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AGILE PROJECT MANAGEMENT PRACTICES AND PERFORMANCE OF TELECOMMUNICATION INFRASTRUCTURE PROJECTS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Project managers and organizations seek to adopt varying project methodologies and practices to achieve the best outcomes in tandem with emerging issues and challenges. This study examined the effect of agile project management practices on performance of telecommunication infrastructure projects in Nairobi City County, Kenya. It sought to examine the effect of value-based work prioritization, and iterative development on performance of telecommunication infrastructure projects in Nairobi City County, Kenya. The study was anchored on the following theories: Scrum theory, utility theory, Complexity Theory, and Theory of Change. This study adopted a descriptive research design. The target population for the study was 123 project managers and field engineers. A sample size of 94 respondents drawn from the target population was used. Stratified random sampling was employed to select respondents. The study collected primary data by means of questionnaires. The pilot study was done in Nairobi County where the researcher administered the questionnaire to 9 respondents from the 3 randomly selected telecommunication projects. These respondents were not included in the final study. From the pilot study, the results showed that the internal consistency of the variables was above the accepted 0.7 value. Thus, the instrument was reliable. Based on the output of Pearson's correlation, p-values obtained from the dependent variable and predictors were less than 0.05. Hence, it was concluded that there was a significant relationship between the independent and dependent variables and that they were valid. From the findings, the tolerance for all the variables was more than 0.1 and the VIF less than 5; therefore, there was no need for further investigations to assess for multicollinearity. Based on the output of the One-Sample Kolmogorov-Smirnov Test, the p-value on value-based prioritization was 0.20, the Agile project team was 0.20, iterative development was 0.20, and agile quality management was 0.20, and it was concluded that the data of all the variables were normally distributed since the p-value is more than 0.05. The Scatterplot output indicated that the spots were diffused and did not form a clear specific pattern. Thus, it was concluded that the regression model did not have a heteroscedasticity problem. Finally, the Durbin-Watson test reported a test statistic, with a value that showed a value of 2.277, denoting the absence of autocorrelation. The regression analysis revealed significant beta coefficients for each variable, indicating their unique impact on the performance of telecommunication infrastructure projects in Nairobi City County, Kenya. Specifically, value-based work prioritization ($\beta = 0.341$, $p < 0.05$), iterative development ($\beta = 0.524$, $p < 0.05$), showed positive associations with project performance. These findings suggest that incorporating these practices into project management frameworks can improve project outcomes. Therefore, the study recommends that organizations prioritize value-driven approaches, foster agile team structures, implement iterative development processes, and emphasize agile quality management practices to enhance the performance of telecommunication infrastructure projects in Nairobi City County, Kenya.

Key words: Value-Based Work Prioritization, Iterative Development, Performance

Background of Study

A project is a sequence of unique, complex, and connected activities with one goal or purpose that must be accomplished by a specific time, within a given budget, and according to certain specifications (Project Management Institute, 2021). The project management process involves thorough planning, organising, monitoring, and controlling all the different aspects of the project to ensure that it is carried out in the desired time, under well-defined and accounted-for costs, and with above-optimum performance (Gray & Larson, 2021). Due to the complexity of the variables relevant to project performance, project managers must do a balancing act to ensure optimal and strategic use of the project management practices. According to empirical research by Gemino et al. (2021), the chosen methodology determines the project's positive or negative outcome. Project management practices refer to the set of procedures that an organization adheres to throughout the entire project lifecycle, from the initial stages of project initiation to the final stages of project implementation (Tereso et al., 2019).

In the realm of project work, there are two distinct categories of projects: definable and high uncertainty. Definable work is characterised by well-established protocols, clear procedures, and minimal risk. Conversely, high-uncertainty work is more exploratory in nature, carries a higher degree of risk, and necessitates collaboration (PMI, 2017). Definable work such as production, is getting more automated, meaning project teams are undertaking more high-uncertainty work projects to solve problems and design solutions in areas like engineering and science. These projects are known for their complexity and frequent changes (Singoei, 2021). To manage the dynamic nature and intricate details of high-uncertainty projects, agile approaches are often employed.

Originating from software development, agile as a methodology was formulated to address gaps that traditional approaches could not solve in complex projects. Through empirical results, it has developed into a mainstream methodology beyond software development (Chelangat & Karanja, 2019). Agile methodology is defined by the ability to adapt and rapidly change while dividing the work into distinct iterations throughout the project (Gemino et al., 2021). As a framework, agile values individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (PMI, 2017). The Agile framework involves a departure from the traditional/waterfall approach, which follows a linear project lifecycle. The waterfall approach is plan-driven and relies on predetermined, detailed, and mandatory roles, deliverables, and processes. In this approach, project managers are expected to adhere to these predetermined procedures as closely as possible. In contrast, agile project management (APM) is focused on iterative and incremental work that involves collaboration, continuous releases, and incorporation of customer feedback. Due to its flexibility, APM promotes rapid adaptation to changes within the project, with the project team acting autonomously using shared resources (Garzon et al., 2019).

