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**THE IMPLEMENTATION OF AGILE PROJECT MANAGEMENT
AT SOFTWARE COMPANIES IN NIGERIA**

BY

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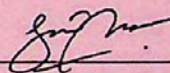
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ABSTRACT

This research explores the implementation of agile project management (APM) practices within Nigeria software companies, focusing on two companies: Kredi Technology Limited and Sidmach Technology Limited. In today's fast-paced and competitive software industry, the need for adaptable and customer-centric project management methodologies has become increasingly crucial. However, despite the growing adoption of agile practices globally, the challenges and benefits of these practices within the context of Nigeria remain underexplored. This study aims to fill this gap by investigating the implementation, challenges, benefits as well as the impacts of agile project management practices on software development in Nigeria, and particularly within the context of the two organizations. To achieve these objectives, a qualitative research method was employed, utilizing semi-structured interviews with two respondents who are experts in software development from both companies. The interviews were analysed using thematic analysis, which provided deep insights into the implementation processes of agile practices. The findings revealed that the implementation of agile project management practices particularly the scrum framework is based on its qualities of flexibility, iterative development, and enhanced customer satisfaction. The study also identified significant challenges in the implementation process, including organizational and human factors, which necessitate strong leadership support, adequate training, and effective tooling. The research highlighted the benefits of agile practices in software development such as improved collaboration, increased productivity, cost optimization, timely delivery, and higher levels of customer satisfaction. These findings aligned with the principles of Innovation Diffusion Theory, and Empirical Process Control Theory, which emphasizes the importance of adaptability and continuous improvement in rapidly changing environments. The study concludes that while agile practices offer significant benefits, their successful implementation in Nigerian software companies requires addressing the challenges identified and fostering an organizational culture that supports continuous training and collaboration.

Keywords: Agile Project Management, Software development, scrum methodology, Nigeria.

ABSTRAK

Penyelidikan ini meneroka pelaksanaan amalan pengurusan projek tangkas (APM) dalam syarikat perisian Nigeria, memfokuskan pada dua syarikat: Kredi Technology Limited dan Sidmach Technology Limited. Dalam industri perisian yang pantas dan kompetitif hari ini, keperluan untuk metodologi pengurusan projek yang boleh disesuaikan dan mengutamakan pelanggan telah menjadi semakin penting. Walau bagaimanapun, walaupun penggunaan amalan tangkas semakin meningkat di seluruh dunia, cabaran dan faedah amalan ini dalam konteks Nigeria masih kurang diterokai. Kajian ini bertujuan untuk mengisi jurang ini dengan menyiasat pelaksanaan, cabaran, faedah serta kesan amalan pengurusan projek tangkas terhadap pembangunan perisian di Nigeria, dan terutamanya dalam konteks kedua-dua organisasi. Untuk mencapai objektif ini, kaedah penyelidikan kualitatif telah digunakan, menggunakan temu bual separa berstruktur dengan dua responden yang pakar dalam pembangunan perisian dari kedua-dua syarikat. Temu bual telah dianalisis menggunakan analisis kandungan tematik, yang memberikan pandangan mendalam tentang proses pelaksanaan amalan tangkas. Penemuan mendedahkan bahawa pelaksanaan amalan pengurusan projek tangkas terutamanya rangka kerja scrum adalah berdasarkan kualiti fleksibiliti, pembangunan berulang dan kepuasan pelanggan yang dipertingkatkan. Kajian itu juga mengenal pasti cabaran ketara dalam proses pelaksanaan, termasuk faktor organisasi dan manusia, yang memerlukan sokongan kepimpinan yang kuat, latihan yang mencukupi dan perkakas yang berkesan. Penyelidikan itu menyerlahkan faedah amalan tangkas dalam pembangunan perisian seperti kerjasama yang lebih baik, peningkatan produktiviti, pengoptimuman kos, penghantaran tepat pada masanya dan tahap kepuasan pelanggan yang lebih tinggi. Penemuan ini sejajar dengan prinsip Teori Resapan Inovasi, dan Teori Kawalan Proses Empirikal, yang menekankan kepentingan kebolehsuaian dan penambahbaikan berterusan dalam persekitaran yang berubah dengan pantas. Kajian itu menyimpulkan bahawa walaupun amalan tangkas menawarkan faedah yang ketara, kejayaan pelaksanaannya dalam syarikat perisian Nigeria memerlukan menangani cabaran yang dikenal pasti dan memupuk budaya organisasi yang menyokong latihan dan kerjasama berterusan.

