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AGILE METHODOLOGY AND IT PROJECT SUCCESS: THE ROLE OF EMPLOYEE ENGAGEMENT, ADAPTABILITY, AND CONTINUOUS IMPROVEMENT - EVIDENCE FROM NNPC LTD, NIGERIA

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Abstract

This paper explores the importance of employee engagement, adaptability, and continuous improvement on the association between Agile methodology and the success of the IT projects in the Nigerian National Petroleum Corporation Limited (NNPC Ltd), Nigeria. Although Agile practices are becoming a common practice in the emerging economies, there is scant empirical data on the effect of Agile methodologies on the outcome of projects. The research design was a quantitative survey design, and the data were gathered using structured questionnaires among 102 IT employees of NNPC Ltd Corporate Headquarters. Three hypotheses were tested by regression analysis at the level of significance of 0.05. The findings reveal that the engagement of employees ($\beta = 0.25$, $p = 0.04$), adaptability ($\beta = 0.12$, $p = 0.02$), and continuous improvement ($\beta = 0.40$, $p = 0.013$) have a significant and positive influence on the success of IT projects, with constant improvement having the biggest effect on the success. The article presents empirical data from an emerging-economy setting and emphasizes the need to promote engagement, flexibility, and the need to learn constantly to maximize the use of Agile.

Keywords: Agile Project Management, Employee Engagement, Project Performance, IT Project Success, Adaptability.

1. INTRODUCTION

The agile project management approach has received a lot of attention in information technology (IT) project management due to its adaptive and collaborative style of managing complex and dynamically changing projects. It is quite different from the traditional or waterfall approach, with its focus on an iterative development process, the constant participation of stakeholders, and the early provision of working software, which is especially important in the fast-paced and constantly changing world of information technology. Agile project management is more about flexibility and responsiveness to change, as it is treated (agile project management) according to [1], and since IT projects are unpredictable, solutions should be provided as per changing requirements.

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The IT projects were primarily managed under the traditional waterfall approach to IT project management, which emphasized strict planning, progressive development, and documentation before the Agile revolution. The given practice usually led to lengthy development cycles and failure to respond to the stakeholders' changing needs. In the early 2000s, the paradigm changed as the team of software creators developed the Agile Manifesto, which advocated a more flexible, collaborative, and iterative project management. This change focused on flexibility, partnership with customers, and change responsiveness instead of sticking to an already set course of action.

The ever-changing dynamics of software development and the necessity to respond swiftly to changes in the market promoted the massive spread of Agile practices like Scrum, Kanban, and Lean among people working in the IT industry. Companies started to state improved time-to-market, higher quality, better team spirit, and customer satisfaction, and more widely, Agile principles started to be accepted in the technology industry. Nevertheless, although it is increasingly being utilized worldwide, empirical studies indicate that IT projects have been uneven in their success.

According to the Standish Group CHAOS Report (2018), merely 31 percent of the IT projects are able to achieve time, cost, and scope goals, and 50 percent of them are put to the test, and 19 percent of the projects fail altogether [25]. Figure 1 illustrates these concerning statistics, highlighting that the majority of IT projects (69%) either face significant challenges or fail.

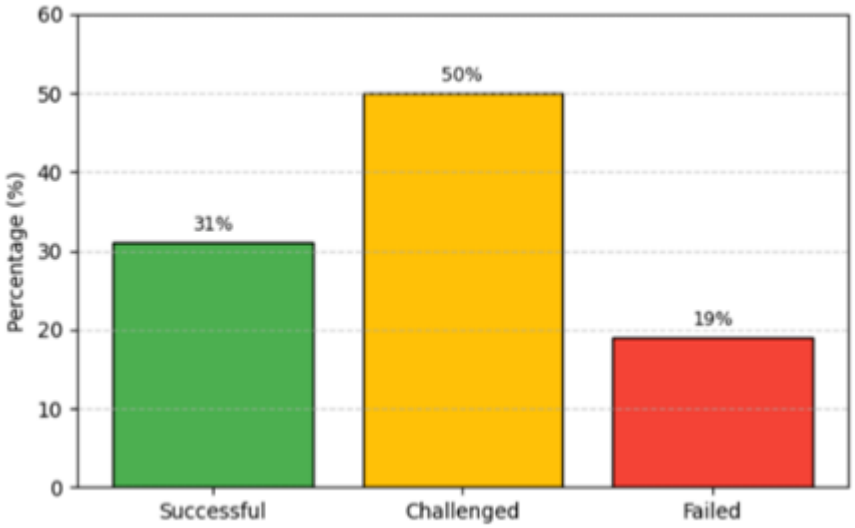

Figure 1: Global IT Project Outcomes (Standish Group CHAOS Report, 2018)

As illustrated in Figure 1, less than one-third of IT projects achieve complete success, underscoring persistent challenges in IT project delivery even in the contemporary era of widespread Agile adoption. Although studies indicate that Agile methodologies may enhance these results, their effectiveness is highly determined by contextual factors, including employee engagement, adaptability, and commitment of the leadership [2][3].

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In emerging markets such as Nigeria, the implementation of Agile experiences other setbacks, such as a lack of awareness, training, and company opposition. These issues also highlight the importance of empirical evidence studying the impact of particular Agile factors on project performance under the conditions of emerging economies.

