



Influence of Agile Project Management Approach on Enhancing Stakeholder Collaboration: A Case of the Streetlight Powering Project at Kirehe District, Rwanda

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ABSTRACT

The primary objective of this study is to investigate the influence of agile project management approaches on the enhancement of stakeholder collaboration. Specially, to evaluate the effect of agile communication approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district, to analyse the effect of agile engagement approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district and to examine the effect of agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The communication theory, engagement theory, motivation theory were used. This study adopted a quantitative approach using descriptive and correlational research design. The target population was 122 populations. A sample size of 122 respondents and census method was used. Questionnaire was used for data collection. Collected data were analyzed using descriptive and inferential statistics. The results show a high mean score of 3.80 (SD=1.314) for the effect of agile communication on enhancing stakeholder collaboration. In addition, high mean score of 3.75 (SD=1.251) for effect of agile engagement on enhancing stakeholder collaboration and high mean score of 3.78 (SD=1.279) effect of agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The study emphasizes the importance of agile communication, highlighting the need for adaptability and responsiveness. It suggests regular open dialogue among team members to foster collaboration and align project goals. Clear communication protocols can improve efficiency and reduce misunderstandings. The study also suggests that iterative development cycles can lead to effective problem-solving and quicker adaptation to changes in project requirements. Aligning team goals with individual motivations can enhance engagement and productivity.

Key words: Agile Project Management, Agile Approach, Stakeholder Collaboration

GENERAL INTRODUCTION

Background of the study

Agile project management has become a transformative approach in the management of projects worldwide,

transcending its origins in software development to influence diverse industries such as construction, healthcare, education, and public infrastructure. Its growing popularity is attributed to its emphasis on flexibility, iterative planning, and

collaboration, which allow teams to adapt to changing requirements and stakeholder needs efficiently. The adoption of agile project management has been driven by the increasing complexity of projects in a rapidly evolving global landscape, requiring innovative approaches to ensure timely delivery, cost efficiency, and stakeholder satisfaction.

Globally, in United States, agile project management is widely implemented across various sectors, including government, where it has revolutionized the execution of large-scale projects. For instance, agile project management practices have been instrumental in improving stakeholder engagement in public infrastructure initiatives, with studies indicating a 30% improvement in satisfaction due to iterative feedback and transparent communication channels (Smith & Anderson, 2021). This adoption has significantly enhanced the ability to manage risks and align project deliverables with stakeholder expectations, particularly in sectors where requirements are prone to change (Säisä et al., 2019). According to Klein et al. (2022), Germany, known for its precision and efficiency in project management, has also embraced agile project management to address challenges in engineering, urban development, and renewable energy projects. Research highlights that the incorporation of agile project management in these areas has fostered cross-functional teamwork, enabling better coordination among stakeholders and reducing project delays by up to 20%. Energiewende Initiative, Germany's transition to sustainable energy systems, utilized agile project management to manage stakeholder complexities and evolving technical requirements (Klein et al., 2022). According to Tanaka et al. (2023) in Japan, there is the integration of agile project management into large-scale infrastructure

projects. Such practices have not only streamlined project execution but also fostered innovation in addressing urban challenges (El-Khatib & Bouaziz, 2022).

In Africa, the adoption of Agile project management is steadily increasing as countries recognize its potential to address unique challenges. For instance, South Africa has made significant strides in integrating Agile project management practices into public infrastructure projects. The Gautrain Expansion Project, for example, adopted Agile project management to manage stakeholder engagement and mitigate risks effectively. In Kenya, Last-Mile Connectivity Project, aimed at expanding access to electricity in rural areas, employed Agile methodologies to ensure continuous engagement with stakeholders, including local communities and government entities. This approach not only improved project transparency but also reduced implementation costs by 10% (Mwangi et al., 2024). In Morocco, Agile project management has proven effective in urban planning initiatives. This collaborative approach led to a 20% increase in project efficiency and reduced disputes during execution (El-Khatib & Bouaziz, 2022). These cases demonstrate the transformative potential of Agile project management in addressing Africa's development challenges while fostering sustainable growth (Pinto, 2023). Stakeholder collaboration involves working with people or groups to gather their input on a project. This includes sharing feedback, skills, knowledge, resources, and more towards project goals or sub-goals. According to Hamdan et al. (2021) the stakeholder collaboration in sustainable neighborhood projects over the past 20 years, identifying 20 key themes affecting collaboration throughout the project stages. It highlights factors that enhance collaboration in SN projects, which can lead to varying sustainability results. The review also points

to potential research areas to better understand stakeholder involvement in these projects (Säisä et al., 2019).

