that project team members were proficient in overhaul project budgeting during planning. Its 4.12 average, compared to a composite’s 4.22, suggests that not all overhaul project team members understand the

budgeting process during planning, which may hurt project performance. Opinion divergence is shown by the 0.827 standard deviation versus the composite's 0.4.

Statement (6) on equipment overhaul project spare parts and material cost estimation accuracy possessed a 0.986 standard deviation and averaged 4.23. Forty (47.6%) of the 84 participants strongly agreed that the equipment overhaul project spare parts and material cost estimates are accurate. The average score was 4.23, compared to the composite's 4.22. Its standard deviation (0.986) compared to the composite (0.340) indicated a difference in opinions. The results corroborated the findings of Bulle and Makori (2015) claim that resource allocation affects project speed, quality, and cost compliance.

Results from statement (7) indicate that the board of directors typically approves the full budget for equipment overhauls. The data set averaged 4.24. The findings show that 36 out of 84 respondents, accounting for 42.9% of the total, expressed strong agreement that the board of directors fully approves the equipment overhaul project's budget. The 4.24 average, compared to composite's 4.22 suggests that the board of directors normally approves the budgeted amount for an equipment overhaul project, which positively affects project performance. The 0.801 standard deviation exceeds the composite's 0.40, suggesting different points of view.

The mean of statement (8), 'Work order creation for the overhaul project during the planning stage', was 4.18. Out of the 84 participants, 41, accounting for 48.8% of the total, expressed agreement. The 4.18 mean score was lower compared to the composite's 4.22. This suggests that if all team members don't use ERP SAP PM to

schedule work orders, it could affect the performance of overhaul projects. The 0.880 standard deviation exceeds the composite's 0.40, suggesting different points of view.

Statement (9) "automated SAP work order are used for scheduling for overhaul projects", averaged 4.26. The findings suggest that 37 participants, accounting for 42.9% of the total, expressed agreement. The average score was 4.26, compared to composite's 4.22. This suggests that automated SAP work order scheduling can improve overhaul project performance. The 0.838 standard deviation exceeds the composite's 0.400, indicating a small variation in respondents' opinions.

According to statement (10), project team leaders use ERP SAP systems proficiently, averaged 4.19. From a sample of 84 respondents, 36 individuals (42.9%) agreed that project team leads effectively utilize ERP SAP systems. The lower average score than the composite's 4.22 implied that project team leads moderately utilize ERP and SAP systems to plan and manage overhaul projects, which may also have a moderately positive effect on their performance. Respondents' opinions vary, as seen by the statement's 0.857 standard deviation, higher than the composite, 0.400.

Statement (11), which states that performance cascading includes overhaul project objectives, averaged 4.24. This suggests that 36 (42.9%) of the 84 participants agreed that performance cascading includes overhaul project objectives. The average score was 4.24, compared to composite scores of 4.22. This suggests that the inclusion of overhaul project performance objectives in performance cascading typically enhances project performance. Respondents' opinions vary, as seen by the higher standard deviation of 0.722 against the composite's 0.40.

According to statement (12), project team leaders use planning tools such as Gantt charts to manage equipment overhaul projects. The mean to this assertion is 4.35. These findings indicate that 40 out of 84 participants, or 47.6%, strongly agreed with project team leaders' use of planning tools like Gantt charts to manage equipment overhaul projects. The average score was 4.35, compared to composite scores of 4.22. This suggests that project team leaders use Gantt charts to manage equipment overhaul projects, thereby improving their performance. Compared to the composite's 0.40, the 0.703 standard deviation is higher indicating variation in respondents' opinions. The findings support Nyabera's (2015) claim that project management requires project tools for workload distribution, activity timelines, and schedules.

The results in statement (13) demonstrate a strict adherence to the approved procurement plan's completion dates for equipment overhaul projects. The average adherence is 4.27. Out of 84 respondents, 36 (42.9%) strongly agreed that equipment overhaul projects must meet procurement plan deadlines. The average score was 4.27, compared to composite scores of 4.22. A strong commitment to meeting equipment overhaul project deadlines, as outlined in the approved procurement plan, improves project performance. There is a slight difference in respondents' opinions, as evidenced by the 0.734 standard deviation, higher than the composite's 0.40.

4.5.3 Inventory Management analysis

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

Table 4.7: 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	84	368	20 (23.8%)	51 (60.7%)	13 (15.5%)	0 (0.0%)	0 (0.0%)	4.38	0.693

	overhaul projects.									
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.

The statement (4), 'there is timely delivery of spare parts', averaged 4.31. Out of the 84 respondents, 39 (46.4%) strongly agreed that spare parts are delivered on time. The 4.31

average was less than composite's 4.33, indicating that spare parts are delivered on time and hence improve overhaul project performance. Compared to the composite's 0.401, the 0.791 standard deviation is higher indicating variation in respondents' opinions. Like Crespo (2018), the findings suggest that project administration should integrate timely delivery, resource management, and scope-appropriate budgetary goals.

Statement (5) reveals the formation of inspection and acceptance committees for each delivery to the warehouse. The assertion average value was 4.30. This discovery suggests among the 84 participants, 39 individuals (46.4%) agreed to the formation of inspection and acceptance committees for every warehouse delivery. This means that its average score was marginally lower than the average score for the composite, which was 4.33. This suggests that inspection and acceptance committees may give the project team more confidence in making sure that the spare parts delivered are real and correct, which may have a moderate effect on overhaul projects' performance. The higher standard deviation of the (0.741) in comparison to the composite (0.401), indicates that there existed a significant difference in consensus among the respondents.

The processing of overhaul spare part payments is swift, according to Statement (6). The statement averaged 4.32. The survey revealed that 39 (46.4%) out of 84 participants concurred with the idea of expediting overhaul spare part payments. The average score was 4.32, almost equating the average composite score of 4.33. This implies that timely payment processing for overhaul spare parts is a moderate supply chain disruption prevention measure. This practice has a moderate effect on overhaul project performance because it ensures supplier cash flow. When compared to the composite's 0.401, the standard deviation stands at an outstanding 0.809, indicating that respondents had different opinions.

According to Statement (7), the warehouse organizes spare parts by material coding for easy access, averaged 4.37. Thirty-nine (39), 46.4% of the 84 respondents, agreed that the warehouse organizes its spare parts by material coding for easy access. This suggests that the warehouse's spare parts arrangement is well-organized with materials coded for easy access, when comparing the 4.37 average to the composite's 4.33. This organization boosts overhaul projects. While the composite is 0.401, the statements standard deviation is 0.636, which is greater, indicating that respondents had different opinions.