Although research has been conducted on the adoption and application of Agile project management in an IT implementation and its resulting benefits and challenges, a significant gap in research remains still possible to determine the exact mechanisms by which the Agile methodology affects the success of a project. The special focus is required on such aspects as team dynamics, organizational culture, employee involvement, change adaptability, and constant improvement in non-Western cultures.

The main objective of this study is to evaluate the effect of Agile project management methodology on IT project performance in Nigeria, specifically within NNPC Ltd. The specific objectives are to:

1) Examine the effect of employee engagement on IT project success.
2) Investigate the influence of adaptability on IT project success.
3) Determine the contribution of continuous improvement to IT project success.

Based on these objectives, the following hypotheses were tested:

H_{01}: Employee engagement has no significant effect on IT project success.

H_{02}: Adaptability has no significant effect on IT project success.

H_{03}: Continuous improvement has no significant effect on IT project success.

In this research, the current understanding of how to manage the Agile project within the environment of developing nations is extended and offers a practical experience to the organizations that strive to make the projects more involving, flexible, and learning.

2. LITERATURE REVIEW

Agile methodology can be characterized by a beneficial impact on the performance of projects in a great number of domains. Its use, especially the application of the Scrum framework, has shown enhancement in the quality of the project and the value to the business [2].

The dynamic, complex, and fast-changing nature of the Information Technology (IT) environment dictates that project management approaches be central in defining the success and effectiveness of projects. Agile is a revolutionary methodology among the many that have been developed; it is marked by a high degree of flexibility, adaptability, and is iterative in nature. Agile methodology, which began in the sphere of software development, soon penetrated different spheres of IT project management. It is now responsive and participatory in nature and is in complete contrast to the old plan-driven ones. Agile methodology implementation creates challenges to the implementation of projects in the public sector because of the variation of conventional ways of funding, the

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ways of governing, and the ways of management practices, which disallow the comprehensive integration with the traditional systems [3]. Moreover, the implementation of Agile with Lean approach is not unchallenged, as the two concepts present distinct benefits in special situations or problems, based on the research results of the past studies [4]. Further research is thus required to study the impacts of Agile methodology on project performance in various contexts and to resolve the still-existing tension or conflicts during its usage.

The necessity to conduct additional studies addressing the impact of Agile methodology on the performance of the project in various settings and to find answers to the issues that have not been completely resolved regarding the use of the Agile methodology is becoming increasingly prominent [2]. The use of Agile methods like Scrum and Kanban has increased significantly in software development as these techniques have enabled them to provide high-quality output within a short period. Agile methodology encourages teams to be self-organizing, provide feedback continuously, and improve to keep the project moving and deliver on the demands of the client [5].

The latest literature confirms the main principles of Agile methodology, and now a more vigorous emphasis is placed on customer cooperation and dynamic planning. An example is [6], which addresses the improved application of iterative development to software projects to suit the fast-evolving requirements of users. It is also during the same era that the already existing models like Scrum and Kanban have evolved and been adjusted to accommodate remote and distributed teams [7]. Industry-specific Agile frameworks, such as healthcare and finance new models have also been introduced, as discussed by [8].

All these works reiterate that Agile methodology has developed to be more than software development to be a versatile framework that can be used in complex projects in various sectors. However, the majority of the current research is concentrated on small organizations and software companies, and there is little empirical evidence regarding the use of Agile in the public sector or in developing economies. It brings out the necessity to look at the role played by contextual variables like organizational structure, governance, and culture in determining Agile effectiveness.

The advantages of Agile, especially the flexibility, better quality of products, and the empowerment of teams, have been further supported in recent research. A thorough research undertaken by [9] establishes that Agile practices have a great impact on reducing the time and flexibility in project delivery in unpredictable market environments. The application of the Agile methodology, as present in case studies of industries like fintech and e-commerce, as discussed by [10], shows that it is an impetus towards innovation and quick response to the market.

Agile methodology has been demonstrated to be very flexible and relevant, as illustrated in the literature, and has the potential to influence project management practices even in the future. Agile methodologies have critics and challenges despite these positive attributes, especially in terms of scalability and their use in situations where the requirement is inflexible. Some papers, among which that of [11], cover the challenges in

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applying Agile to large businesses with well-established bureaucracies. Additionally, the misuse of the Agile principles has been cited by critics as well, which has led to the Agile in name only situation, as follows [12].

[13] in their study investigated the effects of Agile methodologies on software project management in Pakistani software companies. An extensive survey across 52 notable companies to explore how Agile approaches influence project management factors like schedule, scope, risk, budget, quality, and resources was employed. They found out that Agile methodologies, particularly Extreme Programming, Scrum, Kanban, and Agile Modelling, significantly contribute to the successful development of software projects. It was emphasized that the positive correlation of the quality factor with other project management aspects suggests that budget management is crucial for achieving desired project outcomes. Their research highlighted the unique impact of different Agile methodologies on managing project management factors and suggests further empirical investigation into their productivity and management effects.

[14] in his study explored the applicability and implications of Agile methodology in regulatory compliance projects within the financial sector. He contrasted Agile with traditional waterfall approaches, highlighting Agile's advantages in fostering autonomous problem-solving teams. This he did through a qualitative study involving semi-structured interviews. The research examines practical actions and success factors for implementing Agile in regulatory contexts. His findings suggest that Agile offers significant benefits over the waterfall method. Although agile faces challenges due to the strict and defined nature of regulatory compliance requirements. His study contributes to understanding how Agile methodologies can be adapted for complex regulatory projects, proposing a more flexible, iterative approach to compliance.