The agile project management approach is still a novel practice for most organizations but is becoming increasingly popular worldwide (Muhammad et al., 2021). Many organizations around the world are currently undergoing significant transformations as a response to the varying needs of their customers, unpredictable market demands, intense competition, and disruptive technologies (Getyengana, 2020). Forbes Insights and Scrum Alliance (2018) discovered that globally, 77% of leading organizations leverage agile methodologies to support digital transformation and drive growth in a rapidly changing market. Organisations that successfully adopt agility record faster time to market (60%), faster innovation (59%), improved customer experience and product quality (58%), and improved employee morale (57%). Such benefits have been realized on a global scale, from Asia-Pacific to the Middle East.

The report from IQ Business (2021) regarding the state of agile in Africa reveals a shift in the

continent towards agile's collaborative, people-focused and accelerated product delivery approach, particularly within the financial service sectors. However, traditional business models and unprepared leadership communities for modern challenges still exist in Africa, as is the case in other parts of the world. Additional challenges include traditional organizational and political culture, lack of executive sponsorship and commitment, an Agile skills gap, managerial apathy, and organizational resistance to change. IQ Business (2021) findings indicate that agile adoption in Africa is progressing and expanding in both IT and non-IT sectors, with scrum being the most used framework by 71% of the respondents sampled. According to a survey conducted in 2021, 94% of the respondents have experience with agile. Out of these, only 27% claim to be fully agile while 63% stated that they are still on their journey to becoming more agile. The data shows an improvement compared to 2020, where only 21% claimed to be fully agile (IQ Business, 2021). This suggests that agile maturity may be increasing on the continent.

In Uganda, Swinnerstone and Lubega (2019) examined the effect of agile methodology on the success of software development projects, concluding that using agile methodology improves the success of those projects. Bigirumwami, Wafula, and Mwangi (2023) carried out research in Rwanda and found that agile project management practices positively influence project performance. Moloto, Harmse, and Zuva (2021) investigated the influence of agile methods on project performance in the South African banking sector and found that agile practices such as iterative delivery and reduced upfront planning positively influence project performance. However, the diverse business environments in Africa pose a hidden challenge to agile adoption and can affect the willingness to adopt agile methodologies (IQ Business, 2021).

In recent years, agile methodologies have gained popularity in Kenya to combat the high rate of project failures (Chelangat & Karanja, 2019). Singoei (2021) found that scrum is the most adopted agile methodology in Kenya by insurance firms, used by 39% of the respondents. Ndung'u (2020) conducted a study at Safaricom that delved into the impact of agile marketing on brand equity, revealing that the company has successfully implemented key agile practices like user stories, sprints, and iterative delivery as part of their agile techniques. This performance has resulted in a positive relationship with their customers. Safaricom's use of APM has created a consistent and ongoing channel for customer feedback. Furthermore, their adoption of iterative delivery has allowed the company to be proactive by reducing time-to-market. Namatsi & Muchelule (2021) studied the impact of agile project management methods on project success at Safaricom and determined that team training and project monitoring processes positively influence project success. A case study to investigate the effect of agile project management techniques on the performance of publicly funded projects of Kenya Urban Roads Authority (Bii & Kamaara, 2018) found that resource mobilization, stakeholders' participation and project team competence had a positive and significant relationship with project performance. Whereas most of these studies are in agreement as to the positive impact of agile project management on project performance, only a few variables carried out in this study have been explored in Kenya by scholars.

Statement of the Problem

Telecommunication infrastructure projects are within the infrastructure construction domain and are, therefore, complex and require flexibility (Lalmi et al., 2021). Regulated by the CAK, Kenya's telecommunication sector continues to grow exponentially, evidenced by the rise in mobile connectivity from 37% to 49.6% between 2014 and 2019 (Syekei et al., 2021). To support this consumer demand, there has been a significant increase in infrastructure coverage in Kenya (Institute of Economic Affairs, 2021). The telecommunication sector, as part of the ICT sector, is a significant contributor to the GDP of Kenya (Mwaniki & Anene, 2023), and there is potential for even further growth of the sector due to the liberalization measures enabled by the government due to global technological advancements and population growth.

Rapidly changing strategies, flexible project scope, desire for quicker project turn-around periods, and shifting project milestones are some of the issues project managers in the telecommunication industry currently deal with (Akhwaba, 2020). According to PMI (2021), 26% of projects in the telecommunication industry do not meet their intended goals while 11% are deemed as failures. In comparison, a similar percentage of projects in the construction industry do not meet their goals while 12% are deemed as failures. Lakmeeharan et al. (2020) state that 80% of infrastructure projects in Africa fail at the initiation and planning stages, with poor project delivery being one of the root causes. Ochuodho (2021) avers that over 70% of ICT projects fail in Kenya due to budget overruns, schedule delays, and resource depletion.

