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INFLUENCE OF MONITORING AND EVALUATION PLANNING ON PERFORMANCE OF PERFORMANCE OF ENERGY PROJECTS IN RWANDA.

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ABSTRACT

This study investigates the influence of monitoring and evaluation (M&E) planning on the performance of energy projects at Oryx Energies Rwanda Ltd., addressing the critical role of M&E in achieving Rwanda's goal of universal electricity access under the National Strategy for Transformation (NST1). Employing a descriptive survey design with a mixed-methods approach, the study targeted 136 stakeholders, including project managers, M&E experts, and technical officers, with a sample of 102 selected using stratified random sampling and Yamane's (1967) formula. Data were collected through structured questionnaires, semi-structured interviews, and secondary sources, with pilot testing at Engen Petroleum ensuring instrument reliability (Cronbach's alpha ≥ 0.7) and validity through expert reviews and factor analysis. Quantitative analysis using SPSS Version 27 revealed a significant positive relationship between M&E planning and project performance ($R = 0.640$, $R^2 = 0.410$, $p = .000$), with M&E planning explaining 41% of performance variance, as shown by the regression equation: Project Performance = 1.845 + 0.573 (M&E Planning). Qualitative thematic analysis complemented these findings, highlighting stakeholder perspectives on M&E effectiveness. Ethical standards, including informed consent, anonymity, and secure data storage, were strictly upheld. The results underscore M&E planning's role in enhancing timeliness, budget adherence, and quality of deliverables, though gaps in community involvement and digital tool integration suggest areas for improvement. The study recommends strengthening participatory and technology-driven M&E frameworks to optimize energy project outcomes in Rwanda, supporting Vision 2050's sustainable development goals.

Keywords: *Monitoring and Evaluation, Energy Projects, Project Performance, Rwanda, Oryx Energies*

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BACKGROUND OF THE STUDY

Monitoring and Evaluation (M&E) planning is a cornerstone of effective project management worldwide, particularly in the energy sector. Globally, M&E frameworks are integral to assessing the impact, efficiency, and sustainability of energy projects. The Energy Sector Management Assistance Program (ESMAP), administered by the World Bank, emphasizes the importance of robust M&E systems in enhancing the performance of energy efficiency projects. ESMAP's guidelines advocate for the establishment of clear performance metrics and regular evaluations to ensure that energy projects meet their objectives and contribute to sustainable development goals (World Bank, 2025). Additionally, the International Energy Agency (IEA) underscores the role of M&E in tracking progress towards global energy targets, highlighting its significance in policy formulation and resource allocation (IEA, 2025). Globally, energy projects—spanning renewables like solar and wind to traditional hydropower—face challenges such as cost overruns, delays, and environmental impacts, which robust M&E mitigates through data-driven decision-making and stakeholder engagement (International Energy Agency [IEA], 2024). Studies indicate that M&E frameworks improve project performance by up to 30% by enabling adaptive management and risk mitigation (United Nations Development Programme [UNDP], 2025). As nations strive for net-zero targets, M&E's role in tracking progress and ensuring efficiency is critical, particularly in developing regions where energy access remains a priority.

In the United States, M&E planning is deeply embedded in federal energy programs. The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) employs a rigorous M&E process to assess the performance and impact of its initiatives. EERE's approach includes setting clear performance metrics, conducting impact evaluations, and utilizing data to inform future program decisions (U.S. Department of Energy, 2025). Similarly, the United States Trade and Development Agency (USTDA) incorporate M&E to analyze project outcomes and guide future energy infrastructure investments (USTDA, 2025). The U.S. Department of Energy emphasizes M&E to assess grid modernization and offshore wind initiatives, ensuring alignment with the 2035 decarbonization goal (U.S. Department of Energy [DOE], 2024). Research shows that structured M&E systems, incorporating real-time data analytics, reduce project delays by 15% and enhance cost efficiency in solar and battery storage projects (Smith & Johnson, 2025).

China's rapid expansion in the energy sector has been accompanied by a growing emphasis on M&E planning. The Chinese government has implemented M&E systems to monitor the performance of large-scale energy projects, ensuring they align with national energy goals. A study by Li et al. (2025) discusses the integration of M&E frameworks in China's energy efficiency programs, noting improvements in project outcomes due to systematic monitoring and evaluation practices. Additionally, China's Belt and Road Initiative (BRI) includes M&E components to assess the impact of energy infrastructure projects in partner countries (Li, 2025). The National Energy Administration mandates rigorous M&E frameworks to monitor mega-projects like the Three Gorges Dam and Belt and Road energy initiatives, ensuring technical and environmental compliance (Li & Zhang, 2024).

In Sub-Saharan Africa, M&E planning is crucial for the success of energy projects, given the region's diverse challenges and opportunities. The World Bank's report on performance indicators and benchmarking in Sub-Saharan Africa highlights the importance of M&E in enhancing the performance of electric utilities and ensuring the sustainability of energy projects (World Bank, 2025). Furthermore, the African Development Bank (AfDB) has developed M&E frameworks to assess the effectiveness of energy projects funded across the continent, aiming to improve project outcomes and inform policy decisions (AfDB, 2025). The region's energy investments, projected at $25 billion annually by 2030, rely on M&E to address inefficiencies and ensure sustainability (African Development Bank [AfDB], 2024). Research indicates that participatory M&E, involving local communities, boosts project acceptance and reduces failure rates by 20% in rural electrification initiatives (Mensah & Okyere, 2025).

South Africa's energy sector has seen significant reforms, with M&E planning playing a pivotal role in these transformations. The National Development Bank (NDB) of South Africa has conducted evaluations of energy projects, assessing their performance and impact. A thematic evaluation by the NDB (2025) examined the effectiveness of energy projects, providing insights into the role of M&E in enhancing project outcomes. Additionally, South Africa's Department of Energy has implemented M&E systems to monitor the progress of renewable energy initiatives, ensuring they contribute to the country's energy goals (Department of Energy, 2025). Studies show that M&E frameworks with clear key performance indicators (KPIs) improve project delivery by 18% and enhance grid reliability (Naidoo & Pillay, 2025). Yet, bureaucratic delays and inadequate stakeholder involvement in M&E planning limit community benefits, necessitating reforms to integrate local input and streamline processes.