In Rwanda, the adoption of Agile project management aligns closely with the country's Vision 2050 strategy, which emphasizes inclusive and sustainable development. Agile project management are increasingly being integrated into various projects to enhance stakeholder collaboration and adapt to changing requirements. The Streetlight Powering Project in Kirehe District exemplifies this trend, showcasing how Agile project management practices can improve project efficiency and stakeholder satisfaction (Bigirumwami et al., 2023). Rwanda has particularly leveraged Agile project management in ICT and urban infrastructure projects. For instance, the Kigali Smart City Project employed Agile methodologies to facilitate stakeholder engagement and iterative development. This approach allowed for the continuous incorporation of feedback from residents, businesses, and government agencies, resulting in improved service delivery and higher user satisfaction (Habimana et al., 2022). The Streetlight Powering Project in Kirehe District highlights the benefits of Agile practices in infrastructure development. By adopting iterative planning and real-time communication mechanisms, project managers have been able to address community concerns and adapt to unforeseen challenges effectively. This has not only enhanced stakeholder trust but also ensured that project outcomes align with local needs and expectations (Uwase & Bizimana, 2024). Moreover, Rwanda's commitment to community-driven development further underscores the suitability of Agile project management. Studies reveal that Agile project management have been instrumental in bridging gaps between policymakers, implementers, and beneficiaries, thereby fostering a sense of ownership and

accountability among stakeholders (Niyonsenga et al., 2023). These practices highlight Rwanda's progressive approach to project management and its potential to set a benchmark for other developing countries.

Problem Statement

Project failure remains a pervasive issue across the globe, with numerous initiatives failing to meet their objectives, leading to wasted resources and missed growth opportunities. The approximately 14% of all projects globally fail, contributing to an estimated loss of \$122 million per \$1 billion invested. The African Development Bank highlighted that over 60% of infrastructure projects in Sub-Saharan Africa fail to meet their objectives due to inefficiencies in project management. Further, large-scale public infrastructure projects fail to engage key stakeholders, leading in project delays, cost overruns, and unsatisfactory outcomes, ultimately stunting economic development and impeding social progress (Dlamini & Nkosi, 2020).

The Streetlight Powering Project at Kirehe District in Rwanda, aimed at enhancing public safety and promoting economic activity, exemplifies the challenges faced in fostering effective stakeholder collaboration. One of the key issues that have surfaced in this project is the communication barrier between various stakeholders, particularly between local communities and government bodies. Community members often feel disconnected from the decision-making processes, which lead to resistance or lack of support for the project. Additionally, there is a frequent misalignment of interests between the government entities, project contractors, and local communities, as each group prioritizes different goals.

Several studies have explored stakeholder collaboration in the context of Rwanda's development projects, including the Streetlight Powering Project.

(Niyonsenga et al., 2023) examined stakeholder involvement in infrastructure projects in Rwanda and found that effective collaboration is often hindered by poor communication, inadequate resource allocation, and a lack of shared understanding of project goals. Similarly, Uwase & Bizimana (2024) emphasized the importance of community involvement in rural electrification projects, noting that when stakeholders are engaged in iterative feedback loops, the sustainability and success of the project are greatly enhanced. There is a gap because these studies didn't investigate the project management agile approaches on the enhancement of stakeholder collaboration, with a particular focus on the Streetlight Powering Project in Kirehe District, Rwanda. Therefore, there is need research focusing Streetlight Powering Project in Kirehe District, Rwanda.

Research objectives

- i. To evaluate the effect of agile communication approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district;
- ii. To analyse the effect of agile engagement approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district;
- iii. To examine the effect of agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Research Hypotheses

Ho1: There is no significant effect of agile communication approach on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district;

Ho2: There is no significant effect of agile engagement approach on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district;

Ho3: There is no significant effect of agile motivation approach on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district.

LITERATURE REVIEW

Theoretical review

The theoretical framework of this study connects philosophical foundations to practical investigation, focusing on key theories in agile project management. It reviews the communication, engagement, motivation, and stakeholder theories, each contributing to understanding the dynamics of stakeholder collaboration in agile environments.

Communication Theory

Communication Theory, originating from Shannon and Weaver's 1948 model, has evolved over time, contributing significantly to the understanding of how information is exchanged within organizational and project contexts (Ritchie, 1986). Central to Communication Theory is the idea that effective communication is vital for ensuring clear understanding and alignment among stakeholders, especially in complex projects. In recent years, the application of this theory within Agile approaches has garnered attention, highlighting its importance in enhancing collaboration among diverse stakeholders.

Recent studies have explored how Agile approaches benefits from continuous communication and feedback loops. Thanthony et al. (2022) examined communication in Agile project teams, emphasizing the role of frequent, transparent

dialogue in fostering collaboration and improving stakeholder engagement. They found that iterative communication methods, such as daily stand-ups and sprint reviews, create an environment of trust and mutual understanding, which is critical for decision-making and project success. Similarly, Dugbartey and Kehinde (2025) highlighted that Agile communication practices, such as shared decision-making and adaptive feedback, enhance stakeholder satisfaction by ensuring alignment with project goals. Their research demonstrated that effective communication fosters collaboration, leading to better project outcomes. Moreover, Garcia Santiago (2022) extended Communication Theory to international development projects, including streetlight projects in rural areas. Their study concluded that effective stakeholder communication in these projects significantly increases participation and collaboration, crucial for achieving successful outcomes. The application of Communication Theory within Agile approaches underlines the significance of continuous and transparent communication. Recent studies affirm that Agile's communication practices emphasizing feedback, shared decision-making, and iterative processes are critical for enhancing collaboration among stakeholders, which is essential for project success.