Statement (8) shows that the warehouse can hold overhaul spare parts averaged 4.38. According to 84 respondents, 40 (47.6%) agreed that the warehouse has enough space for overhaul spare parts. The 4.38 average score being higher than the composite's 4.33, suggests that warehouse space greatly reduces the stress of receiving spare parts by making the process easier, and affects overhaul project performance positively. While the composite is 0.401, the statements standard deviation is 0.693, which is greater, indicating that respondents had different opinions.

According to statement (9) "warehouse personnel have a mean technical knowledge for parts and materials," scored 4.26 as its average. Out of 84 respondents, 39 (46.4%) agreed that warehouse workers are technically skilled at handling parts and materials. The average score was 4.26, only marginally lower than the 4.33 overall average score. This suggests a moderate effect on overhaul project performance. The study confirms Makori (2021) that inventory management during planning, ordering, and controlling improves project performance. Checking the composite value 0.401 with the standard deviation of 0.838, the latter is greater indicating that respondents had different opinions.

The statement (10) indicates that the utilization of the ERP SAP module for reserving and issuing warehouse spare parts and consumables is widely accepted, scored 4.26 as its average. Out of the 84 respondents, 43 (51.2%) agreed to the adoption of the ERP SAP module for reserving and issuing warehouse spare parts and consumables. The average score for the composite was 4.33, while the average score was 4.26. This suggests that the widespread acceptance of the ERP SAP module for reserving and issuing warehouse spare parts and consumables may hinder overhaul projects' performance. The higher standard deviation of the respondents' differing opinions is supported by the 0.679 value, which stands in contrast to the amalgamated score of 0.401.

The statement (11) states that team leaders have the authority to reserve overhaul spares for accountability. The average score of this statement is 4.31. From a sample of 84 respondents, 40 (47.6%) agreed that team leads have the authority to reserve overhaul spares for accountability. According to these findings, its average score of 4.31 was nearly identical to the composite's 4.33. This suggests that team leaders have the authority to reserve overhaul spares for accountability, which moderately affects the performance of overhaul projects. There was a notable difference between its standard deviation (0.658) and the composite (0.210) which indicates a significant difference in opinion among the respondents.

According to the statement (12), warehouse staff issue spare parts and consumables quickly averaged 4.37. This indicates that 39 (46.4%) of 84 participants agreed that warehouse staff issue spare parts and consumables quickly. The average score was 4.26, higher than the 4.33 overall average score implies that warehouse staff issue spare parts and consumables quickly. Hence, the research agrees with Murat and Kadir (2016)

findings that effective inventory management is crucial for minimizing turnaround time (TAT) in maintenance, repair, and overhaul operations. The statement standard deviation stands at 0.655 being higher than the composite's 0.210 is suggestive of a difference in viewpoint among the respondents.

Statement (13) shows that the project team leads the tracking of spare parts and consumables. The data averaged 4.24. Out of 84 respondents, 40 (47.6%) agreed that project team leaders monitor spare parts and consumables daily. This showed that the average score (4.24), is slightly lower than the composite's 4.33. This suggests that project team leaders monitor spare parts and consumables daily, which has a moderate influence on overhaul project performance. Compared to the composite's 0.401, the standard deviation stands at 0.754, indicating that respondents had different opinions. This study confirms Anyim's (2020) findings that project managers must monitor progress to achieve objectives and support the organization's goals.

4.5.4 Overhaul Resource Management analysis

The study implemented a third project internal administration variable, which involved the comprehensive restructuring of resource management. The table below displays the results of the analysis of the responses that were collected.

Table 4.8: 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	84	348	28 (33.3%)	43 (51.2%)	11 (13.1%)	1 (1.2%)	1 (1.2%)	4.14	0.778

	identify missing resources for the execution of an overhaul project.									
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 capitalized	84	378	46 (54.8%)	34 (40.5%)	4 (4.8%)	0 (0.0%)	0 (0.0%)	4.50	0.591
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	84	366	36 (42.9%)	42 (50.0%)	6 (7.1%)	0 (0.0%)	0 (0.0%)	4.36	0.614

	projects									
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.

The statement (4), 'There is the elimination of spare parts and material waste', averaged 3.95. It follows that 46 (54.8%) of the 84 participants concurred with the elimination of spare parts and material waste. Compared to the overall average score of 4.23, the statement average score (3.95) was lower, indicating that the elimination of spare parts and material waste negatively affects the overhaul project performance. Respondents divergent views were evidence with the 0.675 standard deviation which is lower than the composite's 0.368. The study confirms Jusoh and Kasim (2017) that insufficient documentation affects waste performance and time.

Statement (5) about capitalizing all overhaul spare parts boasted an averaged 4.50. Out of 84 respondents, 46 (54.8%) said all overhaul spare parts are capitalized. The average score was 4.50, compared to 4.23 for composite scores. This indicates that all overhaul spare parts are valuable assets that enhance project performance. Looking at the composite's 0.368 and the standard deviation (0.591) gives an indication of a significant difference in opinion among respondents.

The results of statement (6) that the all parts procured for overhaul projects are installed averaged 4.11. The results of this research showed that 52 (61.9%) of 84 participants agreed that all overhaul project components are installed. The average score was 4.11, slightly lower than the composite score of 4.23. This suggests that all overhaul project parts have a moderate level of installation and affect project performance moderately. It is clear that respondents had differing opinions since the difference between the composite (0.368) and the statement (0.640) standard deviations were significance.

The results of statement (7) suggest there is a maintenance planner in the power station who coordinates personnel and resources. This statement averaged 4.27. Forty-seven (47) representing 56.0% of the respondents agreed there is a maintenance planner in the power station. This suggests average scores of 4.27, which was higher than the overall average of 4.23. This means the power station has a maintenance planner who coordinates personnel and resources, improving overhaul project performance. The 0.608 standard deviation, indicates that respondents held differing opinions, as it is greater than the composite's 0.368.

The statement (8) 'transparency helps prevent avoidable miscommunication mishaps between team members' averaged 4.23. These findings indicate that 45 (53.6%) of the 84 participants agreed that transparency prevents team miscommunication. The average score, 4.23, compared to the composite score of 4.25, suggests transparency improves team communication and positively affects project overhaul performance. The 0.647 standard deviation, indicates that respondents held differing opinions, as it is greater than the composite's 0.368.

