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PROJECT MANAGEMENT AND PERFORMANCE OF SOLAR STREET LIGHT PROJECTS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

The implementation of solar street lighting projects in Kenya aims to address several critical urban challenges, including inadequate public lighting, high energy costs, and unreliable power supply. Despite the significant potential and investment in these projects, many have failed to achieve the desired outcomes. The general objective of the study was to establish the influence of project management on performance of solar street light projects in Nairobi City County, Kenya. Specifically, the study sought to establish the influence of project planning on performance of solar street light projects in Nairobi City County, Kenya, to examine the influence of stakeholder communication on performance of solar street light projects in Nairobi City County, Kenya. This study was anchored on; Systems Theory, and Stakeholders Theory. The descriptive research design was employed. This study targeted solar street light projects in Nairobi City County, Kenya. According to the Ministry of energy (2022), the study targeted 11 solar street light projects in Nairobi City County, Kenya. The unit of observation was the project engineers and site managers from the 11 solar street light projects in Nairobi City County, Kenya. The total target population was 462 project engineers and site managers. The study used simple random sampling to select a sample of 214 project engineers and site managers from the target population. This research used a questionnaire to collect primary data. Twenty four questionnaires were piloted that represented 10% of the target population. The study collected quantitative data which was analysed using descriptive and inferential statistics using the Statistical Package for Social Sciences (SPSS) version 24. Multivariate linear regression was used to determine the relationship between the dependent and independent variables. The study results were presented through use of tables and figures. The study concludes that project planning has a positive and significant influence on performance of solar street light projects in Nairobi City County, Kenya. In addition, the study concludes that stakeholder communication has a positive and significant influence on performance of solar street light projects in Nairobi City County, Kenya. Based on the findings, the study recommends that the management of solar street light projects in Kenya should implement comprehensive stakeholder engagement throughout the project planning phase. By actively involving local communities, government agencies, and potential beneficiaries from the outset, project planners can ensure that the needs and concerns of all stakeholders are addressed.

Key Words: Project Management, Performance of Solar Street Light Projects, Project Planning, Stakeholder Communication

Background of the Study

Around the world, the push for sustainable and renewable energy solutions has gained significant momentum. This shift is driven by increasing concerns over climate change, rising energy costs, and the need for sustainable urban development (Agustiawan, Coffey & Sutrisno, 2020). Solar street lighting has emerged as a prominent component of urban infrastructure due to its potential to significantly reduce carbon footprints, lower energy costs, and improve public safety. The technology leverages the abundance of solar energy to provide a reliable and environmentally friendly lighting solution, making it an attractive option for both developed and developing countries. In developed countries, the adoption of solar street lighting is part of broader efforts to transition to green energy and smart city initiatives (Hussain, et,al, 2022). For instance, cities in Europe and North America have implemented solar street lighting to enhance urban aesthetics, reduce greenhouse gas emissions, and cut down on electricity bills. These systems are often integrated with advanced technologies such as smart sensors and IoT (Internet of Things) to optimize energy usage and maintenance. The ability to operate independently of the grid also makes solar street lights a resilient solution in the face of natural disasters or power outages, ensuring continuous illumination and safety (PokuaaAddo-Parker, *et, al* 2021).

Developing countries, on the other hand, face unique challenges that make solar street lighting an even more critical infrastructure investment. Many regions in Africa, Asia, and Latin America struggle with inadequate grid infrastructure and frequent power outages, which can hamper economic activities and compromise public safety. In these contexts, solar street lighting offers a viable and cost-effective solution to bridge the gap in public lighting (Ojie, 2019). The relatively low maintenance costs and the availability of abundant sunlight make solar street lighting a practical choice for these regions. Moreover, these projects can contribute to socioeconomic development by extending productive hours for businesses and enhancing the security of communities (Mugabo & Mulyungi, 2019). The benefits of solar street lighting extend beyond environmental and economic advantages. Improved public lighting enhances safety and security, reducing crime rates and accidents, which is particularly beneficial in urban areas with high population densities. Additionally, well-lit streets can boost local businesses by creating a safer environment for evening commerce and activities. The social impact of these projects is significant, as they contribute to the overall quality of life and well-being of residents (Sanggoro, Widyaningsih & Bintoro, 2020). Furthermore, solar street lighting projects serve as a catalyst for technological and infrastructural innovation. They encourage the adoption of renewable energy technologies and can spur local industries related to solar energy production and maintenance. This can lead to job creation and skills development in emerging sectors, further bolstering the economic impact of these projects (Tuyishime &Nyambane, 2021).