[5] explored how various Agile practices impact team communication, project requirements, and priorities in software development projects. Utilizing a survey methodology, it gathers data from individuals involved in Agile software development teams. The findings suggest that adopting a combination of Agile practices correlates with improved project outcomes, emphasizing that more extensive adoption of Agile practices can enhance communication within teams and with customers, thereby positively influencing project requirements and priorities.

[15] in their study investigated the transformation in project management practices resulting from the adoption of Agile and DevOps methodologies in software development. Their study discussed how Agile and DevOps methodologies impact scope, quality management, estimation, shared responsibility, automation, and feedback mechanisms within project teams. The study went ahead to propose a conceptual framework to further study these impacts and provided recommendations for sectors looking to adopt Agile and DevOps. They concluded in their study that Agile and DevOps significantly enhance project management practices and team structures. They, however, advocated further empirical research to explore these effects comprehensively. [16] in their study examined the influence of agile management practices on project performance within the IT sector of Pakistan. They considered the mediating role of project complexity and the moderating

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effect of leadership competencies. Some registered IT firms across various metropolitan areas in Pakistan were used for them. It was discovered that agile management practices can mitigate the negative impacts of project complexity on performance and that leadership competencies significantly enhance and influence project outcomes by effectively and efficiently managing project complexity. Their study contributed to the understanding of agile management's direct and mediated effects on project performance, highlighting the critical role of leadership competencies in agile environments.

In [17], the authors study the use and effect of Agile methodologies on conventional project management in governmental entities. It is about the shift towards conventional to Agile practices, and the increasing demand for flexibility and adaptability in the project management methods, especially in the post-pandemic period. The study identifies the potential utilization of Agile practices like Scrum and Kanban to fit conventional projects like construction and infrastructure projects, and improve the deliverables with better agility and responsiveness.

Similarly, [18] examines the use of Agile in software development, its benefits, and challenges. The paper gives an in-depth discussion of the effects of the Agile methodologies, such as Extreme Programming, Scrum, and the Dynamic Systems Development Method (DSDM), in project management aspects, such as planning, documentation, and the development process.

It also talks about the effects of Agile practices on other stakeholders, developers, testers, project leaders, and customers, and their implications on the type of project and organizational factors. The research concludes that, although Agile practices have significant benefits, including a high level of flexibility and responsiveness, they cannot be applied to every project and organization, as they should be adjusted to the specifics of the project and the organization.

[4] in their research, contrast Lean and Agile project management methodologies. They highlighted their origins, principles, and application areas. While lean originated from manufacturing and focuses on waste reduction and value maximization, Agile emerged from software development and emphasizes flexibility, customer satisfaction, and iterative progress. Their article discussed how both methodologies can be adapted and combined. This they illustrated through practical examples and case studies, ultimately suggesting that the integration of Lean and Agile approaches could enhance project management across various sectors.

[19] in their research explored the adaptation and effectiveness of Agile Project Management methodologies in the finance sector. They achieved this within a pioneering Libyan IT and financial services company. Their study aimed to demonstrate the positive impact of agile project management methodologies and best practices on project success, highlighting the transition from traditional services to electronic services through financial technologies.

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Their Study highlighted the enormous benefits, including enhanced project success, immediate advantages of adopting agile project management methodologies, and the crucial role of adopting these methodologies for successful project completion. [2] investigates the impact of Agile methodologies on IT project performance. A survey conducted among 404 IT professionals in India examines the correlation between Agile practices, specifically the Scrum framework, and project outcomes. The study finds that Agile methodology significantly enhances project performance, highlighting the importance of Scrum practices in improving project quality and business value. The research underscores Agile's potential in addressing the dynamic requirements of IT projects, advocating for its broader adoption within the industry.

[7] explores the challenges and benefits experienced by project managers during the transition from traditional to Agile Project Management (APM) within a financial institution in Cebu City. Utilizing qualitative research methods, including interviews with five project managers, the study reveals significant changes in project management approaches, highlighting increased agility, collaboration, and adaptability to changes. Despite the positive outcomes, the study identifies challenges such as scope creep, underestimated timelines, and inefficient workload allocation, offering recommendations for improving Agile implementation in similar organizational contexts.

[3] explores the dynamics of Agile methodology implementation within the context of a large IT program in the UK defence sector. Utilizing institutional logics as a theoretical framework, it examines the interplay between Agile practices and the institutional environment, focusing on the mechanisms of change and the tensions that arise.

The study reveals how Agile methodologies intersect with market, state, and corporate orders within the public sector, highlighting the role of professions in facilitating Agile adoption. It presents a nuanced understanding of Agile's impact on project management and organizational culture in the public sector, emphasizing the need for alignment between Agile practices and institutional logics to navigate challenges effectively.

Overall, although the literature provides a consistent demonstration of the benefits of Agile in its ability to improve flexibility, quality, and stakeholder satisfaction, the problems of adapting it to complex, bureaucratic, and resource-constrained environments remain. Little research has investigated the role of Agile within the context of developing nations or within institutions of the public sector, where structural and cultural barriers can potentially skew research findings. The current study thus fills this gap by conducting empirical research on the role of employee engagement, adaptability, and continuous improvement on the success of IT projects in the case of NNPC Ltd in Nigeria.