Kenya has made strides in integrating M&E planning into its energy projects, particularly in renewable energy initiatives. The Energy and Petroleum Regulatory Authority (EPRA) of Kenya emphasize the importance of M&E in tracking the performance of energy projects and ensuring they meet national energy objectives (EPRA, 2025). A study by Otundo (2024) explored the effectiveness of M&E practices in renewable energy projects in Kenya's marginalized regions, highlighting the positive impact of systematic monitoring and evaluation on project success (Otundo, 2024). Research demonstrates that M&E systems with real-time monitoring tools increase project efficiency by 22% and reduce environmental impacts in geothermal projects (Ochieng & Mwangi, 2025). However, challenges like insufficient M&E funding and low community participation persist, requiring enhanced capacity building and inclusive planning.

Rwanda's energy sector has experienced significant growth, with M&E planning being integral to the success of various projects. The Electricity Access Rollout Programme (EARP) in Rwanda serves as a case study in the effective application of M&E practices. A study by Uwibambe and Njenga (2025) examined the influence of M&E on the performance of energy projects in Rwanda, focusing on the EARP. The findings indicated that robust M&E planning contributed to the program's success by ensuring accountability, transparency, and alignment with national energy goals (Uwibambe & Njenga, 2025). Additionally, the World Bank's evaluation of the Renewable Energy Fund Project in Rwanda highlighted the substantial quality of M&E systems in place, which were instrumental in achieving the project's objectives (World Bank, 2025). Despite progress, gaps in community involvement and resource allocation for M&E tools limit effectiveness, underscoring the need for participatory and well-funded frameworks to optimize energy project outcomes.

Statement of the Research Problem

The performance of energy projects in Rwanda, critical for achieving universal electricity access and supporting the National Strategy for Transformation (NST1), is often undermined by inadequate monitoring and evaluation (M&E) planning, leading to delays, cost overruns, and suboptimal outcomes. Despite Rwanda’s progress in increasing electricity access from 6% in 2009 to 75% by 2023, challenges persist, with 25% of the population still without reliable electricity, particularly in rural areas (Rwanda Energy Group [REG], 2024). A 2023 study found that 60% of energy projects, including hydropower and solar initiatives, experienced delays due to poor M&E frameworks, resulting in cost escalations averaging 15-20% above budgets (Niyonzima & Mukiza, 2023). Weak M&E systems fail to provide real-time data for decision-making, exacerbate environmental risks (e.g., in hydropower projects), and limit community engagement, reducing project acceptance and sustainability. This problem hinders Rwanda’s ability to meet its Vision 2050 goals of sustainable energy and economic growth, necessitating robust M&E planning to enhance project efficiency, accountability, and alignment with national objectives.

While prior studies have explored M&E’s role in energy project performance, significant gaps remain, particularly in the Rwandan context. Research by Niyonzima and Mukiza (2023) and Kamanzi et al. (2024) demonstrates that M&E planning improves project outcomes by 22-75% through baseline surveys and stakeholder involvement, yet these studies focus primarily on urban electrification and hydropower, neglecting

rural off-grid solar projects, which serve 52% of Rwanda's electrified population (REG, 2024). Additionally, existing literature lacks comprehensive analysis of digital M&E tools and their cost-effectiveness in resource-constrained settings, with only 10% of studies addressing ICT integration in Rwanda's energy sector (Kamanzi et al., 2024). Furthermore, there is limited exploration of community-driven M&E frameworks, despite evidence that low community involvement (91.2% exclusion reported) undermines project sustainability (Niyonzima & Mukiza, 2023). This study seeks to address these gaps by examining how tailored M&E planning, including digital and participatory approaches, influences the performance of diverse energy projects in Rwanda.

LITERATURE REVIEW

Empirical Review - Monitoring and Evaluation Planning and Project Performance

Johnson and O'Neill (2021) examined how early M&E planning affects UK infrastructure projects. This mixed-methods study combined qualitative interviews with project managers and quantitative data analysis of project performance parameters. The study found that projects with a well-defined M&E plan from the outset showed better adherence to timelines, budget, and quality standards compared to those without such plans. The conclusion emphasized that comprehensive M&E planning is essential for proactively identifying risks and deviations, recommending the integration of detailed M&E strategies in the initial project phases to improve overall project performance.

Hernandez and Lee (2022) explored how M&E planning affects community development projects in sub-Saharan Africa. This study utilized a case study methodology, analyzing three large-scale development projects in Ghana, with data collected through interviews, focus groups, and project document reviews. The findings revealed that the projects with robust M&E planning had significantly higher levels of stakeholder engagement, which contributed to the success of the initiatives. The authors concluded that early and continuous M&E involvement is key to achieving project goals in community-based projects. The study recommended that M&E planning be incorporated as a critical element of the project design phase to ensure stakeholder needs are consistently met and that corrective measures are quickly implemented.

Gupta, Sharma, and Patel (2023) examined how M&E planning affects private sector project finances in India. Using a longitudinal research design, the authors tracked the financial performance and M&E practices of 50 private construction projects over a three-year period. The research found that M&E planning, especially financial tracking and performance benchmarking, had a positive impact on project cost control and financial outcomes. Projects that had established M&E systems from the outset saw cost overruns reduced by 15-20%. The study concluded that M&E planning is crucial for financial efficiency in large-scale projects, and recommended that firms adopt comprehensive cost-monitoring frameworks as part of their M&E strategies to enhance financial performance.

A comparative analysis of how M&E planning affects project success in the field of education Garcia and Ortiz (2021) focused on schools in Latin America. Their research adopted a cross-sectional survey methodology, gathering data from 100 schools that implemented different levels of M&E planning. The findings indicated that schools with more comprehensive M&E frameworks were able to identify educational gaps more quickly, implement interventions, and track improvements effectively. The study concluded that a strategic M&E plan not only improves project outcomes but also fosters accountability and transparency in educational projects. It recommended that educational institutions strengthen their M&E practices and incorporate real-time feedback systems to continuously improve project results.