With projects becoming increasingly volatile and subject to frequent changes, traditional prescriptive and standardized project management processes are no longer effective (Ali et al., 2021). Many studies have been carried out to investigate the effectiveness and applicability of agile methodology in different sectors. These studies have empirically demonstrated that agile methodologies positively influence project performance (Chathuranga et al., 2023; Diepersloot, 2019; Masia & Poll, 2021). This has been observed both in Kenya (Chelangat & Karanja, 2019) and the rest of the world (Ali et al., 2021). Can agile project management be the solution to the reported high failure rate of telecommunication infrastructure projects and address the existing research gap in Kenya? This is the objective of this study.

General Objective

The general objective was to examine the effect of agile project management practices on performance of telecommunication infrastructure projects in Nairobi City County, Kenya.

Specific Objectives

The specific objectives of this study were to:

i. To determine the effect of value-based work prioritization on performance of telecommunication infrastructure projects in Nairobi City County, Kenya.

ii. To examine the effect of iterative development on performance of telecommunication infrastructure projects in Nairobi City County, Kenya.

Theoretical Literature Review

A theory is a collection of interconnected constructs, definitions, and propositions that collectively give a comprehensive explanation of phenomena (Taylor, 2014). The study will be anchored on the following theories: Scrum theory, Complexity Theory.

Scrum Theory

The Scrum theory was developed by Ken Schwaber and Jeff Sutherland in 1995. The scrum concept originated from Takeuchi and Nonaka (1986) who observed that successful product development mirrored the flexible and adaptive nature of rugby, which led them to coin the term "Scrum" to describe this approach. They advocated that product development should be analogous, with the team working together towards a common objective, rather than following a structured sequential approach. Scrum is a flexible and adaptable framework for contemporary project management (SCRUMstudy, 2022). Schwaber (1997) formalized the scrum framework and developed a systematic approach for software development.

Agile teams embrace change as an opportunity to deliver better projects and aim for regular and consistent delivery of results. Agile teams regularly reflect on their processes and performance to identify areas for improvement, allowing for continuous learning and growth towards producing

quality outputs (Muhammad et al., 2021). They break down projects into small increments with minimal viable functionality, allowing for continuous improvement and adaptation to changing requirements (Diepersloot, 2019). By evaluating how agile project teams in telecommunication infrastructure projects in Nairobi City County applied Scrum theory's principles and practices, it was possible to assess the direct impact on project performance. This assessment helped identify strengths, areas for improvement, and the overall effectiveness of utilizing Scrum within these projects.

Complexity Theory

According to (Mitchell, 2009), a complex system is a decentralized system which consists of networks of simple components that collectively exhibit complex behaviour, information processing, and adaptive capabilities. These systems often exhibit emergent properties, which arise because of interactions between the individual components and can be further shaped by learning or evolutionary processes. Complexity Theory offers an interdisciplinary methodology for comprehending complex systems, wherein the correlation between components is non-linear and often uncertain. Dao et al. (2016) posit that Complexity theory explains how systems with multiple interacting elements spontaneously organize themselves into elaborate structures over time. A project is made up of various interconnected elements that are subject to unpredictable changes, making it a complex system. Although specific deliverables are expected upon completion, complexity theory suggests that the outcomes can be unpredictable and chaotic (Menon, 2019). In agile, this theory is crucial because it acknowledges that outcomes in complex environments, such as telecommunication infrastructure projects, are inherently uncertain and unpredictable. Therefore, a traditional deterministic approach to project management is ineffective.

Complexity theory posits that fully predicting or controlling complex systems is not possible. Agile methodologies align with this fundamental principle, employing an iterative and incremental approach. Instead of attempting to predict the entire project outcome upfront, agile embraces the complexity of the project by breaking it into small, manageable iterations. Each iteration enables continuous feedback, learning, and adaptation based on the evolving project landscape. Iterative development is closely aligned with Complexity Theory as it recognizes that complex projects are inherently unpredictable. This approach is a practical application of Complexity Theory, which suggests that the most effective way to navigate complex systems is through iterative experimentation and adaptation (Callaghan, 2022).

Theory of Change

Ruesga (2010) describes the theory of change as a theoretical framework that facilitates the planning, implementation, and evaluation of change at the individual, organizational, or community level. Every project has specific assumptions and hypotheses about how the change will happen. Identification of which assumptions are relevant to a particular theory of change for a specific project can be a challenge (Church & Rogers, 2006) and in some cases impossible to decide which of all possible beliefs and assumptions will be critical to successfully implementing change (Ruesga, 2010). The theory of change assumes that actions taken in a project are purposeful. Considering its context, it articulates that such actions will influence intended change outcomes. Lederach et al. (2012) bring to the fore the element of dimensions of change relating to four dimensions of conflict: personal, relational, structural, and cultural.