Effective project management is crucial for the success of any infrastructure project. It involves meticulous planning, execution, monitoring, and evaluation to ensure that projects are completed within scope, on time, and within budget. For solar street lighting projects, robust project management is vital to address the technical, logistical, and stakeholder-related challenges (Chepng'eno & Kimutai, 2021). Factors such as procurement processes, team coordination, technical specifications, and stakeholder engagement are critical to achieving the desired project outcomes. Successful project management can lead to enhanced project performance, ensuring that the benefits of solar street lighting are fully realized (Umulisa, Mbabazize & Shukla, 2018).

Statement of the Problem

The implementation of solar street lighting projects in Kenya aims to address several critical urban challenges, including inadequate public lighting, high energy costs, and unreliable power supply. Despite the significant potential and investment in these projects, many have failed to

achieve the desired outcomes. Inefficiencies in planning, execution, monitoring, and stakeholder engagement have led to delays, budget overruns, and poor quality installations, undermining the overall performance and sustainability of these initiatives (Makokha & Ngugi, 2023). One of the primary issues is the inconsistent completion of projects within the allocated time and budget. For instance, a report by the Nairobi City County Government in 2022 highlighted that only 60% of the solar street lighting projects were completed on schedule, while the remaining 40% experienced delays ranging from three to twelve months. Budget overruns were reported in 35% of the projects, with actual costs exceeding initial estimates by an average of 20% (Mwithi, Were & Muturi, 2019).

Furthermore, the quality of installations has been a recurring problem. A 2021 audit by the Energy Regulatory Commission (ERC) revealed that 25% of the installed solar street lights were non-functional within the first year of operation due to poor installation practices and inadequate maintenance. This not only compromises public safety and security but also erodes public trust in the efficacy of solar street lighting as a sustainable solution. Effective project management requires active participation and coordination among various stakeholders, including government agencies, private contractors, local communities, and funding bodies. However, a study conducted by the Kenya Institute for Public Policy Research and Analysis (KIPPRA) in 2023 found that 45% of the solar street lighting projects in Nairobi lacked sufficient community involvement and stakeholder coordination. This often resulted in projects that did not fully address the needs and expectations of the local population, leading to lower acceptance and support (Gitau, Abayo & Kibuine, 2020).

Additionally, the sustainability of these projects is jeopardized by inadequate maintenance and technical support. Data from the Nairobi County Public Works Department indicated that nearly 30% of the solar street lights installed between 2018 and 2020 have not received any maintenance, leading to a high rate of malfunctioning units. This lack of maintenance stems from insufficient budget allocations for ongoing support and a shortage of skilled personnel to conduct regular inspections and repairs (Gitau, Abayo & Kibuine, 2020). Several studies have been conducted on project management and project performance. For instance, Otunga (2021) conducted a study on factors affecting the performance of fast-moving consumer goods firms listed on Nairobi securities Exchange. Achola and Were (2019) conducted a study on the influence of project management practices on performance of fast-moving consumer goods companies in Nairobi County, Kenya. Oballah, Waiganjo and Wachiuri (2019) researched on the effect of project management practices on organizational performance in public health institutions in Kenya. Nevertheless, none of these studies showed the relationship between project management and performance of solar street light projects in Nairobi City County, Kenya. To fill the highlighted gaps, the current study sought to establish the influence of project management on performance of solar street light projects in Nairobi City County, Kenya.

General Objective of the Study

The general objective of the study was to establish the influence of project management on performance of solar street light projects in Nairobi City County, Kenya.