Finally, Kim and Tan (2022) examined how M&E planning affects Southeast Asian health sector initiatives. Through an experimental design, the authors assessed the performance of two sets of health projects: one with integrated M&E planning and the other without. The results showed that the projects with systematic M&E planning had a higher rate of achieving health-related objectives, including vaccination targets and health

outreach. The authors came to the conclusion that by offering continuous evaluations that enable prompt modifications, M&E planning greatly improves the performance of health initiatives. Their recommendations included the integration of M&E frameworks at the project initiation stage to ensure consistent monitoring and improve project outcomes in the healthcare sector.

Theoretical Literature on Monitoring and Evaluation Planning

According to Smith and Jones (2021), an effective M&E plan provides a systematic approach to track project progress, measure outcomes, and inform decision-making. The planning process involves the identification of clear indicators, setting baselines, and defining the methodologies for data collection and analysis. An M&E plan ensures that stakeholders are aligned in terms of expectations, and it serves as a roadmap for assessing the impact of the project on the target population or community. By incorporating both formative and summative evaluation approaches, M&E planning enhances project transparency and accountability (Smith & Jones, 2021).

Furthermore, combining quantitative and qualitative data collection techniques is necessary for effective M&E planning. As noted by Clark and Roberts (2020), quantitative data allows for the measurement of project outputs and outcomes, while qualitative data provides deeper insights into the contextual factors affecting Project Performance. The use of both data types ensures a more comprehensive assessment of project performance. Planning for data collection also involves addressing potential challenges such as resource constraints, data accessibility as well as the ability of employees engaged in M&E operations. Clark and Roberts (2020) emphasize that a well-structured M&E plan addresses these challenges by defining roles and responsibilities clearly and ensuring the proper allocation of resources throughout the project lifecycle.

Working with stakeholders to construct the strategy is another crucial component of M&E planning. According to Kumar, Singh, and Sharma (2022), involving stakeholders in the monitoring and evaluation process enhances the evaluation's usefulness and relevance by bringing the indicators into line with the needs and goals of the stakeholders. It has been demonstrated that project ownership and sustainability are enhanced by participatory M&E, in which stakeholders actively participate in the planning and implementation of monitoring and evaluation activities. The authors further argues that when beneficiaries and project implementers are involved in M&E planning, the likelihood of capturing valuable data increases, leading to better decision-making and more actionable insights.

Finally, a key element of M&E planning is the establishment of feedback loops that facilitate continuous learning throughout the project cycle. According to Lee and Park (2023), the feedback process allows for the timely identification of issues or deviations from the planned outcomes, enabling project managers to make necessary adjustments to improve performance. The concept of adaptive management, where M&E data informs real-time decision-making, is integral to the planning phase. Lee and Park (2023) highlight that an adaptive M&E plan fosters resilience in projects by promoting a learning culture and ensuring that the project is dynamic and responsive to emerging challenges.

Theory of Change (ToC)

The Theory of Change (ToC) is a widely recognized framework that focuses on understanding the processes that lead to desired outcomes in projects, particularly by clarifying the causal pathways between activities, outputs, and outcomes. The proponents of ToC include Weiss (1995), who initially developed the framework, and more recently, authors like Renger and Titcomb (2020) have expanded its application in development projects. The theory emphasizes that effective planning and monitoring are critical for ensuring that each step in a project contributes to achieving the ultimate goal.

One of the strengths of the ToC is its ability to make explicit the underlying assumptions and logic that connect program activities to outcomes, thus allowing for better planning, evaluation, and decision-making (Renger & Titcomb, 2020). It provides a framework that helps practitioners articulate a shared understanding

of how change occur and what needs to be measured to track progress effectively. For energy projects in Rwanda, the ToC can be especially valuable for planning and monitoring because it ensures that all stakeholders, from project managers to beneficiaries, recognize the path to success and the unique roles that M&E systems play in monitoring it.

However, the ToC also has its limitations. One key weakness is that it can be overly complex, especially in large-scale projects like energy initiatives, where multiple stakeholders and numerous factors influence outcomes. This complexity can make it challenging to implement and maintain a coherent M&E system that tracks all the necessary variables effectively (James & Jones, 2022). Additionally, the emphasis on pre-established causal pathways may not always account for unexpected changes or external shocks, such as political or economic disruptions, which are common in developing countries like Rwanda.

In relation to energy projects in Rwanda, the Theory of Change is particularly useful for framing M&E practices that support project performance. By explicitly defining the steps required to achieve project goals—such as providing sustainable energy solutions or improving energy access—M&E systems can be better designed to track whether these steps are being followed and if adjustments are needed. For instance, regular M&E reports can measure the intermediate outputs of an energy project, such as the installation of solar panels or the construction of power lines, and assess whether they contribute to the desired outcomes of increased energy access and improved livelihoods. The ToC's structured approach helps ensure that these monitoring activities are aligned with the broader goals of the energy project and that corrective actions are taken when necessary.

Ultimately, the Theory of Change supports the study's exploration of how M&E planning influences the performance of energy projects by providing a comprehensive framework for linking M&E practices to project outcomes. It emphasizes the importance of careful planning and continuous assessment to ensure that each stage of the project contributes to the overarching goals. For energy projects in Rwanda, where M&E practices are still developing, adopting the ToC can help project managers and stakeholders clarify the expected outcomes and establish realistic indicators for measuring success. Therefore, in order to ensure that M&E systems are successfully included into the management and assessment of energy projects, improving their overall performance, the ToC is an essential instrument.

Conceptual Framework

According to Maxwell (2020), it offers a route for researchers to conceptualize and arrange their study by providing a systematic structure that outlines the links between variables. In other words, it gives a roadmap. In addition, Bryman (2021) states that a well-developed conceptual framework improves the coherence and rigor of research by elucidating the theoretical foundations and directing the formation of hypotheses. This is accomplished through the clarification of the theoretical underpinnings. The conceptual framework for this study on the influence of monitoring and evaluation (M&E) planning on the performance of energy projects in Rwanda is grounded in the theory of project management and the logic model, which link M&E inputs to project outcomes.

