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Effect of Monitoring and Evaluation on Adoption of Internal Combustion Engine to Electric Retrofitting Project in Rwanda

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Abstract: *This study assessed the effect of monitoring and evaluation on the adoption of electric mobility projects in Rwanda, with specific focus on the Internal Combustion Engine (ICE) to Electric Retrofitting Project implemented by REMA in Kigali City. The target population consisted of 237 respondents, including project managers, technical officers/engineers, sales and marketing staff, electric fleet operators/drivers, and subcontractors. A sample size of 149 respondents was selected using Slovin's formula, stratified sampling, and simple random sampling. Data were collected using structured questionnaires, semi-structured interview guides, and documentary review. Quantitative data were analyzed using SPSS Version 29 through descriptive statistics, Pearson correlation, and multiple regression analysis. The findings showed that M&E Data had a positive and significant effect on adoption of electric mobility project (B = 0.253, t = 3.892, p = 0.000); M&E Tools had a positive and significant effect on adoption of electric mobility project (B = 0.373, t = 6.661, p = 0.000); M&E Design had a positive and significant effect on adoption of electric mobility project (B = 0.217, t = 3.875, p = 0.000); M&E Process had a positive and significant effect on adoption of electric mobility project (B = 0.176, t = 2.983, p = 0.003). The study concluded that monitoring and evaluation significantly contributed to adoption of electric mobility project in ICE to Electric Retrofitting Project. It recommended that responsible institutions should strengthen data accuracy, completeness, reliability and relevance across retrofitting activities while also strengthening the other significant practices identified by the study.*

Keywords: *Monitoring and Evaluation, M&E Data, M&E Tools, M&E Design, M&E Process, Adoption of Electric Mobility Project, ICE to Electric Retrofitting Project.*

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1. Introduction

The integration of systematic tracking mechanisms serves as a cornerstone for modern project management, ensuring that sustainable infrastructure goals translate into measurable outcomes. Globally, the shift toward decarbonized transport requires rigorous monitoring and evaluation to validate the efficiency of green investments and maintain stakeholder confidence. High-level data collection allows for the early detection of adoption barriers, such as technical failures or infrastructure gaps, while providing empirical evidence needed to scale successful pilots. By establishing clear performance indicators, international organizations ensure that project results remain aligned with global environmental standards and long-term sustainability mandates (International Energy Agency [IEA], 2024).

Environmental progress in Rwanda has been marked by the implementation of a comprehensive Strategic Paper on Electric Mobility that includes specific national monitoring targets. The Rwanda Utilities Regulatory Authority (RURA) tracks the registration of all electric motorcycles and cars to assess the effectiveness of current zero-rated VAT and lower electricity tariffs. Evaluations focus on the reduction of greenhouse gas emissions in Kigali as more electric vehicles replace older, polluting taxis and heavy-duty buses. These reports provide the necessary evidence to adjust policy instruments and ensure that the national goal of reducing carbon emissions is met by 2030 (Rwanda Environment Management Authority [REMA], 2023).

Rwanda's electric mobility project supportS a clean, affordable and reliable transport system by reducing dependence on internal combustion engine vehicles, lowering greenhouse gas emissions and improving sustainable urban mobility. The Government of Rwanda set a national climate ambition of reducing greenhouse gas emissions by 38% by 2030, which makes electric mobility an important part of the country's green growth agenda. In the same direction, Ministry of Infrastructure [MININFRA] (2021) emphasized the need to increase the use of electric vehicles, expand charging infrastructure and promote public awareness of electric transport benefits.

The performance of electric mobility projects remains constrained by several practical challenges that create a gap between policy ambition and actual implementation. MININFRA (2024) noted that charging infrastructure remains an important requirement for the successful expansion of electric mobility, especially as limited access to charging services can reduce user confidence and create range anxiety. Similarly, the World Bank (2025) highlighted that electric mobility development requires coordinated investment in infrastructure, financing, technical capacity and institutional support. Failure to expand charging infrastructure, financing mechanisms and technical capacity could also discourage private investors, fleet operators and transport users from adopting electric mobility (NDC Partnership, 2021).

Effective M&E should generate reliable data on project progress, charging infrastructure coverage, vehicle adoption, emissions reduction, cost efficiency, user satisfaction, maintenance performance and stakeholder participation. According to the NDC Partnership (2021), climate-related interventions require clear tracking of results, responsible institutions, budgets and expected outcomes to ensure accountability and effective implementation. However, electric mobility projects may face M&E weaknesses such as limited baseline data, fragmented reporting among public and private actors, insufficient tracking of project outcomes, and weak use of performance indicators to guide corrective action. Therefore, weak M&E may make it difficult to determine whether electric mobility and retrofitting interventions are producing the intended development and environmental results (NDC Partnership, 2021).