Specific Objectives of the Study

i. To establish the influence of project planning on performance of solar street light projects in Nairobi City County, Kenya.

ii. To examine the influence of stakeholder communication on performance of solar street light projects in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Review

Systems Theory

Systems theory was developed by Ludwig von Bertalanffy in (1972). Systems Theory is a conceptual framework that views organizations and phenomena as complex, interconnected systems composed of numerous components working together to achieve a common purpose. One key concept within Systems Theory is that of a "system," which can be any entity, organization, or process with interconnected and interdependent components. These components, referred to as elements or subsystems, work together to form a unified whole. In the context of public secondary schools in Nairobi City County, Kenya, a school can be viewed as a system with interconnected elements, including students, teachers, administrators, curriculum, infrastructure, and community relationships (Gitau, Abayo & Kibuine, 2020).

A crucial aspect of Systems Theory is the recognition that changes in one part of the system can have cascading effects on other parts. For instance, alterations in the curriculum might impact teaching methods, which in turn affect students' learning experiences and outcomes. Understanding these interconnections is vital for effective management and decision-making in complex systems like educational institutions. Moreover, Systems Theory introduces the idea of feedback loops, where information about the system's performance is fed back into the system to modify and adjust its functioning. In the context of public secondary schools, feedback mechanisms can involve assessments, evaluations, and communication channels that allow for continuous improvement based on the information received (Chi & Bump, 2019).

Systems Theory is relevant in this study since it enhances the understanding of how various elements within the educational system interact and influence overall performance. For instance, by considering how changes in top management support, resource allocation, and teacher training (as discussed in the previous response) interact within the larger educational system, administrators can better comprehend the systemic impact of their decisions on the school's performance (Aregay, 2019). Systems Theory was used to establish the influence of project planning on performance of solar street light projects in Nairobi City County, Kenya

Stakeholders Theory

The stakeholder theory was developed by Blair (1995) who was seeking new models of corporate governance for the 21st century. The premise of the theory is that focus on shareholders has not provided exhaustive and effective corporate governance. This theory hence advocates for the inclusion of interested parties, financial institutions, consumer groups, media, employees and the public in devising an effective corporate governance model that will be able to make the organization effectively accountable to all interested parties (Ojie, 2019).

The theory proposes that organizations should manage relationships with all stakeholders in a way that considers their needs, concerns, and contributions. This approach contrasts with traditional theories that prioritize the interests of shareholders above all else. Instead, stakeholder theory emphasizes the interconnectedness and interdependence between the organization and its various stakeholders. Stakeholder theory promotes ethical decision-making by encouraging organizations to consider the potential impact of their actions on all stakeholders, including those who may be marginalized or vulnerable. This involves weighing the interests of different stakeholders and striving to minimize harm while maximizing benefits (Mugabo & Mulyungi, 2019).

Organizations are accountable to their stakeholders for their actions and decisions. Stakeholder theory advocates for transparency in communication and decision-making processes, allowing stakeholders to understand how and why certain decisions are made and to hold the organization accountable for its performance. Recognizing that stakeholders may have competing interests or goals, stakeholder theory encourages organizations to engage in

constructive dialogue and negotiation to resolve conflicts and find mutually acceptable solutions. This involves compromise, collaboration, and creative problem-solving to address conflicting priorities and interests (Takim & Adnan, 2019). This study used Stakeholders Theory to establish the influence of stakeholder communication on performance of solar street light projects in Nairobi City County, Kenya

Conceptual Framework

A conceptual framework is a structure or system of concepts that provides a foundation for understanding, analyzing, and interpreting a specific subject or phenomenon. It is a set of interconnected ideas, principles, and theories that form a coherent and comprehensive perspective on a particular topic (Svinicki, 2019). It is a diagram that explains the relationship between dependent and independent variables.