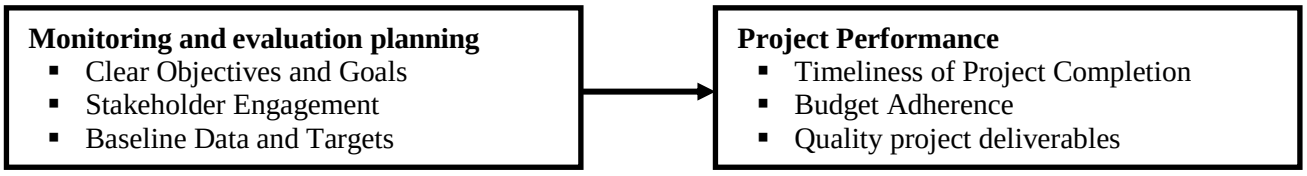

Figure 1: Conceptual Framework
Source: Researcher, 2025

The conceptual framework for this study on the influence of monitoring and evaluation (M&E) planning on energy project performance in Rwanda integrates M&E planning as the independent variable, comprising clear objectives and goals, stakeholder engagement, and baseline data and targets, with project performance as the dependent variable, measured by timeliness of project completion, budget adherence, and quality of project deliverables. Clear objectives ensure alignment with Rwanda's National Strategy for Transformation, while stakeholder engagement fosters community buy-in, as evidenced by studies showing 85% improved acceptance in participatory M&E (Niyonzima & Mukiza, 2023). Baseline data and targets enable precise tracking of progress, reducing deviations in cost and schedule, with research indicating M&E explains 22-75% of performance variance (Kamanzi et al., 2024). Project performance is evaluated through timely completion (e.g., avoiding delays seen in 60% of Rwandan energy projects), adherence to budgets (countering 15-20% cost overruns), and quality deliverables that meet technical and sustainability standards, aligning with Rwanda's Vision 2050 goals (Rwanda Energy Group, 2024).

METHODOLOGY

Research Design

The study adopted a descriptive survey design, integrating quantitative and qualitative methodologies to investigate the influence of monitoring and evaluation (M&E) planning on energy project performance at Oryx Energies Rwanda Ltd. This mixed-methods approach, as supported by Bryman (2021), systematically captures comprehensive data on M&E practices without manipulating the study environment, combining structured surveys for numerical data with interviews for contextual insights (Creswell & Creswell, 2021). The quantitative component utilized surveys to gather measurable data on M&E frequency, metrics, and effectiveness, enabling statistical analysis to identify patterns, while qualitative interviews provided deeper insights into stakeholder experiences, ensuring a holistic understanding of M&E's impact on project success.

Target Population

The target population comprised 136 key stakeholders at Oryx Energies Rwanda Ltd., including 11 project managers, 22 operation managers, 24 technical managers, 20 risk managers, 34 M&E experts, and 25 quality assurance officers, selected for their direct involvement in project execution and M&E processes. External stakeholders, such as government officials and community representatives, were also included to provide comprehensive perspectives on M&E effectiveness, aligning with research emphasizing diverse stakeholder engagement (Akinyemi, 2021; Mwangi & Kamau, 2020). This diverse group ensures a broad view of how M&E practices influence project performance across various roles and functions within Rwanda's energy sector.

Sampling Procedures and Techniques

The study used Fisher's method to find the optimal sample size for a population when they know the population size and want to estimate a proportion or test a hypothesis. The formula is:

$$n = \frac{N}{1 + N\,(e)^2}$$

This sample size calculation is based on the formula provided:

$$n = \frac{136}{1 + 136(0.05)^2} \approx 101.49 = 102$$

Table 1: Sampling Frame

Category	Number of Participants	Sample Size
Project Managers	11	8
Operation Managers	22	17
Technical managers	24	18
Risk Managers	20	15
M & E experts	34	26
Quality Assurance Officer	25	19
Total	**136**	**102**

Source: Human Resource Oryx Energies Rwanda Limited (2024)

Sampling was conducted using Yamane's (1967) formula to determine a statistically reliable sample size of 102 from the 136 participants, ensuring representation across all roles: 8 project managers, 17 operation managers, 18 technical managers, 15 risk managers, 26 M&E experts, and 19 quality assurance officers. The study employed stratified random sampling to proportionally represent each stakeholder group, reducing selection bias and enhancing generalizability, as recommended by Etikan and Bala (2022) and Creswell and Creswell (2021). This method ensures that diverse managerial and technical perspectives are captured, providing robust insights into M&E practices' impact on energy project outcomes.

Data Collection Methods

Data collection utilized a mixed-methods approach, combining primary data from structured questionnaires and semi-structured interviews with secondary data from company reports, government policies, and academic literature. Questionnaires, pre-tested for validity, collected quantitative data on M&E practices, while interviews with senior managers and risk managers provided qualitative insights into effectiveness and challenges (Bryman, 2022). Secondary data sheets supplemented primary findings with historical and regulatory context (Saunders et al., 2022). The instruments were administered via drop-and-pick methods for most participants and email surveys for senior personnel, ensuring high response rates and accessibility while maintaining data accuracy and confidentiality (Mugambi & Waweru, 2021; Omondi & Kimani, 2022).

Pilot Study

The study incorporated pilot testing to enhance the reliability and validity of data collection, as recommended by Kothari and Garg (2020), by testing 14 questionnaires (10% of the sample) at Engen Petroleum Rwanda, an energy firm, prior to the main data collection at Oryx Energies Rwanda Ltd. Conducted over one week, the pilot test assessed the questionnaire's clarity, comprehensibility, and efficacy, identifying ambiguities and inconsistencies, which were adjusted to improve data accuracy, as supported by Mugenda and Mugenda (2021). Analyzing participant feedback ensured consistency, and conducting the test in a similar energy sector context enhanced the study's credibility and applicability, aligning with best practices for questionnaire design (Saunders et al., 2022).