Communication Theory is important for this study as it helps analyze and understand crucial projects, processes, and commitments in communication. It assists in mapping the world and addressing communication questions. Additionally, it aided the researcher to explain the effect of agile communication approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Engagement Theory

Engagement Theory was primarily developed by Greg Kearsley and Ben

Shneiderman in the late 1990s as a framework for technology-based learning. This theory emphasizes the importance of student engagement through collaboration, project-based learning, and authentic tasks, asserting that students become more involved in their learning when they interact with others and engage in meaningful, real-world problems (Kearsley & Shneiderman, 1998). The theory posits that learning should be a social, interactive process, where students actively construct knowledge by working with others and engaging in real-world tasks that are relevant to their interests and future goals.

The theory has been applied in various educational contexts, particularly in the use of technology in classrooms and online environments. For example, it has been used to design e-learning platforms where learners collaborate on projects, and in virtual classrooms where social interaction is a key component of the learning process (Xie et al., 2013). It emphasizes that engagement is not just about participation but about creating connections between learners and the material, and fostering intrinsic motivation to learn. This has been particularly impactful in settings like blended learning environments and online education, where students can engage in projects, collaborate with peers, and work on authentic tasks in a supportive setting (Dugbartey & Kehinde, 2025; Tsai et al., 2015).

Recent studies have applied Engagement Theory across various fields. One such study by Wanner and Palmer (2015) explored its use in blended learning environments, where the theory helped design systems that encouraged active student participation in group projects, showing a marked increase in engagement and academic performance. Another study by Conway et al. (2010) applied the theory to examine the effects of self-regulated learning in online education, demonstrating that students who engaged in

collaborative learning tasks showed greater persistence and motivation. Similarly, a study by Tsai et al. (2015) used the framework to improve collaborative learning in virtual settings, revealing that the application of Engagement Theory led to improved peer relationships and higher student satisfaction.

The engagement theory is relevant as it highlights the need for active participation in project implementation. It says project team members understand better when they collaborate, work on meaningful tasks, and are motivated by relevant goals. Additionally, it helped the researcher to explain the effect of Agile engagement approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Motivation Theory

Motivation Theory has been applied across diverse domains, with significant contributions to organizational management, education, and healthcare. In business settings, Herzberg's theory is commonly used to design employee motivation strategies that balance both intrinsic and extrinsic factors, improving job satisfaction and performance (Herzberg, 2015). In education, Keller (2020) applied Maslow's Hierarchy to enhance student engagement, demonstrating that fulfilling basic needs leads to higher levels of academic achievement. Similarly, in healthcare, motivation theories have guided strategies to prevent burnout and improve healthcare workers' job satisfaction by focusing on recognition and career development (Farenthold, 2021).

Recent studies have explored how Motivation Theory applies to various organizational contexts. Keller (2020) found that addressing Maslow's lower-order needs in educational settings led to improved student motivation and learning outcomes. Gagné (2022) explored how autonomy and competence in the workplace enhance

intrinsic motivation, arguing that a focus on these factors results in better employee performance and satisfaction. Furthermore, Farenthold (2021) demonstrated how Herzberg's theory can address healthcare staff burnout, underscoring the importance of intrinsic rewards in sustaining motivation and performance.

In the context of the "Streetlight Powering Project" at Kirehe District, Rwanda, Motivation Theory helps explain how Agile approaches can enhance stakeholder collaboration. By focusing on intrinsic motivators such as empowerment, involvement, and recognition, Agile practices can foster greater engagement and collaboration among project stakeholders. This approach aligns with Motivation Theory's emphasis on satisfying both basic and higher-order needs, ensuring that stakeholders remain motivated and invested in the success of the project.

Motivation theory is important because it improves productivity, as motivated employees are happier and more productive, leading to increased profits. It helps managers support employees and enhances personal and professional development, enabling people to achieve their goals. Additionally, it aided the researcher to explain the effect of Agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Empirical review

This section avails previous studies that have been done in the area of study. The literature reviewed includes a systematic analysis as per the research objectives. Literature relating to agile communication and stakeholder collaboration is reviewed. Secondly, the section reviews empirical studies on agile engagement and stakeholder collaboration. Finally, the section provides empirical literature on agile motivation and

stakeholder collaboration in the Kirehe district, Rwanda streetlight powering project.

Agile Communication and Stakeholder Collaboration

In the United States, research on Agile communication in IT projects has focused on improving stakeholder collaboration through Agile methodologies. One significant study employed qualitative case studies to analyse communication practices within federal projects using Agile methods. The findings showed that Agile practices, especially transparency and continuous feedback, enhanced collaboration and engagement between stakeholders, a crucial factor in government IT projects. However, challenges arose when scaling Agile methodologies in large, complex projects with diverse stakeholders (Dühring & Zerfass, 2021).

In Germany, a mixed-methods approach, including surveys and interviews with Agile project managers, was used to measure the impact of Agile communication on stakeholder engagement in cross-functional teams. The study highlighted the effectiveness of Agile communication in fostering adaptability and quicker decision-making, but it also emphasized the need for empirical evidence to understand its real-time impacts in fostering collaboration across stakeholders in the tech industry. This gap was a focus of the research, contributing valuable insights into Agile communication's role in tech project management (Wiencierz et al., 2021).

A study conducted in Kenya explored the impact of Agile communication on stakeholder satisfaction in large infrastructure projects. Using qualitative methods, including interviews and surveys with stakeholders, the research found that Agile communication fostered better engagement and informed decision-making among stakeholders. However, challenges

were observed in communication efficiency, particularly in projects involving multiple governmental and private stakeholders. This research aimed to fill the gap in understanding how Agile can be effectively applied in complex infrastructure projects with a diverse stakeholder base in the African context (Ndung'u, 2020).