Statement (9) 'There is job rotation utilization to enable resource leveling' averaged 4.17. Forty-five (53.6%) of the 84 participants agreed with the statement. The score of

4.17 for this statement was slightly lower than the overall average score of 4.23, suggesting that job rotation utilization moderately enables resource levelling hence a moderate effect on overhaul project performance. The standard deviation, 0.691, indicates that respondents held differing opinions, as it is greater than the composite's 0.368.

The average score for the statement (10) 'job rotation reduces physical strain' was 4.39. This suggests that 39 (46.4%) of 84 respondents agreed that job rotation reduces physical strain. The average of 4.39, and the composite's 4.23 indicates that job rotation reduces physical strain and, therefore, positively influences overhaul projects. In comparison with composite's 0.328, its standard deviation (0.621) indicates a significant divergent viewpoint among respondents. The study backs up Sarah and Michelle's (2023) proposal to incorporate job levelling into an employer's comprehensive organizational framework, which encompasses job competencies, including the qualities and abilities needed for each role, and career pathways that encourage advancement within the company.

Statement (11) about the use of specialized tools for overhaul projects was 4.36 on average. Out of 84 respondents, 42 (50.0%) agreed with the provision of specialized tools for overhaul projects. This had an average of 4.36, while the composite averaged 4.25. In comparison with composite's 0.328, its standard deviation (0.614) indicates a significant divergent viewpoint among respondents. The study confirms Tae et al.'s (2020) finding that project execution tools and procedures affect progress.

The average score for statement (12), 'Cooperation exists between power plants on borrowing missing special tools', was 4.21. This suggests that 44 (52.4%) of 84 respondents had an agreement on power plant cooperation in borrowing missing special

tools. The average score was 4.21, whereas the composite score was 4.23 suggests that there is moderate cooperation in the borrowing of tools between power plants, which may have a positive effect on overhaul projects' performance. Compared to the composite's 0.368, the standard deviation of 0.660 indicates a significant divergent viewpoint among respondents.

Statement (13) 'only calibrated tools are used on the overhaul projects' averaged 4.25 with a 0.656 standard deviation. Of the 84 respondents, 46 (54.8%) agreed that the overhaul projects only use calibrated tools. With the average score of 4.35 surpassing the composite's 4.23, strongly suggests the use of only calibrated tools on overhaul projects, which in turn enhances performance. In comparison with composite's 0.328, its standard deviation (0.656) indicates a significant divergent viewpoint among respondents.

4.5.5 Team Execution Management Analysis

Team execution management was the last Project Internal Administration variable used in the study, and the table below shows the analysis's findings.

Table 4.9: 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	84	373	16 (19.0%)	26 (31.0%)	36 (42.9%)	6 (7.1%)	0 (0.0%)	4.44	0.683

	needs to be done									
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 components	84	369	9 (10.7%)	23 (27.4%)	39 (46.4%)	13 (15.5%)	0 (0.0%)	4.39	0.581
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.

Statement (4), 'division of project execution team groups according to skill strengths', averaged 4.27. These findings indicate that 40 out of the 84 respondents, accounting for 47.6% of the total, agreed with the statement. Furthermore, the average score of these respondents was lower than the overall average score of 4.12. This suggests that skill strengths do not separate project execution team groups, potentially negatively influencing overhaul projects. In comparison with composite's 0.386, its standard

deviation (0.700) indicates a significant divergent viewpoint among respondents. Rezende and Blackwell (2019) claimed that relevant skills control institution strengths, but the findings contradict this.

Statement (5) shows that team leaders train on-site during overhaul projects, being 4.42 on average and 0.605 standard deviation. Out of 84 respondents, 42 (50.0%) agreed. The average score was 4.42, which exceeds the 4.35 overall average score. This implies that team leaders conduct on-site training during overhaul projects, which has a positive effect on project performance. In comparison with composite's 0.386, its standard deviation (0.605) indicates a significant divergent viewpoint among respondents. The discovery supports Rezende and Blackwell's (2019) claim that project managers can identify skill gaps and improve training schedules to teach workers the necessary skills.

Averaging at 4.42 with a 0.585 standard deviation, statement (6) confirms the inclusion of safety briefs in the toolbox meetings. This data reveals that out of the 84 respondents, 41 (48.8%) acknowledged the presence of safety briefs in the toolbox meetings. Findings indicate the average score of 4.42 was greater than composite's 4.35. This suggests that the presence of safety briefs from the toolbox meetings has a positive effect on overhaul projects' performance. In comparison with composite's 0.386, its standard deviation (0.585) indicates a significant divergent viewpoint among respondents. The study findings support the conclusions of Akira and Simba (2017), which emphasize the importance of further investigating the safety of both the project team and the equipment, due to the potential financial implications of safety incidents for the organization.

The results of statement 7 indicate that isolated components were fully isolated, locked out, and tagged out as the average score (4.39) was slightly higher, compared to composite's 4.35. Forty-three (43) of 84 respondents (51.2%) agreed that isolated components are isolated, locked out, and tagged out. In comparison with composite's 0.386, its standard deviation (0.581) indicates a significant divergent viewpoint among respondents

Statement (8) results show that project execution strictly follows SOPs, work instructions, and OEM manuals. This assertion averaged 4.37, with a 0.617 standard deviation. Forty-one (48.8%) of the 84 participants agreed to strictly follow SOPs, work instructions, and original equipment manufacturer manuals during project execution, resulting in improved overhaul project performance. The average score (4.37) was slightly higher, compared to composite's 4.35. In comparison with composite's 0.386, its standard deviation (0.591) indicates a significant divergent viewpoint among respondents.

Statement (9) 'work permits are signed before commencement of any work' had 4.27 and 0.647 mean and standard deviation respectively. Forty-six (46) representing 54.8% of 84 respondents agreed that work permits are signed before starting work. The average score of 4.27, is slightly lower than the composite's 4.35. Before work begins, signed work permits suggest a moderate influence on overhaul projects. While the composite is 0.386, the statements standard deviation is 0.647, which is greater, indicating that respondents had different opinions.

The statement (10), 'Collaboration exists between the project execution team and their supervisor', averaged 4.26 with a 0.661 as a standard deviation. Out of 84 people who took part, 53.6% agreed that the project execution team and supervisors collaborate.

The average score for the statement, 4.26, falls just short of the 4.35 composite score. This means that collaboration between the project execution team and supervisors has a moderate effect on overhaul projects' performance. When comparing the composite standard deviation (0.386) to the standard deviation (0.661), it becomes clear that respondents held differing opinions. The finding supports Taryn et al.'s (2018) claim that collaboration improves project management. The study findings are consistent with Akira and Simba (2017)'s findings that managing the team executing a project is critical to organizational performance.