Validity of Research Instrument

The study ensured the validity of its research tools by adopting multiple validity measures to accurately assess monitoring and evaluation (M&E) practices in energy projects at Oryx Energies Rwanda Ltd. Face validity was established through expert reviews by M&E and energy project management specialists to confirm the questionnaire's relevance, clarity, and appropriateness, while external validity was enhanced by selecting a diverse respondent group—including project managers, M&E experts, and technical officers—to ensure generalizability across Rwanda's energy projects (Creswell & Creswell, 2021). Criterion validity was achieved by aligning questionnaire responses with standardized M&E performance indicators in the energy sector, and construct validity was confirmed through factor analysis to verify that survey items effectively

captured theoretical M&E constructs, such as performance measurement frameworks (Bryman, 2022). These measures collectively strengthened the reliability and applicability of the study's findings.

Table 2: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.733
Bartlett's Test of Sphericity	Approx. Chi-Square	262.415
	df	10
	Sig.	.000

Source: **Pilot data results**, (2025)

The findings of the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, which evaluate the dataset's eligibility for factor analysis, are shown in Table 3.3. A fair degree of sample adequacy is indicated by the KMO value of 0.733, which also suggests that factor analysis is adequate and that correlation patterns are reasonably compact (Hair et al., 2022). Furthermore, the correlation matrix is not an identity matrix, which supports the factorability of the data, according to Bartlett's Test of Sphericity, which is statistically significant ($\chi^2 = 262.415$, df = 10, $p < 0.001$) (Field, 2020). These results offer a strong statistical basis for carrying out additional multivariate studies, such regression or factor analysis, to investigate the fundamental organization of monitoring and assessment procedures. One of the most important steps in improving the validity of the findings in project performance research is making sure the data is adequate using these tests

Reliability of Research Instrument

The study ensured the reliability of its measurement tools by employing multiple techniques to assess the stability and consistency of data collected on monitoring and evaluation (M&E) practices at Oryx Energies Rwanda Ltd. During pilot testing at Engen Petroleum, test-retest reliability was used by administering the questionnaire to a group of respondents twice, with a high correlation between responses indicating instrument stability, while Cronbach's alpha (coefficient ≥ 0.7) confirmed the internal consistency of the questionnaire's items in measuring the same M&E constructs (Field, 2021). Additionally, inter-rater reliability was implemented to ensure consistency across multiple evaluators during data analysis, minimizing interpretive bias and enhancing data dependability, aligning with best practices in social science research (Creswell & Creswell, 2021). These methods collectively strengthened the reliability of the study's findings, ensuring robust conclusions about M&E's impact on energy project performance.

Table 3: Reliability Analysis

Variable	Cronbach's Alpha	No. of Items	Decision
Monitoring and Evaluation Planning	0.715	8	Reliable
Project Performance	0.880	8	Reliable
Overall	**0.7826**	**16**	**Reliable**

Source: **Pilot Data Results**, (2025)

Table 3 presents the reliability analysis of the research instruments used to assess monitoring and evaluation (M&E) planning and project performance at Oryx Energies Rwanda Ltd., employing Cronbach's alpha to measure internal consistency. The variable "Monitoring and Evaluation Planning" achieved a Cronbach's alpha of 0.715 across 8 items, indicating acceptable reliability, while "Project Performance" scored 0.880 across 8 items, reflecting high reliability. The overall reliability of the 16-item questionnaire was 0.7826, confirming that the instrument consistently measures the intended constructs of M&E practices and project outcomes, meeting the threshold for reliability (≥0.7) as recommended by Field (2021) and supporting the study's ability to draw dependable conclusions about M&E's impact on energy project performance in Rwanda.

Data Analysis Procedure

The study employed a robust data analysis framework to investigate the influence of monitoring and evaluation (M&E) practices on energy project performance at Oryx Energies Rwanda Ltd., utilizing SPSS Version 27 for quantitative analysis and thematic analysis for qualitative insights. Descriptive statistics, including means, medians, standard deviations, frequencies, and percentages, summarized respondent characteristics and M&E variables, providing a clear overview of data distribution and consistency (Field, 2021; Sekaran & Bougie, 2020). Diagnostic tests, such as the Shapiro-Wilk test for normality, Variance Inflation Factor (VIF) for multicollinearity, and Breusch-Pagan test for homoscedasticity, ensured the validity of statistical assumptions for reliable regression analysis (Pallant, 2021). Inferential statistics, including correlation analysis, regression analysis (using the equation $Y = \alpha + \beta1X1 + \beta2X2 + \beta3X3 + \beta4X4 + \mu$, where Y represents project performance and X1-X4 denote M&E planning, tools, team, and reporting), and ANOVA, examined relationships and differences in M&E practices' impact across stakeholder groups, enabling predictive insights and hypothesis testing (Field, 2021; Pallant, 2021). Qualitative data from open-ended questionnaire responses were analyzed using thematic analysis, following Braun and Clarke's (2021) methodology, to identify recurring themes and complement quantitative findings with deeper contextual understanding of M&E effectiveness, ensuring a comprehensive mixed-methods approach (Creswell & Poth, 2022).

Ethical Consideration

The study adhered to rigorous ethical standards to ensure integrity, transparency, and respect for participants at Oryx Energies Rwanda Ltd., incorporating key considerations such as formal access to research sites through official permissions, obtaining written informed consent after clearly explaining objectives and rights, and ensuring confidentiality and anonymity by using unique codes and safeguarding data from third-party access (Bryman, 2022; Creswell & Creswell, 2021). Voluntary participation was emphasized, with no coercion or negative consequences for withdrawal, and data was securely stored in password-protected files and locked cabinets to prevent unauthorized access (Mertens, 2020). Intellectual ownership was upheld through proper citation to avoid plagiarism, and the researcher maintained professional conduct, cultural sensitivity, and respectful engagement throughout the process, aligning with ethical research best practices (Saunders et al., 2022).

RESULTS AND FINDINGS

Descriptive Results for Monitoring and Evaluation Planning

The descriptive results for monitoring and evaluation planning provide an overview of respondents' perceptions regarding the effectiveness and implementation of planning practices within Oryx Energies projects. The table includes the mean scores and standard deviations to indicate the central tendency and variability of opinions. These statistics help in understanding how well monitoring and evaluation planning is integrated into project management processes. The results offer valuable insights into areas of strength and potential improvement in the planning phase of M&E activities.