3. RESEARCH METHODOLOGY

3.1. Research Design

The study used a quantitative research design to evaluate empirical data collected through a questionnaire survey. The evaluation method was selected because it provides measurable, statistically analysable data, which is essential for confirming the research

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hypotheses. The quantitative design also facilitates wider generalization of the results, considering the fact that the data is a large and significant sample of the target population.

3.2. Population and Sampling

This study population was all the 1,200 employees of NNPC Ltd Corporate Headquarters (NNPC Ltd, 2024). Considering the thorough investigation of IT project management practices and the implementation of the Agile methodology, the census sampling was used, and the entire population of 102 employees in the IT department was considered. The study was conducted on all 102 IT staff members, and the response rate was 100 percent. The reason behind this census method was to cover all the IT personnel who are engaged in Agile project management at the organization, which will guarantee the classifications of all the IT personnel within the company are covered, thus removing sampling error and giving a clear vision of Agile practices within the department.

3.3. Instrument Development and Validation

The questionnaire had two significant parts. The former collected demographic data; the latter included Likert-scale questions on employee engagement, adaptability, continual improvement, and project success. The items were derived based on the existing Agile and project-performance measures [1][2] and tested by three subject-matter professionals on the content validity. The pilot test involving ten IT employees also found the questionnaire to be clear and internally consistent with a Cronbach's alpha of 0.81, which is considered to have a reasonable degree of reliability ($\alpha > 0.70$).

3.4. Data Collection Procedure

This was done before data collection, where informed consent was obtained and ethical approval was acquired. The questionnaires were sent electronically to all 102 employees in the IT department of NNPC Ltd. Respondents were assured of confidentiality and anonymity. The data collection time was four weeks whereby follow-up reminders were sent to get the maximum response rate. A response rate of 100 percent was obtained with all 102 questionnaires being filled and returned.

3.5. Data-Analysis Technique

The completed questionnaires were coded and analyzed with the help of SPSS version 28.0. The answer to the study objectives and the test of the hypotheses developed was provided by using the descriptive and inferential statistical procedures. Some of the tools that were used to indicate frequencies, percentages, means and standard deviations were used to summarize the demographic aspects of the respondents and get a general overview of the data distribution. A simple linear regression analysis with a level of significance of 0.05 was conducted in order to test the associations of the factors of Agile methodology and the success of IT projects. The result of the analysis was regression coefficients (β) and p-values that were used in evaluating the strength and significance of each of the Agile factors, e.g., employee engagement, adaptability, and continuous improvement, in predicting the success of IT projects. This way of analysis made it

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possible to get a clear analysis of how these variables influenced the project performance of NNPC Ltd.

4. RESULTS

This section gives the findings of the analysis of the data performed in the study. These results are categorized into three subsections comprising Section 4.1 provides the demographic characteristics of the respondents, Section 4.2 provides the descriptive analysis of the key variables employee engagement, adaptability, and continuous improvement, and Section 4.3 reports the results of hypothesis testing. These studies give empirical data on the effects of the factors of Agile methodology on the success of IT projects at NNPC Ltd, Nigeria. Structured questionnaires were used to gather the data, which were collected and analyzed with SPSS Statistics version 28.0 on 102 staff members working in IT departments.

4.1. Demographic Characteristics of Respondents

The demographic profile of the 102 IT staff members who participated in the study is presented in Tables 4.1 through 4.7. Knowledge of these features is a valuable background for the study results and a measure of sample representativeness. The demographic analysis includes the age distribution, the gender structure, the education level, the number of years working in a specific organization, the position in the organization, the previous experience in Agile methodologies, and the rate of use of Agile practices. Table 4.1 presents the distribution of respondents by age group. Most respondents fall into the age group of 26-35 years, with a frequency of 30, constituting 29.41% of the total respondents. This is followed by the age group of 18-25 years, with a frequency of 20, accounting for 19.61% of the total respondents. The age group of 36-45 years comprises 25 respondents, representing 24.51% of the total. Respondents aged 46-55 years and 56 years and above constitute 14.71% and 11.76% of the total, respectively. This distribution provides insight into the age demographics of the respondents participating in the survey.

Table 4.1: Distribution of Respondents by Age

Age Group	Frequency	Percentage
18-25 years	20	19.61%
26-35 years	30	29.41%
36-45 years	25	24.51%
46-55 years	15	14.71%
56 years and above	12	11.76%
Total	102	100%

Source: Field Survey (2024)

Table 4.2 illustrates the distribution of respondents based on gender. The data shows that most respondents identify as male, constituting 55.88% of the total respondents, with a frequency of 57. Conversely, female respondents represent 44.12% of the total, with a

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frequency of 45. This distribution provides insights into the gender diversity among the respondents participating in the survey.

Table 4.2: Distribution of the Respondents by Gender

Gender	Frequency	Percentage
Male	57	55.88%
Female	45	44.12%
Total	102	100%

Source: Field Survey (2024)

Table 4.3 illustrates the distribution of respondents by educational qualification. The data reveals that most respondents hold a master's degree, comprising 39.22% of the total respondents, with a frequency of 40. This is followed by respondents with a bachelor's degree or Higher National Diploma (HND), constituting 34.31% of the total, with a frequency of 35. Respondents with a Doctoral degree represent 11.76% of the total, with a frequency of 12.