Theory of change approaches can be viewed as existing within a continuum in which the far-left Theory of change is technically understood as a precise planning tool. In the middle exists the less formal thinking of how the project is expected to turn out, while political literacy can be thought to exist at the far right. The use of theories of change enhances project clarity, rigour, transparency, and targeted outcomes while enabling constructive reviews and adjustments (CARE International,

2012). This theory can not only be used to plan a project from the start, but it can still be helpful when the project is underway to evaluate whether the project is achieving the intended purpose or not and to determine the detriments for change in case the project is not achieving the set objectives (Weiss, 1995). As a framework that helps to outline the assumptions that inform the selection of interventions to achieve a lasting impact, this theory aims to clearly articulate these assumptions and outline intermediate steps needed to achieve long-term goals (Taplin & Clark, 2012)The theory of Change incorporates agile's flexibility to scope changes and make necessary modifications according to actual outcomes in the real world. This cements the theory's influence on the agile principle of continuous improvement and, therefore, its quality practices.

Conceptual Framework

Independent variables are the causative agents that bring about the change, while dependent variables are the outcomes/results realised upon the independent variables' action. A conceptual framework is formed by integrating interconnected concepts to elucidate a particular occurrence or comprehensively comprehend a specific phenomenon (Imenda, 2014).

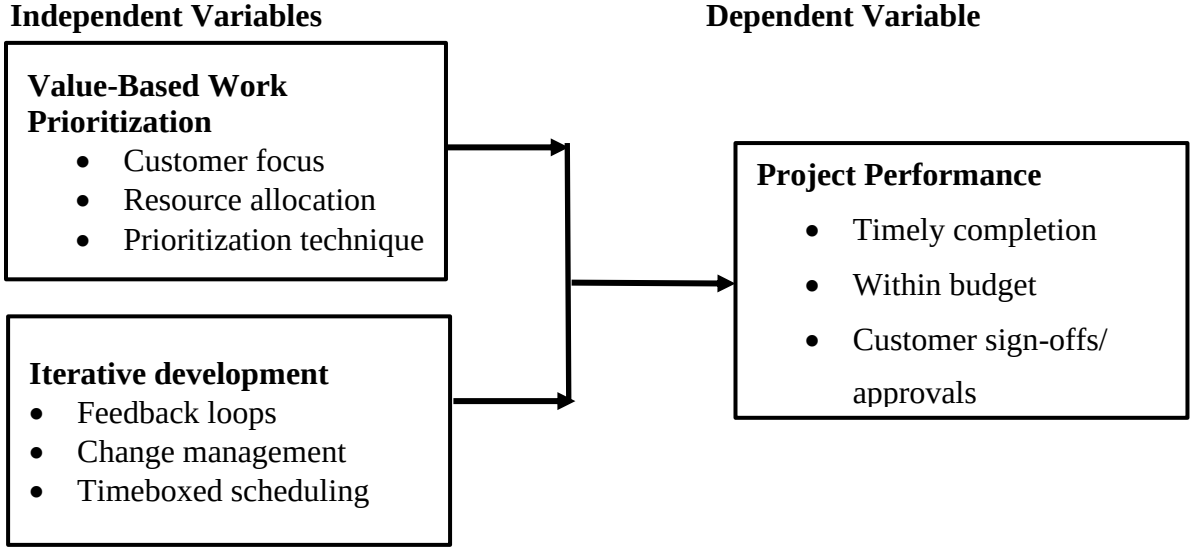

Figure 1: Conceptual Framework

Value-based prioritization in projects involves determining the relative importance or worth of various project components, tasks, or features based on their potential value to the project's success or objectives. It focuses on maximizing the delivery of value by allocating resources, time, and effort to the most crucial and impactful element. The agile framework is designed to maximize business value within the shortest timeframe possible. Prioritization is a vital tool in achieving this objective. It involves distinguishing between tasks that must be completed immediately and those that can wait (SCRUMstudy, 2022). While prioritization is not a new concept in project management and is utilized in traditional Waterfall models, APM employs value-based prioritization as a fundamental principle to encourage adaptability and iterative development. The product owner prioritizes user stories based on relevance and collaborates with stakeholders to identify critical requirements for the product backlog. This approach ensures consistent delivery of high-quality products or services to customers (Ambler & Lines, 2012).

The term "iteration" pertains to revising or repeating project tasks. Revision arises from mistakes made during development, while repetition is due to the introduction of fresh information. Repetition involves the performance of the same task, but at a different level of detail; the substance of the data has evolved. The iterative process empowers managers to modify their

tactical decisions while developing and facilitating smoother adaptation to shifting project demands. Agile projects employ rapid and iterative sprints to incorporate feedback from customers on each deliverable. The sprint retrospective process is utilized by the agile team to evaluate the successes and shortcomings of the previous sprint. This enables the project manager to collaborate with the team and enhance their efforts for the upcoming sprint (SCRUMstudy,2022).