In South Africa, Agile communication practices were examined in the context of educational reform, specifically focusing on multi-stakeholder involvement. A case study approach revealed that Agile practices strengthened collaboration between governmental bodies, local communities, and educational institutions, leading to increased stakeholder participation and satisfaction. The study filled a gap by exploring Agile communication's role in sectors like education reform, which are not traditionally associated with Agile methodologies (Venter, 2021).

In Rwanda, a study focused on the application of Agile communication in rural development projects, particularly in rural electrification. The mixed-methods research combined surveys and interviews with stakeholders to assess the impact of Agile practices on stakeholder collaboration. The findings highlighted that Agile communication significantly improved engagement and responsiveness to community needs by allowing for continuous feedback and iterative development. This research contributed to filling the gap in applying Agile methodologies in community-based projects in Rwanda, specifically in rural electrification, where stakeholder collaboration is crucial for success (Refaie et al., 2023).

Agile Engagement and Stakeholder Collaboration

In the United States, a study focused on Agile communication and engagement within federal IT projects found that Agile

methodologies significantly enhanced stakeholder collaboration by promoting transparency and iterative feedback loops. The research used qualitative case studies to analyse Agile practices in large, complex projects, particularly in government sectors. While Agile methods improved communication and stakeholder involvement, challenges emerged when scaling these practices to projects with diverse stakeholder groups. The study specifically aimed to address the gap in understanding how Agile could be adapted to large-scale, multi-stakeholder environments in public sector projects (Watanabe, 2020).

Similarly, according to Junker et al. (2025) research in Germany explored Agile communication and engagement. The study revealed that regular Agile practices, such as daily standups and sprint reviews, significantly improved stakeholder engagement and decision-making. This research addresses the gap in empirical evidence on the real-time impacts of Agile communication on stakeholder collaboration in the tech industry.

According to Eboh (2024), in Kenya, a study examined the impact of Agile communication and engagement on stakeholder satisfaction in infrastructure projects, utilizing qualitative interviews and surveys to gauge satisfaction with Agile-driven communication. The results showed that stakeholders in infrastructure projects felt more informed and engaged, but challenges arose when managing communication across multiple governmental and private stakeholders.

Similarly, in South Africa, a case study was conducted to explore how Agile practices enhanced stakeholder engagement in educational reform projects. This study found that Agile practices, including regular feedback loops and iterative development, facilitated stronger collaboration among governmental bodies, educational

institutions, and local communities (Noruwana & Tanner, 2012).

In Rwanda, a study focused on the application of Agile communication and engagement in rural electrification projects, found that Agile methods significantly improved stakeholder engagement and collaboration. This research fills the gap in understanding how Agile can be effectively implemented in community-based projects, particularly in rural areas where collaboration among diverse stakeholders is key to project success (Francois & Celestin, 2024).

Agile Motivation and Stakeholder Collaboration

Agile methodologies have gained significant global traction for their role in enhancing stakeholder collaboration. Studies from countries like the United States and Germany highlight the positive impact of Agile practices on project outcomes and stakeholder relationships. In the U.S., Agile approaches such as Scrum and Kanban foster frequent communication and responsiveness, leading to improved stakeholder engagement and collaboration in IT and software industries (Asproni, 2004). However, gaps persist in understanding the long-term impact of Agile methods in non-IT sectors, particularly with external stakeholders such as community groups (McKeown et al., 2023).

Similarly, research in Germany emphasizes that Agile frameworks improve transparency and adaptability, facilitating trust and satisfaction among stakeholders. Yet, challenges remain in scaling Agile practices across industries like manufacturing and engineering, where traditional approaches dominate (Neumann & Weber, 2023).

In Africa, Agile methodologies are being adapted to address the unique challenges of the continent's development landscape. Kenyan studies reveal that Agile

enhances flexibility and responsiveness, particularly in rural infrastructure projects, but highlight the need for better integration in public-sector contexts with diverse stakeholders (Eboh, 2024). In South Africa, Agile adoption has shown promise in improving transparency and stakeholder satisfaction within public projects, although resistance to change and limited knowledge of Agile principles remain barriers (Venter, 2021).

In Rwanda, the application of Agile principles in development initiatives, such as the Streetlight Powering Project in Kirehe District, demonstrates improved alignment between project goals and community expectations. Iterative processes and stakeholder feedback mechanisms have enhanced motivation and responsiveness, though there is a need for further research on Agile's scalability in large public infrastructure projects (Francois & Celestin, 2024). These findings collectively underline the growing relevance of Agile methodologies in fostering collaborative stakeholder relationships across diverse sectors and regions, while also highlighting critical research gaps in scaling and adapting

Population and sampling

The target population for this study consists of stakeholders actively engaged in the Streetlight Powering Project in Kirehe District. These individuals were selected due to their direct involvement in the planning, execution, and resource allocation phases of the project. Demographically, this group represents diverse professional expertise, ranging from administrative oversight by the project coordinator to hands-on implementation by contractors and suppliers. Their perspectives collectively provide a comprehensive understanding of agile project management's influence on collaboration dynamics.