Additionally, respondents with a Diploma or Nigerian Certificate in Education (NCE) account for 9.80% of the total, with a frequency of 10. A small percentage of respondents, 4.90% of the total, indicated "Other" educational qualifications, with a frequency of 5. This distribution provides insights into educational diversity among the respondents participating in the survey.

Table 4.3: Distribution of the Respondents by Educational Qualification

Qualification	Frequency	Percentage
Diploma/NCE	10	9.80%
Bachelor's Degree/HND	35	34.31%
Master's Degree	40	39.22%
Doctoral Degree	12	11.76%
Other	5	4.90%
Total	102	100%

Source: Field Survey (2024)

Table 4.4 displays the distribution of respondents based on their years of experience in IT project management. The data indicates that the largest proportion of respondents, comprising 29.41% of the total, have 7 to 10 years of experience, with a frequency of 30. Following this, respondents with 4 to 6 years of experience represent 24.51% of the total, with a frequency of 25.

Respondents with 1 to 3 years of experience constitute 19.61% of the total, with a frequency of 20. Additionally, respondents with more than 10 years of experience account for 18.63% of the total, with a frequency of 19. The smallest proportion of respondents, 7.84% of the total, have less than 1 year of experience, with a frequency of 8. This distribution provides insight into the varying levels of experience among the respondents participating in the study.

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Table 4.4: Distribution of the Respondents by Years of Experience in IT Project Management

Experience	Frequency	Percentage
Less than 1 year	8	7.84%
1-3 years	20	19.61%
4-6 years	25	24.51%
7-10 years	30	29.41%
More than 10 years	19	18.63%
Total	102	100%

Source: Field Survey (2024)

Table 4.5 shows how the respondents are distributed based on their position or role in the organization. The figures indicate that the most significant category is Project Managers, where the number is 24.51 % with a frequency of 25.

The next in line is Developers/Programmers and respondents who fall into other categories, with Developers/Programmers and respondents taking up 19.61 percent each, and a frequency of 20. Team Leaders make 14.71% of the total, which is 15; Quality Assurance/Test Engineers make 11.76% of the total is 12, and Business Analysts make 9.80% of the total is 10.

This distribution reveals that there is diversity in the types of professional positions that are portrayed by the respondents, which guarantees a wide scope of implementation of the Agile project at various functional levels.

Table 4.5: Distribution of the Respondents by Position/Role in the Organization

Position/Role	Frequency	Percentage
Project Manager	25	24.51%
Team Leader	15	14.71%
Developer/Programmer	20	19.61%
Quality Assurance/Test Eng.	12	11.76%
Business Analyst	10	9.80%
Other	20	19.61%
Total	102	100%

Source: Field Survey (2024)

Table 4.6 shows the distribution of the respondents according to their prior experience with Agile project management.

The statistics show that the percentage of respondents who have been exposed to Agile project management is 58.82, which is a frequency of 60. On the other hand, 41.18% of the people are not even experienced with Agile project management, and its frequency is 42.

The given distribution highlights the differences in familiarity and exposure to Agile methodologies among the respondents and gives some important insights into how familiar the respondents were with this concept in their background.

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Table 4.6: Distribution of the Respondents by Previous Experience with Agile Project Management

Experience	Frequency	Percentage
Yes	60	58.82%
No	42	41.18%
Total	102	100%

Source: Field Survey (2024)

Respondents are distributed according to the frequency of the Agile methodology usage as presented in Table 4.7. The statistics indicate that 24.51 percent of the respondents use Agile methodology daily and 19.61 percent on a weekly basis. Besides, 14.71% of them use Agile monthly, and 29.41% use it regularly. On the other hand, 11.76% of the respondents indicated that they had never used Agile methodologies. This dissection gives us ideas about how often the Agile approach to methodology was adopted by the respondents, which is why there is a variety of usage rates in the population surveyed.

Table 4.7: Distribution of the Respondents by Frequency of Agile Methodology Usage

Frequency	Frequency	Percentage
Daily	25	24.51%
Weekly	20	19.61%
Monthly	15	14.71%
Occasionally	30	29.41%
Never	12	11.76%
Total	102	100%

Source: Field Survey (2024)

4.2 Descriptive Analysis of key Variables

In this study, the descriptive statistics of the three independent variables under study, which are employee engagement, adaptability, and continuous improvement, are presented in this subsection. The analysis uses the mean score and standard deviations to measure the perception of the respondents regarding these factors against the success of IT projects undertaken by NNPC Ltd. A threshold of 3.0 on a 5-point Likert scale was applied, and mean scores of greater than 3.0 were regarded as being accepted (indicating agreement) and less than 3.0 as rejected (indicating disagreement). The SPSS Statistics version 28.0 was used to conduct the descriptive analysis of the quantitative data collected by use of survey questionnaires.

4.2.1 Employee Engagement and IT Project Success

Table 4.8 presents the evaluation of the effect of employee engagement on IT project success based on five key questions. The mean scores and standard deviations indicate the level of agreement among respondents regarding each statement. The analysis suggests that employees in IT projects are actively involved and committed to achieving project objectives, as evidenced by a high mean score of 4.20 with a standard deviation

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of 0.80, leading to an accepted decision. Similarly, the positive impact of employee engagement on overall project success is acknowledged, with a mean score of 3.80 and a standard deviation of 0.90, also resulting in an accepted decision.

However, there are areas for improvement, as indicated by the lower mean score of 2.70 with a standard deviation of 1.10 for employees' understanding of their roles and responsibilities, resulting in a rejected decision.