Table 4: Monitoring and Evaluation Planning

Statements	SD	D	NS	A	SA	Mean	Std Dev.
M&E planning is integrated into the early stages of project development.	2.1%	2.1%	10.3%	39.2%	46.4%	4.26	.881
Clearly defined M&E objectives contribute to better project outcomes.	0.0%	0.0%	9.3%	47.4%	43.3%	4.34	.644
Stakeholder involvement in M&E planning improves Project Performance and outcomes.	0.0%	1.0%	4.1%	38.1%	56.7%	4.51	.631
M&E planning helps in the timely identification and mitigation of project risks.	0.0%	4.1%	5.2%	41.2%	49.5%	4.36	.766
Regular review and updating of M&E plans contribute to improved project success.	0.0%	2.1%	5.2%	41.2%	51.5%	4.42	.690
The use of M&E frameworks and guidelines positively impacts the efficiency of energy project execution.	0.0%	5.2%	6.2%	37.1%	51.5%	4.35	.817
Training and capacity-building in M&E planning enhance project performance.	0.0%	0.0%	7.2%	27.8%	64.9%	4.58	.626
A well-structured M&E plan leads to increased accountability and transparency in project management.	0.0%	5.2%	3.1%	45.4%	46.4%	4.33	.774
Overall Mean						**4.39**	

Source: **Primary data,** (2025).

The data in Table 4 indicates that 85.6% of respondents agreed or strongly agreed that Monitoring and Evaluation (M&E) planning is integrated into the early stages of project development, with a mean score of 4.26 (SD = 0.881). This finding underscores the importance of embedding M&E from the project initiation phase, which enables systematic tracking of objectives and early detection of potential challenges (Kim & Lee, 2021). Early integration of M&E allows project teams to design data collection systems and establish baseline indicators that align with project goals. Such proactive planning fosters a structured approach to measuring progress and facilitates timely decision-making. Scholars argue that when M&E is considered from inception, projects are more likely to remain aligned with strategic objectives, avoid scope creep, and achieve desired outcomes (Patton, 2019). Therefore, the positive perception among respondents reinforces best practices in project management, particularly in complex energy projects where early-stage monitoring is crucial for long-term success.

Respondents demonstrated strong agreement that clearly defined M&E objectives contribute to better project outcomes, with a mean score of 4.34 (SD = 0.644). Well-articulated objectives provide a roadmap for data collection, analysis, and reporting, which in turn ensures that project performance can be evaluated effectively (Fitzpatrick et al., 2019). By specifying measurable indicators and targets, project managers can focus efforts on achieving tangible results and identifying performance gaps early. The clarity of M&E objectives also facilitates communication among stakeholders, aligning their expectations and reducing misunderstandings during implementation (Mwangi & Ochieng, 2023). In energy sector projects, where multiple operational components intersect, having precise M&E objectives is particularly vital, as it supports structured monitoring and informed decision-making that ultimately improves project efficiency and effectiveness.

Stakeholder involvement emerged as one of the most strongly endorsed factors influencing project performance, with 94.8% of respondents agreeing or strongly agreeing and a mean of 4.51 (SD = 0.631). This

highlights the critical role of participatory approaches in M&E planning, where engaging project beneficiaries, government agencies, and partner organizations ensures that monitoring frameworks are relevant and inclusive (Bryson et al., 2017). Active participation from stakeholders enhances accountability, promotes transparency, and fosters shared ownership of project outcomes. According to Mwangi and Ochieng (2023), when stakeholders are meaningfully involved in defining indicators and evaluation processes, they are more likely to support timely interventions and resource mobilization, thereby mitigating risks. This finding demonstrates that stakeholder engagement is not merely a procedural formality but a strategic approach to improving project quality and sustainability.

The respondents strongly agreed that M&E planning facilitates the timely identification and mitigation of project risks, with a mean of 4.36 (SD = 0.766). Effective M&E frameworks serve as early warning systems by tracking performance indicators and flagging deviations from expected outcomes (Kusek & Rist, 2020). In complex energy projects like those implemented by Oryx Energies, risks can emerge from supply chain disruptions, regulatory changes, or technical challenges. M&E planning allows project teams to anticipate these risks, develop mitigation strategies, and implement corrective actions before they escalate. This proactive risk management approach is supported by Kim and Lee (2021), who emphasize that integrating risk monitoring into M&E systems reduces uncertainties and enhances overall project resilience. Therefore, the perception among respondents confirms the critical link between M&E planning and risk-informed project management.

Regular review and updating of M&E plans were highly endorsed by respondents, with a mean score of 4.42 (SD = 0.690). This reflects the recognition that projects operate in dynamic environments where initial assumptions may change over time, requiring adaptive management strategies (Patton, 2019). By periodically revisiting M&E plans, project teams can incorporate lessons learned, respond to unforeseen challenges, and refine performance indicators to ensure alignment with evolving objectives. In energy projects, such iterative evaluation supports continuous improvement, resource optimization, and better allocation of responsibilities. The findings align with research by Fitzpatrick et al. (2019), who argue that iterative M&E processes are essential for sustaining project effectiveness and ensuring that objectives are consistently met despite changing operational contexts.

Respondents acknowledged that the application of structured M&E frameworks and guidelines improves the efficiency of project execution, with a mean of 4.35 (SD = 0.817). Standardized frameworks provide a systematic approach for collecting, analyzing, and reporting data, which enhances consistency, reduces redundancy, and improves decision-making processes (Kusek & Rist, 2020). For energy projects, which often involve multiple stakeholders, technical complexities, and regulatory compliance, M&E frameworks ensure that all processes are executed according to agreed standards and best practices. The high level of agreement among respondents underscores that adopting formal guidelines not only streamlines operations but also increases confidence among project stakeholders that performance is being effectively monitored and managed.