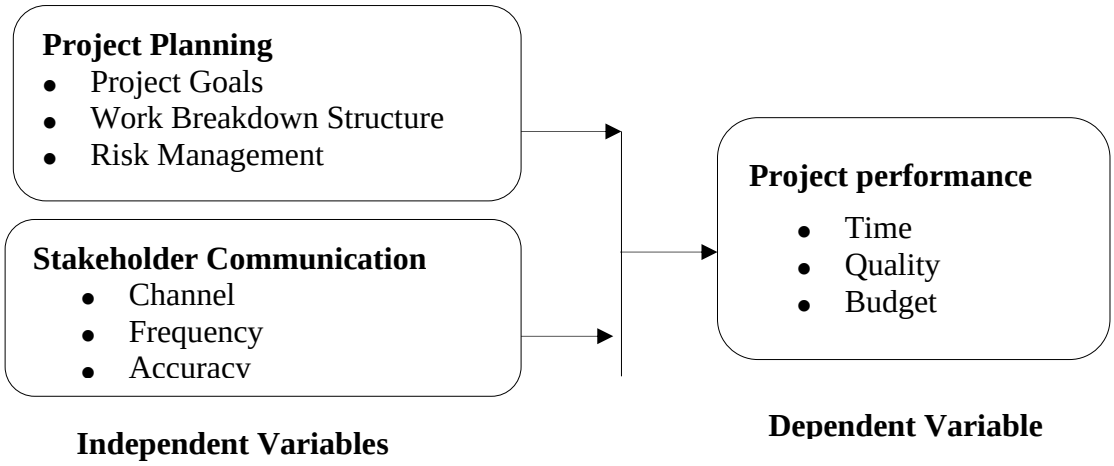

Figure 2. 1: Conceptual Framework

Project Planning

Project goals are the foundation of project planning, serving as the guiding principles that define what the project aims to achieve. These goals provide clarity and direction, aligning the efforts of the project team towards a common purpose. In project planning, it is essential to establish SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals that are clearly defined and understood by all stakeholders. Specific goals outline the desired outcomes of the project, ensuring that the team focuses on delivering tangible results (Sau, 2018). Measurable goals enable progress tracking and performance evaluation, allowing stakeholders to assess the project's success against predetermined criteria. Achievable goals set realistic expectations and consider resource constraints, ensuring that the project remains feasible within the allocated budget, timeframe, and resources. Relevant goals are aligned with the project's overall objectives and stakeholders' expectations, contributing to its strategic significance and value. Time-bound goals establish clear deadlines and milestones, providing a sense of urgency and accountability to keep the project on track. By defining clear and meaningful project goals, project planning lays the groundwork for successful project execution and outcomes (Agustiawan, Coffey & Sutrisno, 2020).

The Work Breakdown Structure (WBS) is a hierarchical decomposition of the project's scope into smaller, more manageable components, tasks, and deliverables. In project planning, developing a WBS involves breaking down the project's scope into distinct work packages that can be easily understood, assigned, and scheduled. The WBS organizes the project's activities into a logical structure, allowing the project team to identify dependencies, estimate resource requirements, and allocate responsibilities effectively (Inganda & Mulyungi, 2018). Each level of the WBS provides increasing detail and granularity, from the highest-level project phases or deliverables down to individual tasks or activities. By breaking down the project scope into manageable chunks, the WBS facilitates more accurate planning, scheduling, and budgeting,

minimizing the risk of scope creep and ensuring that all project requirements are adequately addressed. Additionally, the WBS serves as a valuable communication tool, enabling stakeholders to visualize the project's scope and understand the interrelationships between different project components. Overall, the WBS plays a critical role in project planning by providing a structured framework for organizing and managing project activities, resources, and timelines (Hussain, *et,al*, 2022).

Risk management is an essential component of project planning that involves identifying, assessing, mitigating, and monitoring potential risks and uncertainties that may impact the project's objectives. In project planning, it is crucial to conduct a thorough risk assessment to identify potential threats and opportunities that could affect the project's success. This involves analyzing internal and external factors, such as technical challenges, resource constraints, market dynamics, regulatory requirements, and environmental factors, that may pose risks to the project. Once risks are identified, they are assessed based on their probability of occurrence and potential impact on the project's goals, schedule, budget, quality, and stakeholders. Risk mitigation strategies are then developed to address identified risks, minimize their likelihood or impact, and capitalize on opportunities. These strategies may include risk avoidance, risk transfer, risk reduction, risk acceptance, or risk sharing, depending on the nature and severity of the risks (PokuaaAddo-Parker, *et, al*, 2021).