Project performance is a necessary indicator of the success of the project. Project performance determines the achievement of a project and is often based on how complex the project is, what and how the arrangements and settings were carried out in contracting, how the parties involved relate to each other, the specific skills of the project manager and how capable are the other parties involved (Stevens, 2016). With proper implementation of management practices, the project performance can be determined in terms of quality, the time spent, resources used and whether it achieved the set objectives and touched on the user's needs. The project's successful and stellar performance is reached when the parties involved achieve their targets, whether they do so as individuals or as a group (Atkinson et al., 2019).

RESEARCH METHODOLOGY

The study adopted a descriptive research design. A descriptive research design constituted a conceptual framework that facilitated accurate predictions through data analysis, enabling researchers to draw meaningful conclusions from the findings. This type of research described "what existed" regarding the relationship among variables (Garg and Kothari, 2014).

The target population for the study was 123 key personnel working on the 16 key telecommunication infrastructure projects carried out in Nairobi City County by companies registered as network facilities providers in tier one and tier two by the Communications Authority of Kenya (2023) between 2021 and 2023, as listed in appendix III.

The sampling consisted of 123 project managers and engineers/developers who were working on the 16 key telecommunication projects within the designated time frame and were conducted by registered network facilities providers in Nairobi City County. This frame ensured that the sample drawn for the study adequately represented the characteristics and experiences of the broader population for valid inferences and meaningful research outcomes.

Stratified random sampling was employed to select respondents because the projects and respondents under the study were not homogeneous. The essence of stratification was to ensure inclusion in the sample of each subgroup, which otherwise would have been omitted entirely by other sampling methods because of their numbers. The strata comprised project managers and engineers.

Sample size for this study was determined using Cochran's modified formula for finite populations as follows (Ionas, 2019):

$$n = \frac{z^2 pq}{e^2}$$

Where,

- z= confidence level at 95% (1.96 standard value),
- p= the estimated proportion of individuals in the target population who possess the characteristics being measured.
- q=1-p
- e= level of statistical significance

z = 1.96, p = 0.5 = q, and e = 0.05

$$n = \frac{1.96^2}{4(0.05^2)} = 385$$

$$n_{Adj} = \frac{385 * 123}{385 + 123} = 93.2 = 94$$

The sample size was 94 respondents. The respondents were allocated to various categories according to their relative sizes in the targeted population using the following formula:

n h =(N h /N) x n

n h = Sample size of stratum h

N h = population size of stratum h

N = total population size

n = total sample size

The study collected primary data using questionnaires, which are widely recognized as practical and effective data collection instruments given their applicability and practicability to the research problem at hand and the size of the population under investigation. Questionnaires were administered to the respondents via KoboToolbox, and key informant interviews were conducted with the project managers of these projects.

Pilot studies play a vital role in identifying potential issues and limitations that may arise during the full-scale study. For this pilot study, the questionnaire was administered to 9 respondents. These respondents were not included in the final study. Validity of the questionnaire was conducted using Pearson Product Moment Correlations using SPSS. The validity test Product Moment Pearson Correlations was done by correlating each item questionnaire scores with the total score. The item-item questionnaire that significantly correlated with the total score indicates that the items are valid. If the significance value is greater than 0.05, then the instrument is declared invalid, and if the significance value is less than 0.05, then the instrument is declared valid. Reliability analysis was conducted using Cronbach's alpha to determine whether the data gathered on each variable had a significant relationship with project implementation (Sekaran & Bougie, 2016)Reliability was assessed by the extent to which the results were consistent over time and accurately represented the total population under study.

The data was analysed quantitatively to draw meaningful insights and conclusions. This was aimed at determining whether the data adequately represented the theoretical relationships highlighted in the chapter on literature review in this research. To determine relationships, it was essential to use reliable statistical data analysis software and tools. These tools helped to develop valid variable measurements that were then used to test the hypothesized relationships. IBM SPSS Statistics (ver 26) was used in this study.

Data was gathered, coded, and grouped into various segments to encourage better assessment. Linear regression models were adopted to show the significance of each independent variable.

FINDINGS AND DISCUSSIONS

The study selected a sample of 94 project managers and engineers/developers working on the 16 key telecommunication infrastructure projects carried out in Nairobi City County by companies registered as network facilities providers in tier one and tier two by the Communications Authority of Kenya between 2021 and 2023. Out of the 94 questionnaires distributed, 89 were completed and returned, representing a response rate of 94.7%. The response rate achieved in this study exceeds the 50% threshold that Dillman et al. (2014) recommended, indicating suitability for

robust data analysis and reporting while surpassing the 70% benchmark classified as exemplary (Singer & Ye, 2013).