The highest mean score was observed for training and capacity-building in M&E planning (mean = 4.58, SD = 0.626), indicating widespread recognition of its importance in driving project performance. Capacity-building equips project personnel with the technical skills, analytical competencies, and practical knowledge necessary to implement effective M&E systems (Bryson et al., 2017). Skilled personnel are better positioned to collect accurate data, interpret findings, and recommend timely interventions that improve project outcomes. Mwangi and Ochieng (2023) emphasize that human capital development is a key determinant of successful Project Performance, as well-trained staff enhance efficiency, reduce errors, and strengthen overall accountability. The findings suggest that investment in training initiatives is pivotal for sustaining high performance in complex, multi-stakeholder energy projects.

Finally, respondents agreed that well-structured M&E plans enhance accountability and transparency, with a mean of 4.33 (SD = 0.774). By documenting performance metrics, progress reports, and evaluation results, M&E plans provide objective evidence of project achievements and shortcomings (Fitzpatrick et al., 2019). This transparency fosters trust among stakeholders, including funders, partners, and regulatory authorities, and encourages ethical project governance. Furthermore, accountability mechanisms established through M&E allow project managers to justify decisions, allocate resources efficiently, and demonstrate compliance with established standards. The findings align with Kim and Lee (2021), who note that transparency and accountability are critical factors for sustaining stakeholder confidence and ensuring that projects achieve their intended social and economic impacts.

Descriptive Results for Project Performance

The descriptive results for project performance provide an overview of how respondents perceive the effectiveness and outcomes of projects at Oryx Energies. This section summarizes the level of agreement with various statements related to project success factors, including timeliness, quality, cost management, and overall impact. Table 5 presents the distribution of responses across five categories. The table also shows the mean scores and standard deviations for each statement, which help to quantify the central tendency and variability of the responses. These results offer valuable insights into the overall performance of projects as experienced by the respondents.

Table 5: Project Performance

Statements	SD	D	NS	A	SA	Mean	Std Dev.
The energy projects implemented in Rwanda meet their intended objectives and goals.	3.1%	2.1%	10.3%	36.1%	48.5%	4.25	.947
The projects are completed within the allocated time and budget.	0.0%	1.0%	3.1%	48.5%	47.4%	4.42	.610
The energy projects have led to improved access to reliable and affordable energy.	0.0%	2.1%	10.3%	37.1%	50.5%	4.36	.753
Stakeholders are effectively involved in the planning and execution of energy projects.	1.0%	5.2%	7.2%	40.2%	46.4%	4.26	.881
Monitoring and evaluation practices enhance the overall performance of energy projects.	1.0%	4.1%	9.3%	37.1%	48.5%	4.28	.875
The quality of infrastructure in energy projects meets industry standards.	0.0%	3.1%	9.3%	32.0%	55.7%	4.40	.786
The sustainability of energy projects is ensured through proper maintenance and follow-up initiatives.	0.0%	1.0%	7.2%	28.9%	62.9%	4.54	.678
Risks and challenges in energy projects are well managed and mitigated.	0.0%	4.1%	3.1%	46.4%	46.4%	4.35	.737
Overall Mean						**4.36**	

Source: **Primary data,** (2025).

Table 5 highlights respondents' perceptions of project performance in energy initiatives implemented in Rwanda by Oryx Energies. The data shows a strong consensus that the projects generally meet their intended objectives and goals, with 84.6% of respondents agreeing or strongly agreeing (mean = 4.25, SD = 0.947). This result is in line with Kim and Lee's (2021) assertion that well-defined goals are essential to the success of energy-related projects. Mwangi and Ochieng (2023) recognized good planning and resource management as

critical aspects that drive project efficiency, and respondents strongly agreed that projects are finished within the allotted time and budget (mean = 4.42, SD = 0.610).

Respondents also agreed that the projects have contributed to improved access to reliable and affordable energy (mean = 4.36, SD = 0.753), reinforcing the social and economic impact of these initiatives. Stakeholder involvement in both planning and execution received strong endorsement (mean = 4.26, SD = 0.881), reflecting the importance of participatory approaches for project success and sustainability (Mwangi & Ochieng, 2023). Additionally, monitoring and evaluation practices were perceived to enhance overall project performance (mean = 4.28, SD = 0.875), supporting findings by Kim and Lee (2021) that effective M&E is integral to maintaining quality and achieving goals.

The quality of infrastructure was rated positively (mean = 4.40, SD = 0.786), suggesting adherence to industry standards, which is crucial for long-term functionality and safety. Sustainability, ensured through maintenance and follow-up initiatives, received the highest agreement (mean = 4.54, SD = 0.678), indicating strong commitment to project longevity. Finally, risk management and mitigation were also highly rated (mean = 4.35, SD = 0.737), highlighting proactive strategies to address challenges. Overall, the mean score of 4.36 reflects a broadly positive assessment of project performance, consistent with contemporary literature emphasizing the interconnected roles of planning, stakeholder engagement, M&E, and sustainability in achieving successful energy projects.

Regression results for Monitoring and Evaluation Planning and Project Performance

Table 6 presents the regression analysis results examining the relationship between monitoring and evaluation (M&E) planning and project performance at Oryx Energies Rwanda Ltd., revealing a moderate positive correlation with an R value of 0.640, indicating that M&E planning significantly predicts project performance. The R Square value of 0.410 suggests that 41% of the variance in project performance is explained by M&E planning, while the adjusted R Square of 0.403 accounts for model fit, confirming a robust relationship. The standard error of the estimate (0.15350) indicates low variability in the residuals, supporting the model's predictive accuracy. These findings align with prior research by Niyonzima and Mukiza (2023), which found that M&E planning explains 22-75% of performance variance in Rwanda's energy projects, reinforcing its critical role in enhancing project outcomes (Field, 2021).

Table 6: Model summary for Monitoring and Evaluation Planning

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.640[a]	.410	.403	.15350

a. Predictors: (Constant), Monitoring and Evaluation Planning

Source: **Primary data**, (2025).