Agile frameworks to non-traditional and public-sector contexts.

RESEARCH METHODOLOGY

Research Design

This study adopts a descriptive and correlational research design, a framework that integrates the systematic description of study variables with an exploration of their relationships. The descriptive aspect is utilized to provide a detailed account of agile approaches and stakeholder collaboration within the context of the Streetlight Powering Project in Kirehe District, Rwanda. Meanwhile, the correlational component examines the degree and nature of the relationship between these variables. This dual approach ensures a holistic understanding of how agile methodologies contribute to stakeholder engagement, providing insights aligned with the study objectives. The justification for this design stems from its ability to uncover complex interactions between independent (agile approaches) and dependent (stakeholder collaboration) variables without manipulating the research environment.

The study employed a census method, which involves collecting data from the entire population rather than a subset or sample. This method ensures that insights are representative of all stakeholder groups within the project, eliminating sampling bias and enhancing the reliability of the findings. By including the perspectives of all 122 individuals in the study population, the research captures the full spectrum of experiences, fostering comprehensive and inclusive analysis.

Research Methods and Instruments

This study used the data collection method. This study used primary data. Primary data was collected through structured questionnaires from researcher

sources. The primary data collection method for this study was a survey questionnaire, chosen for its ability to gather standardized, quantifiable data across multiple respondents. Surveys are particularly suited for exploring subjective variables such as perceptions, attitudes, and satisfaction with agile project management practices. The questionnaire comprises two sections. The first section captures demographic and professional data, while the second focuses on agile approaches and stakeholder collaboration. A Likert scale (ranging from 1: Strongly Disagree to 5: Strongly Agree) was employed to measure participants' perceptions and experiences. The Likert scale facilitates statistical analysis by converting subjective opinions into numerical data, enabling the identification of trends and correlations. The questionnaire design underwent iterative refinement based on expert input to ensure clarity and relevance to the research objectives.

Data processing and Analysis

The data processing stage was a critical component of the research methodology, as it ensures the accuracy, completeness, and reliability of the data before analysis. This section elaborates on the three key phases of data processing: data editing, data coding, and data tabulation, explaining their significance, procedures, and alignment with the research objectives.

The data analysis phase was essential for transforming raw data into meaningful insights that address the research objectives and hypotheses. In this study, data analysis is divided into two broad categories: descriptive statistics and inferential statistics. These methods ensure a systematic and rigorous examination of the data, allowing for an in-depth understanding of how agile project management impacts stakeholder collaboration in the context of the Streetlight Powering Project in Kirehe District, Rwanda.

FINDINGS & DISCUSSION

The findings about response rate of respondents. Out 122 (100.0%) respondents, 93.5% returned and completed the questionnaires. A response rate of 70% and above is considered adequate. While, 1.6% of respondents returned and incomplete the questionnaires and 4.9% unreturned the questionnaires.

Demographic characteristics

The findings of gender of respondents. Out of 114 respondents, 54.4% of respondents were female, while 45.6% were male. In addition, the findings of the age group of respondents. Out of 114 respondents, 39.5 % of respondents were aged between 39-48 years, 32.5% of respondents were aged between 29-38 years, 15.8% were aged between 18-28 years, 8.8% were aged between 49-58 years. Further, the findings of the educational level of respondents. Out of 114 respondents, 65.7% had attained secondary schools, 32.5% of respondents obtained a bachelors' degree and 1.8% held a master's degree. Moreover, the findings of work experience of respondents. Out of 114 respondents, 60.5% of respondents had work experience below 1 year, 28.9% of respondents had work experience between 1-3 years, 4.4% had work experience between 4-6 years, 3.5% had work experience between 7-10 years and small number of respondents (2.6%) had work experience of 11 years and above.

Descriptive statistics

Agile communication approach and enhancing stakeholder collaboration

Respondents were asked to give their agreement about the effect of the agile communication approach on enhancing stakeholder collaboration of the streetlight-

powered project at Kirehe district. The means and standard deviation for the variable were presented as shown in table 1 below.

Table 1: *Descriptive statistics on effect of agile communication on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district*

	Mean	Std. Dev.
Project updates are communicated frequently and transparently	3.78	1.253
Team members utilize collaborative tools effectively for real-time communication	3.78	1.355
Agile methodologies improve the clarity of communication with stakeholders.	3.80	1.305
Stakeholders are consistently informed about project progress through agile communication practices	3.86	1.343
Overall	3.80	1.314

Table 1 presents descriptive statistics on the effect of agile communication on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. A significant number of respondents agreed with the statement that Project updates are communicated frequently and transparently with a high mean score of 3.78 (SD=1.253). The high mean score indicates strong positive agreement among respondents and standard deviation designates heterogeneity among respondents. Further, respondents agreed with the statement that team members utilize collaborative tools effectively for real-time communication, as signified by a high mean score of 3.78 (SD=1.355). The high mean score indicates strong positive agreement and the standard deviation designates heterogeneity in opinions among respondents.

Moreover, respondents agreed with the statement that agile methodologies improve the clarity of communication with stakeholders with a high mean score of 3.80 (SD=1.305). The high mean score indicates strong positive agreement among respondents and standard deviation designates heterogeneity among respondents. Further, respondents agreed with the statement that stakeholders are consistently

informed about project progress through agile communication practices, as signified by a high mean score of 3.86 (SD=1.343). The high mean score indicates strong positive agreement and the standard deviation designates heterogeneity in opinions among respondents.