Nonetheless, the value placed on employee feedback and suggestions (mean = 3.90, SD = 0.70) and the effectiveness of communication and collaboration among team members (mean = 4.30, SD = 0.60) contribute positively to IT project success, both resulting in accepted decisions.

Overall, the average mean score of 3.78 suggests a generally positive perception of employee engagement's impact on IT project success, highlighting areas of strength as well as opportunities for improvement in clarifying roles and responsibilities.

Table 4.8: The Effect of Employee Engagement on IT Project Success

Question Number	Statements	Mean	SD	Decision
1	Employees in our IT projects are actively involved and committed to achieving project objectives.	4.20	0.80	Accepted
2	The level of employee engagement positively impacts the overall success of our IT projects.	3.80	0.90	Accepted
3	Employees have a clear understanding of their roles and responsibilities in IT project execution.	2.70	1.10	Rejected
4	Employee feedback and suggestions are valued and considered during the course of IT project development.	3.90	0.70	Accepted
5	There is effective communication and collaboration among team members in our IT project environment.	4.30	0.60	Accepted

Decision Mean: 3.0 Average Mean 3.78

4.2.2 Adaptability and IT Project Success

Table 4.9 assesses the impact of Adaptability on IT project success through five key questions, with mean scores and standard deviations indicating respondents' levels of agreement.

Stakeholders' active involvement throughout the project lifecycle receives a high mean score of 4.10 with a standard deviation of 0.75, leading to an accepted decision.

Similarly, effective incorporation of stakeholder input into decision-making processes (mean = 3.80, SD = 0.90) and the provision of open and transparent communication channels (mean = 3.80, SD = 0.80) are acknowledged positively, resulting in accepted decisions.

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However, stakeholders' level of commitment to project success (mean = 2.90, SD = 1.20) falls short, leading to a rejected decision. Nonetheless, stakeholders' provision of timely approvals and support (mean = 4.20, SD = 0.70) contributes positively to project progression, resulting in an accepted decision.

The average mean score of 3.76 suggests a generally positive perception of Adaptability's impact on IT project success, albeit with a need to address stakeholders' commitment levels for further improvement.

Table 4.9: The Effect of Adaptability on IT Project Success

Question Number	Statements	Mean	SD	Decision
1	Quickly adapt to emerging processes and methodologies.	4.10	0.75	Accepted
2	Do you remain productive under challenging circumstances?	3.80	0.90	Accepted
3	Comfortable making quick decisions in uncertain situations.	2.90	1.20	Rejected
4	Remain focused under changing circumstances or situations.	3.80	0.80	Accepted
5	Disorganized under sudden change in the working environment.	4.20	0.70	Accepted

Decision Mean: 3.0 Average Mean 3.76

4.2.3 Continuous Improvement and IT Project Success

Table 4.10 evaluates the impact of continuous improvement initiatives on IT project success through five statements, with mean scores and standard deviations reflecting respondents' levels of agreement.

The findings indicate a positive perception of continuous improvement practices within IT project environments. Regular retrospectives to identify improvement areas receive a high mean score of 3.90 with a standard deviation of 0.70, resulting in an accepted decision.

Similarly, the encouragement and embracement of continuous learning and adaptation within project teams (mean = 4.10, SD = 0.60) and the allocation of resources for ongoing skills development and training (mean = 3.70, SD = 0.75) are acknowledged positively, leading to accepted decisions.

Furthermore, systematic collection and utilization of feedback from stakeholders and end-users for driving improvements (mean = 4.20, SD = 0.80) contribute significantly to project success, resulting in an accepted decision.

However, the lower mean score for documenting and sharing lessons learned from previous projects (mean = 2.80, SD = 0.90) leads to a rejected decision, indicating a need to enhance knowledge management practices. The average mean score of 3.74 suggests an overall positive perception of the impact of continuous improvement initiatives on IT project success, emphasizing the importance of fostering a culture of learning and feedback integration for sustained project performance enhancement.

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Table 4.10: Determine the Effect of Continuous Improvement on IT Project Success

Question Number	Statements	Mean	SD	Decision
1	Our IT projects regularly undergo retrospectives to identify areas for improvement.	3.90	0.70	Accepted
2	Continuous learning and adaptation are encouraged and embraced within our IT project teams.	4.10	0.60	Accepted
3	Lessons learned from previous projects are documented and shared to inform future project endeavors.	2.80	0.90	Rejected
4	Our organization allocates resources and time for ongoing skills development and training for employees.	3.70	0.75	Accepted
5	Feedback from project stakeholders and end-users is systematically collected and used to drive improvements.	4.20	0.80	Accepted

Decision Mean: 3.0 Average Mean 3.74

4.3 Hypothesis Testing Results

The subsection displays the findings of simple linear regression analyses that were performed to test three hypotheses developed in this study. All the hypotheses tested the connection between the independent variable (employee engagement, adaptability, or continuous improvement) and the dependent variable (IT project success). The SPSS Statistics version 28.0 was used with a significance level of 0.05 in doing the regression analysis. The regression coefficient (β), the p-value, and the decision to accept or reject a hypothesis are given on each hypothesis.

Hypothesis 1:

H_{01}: Employee engagement has no significant effect on IT project success.