Empirical research specifically examined how monitoring and evaluation influenced the adoption of electric retrofitting project within the Rwandan context remained limited. While general reports on e-mobility exist, none of the studies have been conducted on Internal Combustion Engine (ICE) to Electric Retrofitting Project in Rwanda to determine how specific monitoring and evaluation practices affect success. This study bridged that gap of knowledge by examining the correlation between structured M&E systems and the actual adoption levels within this specific organizational framework.

1.1 Objectives of the Study

The general objective of this research was to assess the effect of monitoring and evaluation on the adoption of ICE to Electric Retrofitting Project in Rwanda.

1. Examine the effect of M&E Data on the adoption of ICE to Electric Retrofitting Project in Rwanda.

2. Analyze the influence of M&E Tools on the adoption of ICE to Electric Retrofitting Project in Rwanda.

3. Assess the contribution of M&E Design on the adoption of ICE to Electric Retrofitting Project in Rwanda.

4. Evaluate the effect of the M&E Process on the adoption of ICE to Electric Retrofitting Project in Rwanda.

2. Literature Review

This section provides a comprehensive review of existing literature, theoretical frameworks, and empirical studies related to monitoring and evaluation (M&E) and project adoption.

2.1 Theoretical Review

This section explores four core theories that directly underpin the research objectives: Realist Evaluation Theory, Utilization-Focused Evaluation (UFE), Theory of Change (ToC), and Results-Based Management (RBM) Theory.

2.1.1 Realist Evaluation Theory

Ray Pawson and Nick Tilley developed Realist Evaluation in 1997 as a theory-driven approach that seeks to understand the complex interactions between project interventions and their environments (Stockmann, 2022). This framework is built around the

Context-Mechanism-Outcome (CMO) configuration, which posits that an intervention only works if it triggers specific mechanisms in a favorable setting. It moves away from the simple question of what works to ask what works for whom, in what circumstances, and why. Realist evaluators view programs as theories in practice that must be tested against the choices and reasoning of the actors involved. This theory provides a sophisticated lens for identifying the underlying forces that drive social and technical change (Stockmann, 2022).

The study utilized Realist Evaluation Theory to examine the effect of M&E Data on the adoption of electric mobility projects in Rwanda. This research analyzed how the collection of specific performance metrics and contextual information provides the evidence needed to understand user behavior at ICE to Electric Retrofitting Project. By applying the CMO configuration, the study investigated the data-driven mechanisms that encourage transport operators to transition to electric vehicles. The analysis determined if the quality and depth of current data sets are sufficient to inform strategic decisions in the Gasabo District. This theoretical application clarified how evidence influences the perceived reliability of sustainable mobility among Rwandan stakeholders.

2.1.2 Utilization-Focused Evaluation (UFE)

Michael Quinn Patton established Utilization-Focused Evaluation in 1978, with the most recent comprehensive evolution released as the 5th edition in 2022. This theoretical framework operates on the fundamental principle that the value of an evaluation should be judged primarily by its actual use by intended stakeholders. It moves away from purely academic or compliance-driven assessments toward a model that prioritizes practical utility in real-world settings. The framework identifies that for an intervention to be successful; the evaluative insights must be accessible and relevant to those making strategic decisions. Organizations utilize this approach to ensure that the time and resources spent on monitoring lead to meaningful institutional changes (Patton, 2022).

The research applied Utilization-Focused Evaluation to analyze the influence of M&E Tools on the adoption of electric mobility projects in Rwanda. This study evaluated how the specific digital instruments and reporting dashboards at ICE to Electric Retrofitting Project are tailored to provide useful feedback to project managers and vehicle operators. By examining the functional relevance of these management tools, the researcher determined their contribution to the behavioral transition toward electric transport. The future analysis focused on whether the utility of these tools reduces technical uncertainty and encourages long-term stakeholder commitment to sustainable mobility. This theoretical lens facilitated an investigation into how user-centered tools drive the integration of innovation in the Gasabo District.

2.1.3 Theory of Change (ToC)

Carol Weiss pioneered the Theory of Change in 1995 as a comprehensive methodology for mapping the complex pathways through which an intervention leads to its long-term goals. This theory requires stakeholders to articulate their underlying assumptions about how and why a specific sequence of activities produced change. It functions as an architectural blueprint that identifies the necessary preconditions and milestones required to achieve the ultimate impact of a project. Evaluators use this framework to go beyond simple progress tracking and instead test the validity of the project's internal logic. This approach is widely considered the gold standard for designing robust and adaptable monitoring and evaluation systems (Mertens, 2023).

This research utilized the Theory of Change to assess the contribution of M&E Design on the adoption of electric mobility projects in Rwanda. This study analyzed how the logical framework and structural arrangement of the e-mobility initiatives at ICE to Electric Retrofitting Project influence the overall rate of technology uptake. By evaluating the pathway of change from policy incentives to actual vehicle registration, the researcher identified the design elements that most effectively encourage adoption. The study investigated whether the current project design successfully accounts for the specific barriers facing Rwandan transport operators. This theoretical application clarified how a rigorous oversight plan contributes to the sustainability of green transport solutions.