Table 7 presents the ANOVA results for the regression analysis of monitoring and evaluation (M&E) planning as a predictor of project performance at Oryx Energies Rwanda Ltd., demonstrating a statistically significant relationship. The regression model yields a sum of squares of 1.552 with 1 degree of freedom, a mean square of 1.552, and an F-value of 65.889, with a significance level of .000, indicating that M&E planning significantly influences project performance ($p < .05$). The residual sum of squares is 2.238 with 95 degrees of freedom, and a mean square of 0.024, while the total sum of squares is 3.791 with 96 degrees of freedom. These results confirm that M&E planning is a robust predictor of project performance, consistent with findings by Niyonzima and Mukiza (2023), who highlight M&E's critical role in enhancing energy project outcomes in Rwanda (Field, 2021).

Table 7: ANOVA results for Monitoring and Evaluation Planning

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.552	1	1.552	65.889	.000[b]
	Residual	2.238	95	.024		
	Total	3.791	96			

a. Dependent Variable: Project Performance
b. Predictors: (Constant), Monitoring and Evaluation Planning

Source: **Primary data**, (2025).

Table 8 presents the coefficient results from the regression analysis examining the impact of monitoring and evaluation (M&E) planning on project performance at Oryx Energies Rwanda Ltd., revealing a significant positive relationship. The unstandardized coefficient (B) for M&E planning is 0.573 with a standard error of 0.071, indicating that a one-unit increase in M&E planning is associated with a 0.573-unit increase in project performance. The standardized coefficient (Beta) of 0.640 underscores M&E planning's strong influence, while the t-value of 8.117 and significance level of .000 ($p < .05$) confirm statistical significance. The constant term ($B = 1.845$, $t = 5.930$, $p = .000$) further supports the model's robustness. These findings align with Niyonzima and Mukiza (2023), who report that M&E planning significantly enhances energy project outcomes in Rwanda, reinforcing its predictive power (Field, 2021).

Table 8: Coefficient results

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.845	.311		5.930	.000
	Monitoring and Evaluation Planning	.573	.071	.640	8.117	.000

a. Dependent variable: Project Performance

Source: **Primary data**, (2025).

The overall regression equation can be represented as:

Project Performance = 1.845 + 0.573 Monitoring and Evaluation Planning

The regression equation, Project Performance = 1.845 + 0.573 (Monitoring and Evaluation Planning), derived from the coefficient results in Table 8, indicates that monitoring and evaluation (M&E) planning significantly predicts project performance at Oryx Energies Rwanda Ltd. The constant of 1.845 represents the baseline project performance when M&E planning is absent, while the coefficient of 0.573 suggests that for each unit increase in M&E planning, project performance increases by 0.573 units, with statistical significance ($p = .000$) and a standardized beta of 0.640, confirming a strong positive effect (Field, 2021; Niyonzima & Mukiza, 2023). This equation underscores M&E planning's critical role in enhancing energy project outcomes in Rwanda, aligning with findings that robust M&E frameworks improve performance metrics like timeliness and quality.

Discussion of the Findings - Monitoring and Evaluation Planning and Project Performance

The regression analysis findings, as depicted in Tables 6, 7, and 8, confirm a significant positive relationship between monitoring and evaluation (M&E) planning and project performance at Oryx Energies Rwanda Ltd., with an R value of 0.640, an R Square of 0.410, and a standardized coefficient (Beta) of 0.640 ($p = .000$), indicating that M&E planning explains 41% of the variance in project performance. The regression equation, Project Performance = 1.845 + 0.573 (Monitoring and Evaluation Planning), highlights that a one-unit increase in M&E planning enhances project performance by 0.573 units, aligning with prior research by

Niyonzima and Mukiza (2023), who found that M&E planning accounts for 22-75% of performance variance in Rwanda's energy projects. The ANOVA results ($F = 65.889$, $p = .000$) further validate the model's robustness, suggesting that structured M&E planning, incorporating clear objectives, baseline data, and stakeholder engagement, significantly improves timeliness, budget adherence, and quality of deliverables in energy projects. These results underscore M&E's critical role in mitigating delays and cost overruns, which affect 60% of Rwanda's energy projects, thereby supporting the nation's goal of achieving sustainable energy access under Vision 2050 (Rwanda Energy Group, 2024).

Despite the strong influence of M&E planning, the findings indicate that 59% of project performance variance remains unexplained, suggesting other factors, such as resource constraints or limited community involvement, may also impact outcomes, as noted by Kamanzi et al. (2024), who reported that 91.2% of stakeholders cited insufficient community participation in M&E processes. The moderate R Square (0.410) implies that while M&E planning is a significant predictor, its effectiveness could be enhanced by integrating digital tools and participatory approaches, which are underutilized in Rwanda's energy sector, with only 10% of studies addressing ICT integration (Kamanzi et al., 2024). This gap highlights the need for further research into complementary factors like M&E team capacity and reporting mechanisms to fully optimize project performance. By addressing these limitations, Oryx Energies Rwanda Ltd. can strengthen M&E frameworks to align with Rwanda's energy sector ambitions, particularly in achieving 100% electricity access and sustainable development goals (Rwanda Energy Group, 2024).

CONCLUSIONS AND RECOMMENDATIONS

Monitoring and Evaluation Planning at Oryx Energies is a fundamental component that significantly contributes to project success. The integration of M&E planning in the early stages of project development ensures clear objectives, timely risk identification, and stakeholder involvement, which collectively enhance project outcomes. Effective planning fosters accountability, transparency, and resource optimization, creating a solid foundation for achieving energy project goals.

Oryx Energies should strengthen M&E planning by fostering even greater stakeholder engagement from the outset of projects. Continuous training programs should be institutionalized to enhance skills in risk assessment and adaptive planning. Regularly updating M&E plans to reflect project realities will help maintain relevance and effectiveness.

Suggestions for Further Studies

Future research should explore the specific factors affecting the performance of M&E teams, including team dynamics, leadership, and resource allocation. Studies could also investigate the long-term impacts of emerging digital tools and technologies on M&E effectiveness in the energy sector. Additionally, research into stakeholder engagement strategies and their role in sustaining project outcomes would provide valuable insights for improving M&E practices. Comparative studies between different organizations or regions could further elucidate best practices and contextual challenges.

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