Pilot Test Results

The piloting was done in Nairobi City County. The pilot sample consisted of 9 randomly selected respondents and will not be included in the study. This represents 10% of the study sample based on the study sample size of 94 respondents. To test for the reliability of the instrument Cronbach's Alpha was used. The results were as indicated in table 1.

Table 1: Reliability Results

Variable	Number of Items	Cronbach Alpha Value	Decision
Value-based work prioritization	7	0.846	Reliable
Iterative development	5	0.767	Reliable
Project Performance	6	0.868	Reliable

From the results, Cronbach's alpha for the variable value-based work prioritization was 0.846, iterative development was 0.767, and project performance was 0.868. This showed that the internal consistency α alpha was above the accepted 0.7. This implied that the internal consistency of the instrument was reliable.

Factor analysis was adopted to ascertain the validity of the data collection instruments. This study considered factor loadings of 0.50 and above as the threshold for interpretations. A low value for communality, less than 0.50, indicates that the variable does not fit well with the other variables in its component and is undesirable, according to Khoi (2017). The results are shown in Table 2.

Table 2: Factor Analysis for all Variables

Variables	Average Variance Extracted	No. of Items	Comment
Value-based work prioritization	.795	7	All items were accepted
Iterative development	.788	5	All items were accepted
Project Performance	.746	6	All items were accepted

The results show that Value-based work prioritization had an average variance extracted (AVE) value of 0.795, Iterative development had an AVE of 0.788, and Project Performance had an AVE of 0.746. These findings showed that factor loadings were above the threshold of 0.50 adopted by the study, which implied that all the constructs were suitable for further analysis.

Descriptive Statistics Analysis

Project Performance

The general objective was to examine the effect of agile project management practices on performance of telecommunication infrastructure projects in Nairobi City County, Kenya. Respondents were therefore asked to indicate their level of agreement or disagreement with the statements about the performance of telecommunication infrastructure projects in Nairobi City County. Table 3 presents a summary of the findings obtained.

Table 3: Descriptive Analysis on Project Performance

Project Performance	Mean	Std. Dev.
The customer/user was satisfied with the project and signed off	3.957	0.668
The project was completed within required timelines	3.888	0.574
The project utilized results-based management to ensure effectiveness and impact.	3.881	0.637
The project output/product conformed to the quality standards & approved designs	3.879	0.683
The project was completed within planned budget & cost	3.855	0.874
The project met the intended objectives set at the initial stages	3.839	0.627
Aggregate Score	**3.883**	**0.677**

The study findings showed that the respondents agreed that the customers/users were satisfied with the project and signed off (M= 3.957, SD= 0.668); that the project was completed within required timelines (M= 3.888, SD= 0.574); and that the project utilized results-based management to ensure effectiveness and impact (M= 3.881, SD= 0.637). The respondents further agreed that the project output/product conformed to the quality standards and approved designs (M= 3.879, SD= 0.683); that the project was completed within the planned budget and cost (M= 3.855, SD= 0.874); and that the project met the intended objectives set at the initial stages (M= 3.839, SD= 0.627). The findings are supported by an aggregate mean of 3.883 (SD= 0.677) showing that the respondents were in agreement with all the items of project performance. This finding is consistent with the research conducted by Cristal, Wildt, and Prikladnicki (2008), who observed incremental improvements in project outcomes resulting from the adoption of agile practices within a global software development company. Agile methodologies facilitate more frequent software builds and refined testing processes, thereby enhancing project efficiency and effectiveness.

Value Based Work Prioritization

The first objective of the study was to examine the effect of value-based work prioritization on performance of telecommunication infrastructure projects in Nairobi City County, Kenya. Respondents were therefore asked to indicate their level of agreement or disagreement on various statements on value-based work prioritization. Table 4 presents a summary of the findings obtained.

Table 4: Descriptive Analysis on Value Based Prioritization

Value Based Prioritization	Mean	Std. Dev.
Neglecting feedback loops diminished project adaptability and stakeholder alignment	3.999	0.881
The project work was prioritized based on value to the customer	3.991	0.736
The customer/user had a dedicated representative during team meetings	3.961	0.907
The customer started getting value while the project was still on-course, not only at completion	3.942	0.708
Changes advocated by the client/customer were prioritized and almost always implemented	3.937	0.800
The resources for the project were allocated based on value	3.888	0.599
The project team utilized a prioritization technique (e.g Kano & MoSCoW) to determine the order in which tasks were carried out	3.629	0.714
Aggregate Score	**3.907**	**0.764**

The findings show that the respondents agreed that neglecting feedback loops in value-based work

prioritization diminished project adaptability and stakeholder alignment (M= 3.999, SD= 0.881); that project work was prioritized based on value to the customer (M= 3.991, SD= 0.736); and that customer/user had a dedicated representative during team meetings (M= 3.961, SD= 0.907). They were further in agreement that the customer started getting value while the project was still on course, not only at completion (M= 3.942, SD= 0.708); that the changes advocated by the client/customer were prioritized and almost always implemented (M= 3.937, SD= 0.800); that the resources for the project were allocated based on value (M= 3.888, SD= 0.599); and that the project team utilized a prioritization technique to determine the order in which tasks were carried out (M= 3.629, SD= 0.714).