Statement (11) ‘Team leads perform quality checks at each overhaul phase’, averaged 4.26 with a 0.642 standard deviation. Forty-four 44 (52.4%) of the 84 respondents strongly agreed that team leads conduct quality checks at every stage of the overhaul project. The average score for the statement, 4.26, fell just short of the 4.35 composite score, suggesting that quality checks at every stage of the overhaul project may moderately influence the performance of overhaul projects, which improves their performance. When compared to the composite’s 0.386, the statement standard deviation (0.642) shows that respondents had varying opinions.

The results of the statement (12) demonstrate that project leaders document the overhaul progress in written reports. Forty-three 43 (51.2 %) of the 84 participants agreed that project team leads provide comprehensive written reports on overhaul progress. While the average score was 4.27, the amalgamated score was 4.35, suggesting that overhaul project performance may be improved by project team leads providing thorough, official written reports. While the composite is 0.386, the statements standard deviation is 0.647, which is greater, indicating that respondents had different opinions.

The statement's (13) findings suggest that overhaul projects use inspection and equipment servicing records. It consisted of 4.27 on average and 0.683 as the standard deviation. Out of 84 respondents, 47 (56%) agreed that overhaul projects use inspection and equipment servicing records. The 4.27 average score, compared to the composite's 4.35 indicates a moderate use of past inspection records and equipment servicing in overhaul projects, which may moderately influence the performance of the overhaul project. The standard deviation is 0.683, which is superior to the composite's 0.386, indicating that respondents had different opinions.

4.6 Inferential Statistics

Utilizing inferential statistics, the research examined the influence of project internal administration on the performance of overhaul projects in KenGen, Kenya. This study utilized correlation and regression analysis. This section presents the outcomes.

4.6.1 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 4.10 displays the outcomes that were achieved.

Table 4.10: 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 study revealed a strong and statistically significant link (r = 0.514, P-value = 0.000, between the performance of overhaul projects and their planning. Planning concepts can affect the outcome of an overhaul project; hence, there is a clear and favourable correlation between planning and project performance. This is consistent with the findings of 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. Consistent with the conclusions, Owuor et al. (2022) and Tuyishime and Nyambane (2021) found a statistically significant positive correlation between planning and project performance.

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. The results of the study showed a statistically significant positive correlation (r = 0.516, P-value = 0.000, between the performance of overhaul projects and inventory management. After a painstaking investigation, Makori (2021) found a consistent empirical correlation between inventory control and project goal attainment. At another site, Tarus and Kihara (2018) found a direct correlation between project performance and inventory control variables. The correlation analysis showed that project performance was favourably influenced by all the variables. The correlation analysis showed that project performance was favourably influenced by all the variables. Improvement of varying quantities produced 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 moderate 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 moderate 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 a study conducted by Mutua (2018), it was discovered that proficient team management has a profound effect on the performance of projects. In Wachira's (2018) study, a robust positive correlation was discovered between project performance and the competence of the management team.

4.6.2 Diagnostics Tests

Amollo (2022) emphasizes the importance of employing multilinear regression analysis in a study to reduce the likelihood of bias in the estimated coefficient and standard errors. Hence, the study aimed to authenticate the following assumptions:

4.6.2.1 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 4.11.

Table 4.11: 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)

4.6.2.2 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 4.12: 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)

4.6.2.3 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 4.13: 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.

4.6.2.4 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 4.7, 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 4.14: 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)

4.6.3 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 4.15 displays the results.

Table 4.15: 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. This implies that the determination of project results depends much on elements including planning, inventory control, resource allocation, and team performance. Other elements not covered in the model affect the remaining 41% of variability. These might include external factors like government policies, or unforeseen technical issues.

4.6.3.1 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 4.25 displays the outcomes of the regression analysis using ANOVA.

Table 4.16: 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)

Sum of squares 5.696, which is high relative to the total sum of squares, indicated that the model explains a significant portion of the variation in the dependent variable as explained by the independent variable. The sum of squares 3.953, which represents the unexplained variation in the dependent variable after accounting for the regression model, is small compared to the total sum of squares, indicated a better fit of the model. 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.

4.6.3.2 Coefficients for Regression

Project internal administration's effect on overhaul project performance was the intended focus of the research. Table 4.17 displays the results of the regression coefficients.

Table 4.17: 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 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 (β2=0.361), followed by

planning (β1=0.268), followed by team execution management (β4=0.160), and then overhaul resource management (β3=0.157).

The findings showed a regression α = 0.307. The coefficients of the variable planning, β1 = 0.268, Sig = 0.001<.05, that a shift in planning can cause a shift of 0.268 in the performance of overhaul projects. Standardized Coefficient (β=0.315) indicated planning had a moderately strong positive contribution to the model. 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 (β2 = 0.361, Sig =.001<.05). Standardized Coefficient (β=0.425) indicated the variable had the strongest contribution to project performance compared to other predictors. 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 β3 = 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. Standardized Coefficient β=0.170

indicated the variable has a relatively weaker influence compared to planning and inventory management. The p-value indicates it is a significant predictor, though its effect is modest. 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 p-value confirms it is statistically significant. Standardized Coefficient β=0.181 indicated the variable had a slightly stronger effect than resource management but is weaker compared to planning and inventory management. 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.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

A concise synopsis of the findings, outcomes, inputs to the current knowledge base, and policy and practice recommendations is provided in this chapter. Also included are recommendations for additional research.

5.2 Summary

KenGen faces the pressing challenge of high operational and maintenance costs. These financial pressures are the result of frequent machine breakdowns, poor overhaul project performance, lengthy procurement delays, and deficiencies in maintenance and resource management. Critical failures have resulted in significant revenue losses, project delays, and penalties for noncompliance with Power Purchase Agreements that require availability greater than 85%. This inefficiency not only harms KenGen's financial health, but it also jeopardizes the national power grid's reliability, as equipment failures persist despite routine maintenance. Despite periodic overhaul efforts, the persistence of equipment failures reveals flaws in maintenance plan strategies, inventory management, resource management, team, and overhaul project management. 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. 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 paper attempted to fill this gap by investigating the project's internal administration in terms of planning, inventory control, overhaul resource management, team execution management, and the effects on overhaul project performance. The

study's specific goals were to determine how team execution management, inventory management, planning, and overhaul resource management affect the performance of KenGen PLC overhaul projects. The study methodology included the target population, the sampling frame and respondent selection procedures, the data collection and analysis techniques used, dependability, validity, data presentation technique, ethical considerations, and variable operation.