Stakeholder Communication

Stakeholder communication is a vital aspect of project management that focuses on establishing and maintaining effective dialogue with all individuals and groups who have an interest or influence in the project's outcomes. Effective stakeholder communication is essential for ensuring that stakeholders are informed, engaged, and supportive throughout the project lifecycle (Oke & Gbadura, 2019). In project management, stakeholder communication begins with identifying key stakeholders and understanding their interests, concerns, and expectations regarding the project. This involves conducting stakeholder analysis to determine the stakeholders' level of influence, attitude towards the project, and communication preferences. By understanding stakeholders' needs and priorities, project managers can tailor their communication strategies to effectively engage and address their concerns (Tuyishime &Nyambane, 2021).

Once stakeholders have been identified, project managers develop a communication plan that outlines the objectives, key messages, channels, and frequency of communication for each stakeholder group. The communication plan serves as a roadmap for managing stakeholder communication throughout the project, ensuring that relevant information is delivered to the right stakeholders at the right time. Effective stakeholder communication involves employing various communication channels and techniques to disseminate information, gather feedback, and foster collaboration. This may include face-to-face meetings, email updates, project status reports, stakeholder workshops, newsletters, and project websites, among others. Project managers should utilize a mix of formal and informal communication methods to reach stakeholders and accommodate their diverse preferences (Muute & James, 2019).

Furthermore, stakeholder communication is not only about sharing information but also about actively listening to stakeholders' concerns, feedback, and suggestions. Project managers should create opportunities for two-way communication, allowing stakeholders to express their opinions, ask questions, and provide input on project decisions. By actively engaging with stakeholders and soliciting their input, project managers can build trust, credibility, and goodwill, fostering stronger relationships and collaboration. Throughout the project lifecycle, stakeholder communication requires continuous monitoring and adjustment to ensure that stakeholders remain informed and engaged. Project managers should regularly assess the effectiveness of their communication efforts, gather feedback from stakeholders, and adapt

their communication strategies as needed to address emerging issues and changing stakeholder needs (Takim & Adnan, 2019).

Empirical Review

Project Planning and Project Performance

Agustiawan, Coffey and Sutrisno (2020) conducted a study on the role of project culture in achieving the performance of Indonesian toll road projects. The study used a case study approach. The case studies were based on data collected through examining archives, responses to the questionnaire, and formal interviews with project participants from the client, contractor, and subcontractor organizations. The study found that project parties put in place collaboration as their main concern and found prevalence of goal-oriented, people-oriented, and cooperative dimensions. The study concluded that there is no fixed dimension of culture in Indonesian toll road infrastructure projects.

Hussain, *et,al* (2022) investigated on the project success factors and project management: empirical evidence from Pakistan. Descriptive research was used in the study. The target population was 5 major companies of the construction industry. The study found that all the factors of project management were having significant impact on project success, while planning activities were having more contribution on project success. The study concluded that the performance of project management has an influence on project's success and adoption of management techniques has been shown to have a significant impact.

PokuaaAddo-Parker, *et, al* (2021) researched on the assessing the relationship between project planning effort and project success in the construction industry of Ghana. The study employed explanatory design of the quantitative approach. The target population was Management of Glenshire Hills Estate and Incept Architectural Consult. The study found that projects constructed by selected companies were mainly residential buildings with few commercial building, health, educational structures and religious facilities. Project planning effort affects project success positively and human factors, technical factors and management factors affect project success positively. The study concluded that factors inhibiting the contribution of project efforts to project success in the construction industry included; human factors, cost performance baseline, lack of clear goals and objectives among others.

Tuyishime and Nyambane (2021) conducted a study on planning and project performance in public institutions in Rwanda. a case of establishment of a frequency spectrum management and monitoring system project in Rwanda. The study used causal research design. Target population comprised of 145 respondents from Rwanda Utilities Regulatory Authority. The study found that there was a positive significant linear relationship between planning and projects performance. The study concluded that planning practices influences project performance.

Muute and James (2019) investigated on the project planning practices and performance of construction projects in Nairobi City County, Kenya. Descriptive research design was adopted in this study. The target population was one hundred and twenty-five construction projects within Nairobi City County. The study found that all material resources allocated were in use and that project output had been well defined and quality projects' planning was being carried out effectively. The study concluded that human resource planning, time management, material resource planning and financial resource planning positively and significantly contributes to performance of the construction projects.