The aggregate mean value of 3.907 (SD= 0.764) shows that the respondents agreed that value-based work prioritization affects the performance of telecommunication infrastructure projects in Nairobi City County, Kenya. This aligns with the research conducted by Azar, Smith, and Cordes (2007), who demonstrated the effectiveness of value-oriented prioritization in balancing conflicting enhancement requirements within development organizations. By prioritizing work based on strategic values, stakeholders are engaged in constructive discussions that streamline decision-making and enhance project outcomes. Moreover, the findings resonate with the study conducted by Wong, Olanrewaju, and Lim (2021), which identified critical success factors, such as responsiveness to needs and innovative practices, that significantly contribute to improving service delivery in hospital maintenance. The integration of value-based practices not only enhances project prioritization but also ensures alignment with strategic objectives, ultimately driving performance and success in telecommunication infrastructure projects.

Iterative Development

The second objective of the study was to examine the effect of iterative development on performance of telecommunication infrastructure projects in Nairobi City County, Kenya. Respondents were, therefore, asked to indicate the extent to which they agree or disagree with the given statements about iterative development. Table 5 presents a summary of the findings obtained.

Table 5: Descriptive Analysis for Iterative Development

Iterative Development	**Mean**	**Std. Dev.**
Feedback loops were utilized in our telecommunication infrastructure projects.	3.857	0.607
The company/department had a robust change management system that the project team utilised.	3.811	0.925
Insufficient integration of knowledge management systems or tools caused difficulties in accessing relevant information.	3.726	0.884
Timeboxing was practised during the project to schedule activities.	3.7	0.81
Project team members were encouraged to make changes to the designs frequently based on feedback	3.659	0.853
Aggregate Score	**3.751**	**0.816**

The findings show that respondents agreed on average that feedback loops were utilized in their telecommunication infrastructure projects (M= 3.857, SD= 0.607); that the company/department had a robust change management system that the project team utilized (M= 3.811, SD= 0.925); and that insufficient integration of knowledge management systems or tools caused difficulties in accessing relevant information (M= 3.726, SD= 0.884). They further agreed that timeboxing was practised during the project to schedule activities (M= 3.7, SD= 0.81) and that project team members were encouraged to make changes to the designs frequently based on feedback (M=

3.659, SD= 0.853). The findings supported by an aggregate mean of 3.751 (SD= 0.816) show that respondents agreed on average that iterative development affects the performance of telecommunication infrastructure projects in Nairobi City County, Kenya. This aligns with the research conducted by Wang and Liu (2020), who emphasized the importance of incorporating uncertain design iterations in project scheduling to evaluate the risk of completion durations accurately. By developing simulation-based models that consider uncertainties and iterations, organizations can effectively manage project schedules and mitigate potential risks, ultimately improving project performance.

Correlation Analysis

The study computed correlation analysis to test the strength and the direction of the relationship that exists between the variables. The correlation values range from 0 to 1; if the correlation values are r = ±0.1 to ±0.29, then the relationship between the two variables is small; if it is r = ±0.3 to ±0.49, the relationship is medium, and when r= ±0.5 and above there is a strong relationship between the two variables under consideration. Table 4.6 presents correlation analysis findings for this study.

Table 6: Correlation Analysis

		Performance of telecommunication infrastructure projects	Value-based work prioritization	Iterative development
Performance of telecommunication infrastructure projects	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	89		
Value-based work prioritization	Pearson Correlation	.692**	1	
	Sig. (2-tailed)	.000		
	N	89	89	
Iterative development	Pearson Correlation	.791**	.018	1
	Sig. (2-tailed)	.000	.098	
	N	89	89	89

The Pearson correlation coefficient between performance of telecommunication infrastructure projects and value-based work prioritization is 0.692, with a p-value of 0.000, indicating a strong positive correlation. This implies that as value-based work prioritization increases, the performance of telecommunication infrastructure projects also tends to increase significantly. This correlation suggests that prioritizing work based on strategic values leads to better project outcomes, aligning with the findings of Azar, Smith, and Cordes (2007), who demonstrated the effectiveness of value-oriented prioritization in enhancing project outcomes.

Moreover, the correlation between performance of telecommunication infrastructure projects and iterative development is 0.791, with a p-value of 0.000, indicating a strong positive correlation. This suggests that as organizations implement iterative development methodologies, the performance of telecommunication infrastructure projects tends to improve significantly. This correlation is supported by the findings of Wang and Liu (2020), who emphasized the importance of incorporating uncertain design iterations in project scheduling to enhance project outcomes.