2.1.4 Results-Based Management (RBM) Theory

Results-Based Management emerged as a formalized management theory in the early 2000s, promoted by international bodies like the OECD to shift the focus of projects from inputs to measurable results. The theory posits that the success of any intervention depends on a continuous cycle of planning, implementation, and evaluative feedback. It provides a standardized process for ensuring that all organizational activities are directed toward the achievement of high-level strategic outcomes. This management philosophy emphasizes that accountability should be based on what a project actually achieves rather than just the activities it performs. RBM has become the primary framework for ensuring efficiency in large-scale infrastructure and development programs (Bester, 2023).

The study employed Results-Based Management Theory to evaluate the role of the M&E Process on the adoption of electric mobility projects in Rwanda. This research investigated how the sequential stages of the monitoring and evaluation cycle at ICE to Electric Retrofitting Project facilitate the efficient implementation and uptake of electric vehicles. By analyzing the feedback loops and reporting procedures, the study determined how the management process helps overcome operational bottlenecks in the transport sector. The future research assessed whether a disciplined focus on results rather than just activities lead to higher levels of stakeholder commitment in Kigali. This theoretical lens provided a comprehensive understanding of the process dynamics that drive sustainable transport success.

2.2 Empirical Review

2.2.1 Monitoring and Evaluation Data and Adoption of Electric Mobility Project

Nsengimana (2023) examined the factors influencing the registration and adoption of electric vehicles in Kigali City, Rwanda, with a focus on data-driven policy oversight. A mixed-methods approach was used, combining structured questionnaires from 150 early adopters with an analysis of government registration data to quantify market growth. The results showed that 60% of the variance in adoption levels could be explained by the availability of verified charging performance data. Quantitative proof indicated that the adoption rate increased by 22% following the publication of the first national electric mobility performance report. The study concluded that data serves as a critical bridge between government policy and private sector investment decisions within the local automotive industry. It was recommended that the Rwanda Utilities Regulatory Authority (RURA) establish a public-facing dashboard to share vehicle performance metrics with potential buyers.

2.2.2 Monitoring and Evaluation Tools and Adoption of Electric Mobility Project

Kim et al. (2023) analyzed the influence of digital monitoring tools on the success of smart city transport projects in Seoul, South Korea. The study employed a quasi-experimental design, comparing districts that used advanced IoT-based tracking tools with those using traditional reporting methods for oversight. The findings showed that districts using digital instruments experienced a 28% increase in the adoption of electric public transit solutions. Regression analysis confirmed that system quality was a significant predictor of tool usage, with a coefficient of 0.54 ($p < .05$). The research concluded that the sophistication of management tools directly affects the efficiency and visibility of sustainable transport transitions. It was recommended that urban planners prioritize the integration of cloud-based monitoring platforms to enhance project oversight and stakeholder trust.

Kamanzi (2023) evaluated the effectiveness of digital monitoring and evaluation tools in the adoption of electric mobility solutions by Rwandan private logistics firms. The researcher used a descriptive methodology, sampling 120 logistics managers and technicians based in the Kigali Special Economic Zone to measure tool reliability. The results indicated that firms using real-time GPS and energy monitoring tools reported a 15% lower operational cost, which directly influenced fleet expansion. Quantitative analysis showed a mean score of 4.3 on a 5-point scale regarding the perceived usefulness of these digital instruments. The study concluded that technical tools are a primary driver of private sector confidence in the e-mobility transition in Rwanda. It was recommended that Rwandan technical colleges incorporate training on specialized e-mobility monitoring software into their automotive engineering curriculum.

2.2.3 Monitoring and Evaluation Design and Adoption of Electric Mobility Project

Tan et al. (2024) investigated the conceptual design of monitoring frameworks for electric bus pilot projects in Singapore. The study utilized a focus group methodology and a review of project blueprints to determine how structural design affects long-term sustainability. The findings indicated that frameworks including multi-stakeholder feedback loops saw a 50% faster transition from pilot to full-scale adoption. Regression results showed a significant positive impact of design flexibility on the willingness of transport operators to maintain the technology ($B = 0.44$). The study concluded that a well-structured M&E design acts as a safeguard against technical and operational risks in emerging technology projects. It was recommended that the Singaporean Land Transport Authority adopt a standardized results-based design for all future green mobility tenders.

Habiyaremye (2022) examined the relationship between evaluation design and the adoption of sustainable transport policies among government institutions in Rwanda. The study used descriptive research design, collecting data from 85 policy makers and technical advisors in the Ministry of Infrastructure. The findings showed that 70% of participants believed that a well-defined M&E design was essential for justifying continued investment in electric mobility. Statistical analysis indicated that projects with clearly defined baseline indicators were 25% more likely to be scaled up to the national level. The study concluded that the structural integrity of the monitoring plan is a major determinant of policy success in Rwanda's green growth agenda. It was recommended that the Rwanda Management Institute (RMI) offer specialized training on the design of results-based monitoring frameworks.