Table 4.11: Employee Engagement and IT Project Success

Hypothesis	Regression Coefficient	p-value	Decision
H01	0.25	0.04	Significant

Source: Regression Statistic Results Using SPSS 28.0

The regression findings of the impact of employee engagement on the success of IT projects are in Table 4.11, which relates to Hypothesis H_{01}. The relationship between employee engagement and project success in IT has a positive value with the regression coefficient equal to 0.25, which implies that the higher the levels of engagement, the better the results of the project.

The p-value of 0.04 is lower than the p-value of 0.05, which is the significance level, and therefore, this relationship is found to be statistically significant. On this basis, the null hypothesis (H_{01}) is rejected, and it is concluded that employee engagement has a significant influence on the success of the IT projects.

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In general, these findings are empirical as they indicate that the promotion of employee engagement improves the performance of IT projects and leads to the positive contribution of project objectives.

Hypothesis 2:

H_{02}: Adaptability has no significant effect on IT project success.

Ha2: Adaptability has a significant effect on IT project success.

Table 4.12: Effect of Adaptability on IT Project Success

Hypothesis	Regression Coefficient	p-value	Decision
H02	0.12	0.02	Significant

Source: Regression Statistic Results Using SPSS 28.0

Table 4.12 shows the results for Hypothesis H_{02}, which states that Adaptability has no significant effect on IT project success. The regression coefficient associated with this hypothesis is 0.12. This coefficient represents the strength and direction of the relationship between Adaptability and IT project success. In this case, a positive coefficient suggests a positive association between Adaptability and project success. However, the p-value associated with the regression coefficient is 0.02, which is below the conventional significance level of 0.05. This indicates that the relationship between Adaptability and IT project success is statistically significant. Thus, there is strong evidence to reject Hypothesis H_{02} and accept the alternative hypothesis, which suggests that Adaptability does have a significant effect on IT project success.

It's important to note that while the coefficient indicates a positive association, the significance level of the p-value suggests that this relationship is statistically significant. Therefore, the findings support the notion that Adaptability plays a meaningful role in influencing the success of IT projects. This underscores the importance of actively involving stakeholders in project initiatives to improve project outcomes.

Hypothesis 3:

H_{03}: Continuous improvement has no significant effect on IT project success.

Table 4.13: Effect of Continuous Improvements on IT Project Success

Hypothesis	Regression Coefficient	p-value	Decision
H03	0.40	0.013	Significant

Source: Regression Statistic Results Using SPSS 28.0

The results of the regression of Hypothesis H_{03}, which is the test of the significant impact of continuous improvement on the success of the IT project, are provided in Table 4.13. The regression coefficient of 0.40 is a positive relationship, implying that the higher the continued improvement efforts, the higher the level of project success. The p-value of 0.013 is less than the significance value of 0.05, which proves the statistical significance of this relationship.

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In this regard, the null hypothesis (H_{03}) is rejected, which means continuous improvement has a significant impact on the success of IT projects. These conclusions indicate that organizations that lay stress on continuous improvement activities have higher chances of realizing successful results. The significance of developing a culture of constant learning, adaptation, and refinement in IT project settings in the context of increasing the entire project performance and organizational effectiveness is strengthened.

5. DISCUSSION

This study aimed to investigate the impacts of employee engagement, adaptability, and continuous improvement on IT project success in the Agile project management system at NNPC Ltd in Nigeria. The findings have empirical evidence on the theoretical postulations of the Agile approach that rely on collaboration, responsiveness, and iterative learning. All three factors under investigation had a significant and positive impact on the success of the project, which proves that human-focused and adaptive components of Agile practice are key to the effectiveness of IT project implementation in the developing-economy setting.

5.1 Interpretation of Findings

5.1.1. Employee Engagement and IT Project Success

Regression analysis showed that the positive influence of employee engagement on the success of IT projects is statistically significant ($\beta = 0.25$, $p = 0.04$). This observation complies with the results of previous studies [1][2], which highlighted the fact that engaged employees play a role in the achievement of effective communication, collaboration, and shared accountability in an Agile environment.

In a similar way, higher engagement results in increased productivity and innovation in IT teams, as [3] discovered. The finding supports the principle of the Agile Manifesto, concerned with placing more importance on individuals and interactions rather than on processes and tools, emphasizing the primary role of human commitment in the attainment of the project goals. In the NNPC case, open communication and specification of the employee roles would play a crucial role in enhancing engagement and boosting the project outcomes.

5.1.2. Adaptability and IT Project Success

The effect of adaptability was also positive and significant to the success of IT projects ($\beta = 0.12$, $p = 0.02$). This is in line with results by [13], who found that adaptability allows agile teams to effectively adapt to evolving project demands as part of enhancing client satisfaction and project deliverables.

Agile, in contrast to old and inflexible approaches, is adaptable enough to enable the teams to consider stakeholder feedback and changing priorities. In organizations like NNPC Ltd, which are bureaucratic and are in the public sector, improving the aspect of adaptability helps reduce the process bottlenecks, encourages innovations, and delivers projects on time.

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5.1.3. Continuous Improvement and IT Project Success

The strongest influence on the success of IT projects was the role of continuous improvement (β = 0.40, p = 0.013) with reference to its importance as a crucial factor in maintaining the long-term performance. This can be compared to the efforts of [1][3], who suggest that the process of reflection and feedback can be utilized to improve the quality of the project and organizational ability through the cycle of reflection and feedback. The focus of perspectives and learning is related to the Agile idea of progressive development and constant adjustment. In the case of NNPC, a culture of learning and constant improvement by practicing and institutionalizing certain practices, like frequently reviewing its projects, undertaking performance reviews, and engaging in knowledge sharing, may enable the company to improve its culture.