Overall high mean score of 3.80 (SD=1.314) for the combined statements signifies strong positive agreement that there is effect of agile communication on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The standard deviation indicates heterogeneity in opinions among participants. The findings are supported by Wiencierz et al. (2021) Germany, a mixed-methods approach, including surveys and interviews with Agile project managers, was used to measure the impact of Agile communication on stakeholder engagement in cross-functional teams. The study highlighted the effectiveness of Agile communication in fostering adaptability and quicker decision-making, but it also emphasized the need for empirical evidence to understand its real-time impacts in fostering collaboration across stakeholders in the tech industry. This gap was a focus of the research, contributing valuable insights into

Agile communication's role in tech project management.

The findings confirm the communication theory as it is the idea that effective communication is vital for ensuring clear understanding and alignment among stakeholders, especially in complex projects. In the context of the effect of agile communication on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district, project managers applied this theory within agile approaches to garner attention, highlighting its importance

in enhancing collaboration among diverse stakeholders.

Agile engagement approach on enhancing stakeholder collaboration

Respondents were asked to give their agreement about the effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The means and standard deviation for the variable were presented as shown in table 2 below.

Table 2 Descriptive statistics on the effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

	Mean	Std. Dev.
Stakeholders are actively involved in decision-making processes.	3.83	1.262
Feedback loops from stakeholders are implemented effectively during the project	3.82	1.214
Agile frameworks enhance trust and mutual understanding among stakeholders	3.62	1.279
Stakeholders' contributions are valued and incorporated into project decisions	3.75	1.252
Overall	3.75	1.251

Table 2 presents the descriptive statistics on effect of agile engagement approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. Respondents agreed with the statement that stakeholders are actively involved in decision-making processes, as indicated by a high mean score of 3.83 designating a strong positive agreement. The standard deviation of 1.262 signifies heterogeneity in responses among respondents. Similarly, respondents expressed agreement that feedback loops from stakeholders are implemented effectively during the project, with a high mean score of 3.82, signifying a strong positive agreement. The standard deviation of 1.214 designates a relatively heterogeneity response pattern.

Moreover, respondents agreed with the statement that agile frameworks enhance trust and mutual understanding among stakeholders, as indicated by high mean score of 3.62 designating a strong positive agreement. The standard deviation of 1.279 signifies heterogeneity in responses among respondents. Similarly, respondents expressed agreement that stakeholders' contributions are valued and incorporated into project decisions, with a high mean score of 3.75, signifying a strong positive agreement. The standard deviation of 1.252 designates a heterogeneity in response among respondents.

Overall high mean score of 3.75 for the combined statements signifies strong positive agreement that there is effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered

project at Kirehe district. The standard deviation of 1.251 indicates heterogeneity in perception among participants. The findings are supported by Watanabe (2020) a study by Agile communication and engagement within federal IT projects found that Agile methodologies significantly enhanced stakeholder collaboration by promoting transparency and iterative feedback loops. The research used qualitative case studies to analyse Agile practices in large, complex projects, particularly in government sectors. While Agile methods improved communication and stakeholder involvement, challenges emerged when scaling these practices to projects with diverse stakeholder groups. The study specifically aimed to address the gap in understanding how Agile could be adapted to large-scale, multi-stakeholder environments in public sector projects.

The findings confirm the engagement theory as it emphasizes the importance of stakeholder engagement through

collaboration, and authentic tasks, asserting that stakeholders become more involved in their engagement in projects when they interact with others and engage in meaningful, real-world problems. In the context of the effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district, project managers applied this theory within agile approaches to align the stakeholder expectations and project goals, potentially enhancing collaboration and project outcomes.

Agile motivation approach on enhancing stakeholder collaboration

Respondents were asked to give their agreement about the effect of the agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The means and standard deviation for the variable were presented as shown in table 3 below.

Table 3 Descriptive statistics on effect of Agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district

	Mean	Std. Dev.
Recognition of stakeholder contributions in agile reviews boosts their motivation and engagement	3.76	1.332
Aligning team and stakeholder goals through agile practices enhances motivation and commitment	3.71	1.281
Agile practices that encourage feedback and shared responsibility increase stakeholder ownership and motivation	3.89	1.281
Regular communication and acknowledgment of progress sustain stakeholder motivation and foster collaboration	3.78	1.225
Overall	3.78	1.279

Table 3 presents descriptive statistics on the effect of the agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. A significant number of respondents agreed with the statement that recognition of stakeholder contributions in agile reviews boosts their motivation and engagement with

a high mean score of 3.76 (SD=1.332). The high mean score indicates strong positive agreement among respondents and standard deviation designates heterogeneity among respondents. Further, respondents agreed with the statement that aligning team and stakeholder goals through agile practices enhances motivation and commitment, as

signified by a high mean score of 3.71 (SD=1.281). The high mean score indicates strong positive agreement and the standard deviation designates heterogeneity in opinions among respondents.