2.2.4 Monitoring and Evaluation Process and Adoption of Electric Mobility Project

Arshad et al. (2023) evaluated the effect of the monitoring and evaluation process on project success and technology adoption in Pakistan's energy sector. The researchers utilized a structural equation modeling (SEM) approach, analyzing data from 400 project professionals to test the process lifecycle. The results indicated that the feedback loop stage of the M&E

process had the strongest influence on the successful integration of new technologies ($B = 0.52$, $p < .001$). Findings showed that projects with a continuous evaluation cycle were 38% more likely to meet their long-term adoption goals compared to those with a single review. The study concluded that a disciplined and repetitive management process is essential for navigating the uncertainties of innovation. It was recommended that the Pakistani government institutionalize a quarterly monitoring cycle for all national energy and transport projects.

Rugamba (2024) assessed the monitoring and evaluation process in Rwandan electric transport projects and its effect on institutional adoption. The study utilized a mixed-methods approach, combining 100 surveys with 10 in-depth interviews with project managers in the Gasabo District. The findings indicated that a structured quarterly review process led to a 15% improvement in the operational efficiency of electric vehicle projects. Quantitative data showed that 75% of project managers believed that the reporting phase of the M&E process was the most critical for securing stakeholder buy-in. The study concluded that the discipline of the management cycle ensures that project outcomes remain aligned with national environmental targets. It was recommended that the Rwanda Government Board (RGB) promote the adoption of standardized evaluation processes across all public-private partnerships.

3. Methodology

This chapter describes the research design, the target population, and the specific sampling techniques that were used to select representative participants for the investigation. The chapter also provides a detailed explanation of the data collection instruments. Finally, it discusses the data processing and analysis plan using statistical software, while addressing the ethical considerations and potential limitations of the research process.

3.1 Research Design

The study utilized a descriptive and correlational research design supported by both quantitative and qualitative approaches to achieve its goals. The descriptive part allowed the researcher to provide a detailed profile of the current adoption levels of electric mobility projects at REMA. The correlational part was used to measure the statistical relationship between monitoring and evaluation practices and technology adoption outcomes. Quantitative data was gathered through surveys, while qualitative insights were obtained through interviews to provide a full understanding of the project management context.

3.2 Study Population

The target population for this research consisted of 237 individuals directly involved in the ICE to Electric Retrofitting Project. This group included project managers, technical staff, sales officers, and fleet operators who work with the new electric vehicle infrastructure. By including these specific groups, the researcher ensured that the data reflects the views of both the people running the project and those using the vehicles. The distribution of the study population across different categories is presented in the table below.

3.3 Sample Size and Sampling

The study used a systematic sampling design to select a representative group from the total population of 237 employees and operators. This design used a mathematical formula to find the sample size and a strategy to ensure all departments are fairly included. The researcher followed a structured plan to reduce sampling errors and ensure that the selected participants know enough about the project to give good answers. This approach helped in collecting high-quality data that can be used to answer research questions. The sample size for this study was calculated using Slovin's Formula, which results in 149 participants. This sample was shared among the different categories using a proportional method to keep the same structure as the original population. This ensured that the voices of both managers and drivers are adequately heard in the final data.

The study used stratified sampling along with simple random sampling to select the 149 participants. The population was first split into layers (strata) based on their jobs to ensure that each group is fairly represented. Within each job layer, the researcher used a simple random choice method, such as picking names from a hat or using a computer, to find the final participants. This dual-layered approach guaranteed that the different views within the company are captured correctly and scientifically.

3.4 Data Collection Instruments

The researcher reviewed internal project reports, M&E plans, and vehicle registration logs for the period between 2021 and 2026. This process involved taking out important data on how the vehicles are performing and the specific targets used by the management team. The information found in these records was used to cross-check the answers given by participants in the questionnaires. This documentary evidence served as the factual base for describing the M&E environment of the electric mobility project.

The researcher distributed structured questionnaires to the 149 selected participants to measure their views on

M&E Data, Tools, Design, and Processes. The tool was split into sections matching the research goals and used a 5-point scale ranging from Strongly Disagree to Strongly Agree. This process was done using both paper copies and online forms to make sure as many people as possible answer. The collected answers provided the quantitative data needed for testing the research ideas through statistical analysis.

3.5 Pilot Study, Validity and Reliability

The researcher conducted a pilot study with 15 participants, representing 10% of the sample size, at Kabisa. Kabisa was used for pilot study as it is directly related to the electric mobility sector and has participants who are familiar with electric mobility operations, user experiences, technical issues and project implementation challenges. Therefore, it provides an appropriate setting for testing whether the research instruments are clear, relevant and understandable before conducting the main study. The results of the pilot study were used to correct unclear questions, improve the wording of the survey items and ensure that the language is simple and easy for all respondents to understand. This process helped to strengthen the validity and reliability of the final research tools and ensure that they produce accurate and useful results during the main study.