5.2.1 Planning and Performance of Overhaul Projects

Participants agreed on the effect of planning on overhaul project performance, according to the Likert scale. The study found a strong positive relationship between overhaul project performance and the degree of planning. The ANOVA's findings indicate a statistically significant regression model for the overhaul project's performance, pointing to a more accurate forecast. The results of the basic linear regression analysis showed that planning had a statistically significant influence on overhaul project performance. According to the study, planning and project performance have a statistically significant positive linear relationship.

5.2.2 Inventory Management and Performance of Overhaul Projects

The effect of inventory management on the performance of overhaul projects formed the second objective. Participants on the Likert 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. The low p-value led to a conclusion that the two variables were statistically related. According to the findings of the ANOVA, the inventory management regression model significantly improved the accuracy of predicting overhaul project performance.

5..2.3 Overhaul Resource Management and Performance of Overhaul Projects

The third goal of the study was to determine how resource management affected overhaul project performance. According to the participants' Likert scale answers, everyone agreed that resource management has an effect on the success of overhaul projects. The performance of the overhaul project and how resources were managed during the overhaul were found to be positively correlated. The regression model for resource management during overhauls greatly enhanced performance prediction in overhaul projects, according to the ANOVA results, and the relationship is statistically significant.

5.2.4 Team Execution Management and Performance of Overhaul Projects

Additionally, the research endeavor attempted to examine the effect of team execution management on the performance of overhaul projects. According to the Likert scale, 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. The statistically significant relationship indicated the performance of overhaul projects is significantly affected by effective team execution management. The ANOVA results indicated the regression model for team execution management is a highly reliable predictor of performance for overhaul projects. A statistically significant effect of team execution management on the performance of overhaul projects was shown by the coefficient values of the simple linear regression.

5.3 Conclusions

The research examined project internal administration's effect on overhaul projects' performance. Overhaul planning activities like overhaul project specifications, assigning roles and responsibilities, budgeting, SAP work order creation, performance

cascading, and planning tools positively influenced overhaul projects' performance. The study also concluded that practices like direct procurement, framework contracting, small lead times, material inspection and acceptance, warehouse arrangement, and material reservation using the ERP SAP module positively influenced the performance of overhaul projects. The resource management techniques used during the overhaul improved project performance by ensuring that resources were available on time, controlled, open, job rotating, and with access to specialized tools. Team execution management improved the overhaul project's performance by implementing toolbox meetings, team leadership selection, safety monitoring, cooperation promotion, quality control inspections, and record keeping. Planning, team execution management, inventory control, and overhaul resource planning all interact to have an immediate influence on project objectives.

5.4 Contribution to the Existing Knowledge

This research investigated the effects of project internal administration, including planning, inventory management, resource allocation, and team execution management, on the performance of overhaul projects. Several studies have only discovered there is a strong relationship between the performance of overhaul projects and the independent variables. The study establishes a connection between competency theory, contingency theory, and the theory of constraints in order to improve project performance. The results of this study significantly enhance our comprehension. The most recent discoveries are showcased below.

Table 5.1: Contribution to Knowledge

Objectives of the study	Contribution to Knowledge
1.To investigate the influence of planning on overhaul projects performance in KenGen PLC, Kenya.	1. The study demonstrates that implementing strategic planning enhances the efficiency and effectiveness of overhaul projects. Similarly, the study demonstrates that power stations have adopted the practice of planning in their renovation projects, which was previously primarily used in construction projects. It also examines whether energy sector projects are affected in a similar manner as projects in the building sector.
2. To determine the effect of inventory management on overhaul projects performance in KenGen PLC, Kenya.	2. The study establishes a connection between the utilization of inventory management and the implementation of overhaul projects. Previous studies have solely concentrated on the utilization of inventory management in business outlets.
3. To examine the effect of overhaul resource management on overhaul projects performance in KenGen PLC, Kenya.	3. This study's findings will be considered benchmarks for future empirical evidence, that demonstrates how improving resource management can enhance project performance. Initially, no study had established a connection between the improvement of overhaul resource management and the performance of projects.
4. Establish the influence of team execution management on overhaul projects performance in KenGen PLC, Kenya.	4. The study presents concrete evidence that shows a connection between the utilization of team execution management and the performance of overhaul projects in power stations in Kenya, which was previously unknown. Prior research has primarily concentrated on the corporate sector, which operates under a distinct organizational framework

5.5 Recommendations

Though it has a rather strong positive influence on project performance, planning cannot fully explain the variation noted. This underlines the need of careful preparation and strategic planning. Clearly defining particular tasks, establishing reasonable deadlines, and allocating suitable resources to guarantee timely and accurate project completion will help organisations to improve general performance.

Project performance is much influenced by inventory control; thus, simplification of this process is quite important. Reducing procurement lead times, guaranteeing timely

spare part availability, and enhancing inventory tracking's accuracy and efficiency help to accomplish this.

Despite the fact that resource management has a lesser infuence on overhaul projects than planning and inventory control, it remains a significant factor. By themselves, improved resource allocation techniques contribute to enhanced performance. This involves ensuring that materials, tools, and trained personnel are distributed in a manner that is appropriate for the specific needs of each project phase. Resource levelling and smoothing techniques are employed to prevent overburdening. Kenya's power plants should enhance the capacity of their overhaul project teams by employing specialised workforce teams. The transition from labor-intensive techniques to automated and technical power plants represents a step towards a workforce that possesses enhanced technical proficiency.

A moderate effect on team performance could also imply that the team members could need more training, particularly in technical skills or project-specific knowledge. Toolbox meetings ought to be used in team execution management to clarify project requirements. Work instructions, Standard Operating Procedures (SOP), Original Equipment Manufacturer (OEM) manuals ensure correct installations during project implementation, so improving the dependability and efficiency of overhaul projects.

5.6 Areas for Further Research

Scholars can conduct research on other comprehensive projects to understand how internal management affects their efficacy and confirm the validity and relevance of the results. Although the performance of the overhaul project was significantly influenced by the application of resource management and team execution management, their importance was limited. This calls for closer inspection of the internal management of

other projects, which accounted for 41% of the total and fell outside the purview of current study. Especially in view of the predictor variables of overhaul resource management and team execution management, more study is needed to ascertain how internal project management influences overhaul project performance.