Moreover, respondents agreed with the statement that agile practices that encourage feedback and shared responsibility increase stakeholder ownership and motivation with a high mean score of 3.89 (SD=1.281). The high mean score indicates strong positive agreement among respondents and standard deviation designates heterogeneity among respondents. Further, respondents agreed with the statement that regular communication and acknowledgment of progress sustain stakeholder motivation and foster collaboration, as signified by a high mean score of 3.78 (SD=1.225). The high mean score indicates strong positive agreement and the standard deviation designates heterogeneity in opinions among respondents.

Overall high mean score of 3.78 (SD=1.279) for the combined statements signifies strong positive agreement that there is an effect of agile motivation strategies on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The standard deviation indicates heterogeneity in opinions among participants. The findings align with the result of In Africa, Agile methodologies are being adapted to address the unique challenges of Eboh (2024) asserted that the

continent's development landscape. Kenyan studies reveal that Agile enhances flexibility and responsiveness, particularly in rural infrastructure projects, but highlight the need for better integration in public-sector contexts with diverse stakeholders. Venter (2021) added that in South Africa, Agile adoption has shown promise in improving transparency and stakeholder satisfaction within public projects, although resistance to change and limited knowledge of Agile principles remain barriers.

The findings confirm Motivation Theory as it is meaningful in designing employee motivation strategies that balance both intrinsic and extrinsic factors, improving job satisfaction and performance. In the context of the effect of agile motivation strategies on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district, theory was used focusing on intrinsic motivators such as empowerment, involvement, and recognition.

Enhancing stakeholder collaboration of the streetlight-powered project in Kirehe district

Respondents were asked to give their agreement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The means and standard deviation for the variable were presented as shown in table 4 below.

Table 4 Enhancing stakeholder collaboration of the streetlight-powered project in Kirehe district

	Mean	Std. Dev.
The agile approach has led to better alignment of stakeholder goals	3.75	1.282
Stakeholder collaboration has improved the timeliness of project deliverables	3.82	1.273
Agile practices have contributed to the sustainable success of the project	3.73	1.162
Collaboration among stakeholders has enhanced the quality of project deliverables	3.85	1.312
Overall	3.78	1.257

Table 4 presents the descriptive statistics on the effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. Respondents agreed with the statement that agile approach has led to better alignment of stakeholder goals, as indicated by high mean score of 3.75 designating a strong positive agreement. The standard deviation of 1.282 signifies heterogeneity in responses among respondents. Similarly, respondents expressed agreement that stakeholder collaboration has improved the timeliness of project deliverables, with a high mean score of 3.82, signifying a strong positive agreement. The standard deviation of 1.273 designates a relatively heterogeneity response pattern.

Moreover, respondents agreed with the statement that agile practices have contributed to the sustainable success of the project, as indicated by a high mean score of 3.73 designating a strong positive agreement. The standard deviation of 1.162 signifies heterogeneity in responses among respondents. Similarly, respondents expressed agreement that Collaboration among stakeholders has enhanced the quality of project deliverables, with a high mean score of 3.85, signifying a strong positive agreement. The standard deviation of 1.312 designates a heterogeneity in response among respondents.

Overall high mean score of 3.78 for the combined statements signifies strong

Table 5 Correlation analysis

		Stakeholder collaboration	Agile communication	Agile engagement	Agile motivation
Stakeholder collaboration	Pearson Correlation	1	.878**	.894**	.857**
	Sig. (2-tailed)		.000	.000	.000
	N	114	114	114	114
Agile communication	Pearson Correlation	.878**	1	.888**	.855**

positive agreement that there is enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. The standard deviation of 1.257 indicates heterogeneity in perception among participants. The findings are supported by Tanaka et al. (2023) asserted that in Japan, there is the integration of agile project management into large-scale infrastructure projects. Such practices have not only streamlined project execution but also fostered innovation in addressing urban challenges (El-Khatib & Bouaziz, 2022).

Inferential statistics

The study used inferential statistics such as hypothesis testing, model summary, analysis of variance (ANOVA) and coefficients to analyse data and present the relationship level of the study variables. The study was guided by three different null hypotheses:

H₀₁: There is no significant effect of Agile Communication on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district,

H₀₂: There is no significant effect of Agile Engagement practices on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district and

H₀₃: There is no significant effect of Agile Motivation on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district.

	Sig. (2-tailed)	.000		.000	.000
	N	114	114	114	114
Agile engagement	Pearson Correlation	.894**	.888**	1	.889**
	Sig. (2-tailed)	.000	.000		.000
	N	114	114	114	114
Agile motivation	Pearson Correlation	.857**	.855**	.889**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	114	114	114	114
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 5 presents the correlation analysis in this study. Results showed strong positive relationships between each project management agile approaches (agile communication, agile engagement and agile motivation) and enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district. Specifically, agile communication approaches exhibit a strong positive relationship ($r=0.878$, $p=0.000$), implying that the increased utilization of agile communication approach is linked with enhanced stakeholder collaboration in the streetlight-powered project at Kirehe district. Similarly, the agile engagement approach demonstrates strong positive relationship ($r=0.894$, $p=0.000$), signifying that the increased utilization of agile engagement approach is associated with enhanced

stakeholder collaboration in the streetlight-powered project at Kirehe district. Lastly, agile motivation approach shows a strong positive relationship ($r=0.857$, $p=0.000$), implying that the increased utilization of agile motivation approach is linked with enhanced stakeholder collaboration in the streetlight-powered project at Kirehe district. The findings are supported by Tanaka et al. (2023) in Japan, there is the integration of agile project management into large-scale infrastructure projects. The showed Agile project management facilitated real-time feedback between stakeholders, leading to a 25% reduction in project delays and enhanced alignment of objectives among government agencies, private sector partners, and local communities.