Stakeholder Communication and Project Performance

Takim and Adnan (2019) researched on the management of stakeholders' needs and expectations in the development of construction project in Malaysia. A survey research was used in the study. The target population was four construction stakeholders comprising: the Government, private clients, consultants and contractors. The study found that priority criteria

used to manage the stakeholders' needs and expectations differ between the public and private sectors in Malaysia, depending on their interests. The study concluded that clients' attitudes towards the development of a project are unpredictable and may change as it progresses.

Sanggoro, Widyaningsih and Bintoro (2020) conducted a study on the analysis influence factors of domination, competency and interpersonal skill in the stakeholder interaction to infrastructure project success. The study used survey research. The target population was stakeholders relating to and having direct influence upon the infrastructure project implementation. The study found that domination factor has the greatest influence to infrastructures project implementation. Respondents from East Java consider competency as a significant variable which influences the infrastructure project success while West Sumatera respondents are the opposite, where competency is not a significant variable to the project success directly. The study concluded that West Sumatra respondents have a more feudal interaction style than stakeholders in East Java.

Mugabo and Mulyungi (2019) investigated on the effect of stakeholder engagement on project success in Rwanda: a case of Gisenyi youth new vision project. The study used descriptive survey design. The target population was 43 respondents including project staff and representatives of stakeholders of the Gisenyi Youth Vision Project. The study found that stakeholder engagement in project planning process influences success of Gisenyi Youth New Vision Project. The study concluded that there is a significant relationship between stakeholder engagement in project execution and success of Gisenyi Youth New Vision Project.

Ojie (2019) researched on the role of effective communication in the management of projects: a case of Alemu Nigeria Enterprises Limited. The study adopted a survey strategy. The target population was 60. The study found that that effective communication in projects play a strategic role in improving project outcomes. The study concluded that electronic communication system enhances effective project communication.

Githinji, Ogolla and Kitheka (2020) conducted a study on the influence of stakeholder's involvement on project performance. a case study of Kenya ferry services. The study adopted a descriptive research design. The target population was 231 stakeholders of Kenya ferry services partners. The study found that involvement of stakeholders in project identification, project monitoring, project funding and resource allocation significantly and positively relates to project performance. The study concluded that involvement of stakeholders in project planning, project monitoring and project funding is positively and significantly related to project performance at Kenya Ferry Services.

RESEARCH METHODOLOGY

The descriptive research design was employed. According to the Ministry of energy (2022), the study targeted 11 solar street light projects in Nairobi City County, Kenya. The unit of observation was the project engineers and site managers from the 11 solar street light projects in Nairobi City County, Kenya. The total target population was 462 project engineers and site managers. The study used simple random sampling to select a sample of 214 project engineers and site managers from the target population. With simple random sampling, each unit of the population has an equal probability of inclusion in the sample (Creswell, 2019).Yamane formula (1967) was used to determine the sample size since the population was less than 10,000 (Yamane, 1967). Thus, the study was administered with questionnaires of 214 respondents mention above. Data was collected using a self-administered semi-structured questionnaire. Data obtained from the field was coded, cleaned, and entered into the computer for analysis using the SPSS version 25. Descriptive statistical included frequency, percentages, mean and standard deviation. Inferential statistical analysis to be used was multiple regression and correlation analysis. The significant of each independent variable was tested at a confidence level of 95%. Multiple regression Analysis was used in this study because it uses the independent variables in predicting the dependent variable. It is a statistical tool attempting to

establish whether some variables can be used together in predicting a particular variable (Mugenda & Mugenda, 2019).

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

The researcher sampled 214 respondents who were each administered with the questionnaires. From the 214 questionnaires 194 were completely filled and returned hence a response rate of 90.6%. The response rate was considered as suitable for making inferences from the data collected. As indicated by Metsamuuronen (2019), a response rate that is above fifty percent is considered adequate for data analysis and reporting while a response rate that is above 70% is classified as excellent. Hence, the response rate of this study was within the acceptable limits for drawing conclusions and making recommendations.