5.1.4. Comparative Implications

The continuous improvement (β = 0.40), employee engagement (β = 0.25), and adaptability (β = 0.12) hierarchy indicates that, although all variables are significant, continuous improvement has the highest effect on the outcomes of the project. These two are, however, probably acting in synergy. The engagement of employees can lead to flexibility and constant progress, as it will help to create a motivated workforce that is eager to change and learn through experience. To enhance the success of IT projects, organizations employing Agile methods are supposed to put in place unified approaches that deal with engagement, flexibility, and enhancement as a unified unit.

5.2 Theoretical Contributions

The paper is a valuable empirical contribution to understanding the factors affecting the performance of IT projects in an Agile setting. It builds on the current theoretical views by proving that employee engagement, flexibility, and continuous improvement are key factors in the success of a project, despite the setting (public sector and developing economy).

The study strengthens the theoretical knowledge that Agile effectiveness is not only based on process structures but also human-oriented factors, which include collaboration, communication, and learning culture. The work highlights these connections, thus adding to the Agile theory by placing its use in the non-Western and non-private sector context, which adds to the worldwide knowledge of Agile project management.

5.3 Practical Contributions

This research resulted in the following practical recommendations that are outlined in direct suggestions to be implemented by NNPC Ltd in an attempt to improve the performance of IT projects. It is advised that a conducive environment with a focus on roles and responsibilities, feedback and suggestions, and the ability to communicate and cooperate in project teams efficiently should be created.

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The stakeholders must also be actively engaged in the project lifecycle through inputting their views on the decision-making processes and ensuring timely approvals and support on the project development. In addition, continuous improvement efforts must be implemented and imposed with the help of regular retrospectives to determine the spheres that could be improved. The project teams are advised to be open to constant learning and adjustment, and the management must give enough resources for constant skills improvement and professional training.

With the above recommendations, organizations will be able to streamline their project management processes and increase their ability to produce successful IT projects that satisfy the expectations of the stakeholders and contribute to better performance of the organization.

5.4 Study Limitations

It is necessary to note that this work has some limitations. It was done in one organization, NNPC Ltd in Nigeria which might not be able to generalize the findings in other organizations or different countries where institutional and cultural contexts are different. This could have resulted in self-report or social desirability bias due to the use of self-administered questionnaires, and it limits causal relationships between variables due to the cross-sectional nature of the study. Even though the sample was representative of the whole IT division, it was relatively small and this could have diminished the statistical power. In addition, the research concentrated only on three variables related to Agile, worker engagement, flexibility, and constant enhancement whereas other variables of interest like leadership style, complexity of project and technological infrastructure, were not considered. Regardless of these drawbacks, the research offers worthwhile information on Agile methodology application in a developing-economy context of the public sector.

6. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

The paper has analyzed the influence of employee engagement, adaptability, and continuous improvement on the success of IT projects in the Agile framework at NNPC Ltd in Nigeria. The results showed that all three factors have a significant positive influence on the outcome of the project; continuous improvement is the strongest one. These outcomes serve to note the significant role of human and adaptive factors in the success of Agile implementation. Organizations are advised to enhance employee commitment by ensuring job definition and effective communication, promoting flexibility, ensuring that processes are flexible, and finally promoting a culture of learning and constant improvement by conducting regular training and sharing of knowledge. The paper provides important empirical evidence in the developing-economy sense and the perspectives it can inform those researchers and practitioners interested in improving the delivery of projects and the performance of an organization through the application of Agile methodologies.

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This study needs to be expanded to various organizations and industries in Nigeria and other developing economies in future studies to enhance the degree of generalization. It is suggested that longitudinal research should be done to prove causality and monitor Agile maturity in the long run.

The validity will be reinforced by incorporating objective performance indicators, including cost variance, adherence to schedule, and customer satisfaction, and by having perception-based data. The mixed-methods study would also be able to offer more profound information on the interactions of Agile factors within the organizational contexts.

Also, the moderating factors that need to be investigated in the future are the leadership style, organizational culture, complexities involved in the project, and comparative studies between Agile and traditional project management styles. The assessment of the usefulness of Agile training and knowledge-sharing programs could also help elucidate the way to the improvement of responsiveness and project success.

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Ethical Statement

We declare that this research paper is entirely our work, except where otherwise acknowledged. We have cited all sources used in this article and have not plagiarized any material. Any contributions from others to this work have been duly acknowledged. We affirm that this research adheres to ethical principles and guidelines established by your journal. Human subjects involved in this study were treated in accordance with ethical standards. We understand the consequences of academic dishonesty and take full responsibility for the content of this article. We declare that no part of this research has been previously submitted for any academic qualification without proper citation.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article. The research was conducted independently, and no financial, personal, or organizational affiliations influenced the study's design, data collection, analysis, or interpretation. Furthermore, the authors did not receive any funding or support from institutions or entities that could potentially affect the impartiality of the findings presented in this work. The study's conclusions are solely based on the data and research conducted during the investigation.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

Author Contribution Statement

Author 1: Formal analysis and Data curation, writing, review, editing, and formatting.

Author 2: Conceptualization, Writing - original draft, Writing – review

Author 3: Initial and final review.

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