Regression Analysis

The model summary was used to measure the variation in the dependent variable due to changes in independent variables. This study tested the amount of variation in the performance of

telecommunication infrastructure projects in Nairobi City County, Kenya, as a result of changes in agile value-based work prioritization, and iterative development.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.846[a]	.715	.702	.34754

a. Predictors: (Constant), Value-based work prioritization, Iterative development

The model summary indicates that the predictors, including value-based work prioritization, and iterative development, collectively account for a substantial proportion of the variance in the performance of telecommunication infrastructure projects, as reflected by the R Square value of 0.715. This suggests that approximately 71.5% of the variability in project performance can be explained by the combination of these predictors. The adjusted R Square value of 0.702, which adjusts for the number of predictors and the sample size, further confirms the robustness of the model.

The study used variance analysis to test the fitted model's significance, using a 5% confidence interval. Table 8 presents the findings obtained.

Table 8: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.477	2	6.369	52.636	.000[b]
	Residual	10.146	8	.121		
	Total	35.623	88			

a. Dependent Variable: Performance of telecommunication infrastructure projects
b. Predictors: (Constant), Value-based work prioritization, Iterative development

The ANOVA results reveal a significant overall relationship between the predictors—value-based work prioritization, and iterative development—and the performance of telecommunication infrastructure projects, as indicated by a highly significant F-value of 52.636 ($p < .001$). This suggests that the variation in project performance can be attributed to the combined influence of these predictors. Overall, these results confirm the significance of the predictors in explaining variations in project performance.

Table 9: Beta Coefficients of Study Variables

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.381	.268		5.153	.000
	Value-based work prioritization	.341	.085	.247	4.012	.000
	Iterative development	.524	.110	.571	4.764	.000

a. Dependent Variable: Performance of telecommunication infrastructure projects

The fitted regression model was as follows:

$$Y = 1.381 + 0.341\ X_1 + 0.524\ X_2$$

The beta coefficient value for value-based work prioritization is 0.341, with a p-value of .000, indicating a highly significant positive relationship with the performance of telecommunication infrastructure projects. Therefore, the study rejects the null hypothesis (H_{01}) that value-based work

prioritization has no significant effect on project performance in Nairobi City County, Kenya. This finding aligns with the research by Grigorenko (2020), which emphasized the effectiveness of value-based prioritization in enhancing project outcomes.

Moreover, the beta coefficient value for iterative development is 0.524, with a p-value of .000, indicating a highly significant positive relationship with project performance. Therefore, the study rejects the null hypothesis (H_{03}) that iterative development has no significant effect on project performance in Nairobi City County, Kenya. This finding is supported by the research by Wang and Liu (2020), which emphasized the importance of incorporating uncertain design iterations in project scheduling to enhance project outcomes.

Conclusions

The findings suggest that value-based work prioritization significantly impacts the performance of telecommunication infrastructure projects in Nairobi City County, Kenya. Organizations can enhance project outcomes and efficiency by aligning project tasks with strategic values and objectives. Therefore, the study conclude that effective value-based work prioritization positively and significantly contributes to project success, ensuring that resources are allocated efficiently and project goals are achieved in a timely manner.

The findings highlight the importance of iterative development in enhancing the performance of telecommunication infrastructure projects in Nairobi City County, Kenya. By embracing iterative approaches and integrating knowledge management systems, organizations can address project challenges more effectively and improve project outcomes. Therefore, the study conclude that effective iterative development positively and significantly contributes to project success, enabling organizations to adapt to changing project requirements and optimize project delivery processes.

Recommendations

Based on the findings, it is recommended that organizations involved in telecommunication infrastructure projects in Nairobi City County, Kenya, prioritize the adoption of value-based work prioritization practices. This can be achieved by developing clear criteria for prioritizing project tasks based on their strategic value and alignment with organizational goals. Additionally, organizations should invest in training programs to enhance employees' understanding of value-based prioritization principles and techniques. Moreover, fostering a culture of continuous feedback and collaboration among project stakeholders can further improve the effectiveness of value-based work prioritization. By prioritizing work based on value to the customer and strategic objectives, organizations can optimize resource allocation, enhance project outcomes, and improve overall project performance.

To improve the effectiveness of iterative development, organizations should focus on integrating knowledge management systems and tools to facilitate information sharing and collaboration among project teams. Additionally, organizations should invest in quality assurance mechanisms and workflow integration systems to ensure the smooth implementation of iterative development processes. Moreover, promoting a culture of continuous improvement and innovation within project teams can further enhance the effectiveness of iterative development. By addressing challenges such as insufficient integration of knowledge management systems and poor knowledge management strategies, organizations can optimize the iterative development process, improve project outcomes, and enhance overall project performance.

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