The researcher checked content validity by giving the survey to a panel of three academic experts and the research supervisors. These experts checked every question for its meaning and clarity, and a Content Validity Index (CVI) was found. A CVI score of 0.70 or higher was needed for the tool to be considered valid for the study. Any questions found to be confusing or not useful during this review were changed or removed before the main data collection begins.

The validity of the instrument was further confirmed using the Content Validity Index (CVI). The CVI was computed as the number of relevant items divided by the total number of items reviewed. The relevant items were 20 questionnaire statements from the variable tables, while the total items were 24, obtained by adding the 20 variable statements to the 4 demographic categories. Therefore, CVI = 20/24 = 0.833. This value was above the recommended threshold of 0.70, confirming that the instrument had acceptable content validity.

The researcher tested the consistency of the questionnaire using Cronbach's Alpha score through SPSS Version 29. A score of 0.70 or higher was required for every part of the survey to be considered reliable for the study. This test was first done on the pilot study data to find any questions that need to be changed. Ensuring high reliability guaranteed that the survey results are steady and provide a good base for testing the research ideas.

Table 1: Reliability Analysis

Variable	Cronbach's Alpha	N of Items
M&E Data	.837	4
M&E Tools	.800	4
M&E Design	.747	4
M&E Process	.756	4
Adoption of Electric Mobility Project	.853	4

The reliability results indicated that all variables had Cronbach's Alpha coefficients above 0.70. This demonstrated that the questionnaire items were internally consistent and reliable for data collection and analysis.

3.6 Data Analysis

The study analyzed data using SPSS Version 29 to produce both basic and advanced statistics. Quantitative data were used to find the link between M&E parts and technology adoption, while qualitative data gave the background. The researcher used a significance level of 0.05 to decide if the research findings are true. This full approach ensured that the results are scientifically sound and useful for managing electric car projects.

The researcher computed the Mean and Standard Deviation for every survey statement to see the current state of M&E and project adoption. An average score higher than 3.5 showed a strong positive feeling among the participants. The standard deviation was used to see if the data is homogenous (most people agree) or heterogenous (people have very different views).

Correlation analysis was used to examine the strength and direction of the relationship between monitoring and evaluation practices and adoption of the electric mobility project. The researcher applied Pearson's correlation coefficient as the study used quantitative data collected through Likert-scale questionnaire items. Pearson's correlation helped to determine whether M&E data, M&E tools, M&E design and M&E process are positively or negatively related to adoption of the project.

The correlation coefficient ranged from -1 to +1. A positive correlation meant that improvement in M&E practices is associated with increased adoption of the electric mobility project, while a negative correlation meant that improvement in M&E practices is associated with reduced adoption of the project. A coefficient close to 0 indicated a weak relationship, while a coefficient close to +1 or -1 indicated a strong relationship. The level of significance was tested at 0.05, meaning that a p-value less than 0.05 showed that the relationship between the variables is statistically significant. This analysis helped the researcher to understand whether M&E practices move together with project adoption before conducting regression analysis.

Regression analysis was used to determine the effect of monitoring and evaluation practices on adoption of the electric mobility project. The researcher used multiple linear regression as the study has more than one independent variable. The independent variables included M&E data, M&E tools, M&E design and M&E process, while the dependent variable was adoption of the electric mobility project. Regression analysis helped to show the extent to which each M&E practice contributes to project adoption when the other variables are held constant.

The regression model for the study was presented as follows:

$Y = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mathcal{E}$

In this formula, Y is the Adoption of Project,

$X_{1,2,3,}4$ variables represent M&E Data, Tools, Design, and Process.

$\beta 0$ = Constant

$\beta 1,2,3,4$ = Coefficients

ε = Error term

3.7 Ethical Considerations

The researcher obtained a letter from the university and a permission letter from ICE to Electric Retrofitting Project before entering the project sites. Every participant was asked to sign a form that explains the study and their right to stop at any time without any trouble. All collected data were kept safe on a computer with a password and was only used for school work. No names or staff ID numbers were used in the final report, so no one can tell who gave which answer. The researcher made sure no one is forced to take part in the study, and everyone joined only if they wanted to.

4. Results and Discussions

This section analyses findings on how Monitoring and Evaluation influenced adoption of the ICE to Electric Retrofitting Project in Rwanda. It presents the response rate, correlation and regression results used to test the specific hypotheses.

4.1 Response Rate

Table 2: Response Rate

Response category	Frequency	Percentage
Questionnaires distributed	149	100.0
Returned and complete questionnaires	137	91.9
Unreturned/incomplete questionnaires	12	8.1

Source: Field data, 2026

Table 2 presents the response rate for the study on ICE to Electric Retrofitting Project in Rwanda, showing that 149 questionnaires (100.0%) were distributed to the selected respondents. Returned and complete questionnaires were 137 (91.9%), which provided a strong basis for quantitative analysis as the response was sufficiently high for drawing study-specific conclusions. Unreturned or incomplete questionnaires were 12 (8.1%), showing that only a limited proportion of the expected responses could not be used in the analysis. This level of participation strengthened the reliability of the findings as the analyzed responses represented the main categories involved in ICE to Electric Retrofitting Project.