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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APPENDICES

Appendix I: Questionnaire

This form seeks to obtain information that will aid relating to academic research relating to the project internal administration and performance of overhaul projects at KenGen, Kenya. The information is obtained in pursuit of MBA in Project Management from Kenyatta University and hence will be purely used for academic purpose. Please answer the questions honestly as ultimate confidence is assured. Do not write your name in this questionnaire.

SECTION (A): Demographic Information

Instruction: Tick (√) where appropriate

1. Gender: { } Male. { } Female.
2. Age: Below 25{ } 26-30{ } 31-35{ } 36-40{ } 40-44{ }

   45-49 { } 50-54{ } 54-60{ } Above 60{ }
3. What is your highest level of education?

   Secondary { } Certificate { } Diploma{ } Bachelor's degree { }

   Postgraduate degree { }
4. Years of service in the company?

   1-4 { } 5-10 { } 11-15{ } 16-20 { } 21-25{ } 26-30{ } 30 and above{ }
5. Please provide the number of overhaul projects you have implemented based on the power generating units.

SECTION (B): PLANNING

1. Kindly indicate how significant each of the following factors affect the performance of overhaul projects in your power station using the scale provided.

   5) Strongly agree; 4) Agree; 3) Neutral; 2) Disagree; 1) Strongly disagree

No	Statement	5	4	3	2	1
B1	All project team members participate in overhaul project specifications.					
B2	The project team members have project specifications technical abilities					
B3	There is timely delivery of accurate overhaul project specifications by the project team.					
B4	The roles and responsibilities of project team members are well defined during the planning of the overhaul project.					
B5	The project team members are well versed in the budgeting process of the overhaul projects during planning.					
B6	Spare parts and material cost estimation for the equipment overhaul project are accurate.					
B7	The budgeted amount for an equipment overhaul project is usually approved in full by the board of directors.					
B8	ERP SAP PM module is used for the work order creation for the overhaul project during the planning stage.					
B9	There is automated SAP work order scheduling for overhaul projects for planning purposes					
B10	ERP SAP systems are proficiently used by project team leads.					
B11	The overhaul project objectives are usually included during performance cascading					
B12	The project team leads use planning tools, e.g., Gantt charts, to navigate the equipment overhaul projects					
B13	There is strict adherence to equipment overhaul projects' due dates according to the approved procurement plan.					

2. How often do your power station come up with a comprehensive plan that outlines the entire overhaul process, including timelines, resource requirements, and budget estimates.

   Never [ ]

Less often [ ]

Often [ ]

Please explain your answer

……

……

……

3. Any other planning factor that leads to overhaul projects performance?

……

……

……

SECTION (C): INVENTORY MANAGEMENT

1. Kindly indicate how significant each of the following factors affect the performance of overhaul projects in your power station using the scale provided.

5) Strongly agree; 4) Agree; 3) Neutral; 2) Disagree; 1) Strongly disagree

No	Statement	5	4	3	2	1
C1	Direct procurement methods are used for critical equipment spares.					
C2	Direct procurement methods reduce the cost of procuring spare parts.					
C3	Framework contracting methods are used for procuring parts.					
C4	There is timely delivery of spare parts					
C5	Inspection and acceptance committees are formed on every warehouse delivery.					
C6	There is timely processing of payment of spare parts delivered for overhaul projects					
C7	The spare parts arrangement at the warehouse is in order of the materials coding for ease of access.					

C8	There is enough space in the warehouse for receiving spares for overhaul projects.					
C9	Warehouse personnel have the technical knowledge of parts and materials.					
C10	The ERP SAP module's use for reserving and issuing warehouse spare parts and consumables is well adopted.					
C11	Team leads reserve the rights of reservation of overhaul spares for accountability purposes					
C12	Minimal time is incurred in issuing spare parts and consumables by warehouse personnel					
C13	The project team leads monitor the spare parts and consumable reserved quantities on a daily basis					

2. How frequent do you encounter inventory management related challenges when performing an overhaul project in your power station?

   Never [ ]

   Less often [ ]

   Often [ ]

3. In which other way do you think inventory management influence overhaul project performance?

   ……

   ……

   ……

   ……

SECTION (D): OVERHAUL RESOURCE MANAGEMENT

1. Kindly indicate how significant each of the following factors affect the performance of equipment overhaul projects in your power station using the scale provided. 5) Strongly agree; 4) Agree; 3) Neutral; 2) Disagree; 1) Strongly disagree

No	Statement	5	4	3	2	1
D1	There is timely availability of required funding for the required resources for an overhaul project.					
D2	Resource analysis is done to identify missing resources for the execution of an overhaul project.					
D3	The funding of overhaul projects is got from internal sources					
D4	There is elimination of spare parts and material waste					
D5	All spares parts used during overhaul are capitalized					
D6	All procured parts for the overhaul projects are installed					
D7	There exists a maintenance planner in my power station who assists in coordination of personnel and available resources					
D8	Transparency helps prevent avoidable miscommunication mishaps between team members					
D9	There is job rotation utilization to enable resource levelling					
D10	Physically strain is reduced through job rotation					
D11	Appropriate special tools are provided to carry out overhaul projects					
D12	Cooperation exists between power plants on borrowing missing special tools.					
D13	Only calibrated tools are used on the overhaul projects					

2. How frequent do you encounter resource conflicts when carrying out an overhaul project in your power station?

   Never [ ]

Less often [ ]

Often [ ]

Please explain your answer.

……

……

……

3. How effective is the current overhaul resource management with regards to overhaul projects performance undertaken in your power station?

……

……

……

SECTION (E): TEAM EXECUTION MANAGEMENT

1. Kindly indicate how significant each of the following factors affect the performance of equipment overhaul projects in your power station using the scale provided. 5) Strongly agree; 4) Agree; 3) Neutral; 2) Disagree; 1) Strongly disagree

No	Statement	5	4	3	2	1
E1	Tool box meetings are held on daily basis before embarking on the project tasks					
E2	The project execution team have a shared understanding of what needs to be done					
E3	Experienced technical staff are appointed as team leads					
E4	Division of project execution team groups is done according to skill strengths					
E5	Team leads perform on-site training during overhaul project execution					
E6	There is inclusion of safety briefs in the tool box meetings					
E7	Isolation, lock out and tag out are performed fully on isolated components					

E8	There is strict adherence of SOP, work instruction and OEM manual during project execution.					
E9	Work permits are signed before commencement of any work					
E10	Collaboration exists between the project execution team and their supervisors					
E11	Team leads perform quality checks at every stage of the overhaul project.					
E12	Overhaul progress is detailed in formal written reports by project team leads					
E13	Records of past inspection and the servicing of equipment are used during overhaul project execution					

2. How frequently do team execution experience complication and setbacks?

   Never [ ]

   Less often [ ]

   Often [ ]

   Please explain your answer.