Descriptive statistics

Project Planning and Project performance

The first specific objective of the study was to establish the influence of project planning on performance of solar street light projects in Nairobi City County, Kenya. The respondents were requested to indicate their level of agreement on various statements related to project planning and performance of solar street light projects in Nairobi City County, Kenya. The results were as shown Table 1.

From the results, the respondents agreed that the project goals are clearly defined and understood by all team members (M=3.995, SD= 0.896). In addition, the respondents agreed that the goals of the project are realistic and achievable within the given timeframe (M=3.900, SD= 0.876). Further, the respondents agreed that the WBS is regularly updated to reflect changes in project scope or deliverables (M=3.887, SD= 0.782).

The respondents agreed that collaboration and input from team members were considered in creating the WBS (M=3.855, SD= 0.685). The respondents also agreed that potential risks to the project are identified and documented in advance (M=3.797, SD= 0.698). In addition, the respondents agreed that there is a clear risk management plan in place to address identified risks (M=3.771, SD= 0.727).

Table 1: Project Planning and Project performance

	Mean	Std. Deviation
The project goals are clearly defined and understood by all team members.	3.995	0.896
The goals of the project are realistic and achievable within the given timeframe	3.900	0.876
The WBS is regularly updated to reflect changes in project scope or deliverables.	3.887	0.782
Collaboration and input from team members were considered in creating the WBS.	3.855	0.685
Potential risks to the project are identified and documented in advance.	3.797	0.698
There is a clear risk management plan in place to address identified risks.	3.771	0.727
Aggregate	**3.868**	**0.777**

Stakeholder Communication and Project performance

The second specific objective of the study was to examine the influence of stakeholder communication on performance of solar street light projects in Nairobi City County, Kenya.The respondents were requested to indicate their level of agreement on various

statements related to stakeholder communication and performance of solar street light projects in Nairobi City County, Kenya. The results were as shown Table 2.

From the results, the respondents agreed that stakeholder feedback is actively solicited through various communication channels (M=3.940, SD=0.772). In addition, the respondents agreed that there are adequate resources available for stakeholders to access information about the project (M=3.840, SD=0.889). Further, the respondents agreed that project updates are communicated to stakeholders at an appropriate frequency (M=3.827, SD=0.768). The respondents also agreed that they receive timely information about project developments and changes (M=3.800, SD=0.562).

As shown in the results, the respondents agreed that the information communicated to stakeholders is accurate and reliable (M=3.743, SD=0.879). In addition, the respondents agreed that they trust the data and updates provided by the project team (M=3.708, SD=0.692).

Table 2: Stakeholder Communication and Project performance

	Mean	**Std. Deviation**
Stakeholder feedback is actively solicited through various communication channels.	3.940	0.772
There are adequate resources available for stakeholders to access information about the project.	3.840	0.889
Project updates are communicated to stakeholders at an appropriate frequency.	3.827	0.768
I receive timely information about project developments and changes.	3.800	0.562
The information communicated to stakeholders is accurate and reliable.	3.743	0.879
I trust the data and updates provided by the project team.	3.708	0.692
Aggregate	**3.810**	**0.760**

Project Performance

The respondents were requested to indicate their level of agreement on various statements related to performance of solar street light projects in Nairobi City County, Kenya. The results were as shown Table 3.

From the results, the respondents agreed that the project is progressing according to the established timeline (M=3.902, SD= 0.766). In addition, the respondents agreed that deadlines for project milestones are consistently met (M=3.887, SD= 0.886). Further, the respondents agreed that the quality of deliverables meets the project requirements and standards (M=3.849, SD= 0.785).

Further, the respondents agreed that there is a clear process for reviewing and ensuring the quality of project outputs (M=3.827, SD= 0.678). The respondents also agreed that the project is executed within the allocated budget (M=3.696, SD= 0.554). In addition, the respondents agreed that financial resources are managed effectively throughout the project (M=3.662, SD=0.761).