4.2 Correlation Analysis

Table 3: Correlation Matrix

		M E Data	M E Tools	M E Design	M E Process	Adoption of Electric Mobility Project
M E Data	Pearson Correlation	1	.846**	.856**	.883**	.903**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	137	137	137	137	137
M E Tools	Pearson Correlation	.846**	1	.833**	.853**	.911**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	137	137	137	137	137
M E Design	Pearson Correlation	.856**	.833**	1	.874**	.895**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	137	137	137	137	137
M E Process	Pearson Correlation	.883**	.853**	.874**	1	.904**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	137	137	137	137	137
Adoption of Electric Mobility Project	Pearson Correlation	.903**	.911**	.895**	.904**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	137	137	137	137	137

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field data, 2026

Table 3 presents correlation analysis to assess the extent to which each monitoring and evaluation variable was associated with adoption of electric mobility solutions in the ICE to Electric Retrofitting Project. The interpretation was limited to the relationships linked to the specific objectives and was guided by the 0.05 level of significance.

M&E Data had a positive relationship with Adoption of Electric Mobility Project where the Pearson correlation coefficient was 0.903 and the significance value was 0.000. Since the significance value was below 0.05, the relationship was statistically significant. This implies that improvement in M&E Data moved together with improvement in adoption of electric mobility project. The relationship therefore provided evidence that the objective linked to M&E Data was relevant in the ICE to Electric Retrofitting Project.

M&E Tools had a positive relationship with Adoption of Electric Mobility Project where the Pearson correlation coefficient was 0.911 and the significance value was 0.000. Since the significance value was below 0.05, the relationship was statistically significant. This implies that improvement in M&E Tools moved together with improvement in adoption of electric mobility project. The relationship therefore provided evidence that the objective linked to M&E Tools was relevant in the ICE to Electric Retrofitting Project.

Kim et al. (2023) and Kamanzi (2023) associate digital monitoring tools with stronger transport-project adoption through dashboards, GPS records, checklists and reporting platforms that make evidence easier to collect and use. The significant relationship in this study supports that position, showing that practical M&E tools helped the retrofitting project organise information, communicate progress and improve confidence in the adoption process.

M&E Design had a positive relationship with Adoption of Electric Mobility Project where the Pearson correlation coefficient was 0.895 and the significance value was 0.000. Since the significance value was below 0.05, the relationship was statistically significant. This implies that improvement in M&E Design moved together with improvement in adoption of electric mobility project. The relationship therefore provided evidence that the objective linked to M&E Design was relevant in the ICE to Electric Retrofitting Project.

Tan et al. (2024) and Habiyaremye (2022) emphasise that a clear evaluation design strengthens adoption by defining indicators, baselines, responsibilities and feedback channels before implementation intensifies. The positive relationship obtained in this study reflects the same pattern, as a structured M&E design gave the retrofitting project a clearer framework for tracking readiness, technical conversion results and stakeholder acceptance.

M&E Process had a positive relationship with Adoption of Electric Mobility Project where the Pearson correlation coefficient was 0.904 and the significance value was 0.000. Since the significance value was below 0.05, the relationship was statistically significant. This implies that improvement in M&E Process moved together with improvement in adoption of electric mobility project. The relationship therefore provided evidence that the objective linked to M&E Process was relevant in the ICE to Electric Retrofitting Project.

Arshad et al. (2023) and Rugamba (2024) present the M&E process as a practical cycle of data collection, verification, analysis, feedback and reporting that guides project learning. The significant correlation in this study is consistent with those findings, showing that adoption of electric mobility improved when project managers used monitoring information repeatedly to correct implementation weaknesses and support informed decisions.

Therefore, the correlation results confirmed that all independent variables had positive and statistically significant relationships with adoption of electric mobility project in the current study, which justified proceeding to regression analysis for deeper effect testing.

4.3 Regression Analysis

Regression analysis was used to determine the predictive strength of the monitoring and evaluation variables on adoption of the ICE to Electric Retrofitting Project in Rwanda. The model summary, ANOVA and coefficient outputs were interpreted together to explain model fitness, joint significance and the individual effect of each predictor.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.957[a]	.916	.913	.11870	1.903

a. Predictors: (Constant), M E Process, M E Tools, M E Design, M E Data
b. Dependent Variable: Adoption of Electric Mobility Project

Source: Field data, 2026

The model summary in Table 4 reported R of 0.957a, R Square of 0.916, and Durbin-Watson of 1.903 for the monitoring and evaluation predictors. R demonstrated that the variables had a strong combined association with adoption of electric mobility project. R Square showed that the predictors explained 91.6% of the variation in adoption of electric mobility project. The unexplained part of the model was linked to other adoption factors outside the present regression. The Durbin-Watson statistic was near 2.000, which suggested that the residuals were sufficiently independent for interpretation.