   ……

   ……

   ……

3. How effective is team execution management in regards to overhaul project performance?

   ……

   ……

   ……

SECTION (F): PERFORMANCE OF OVERHAUL PROJECTS

1. Please provide ratings for the following statements regarding performance of overhaul projects in your power station using the scale provided. 5) Strongly agree; 4) Agree; 3) Neutral; 2) Disagree; 1) Strongly disagree

No	Statement	5	4	3	2	1
F1	Project costs are within set budget					
F2	There are no repeat jobs					
F3	Project schedule delivered on specific time					
F4	Zero loss time injury (LTI) are recorded					
F5	Power generating unit efficiency is increased					
F6	Power station availability is increased					
F7	Power station reliability is increased					

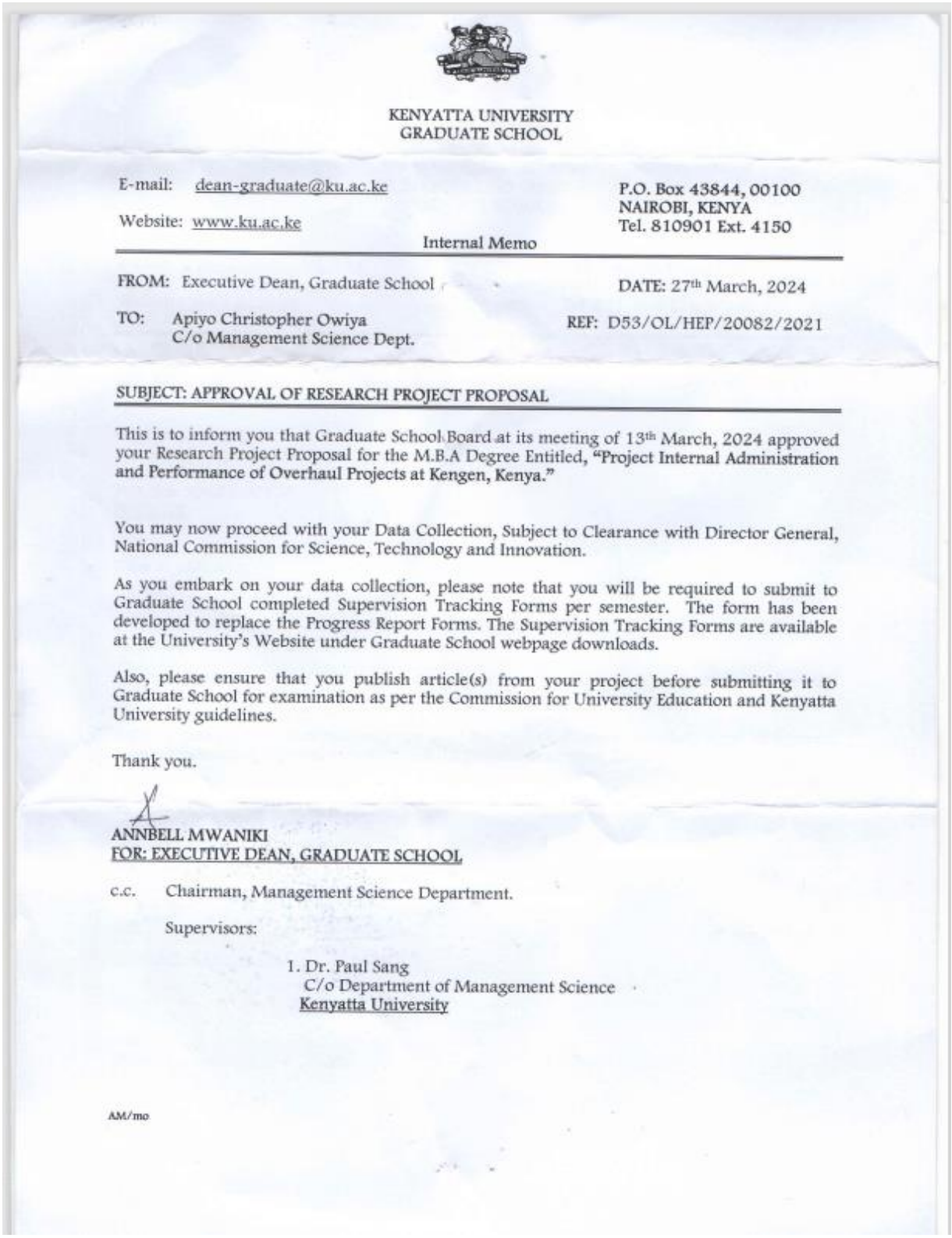
Thank you

Appendix II: KenGen Overhaul Projects

Power Station	Station installed Capacity (MW)	Overhaul projects implemented	Year
Masinga	40MW	Masinga Protection System Rehabiliation	2017
		Masinga Unit 1Runner Rehabilitation	2017
		Masinga Transformer	2018
		Rehabilitation of Damaged Spillway (Masinga)	2019
Kamburu	93MW	Refurbishment of machines	2017
		Kamburu Refurbshiment and New Runners	2018
		Kamburu Transformer	2018
Gitaru	225MW	Gitaru Rehabilitation	2017
Kindaruma	72MW	Kindaruma Cooling Water System and Hydro	2018
		Kindaruma Generator CKT Breakers	2018
Kiambere	144MW	Kiambere Penstock Rehab & UCBs Upgrades	2020
		Kiambere Unit 2 MIV Trunnion Rehabilitation	2020
Sondu	60MW	Sondu DCS Upgrade	2021
		Sondu unit 1&2 15 yrs major overhaul	2022
Tana	20MW	Re-engineering-Tana Governor Units PLCs	2020
Sangoro	20.2MW	Sangoro Main Cooling Water Strainers	2022
Kipevu III	115MW	Unit 2 24000RHS Overhaul	2017
		Unit 5 24000RHS Overhaul	2017
		Unit 4 24000RHS Overhaul	2018
		Unit 7 36000RHS Overhaul	2018

		Unit 1 36000RHS Overhaul	2019
		Unit 3 36000RHS Overhaul	2019
		Unit 6 36000RHS Overhaul	2022
Olkaria I	268.3MW	Olkaria 1 Rehabilitation 45-50.7MW	2017
		OLK 1 140MW-Unit 4 Overhaul	2018
		Olkaria 1 Rehabilitation Project	2022
Olkaria 1 AU	150.52MW	Olkaria 1 AU Major Overhaul	2021
OLK 1V	149.5MW	OLK 1V 140MW-Unit 1 and II Overhaul	2019
Olkaria II	105MW	Upgrade of Olkaria Pump	2021
		Upgrading OLKII Unit2 Turbine monitoring	2023
Ngong III	10MW	10MW Ngong III	2017

Appendix III: Kenyatta University Graduate School Transmission Letter



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 4150

Internal Memo

FROM: Executive Dean, Graduate School

DATE: 27th March, 2024

TO: Apiyo Christopher Owiya
C/o Management Science Dept.