Table 3: Project Performance

	Mean	**Std. Deviation**
The project is progressing according to the established timeline.	3.902	0.766
Deadlines for project milestones are consistently met.	3.887	0.886
The quality of deliverables meets the project requirements and standards.	3.849	0.785

There is a clear process for reviewing and ensuring the quality of project outputs.	3.827	0.678
The project is executed within the allocated budget.	3.696	0.554
Financial resources are managed effectively throughout the project.	3.662	0.761
Aggregate	**3.804**	**0.738**

Correlation Analysis

This research adopted Pearson correlation analysis determine how the dependent variable (performance of solar street light projects in Nairobi City County, Kenya) relates with the independent variables (project planning, stakeholder communication).

Table 4: Correlation Coefficients

		Project Performance	Project Planning	Stakeholder Communication
Project Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	194		
Project Planning	Pearson Correlation	.815**	1	
	Sig. (2-tailed)	.003		
	N	194	194	
Stakeholder Communication	Pearson Correlation	.825**	.327	1
	Sig. (2-tailed)	.002	.032	
	N	194	194	194

From the results, there was a very strong relationship between project planning and performance of solar street light projects in Nairobi City County, Kenya (r = 0.815, p value =0.003). The relationship was significant since the p value 0.003 was less than 0.05 (significant level). The findings are in line with the findings of Agustiawan, Coffey and Sutrisno (2020) who indicated that there is a very strong relationship between project planning and project performance.

Moreover, there was a very strong relationship between stakeholder communication and performance of solar street light projects in Nairobi City County, Kenya (r = 0.825, p value =0.002). The relationship was significant since the p value 0.002 was less than 0.05 (significant level). The findings are in line with the findings of Sanggoro, Widyaningsih and Bintoro (2020) who indicated that there is a very strong relationship between stakeholder communication and project performance.

Regression Analysis

Multivariate regression analysis was used to assess the relationship between independent variables (project planning, stakeholder communication and the dependent variable (performance of solar street light projects in Nairobi City County, Kenya).

Table 5: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.331	0.086		3.849	0.002
project planning	0.386	0.097	0.387	3.979	0.000
stakeholder communication	0.376	0.095	0.375	3.957	0.001

The regression model was as follows:

$$\mathbf{Y = 0.331 + 0.386X_1 + 0.376X_2}$$

According to the results, project planning has a significant effect on performance of solar street light projects in Nairobi City County, Kenya β_1=0.386, p value= 0.000). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings are in line with the findings of Agustiawan, Coffey and Sutrisno (2020) who indicated that there is a very strong relationship between project planning and project performance.

The results also revealed that stakeholder communication has a significant effect on performance of solar street light projects in Nairobi City County, Kenya β1=0.376, p value= 0.001). The relationship was considered significant since the p value 0.001 was less than the significant level of 0.05. The findings are in line with the findings of Sanggoro, Widyaningsih

and Bintoro (2020) who indicated that there is a very strong relationship between stakeholder communication and project performance.

Conclusions

The study concludes that project planning has a positive and significant influence on performance of solar street light projects in Nairobi City County, Kenya. Findings revealed that project goals, work breakdown structure and risk management influence performance of solar street light projects in Nairobi City County, Kenya.

In addition, the study concludes that stakeholder communication has a positive and significant influence on performance of solar street light projects in Nairobi City County, Kenya. Findings revealed that channel, frequency and accuracy influence performance of solar street light projects in Nairobi City County, Kenya.

Recommendations of the Study

The study recommends that the management of solar street light projects in Kenya should implement comprehensive stakeholder engagement throughout the project planning phase. By actively involving local communities, government agencies, and potential beneficiaries from the outset, project planners can ensure that the needs and concerns of all stakeholders are addressed.

In addition, the study recommends that the management of solar street light projects in Kenya should establish a robust stakeholder communication strategy that emphasizes transparency and regular updates. Effective communication channels should be created to inform stakeholders—including local residents, government officials, and community organizations—about project goals, progress, and any challenges encountered.

Suggestions for Further Studies

This study was limited to the influence of project management on performance of solar street light projects in Nairobi City County, Kenya hence the study findings cannot be generalized to performance of other projects in Kenya. The study therefore suggests further studies on the influence of influence of performance of other projects in Kenya.

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