Stockmann (2022) and Organisation for Economic Co-operation and Development [OECD] (2023) explain that monitoring and evaluation works best when data, tools, design and process are connected across the project cycle. The high R Square value is consistent with this view, as adoption of the ICE to Electric Retrofitting Project was explained by a combined M&E system rather than by one isolated monitoring element.

World Bank (2024) and United Nations Development Programme [UNDP] (2024) further show that socio-technical projects depend on evidence systems that detect implementation barriers, guide adaptation and demonstrate value to stakeholders. The model summary supports that argument, as the strong combined relationship showed that adoption improved when M&E data, tools, design and process worked together in the retrofitting project.

Table 5: ANOVA Summary

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	20.280	4	5.070	362.143	.000[b]
1	Residual	1.860	132	.014		
	Total	22.140	136			

a. Dependent Variable: Adoption of Electric Mobility Project
b. Predictors: (Constant), M E Process, M E Tools, M E Design, M E Data

Source: Field data, 2026

The ANOVA output in Table 5 showed an F value of 362.143 with a significance value of 0.000. This result demonstrated that the combined monitoring and evaluation predictors fitted the model for explaining adoption of electric mobility project. Since the significance value was below 0.05, the model was statistically significant. The independent variables jointly predicted adoption in the ICE to Electric Retrofitting Project. This supported further interpretation of individual coefficient effects.

Patton (2022) and Mertens (2023) emphasize that evaluation findings become useful when the design, evidence and use of results are combined to support practical decisions. The significant ANOVA result agrees with this position, showing that the four M&E components jointly created a statistically reliable basis for explaining adoption of electric mobility solutions in the retrofitting project.

Table 6: Coefficients Summary

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.041	.111		.369	.715		
	M E Data	.253	.065	.237	3.892	.000	.174	5.732
	M E Tools	.373	.056	.361	6.661	.000	.220	4.540
	M E Design	.217	.056	.224	3.875	.000	.192	5.206
	M E Process	.176	.059	.191	2.983	.003	.154	6.489

a. Dependent Variable: Adoption of Electric Mobility Project

Source: Field data, 2026

Table 6 presents the coefficient results where the constant was positive but not statistically significant (B = 0.041; t = 0.369; P = 0.715). This means that the intercept did not make a significant independent contribution when the study predictors were considered. The interpretation therefore focused on the independent variables under the specific objectives. The positive constant did not affect the decision on any null hypothesis as hypothesis testing was based on the predictor coefficients. The collinearity interpretation was reserved for the independent variables where tolerance and VIF were reported.

M&E Data positively and significantly predicted Adoption of Electric Mobility Project with an unstandardized coefficient of 0.253, a t value of 3.892, and a significance value of 0.000. A one-unit increase in M&E Data increased adoption of electric mobility project by 0.253 units when the other variables were held constant. The significance value was below 0.05, confirming that the effect was statistically significant. Tolerance of 0.174 and VIF of 5.732 showed that the predictor could remain in the model without unacceptable multicollinearity. Consequently, H01 was rejected.

M&E Tools positively and significantly predicted Adoption of Electric Mobility Project with an unstandardized coefficient of 0.373, a t value of 6.661, and a significance value of 0.000. A one-unit increase in M&E Tools increased adoption of electric mobility project by 0.373 units when the other variables were held constant. The significance value was below 0.05, confirming that the effect was statistically significant. Tolerance of 0.220 and VIF of 4.540 showed that the predictor could remain in the model without unacceptable multicollinearity. Consequently, H02 was rejected.

Kim et al. (2023), Maina (2023) and Bizimana (2024) show that digital and mobile M&E tools improve adoption when they translate field information into usable evidence. The coefficient result supports this literature, as stronger M&E tools produced the largest predictive contribution and helped project managers organise technical records, progress information and stakeholder feedback.

M&E Design positively and significantly predicted Adoption of Electric Mobility Project with an unstandardized coefficient of 0.217, a t value of 3.875, and a significance value of 0.000. A one-unit increase in M&E Design increased adoption of electric mobility project by 0.217 units when the other variables were held constant. The significance value was below 0.05, confirming that the effect was statistically significant. Tolerance of 0.192 and VIF of 5.206 showed that the predictor could remain in the model without unacceptable multicollinearity. Consequently, H03 was rejected.

Tan et al. (2024), Rossi (2022) and Habiyaremye (2022) associate evaluation design with project adoption through clear indicators, baselines and theory-driven assessment structures. The significant effect recorded for M&E Design confirms that a well-arranged measurement framework strengthened adoption of the retrofitting project by clarifying what had to be tracked, reported and improved.