REF: D53/OL/HEP/20082/2021

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL

This is to inform you that Graduate School Board at its meeting of 13th March, 2024 approved your Research Project Proposal for the M.B.A Degree Entitled, "Project Internal Administration and Performance of Overhaul Projects at Kengen, Kenya."

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your project before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

Thank you.

ANNBELL MWANIKI
FOR: EXECUTIVE DEAN, GRADUATE SCHOOL

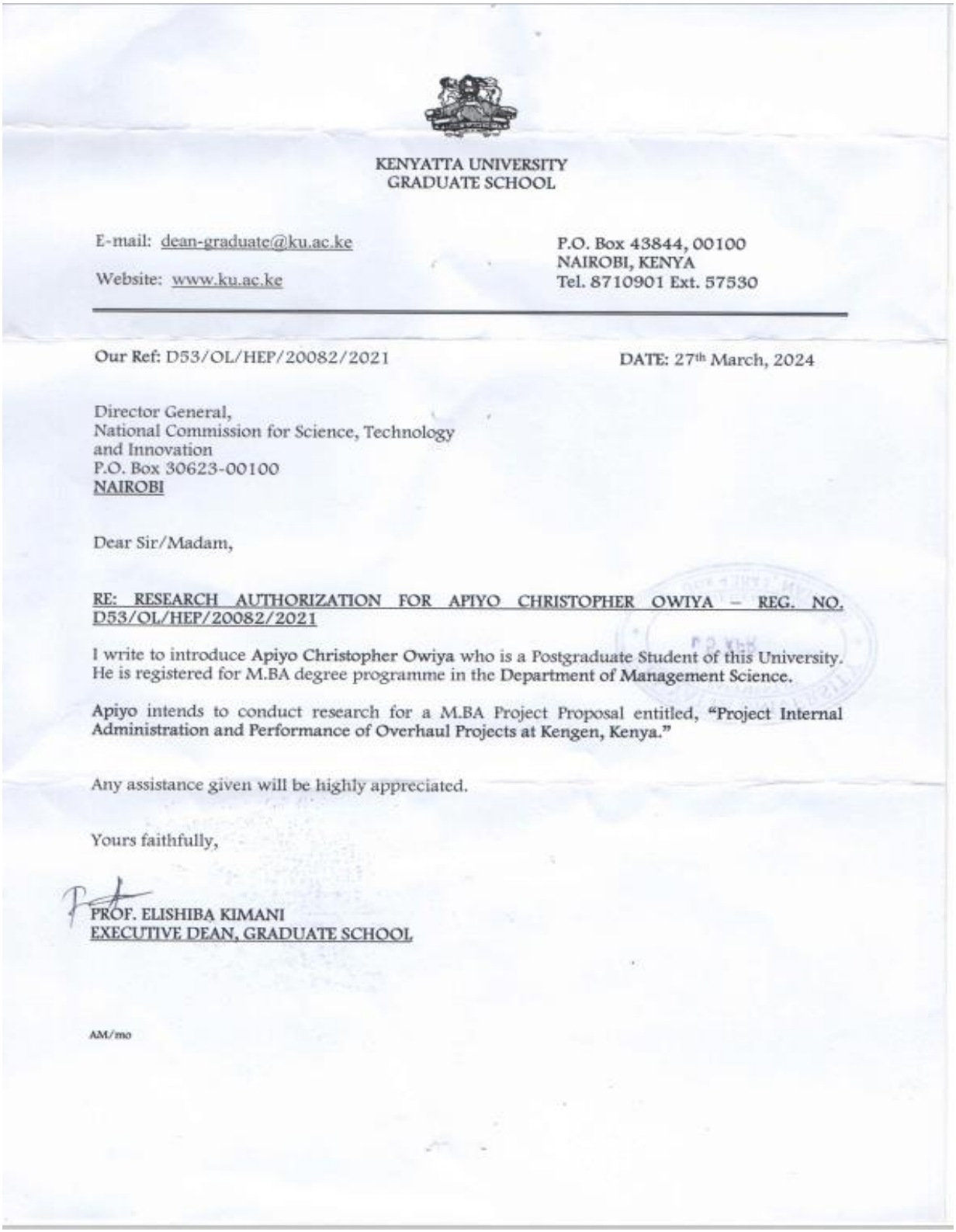
c.c. Chairman, Management Science Department.

Supervisors:

1. Dr. Paul Sang
C/o Department of Management Science
Kenyatta University

AM/mo

Appendix IV: Kenyatta University Graduate School Introductory Letter



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D53/OL/HEP/20082/2021

DATE: 27th March, 2024

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR APIYO CHRISTOPHER OWIYA – REG. NO. D53/OL/HEP/20082/2021

I write to introduce Apiyo Christopher Owiya who is a Postgraduate Student of this University. He is registered for M.BA degree programme in the Department of Management Science.

Apiyo intends to conduct research for a M.BA Project Proposal entitled, "Project Internal Administration and Performance of Overhaul Projects at Kengen, Kenya."

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
EXECUTIVE DEAN, GRADUATE SCHOOL

AM/mo

Appendix V: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **689988**

Date of Issue: **13/May/2024**

RESEARCH LICENSE

This is to Certify that Mr.. Christopher Owiya Owiya Apiyo of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Embu, Kajiado, Kericho, Kiambu, Kisumu, Kitui, Machakos, Mombasa, Muranga, Nakuru on the topic: PROJECT INTERNAL ADMINISTRATION AND PERFORMANCE OF OVERHAUL PROJECTS AT KENGEN. for the period ending : 13/May/2025.

License No: **NACOSTI/P/24/34861**

689988

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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See overleaf for conditions