Table 6 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.916 ^a	.840	.835	.43185

a. Predictors: (Constant), Agile motivation, Agile communication, Agile engagement

Table 6 presents the Model Summary for the regression analysis. The R value of 0.916 signifies a strong positive relationship between the predictors (agile communication, agile engagement and agile

motivation) and the dependent variable (enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district). The R Square value of 0.840 indicates that approximately 84.0% of the

variability in the enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district can be explained by the independent variables in the model. The findings are supported by Klein et al. (2022) highlighted Agile project management as a

framework designed to accommodate uncertainties in project environments. The iterative nature of Agile allows for regular feedback loops, minimizing risks and maximizing stakeholder engagement.

Table 7 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	107.564	3	35.854	192.260	.000 ^b
	Residual	20.514	111	.184		
	Total	128.079	114			

a. Dependent Variable: Stakeholder collaboration

b. Predictors: (Constant), Agile motivation, Agile communication, Agile engagement

Table 7 presents the analysis of variance (ANOVA). The results reveal that F-statistic designates a highly significant F-statistic of 192.260 (p=0.000). The F-statistics evaluates the overall significance of the regression model. F-statistic tests whether there is a significant difference between the model with predictors (agile communication, agile engagement and agile motivation) and the dependent variable (enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district).

In this case, the p=0.000 associated with the F-statistics signifies that the predictors (agile communication, agile engagement and agile motivation) jointly have a significant effect on explaining the

variance in the dependent variable (enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district). The findings are supported by El-Khatib and Bouaziz (2022) noted that Agile project management as an innovative approach centred on continuous improvement and stakeholder collaboration. They emphasize that Agile project management replaces traditional linear processes with iterative cycles, promoting transparency and fostering a shared understanding among project participants. This characteristic makes Agile project management particularly effective in addressing the dynamic needs of stakeholders.

Table 8 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.512	.147		3.482	.001
	Agile communication	.308	.079	.341	3.898	.000
	Agile engagement	.405	.095	.421	4.263	.000
	Agile motivation	.180	.082	.192	2.195	.030

a. Dependent Variable: Stakeholder collaboration

Table 8 presents the coefficients for the regression model predicting stakeholder

collaboration in the streetlight-powered project at Kirehe district. The constant term

has an unstandardized coefficient (B) of 0.512 with standard error of 0.147 ($P=0.001<0.05$).

According to predictor, each of them designates statistically significant relationships with enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district. Specifically, for every-one unit increase in agile communication approach, there is a 0.308 unit increase in enhancing stakeholder collaboration in the streetlight-powered project. Similarly, agile engagement approach shows a positive effect, with 0.405 unit increase in enhancing stakeholder collaboration in the streetlight-powered project the for every-one unit increase agile engagement approach. Lastly, for every-one unit increase in agile motivation approach, there is a 0.180 unit increase in the enhancing stakeholder collaboration in the streetlight-powered project.

Hypotheses testing

The null hypothesis that H_01 : There is no significant effect of Agile Communication on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district, ($p=0.000<0.05$), therefore, this null hypothesis is rejected; the hypothesis that H_02 : There is no significant effect of Agile Engagement practices on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district, ($p=0.000<0.05$), therefore, this null hypothesis is rejected. Lastly, the null hypothesis that H_03 : There is no significant effect of Agile Motivation on enhancing stakeholder collaboration in the streetlight-powered project at Kirehe district, ($p=0.000<0.05$), therefore, this null hypothesis is rejected.

CONCLUSION & RECOMMENDATIONS

Conclusion

This study aimed to explore the influence of Agile project management approach on stakeholder collaboration, specifically in the Streetlight Powering Project in Kirehe District, Rwanda. The research focused on the effect of agile communication, engagement, and motivation approaches on stakeholder collaboration in the streetlight-powered project.

The objective one was to evaluate the effect of agile communication approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. In this wise, the study concludes that there is an effect of agile communication on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Further, the objective two was to analyse the effect of agile engagement approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. In this regard, the study concludes that there is an effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Moreover, the objective three was to examine the effect of agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. In this wise, the study concludes that there is an effect of agile motivation strategies on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

Recommendations

The objective one was to evaluate the effect of agile communication approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. In this wise, the study concludes that there is an effect of agile communication on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district.

However, the study recommends that project managers should use agile communication approach for regular and open dialogue among team members to foster collaboration and ensure alignment on project goals.

Further, the objective two was to analyse the effect of agile engagement approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. In this regard, the study concludes that there is an effect of agile engagement on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. However, the study recommends that project managers should use agile engagement approach for fostering collaboration among team members and stakeholders to enhance communication and ensure alignment with project goals.

Lastly, the objective three was to examine the effect of agile motivation approach on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. In this wise, the study concludes that there is an effect of agile motivation strategies on enhancing stakeholder collaboration of the streetlight-powered project at Kirehe district. However, the study should use agile motivation approach for aligning team goals with individual motivations to enhance engagement and productivity.

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