M&E Process positively and significantly predicted Adoption of Electric Mobility Project with an unstandardized coefficient of 0.176, a t value of 2.983, and a significance value of 0.003. A one-unit increase in M&E Process increased adoption of electric mobility project by 0.176 units when the other variables were held constant. The significance value was below 0.05, confirming that the effect was statistically significant.

Tolerance of 0.154 and VIF of 6.489 showed that the predictor could remain in the model without unacceptable multicollinearity. Consequently, H04 was rejected.

Arshad et al. (2023), Okello (2023) and Rugamba (2024) demonstrate that the M&E process improves adoption when feedback loops are regular, transparent and linked to corrective decisions. The positive coefficient in this study agrees with that evidence, showing that systematic collection, review, reporting and use of information increased adoption of electric mobility solutions.

The adopted model for analysis was structured as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where Y = Adoption of Electric Mobility Project; X_1 = M&E Data; X_2 = M&E Tools; X_3 = M&E Design; X_4 = M&E Process; β_0 = constant; β_1-β_4 = regression coefficients; and ε = error term.

$$Y = 0.041 + 0.253X_1 + 0.373X_2 + 0.217X_3 + 0.176X_4 + \varepsilon$$

Therefore, the coefficient summary confirmed that all null hypotheses were rejected as each predictor had a positive and statistically significant effect on adoption of electric mobility project in the current study.

4.4 Decision on Null Hypotheses

This section presents decisions on the null hypotheses based on regression coefficient significance values. The decision rule was that a null hypothesis was rejected when the significance value was below 0.05 and retained when the significance value was above 0.05.

Table 7: Decision on Null Hypotheses

Hypothesis	Statement	Decision
H_01	There is no significant effect of M&E Data on the adoption of ICE to Electric Retrofitting Project in Rwanda.	Rejected as $P < 0.05$
H_02	There was no significant influence of M&E Tools on the adoption of ICE to Electric Retrofitting Project in Rwanda.	Rejected as $P < 0.05$
H_03	There was no significant contribution of M&E Design on the adoption of ICE to Electric Retrofitting Project in Rwanda.	Rejected as $P < 0.05$
H_04	There was no significant effect of the M&E Process on the adoption of Internal Combustion Engine to Electric Retrofitting Project in Rwanda.	Rejected as $P < 0.05$

Source: Researcher, 2026

The decisions on null hypotheses were based on the coefficient significance values at the 0.05 level. All predictors had significance values below 0.05, which means that each null hypothesis was rejected. The decisions showed that the independent variables made statistically significant contributions to adoption of electric mobility project in the current study. This confirmed that the specific objectives were supported by the regression evidence.

5. Conclusions and Recommendations

5.1 Conclusion

The study concluded that M&E Data contributed positively to adoption of electric mobility in the ICE to Electric Retrofitting Project. Reliable monitoring information helped project actors understand implementation progress, assess field realities and make informed decisions on adoption-related actions. The evidence also showed that data quality was not merely appreciated by respondents but had a significant predictive role in the adoption process. Therefore, the first objective was achieved, as M&E Data proved to be an important element in strengthening evidence-based adoption of electric mobility.

The study established that M&E Tools supported adoption of electric mobility by improving the way project information was collected, organized, shared and used. Tools such as reporting templates, software systems, meetings and accessible monitoring instruments helped stakeholders follow implementation progress more effectively. The findings showed that better use of M&E Tools increased the capacity of the project team to support adoption decisions. This confirmed achievement of the second objective, as M&E Tools were found to be a key contributor to adoption of the retrofitting project.

The study concluded that M&E Design played a meaningful role in adoption of electric mobility within the ICE to Electric Retrofitting Project. Properly developed indicators, baselines, objectives, pre-tests and post-tests gave the project a clearer structure for measuring progress and identifying adoption gaps. The results confirmed that design quality influenced how monitoring evidence was generated and applied. Thus, the third objective was achieved, since M&E Design was confirmed as an important factor in guiding adoption of electric mobility.

The study found that M&E Process enhanced adoption of electric mobility by supporting verification, feedback, analysis and reporting activities throughout the project. A functional process allowed project actors to review information, communicate findings and adjust implementation practices where necessary. Although its predictive contribution was comparatively lower, it remained statistically significant and relevant to adoption outcomes. The fourth objective was therefore achieved, as M&E Process was shown to support the practical use of monitoring and evaluation in the retrofitting project.

5.2 Recommendations

The recommendations are based on the main findings of the study and are directed to institutions, project managers and implementing partners involved in the ICE to Electric Retrofitting Project.

1. REMA and implementing partners should hold regular data review sessions to examine field findings, validate reported information and translate lessons into corrective action.
2. Project managers should strengthen the use of digital platforms, standard reporting templates, structured review meetings and accessible monitoring tools.
3. REMA and implementing partners should periodically review the M&E Design to ensure that it remains aligned with operational realities, stakeholder needs and emerging electric mobility priorities.
4. REMA and implementing partners should strengthen follow-up mechanisms so that findings from M&E Process are converted into practical improvements.

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