Kata kunci: Pengurusan Projek Agile, Pembangunan perisian, metodologi scrum, Nigeria.

DECLARATION

I certify that I am the sole author of this report. It is my own work, and I made sure that all of the references were properly cited in accordance with university regulations. This report was completed in compliance with Universiti Utara Malaysia's policies and procedures.



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List of Abbreviations

API	- Application Programming Interface
APM	- Agile Project Management
CD	- Continuous Delivery
CI	- Continuous Integration
IDEs	- Integrated Development Environments
IT	- Information Technology
SDLC	- Software Development Lifecycle
UCD	- User Centred Design
UX	- User Experience
XP	- Extreme Programming



CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

According to Al-Saqqa et al. (2020), agile methodologies in software development are iterative and collaborative frameworks that prioritize adaptability and customer satisfaction. They entail segmenting the software development process into small, incremental units called sprints or iterations (Ismail & Wediawati, 2023). Constant feedback, adaptability to changes, and cross-functional team collaboration are important components. Throughout the development lifecycle, the Agile approach fosters effective communication between developers, stakeholders, and end users, enabling speedier reaction to changing requirements and better product alignment with customer needs.

Agile project management (APM) is based on several ideas and methods that improve responsiveness and flexibility and help it gain acceptance throughout the world. These guidelines stress the value of actively collaborating with clients to comprehend and address their evolving demands. It also support segmenting the project into smaller, more manageable steps to enable ongoing development and flexibility (Cobb, 2023).

On the other hand, the practice makes use of roles like product owner and scrum master to speed up communication and promote collaboration within cross-functional teams; it also automates testing and deployment procedures, enabling quick issue resolution; and it visualises workflow to maximise efficiency and flexibility by letting teams pull work based on demand and capacity.

Agile project management is widely used because of its flexibility in responding to shifting project needs, promoting teamwork, and producing results that almost match client expectations. Globally, software development projects benefit from the enhanced flexibility and responsiveness that agile principles and practices offer. The recent growth of Nigeria's software development industry has significantly benefitted the technology sector of the country. Small and medium-sized firms (SMEs), established businesses, and startups make up the industry's diverse size. Among the well-known Nigerian software development firms are Sidmach Technology, Kredi, Andela, Interswitch, and SystemSpecs.

Nigeria has made progress in enhancing its technology infrastructure, particularly with regards to mobile adoption and connectivity. The extensive use of mobile technology has an impact on the creation of mobile solutions and innovations. Challenges in the software development industry may include funding, infrastructure limitations, and the shortage of qualified personnel. Initiatives and programmes, however, are meant to deal with these issues and promote a more vibrant and competitive atmosphere.

The Nigerian government has demonstrated interest in advancing innovation and technology via several programmes. The ecosystem for software development is expanding because of initiatives to assist startups and technology centres. Nigeria's economic growth is aided by the software development industry, which fosters innovation and the creation of jobs. It helps Nigeria become a player in the global technology scene and supports the nation's digital economy.

1.2 Problem Statement

The Nigerian software development industry is characterised by a dynamic and swiftly changing landscape, as a multitude of organisations seek to satisfy project deadlines and customer demands while producing superior software. Several pressing factors drive the need to conduct research about the implementation of agile project management (APM) on software development of Nigerian software companies. Recent challenges and performance studies highlight the crucial need to better understand the benefit Agile techniques has in the Nigerian software sector context (Ardo et al., 2023).

The implementation of Agile techniques on software development outcomes in the Nigerian environment still needs to be understood despite the potential for Agile principles to revolutionize software development practices, there remains a lack of information about how these methodologies influence software development outcomes, particularly in Nigeria (Ardo et al., 2023). The Nigerian software industry faces challenges that complicate the successful implementation of agile methodologies such as project delays, quality concerns, cost overruns, infrastructure limitations, funding issues, and a shortage of qualified personnel. These challenges are worsen by inadequate training programs doe agile methodologies, resistance to change from traditional project management methods, and a lack of awareness about the benefits of agile practices (Sithambaram et al., 2021).

Project delays and quality concerns are among the most pressing issues. Delays can result from inefficient project management processes and lack of flexibility in adapting to changing requirements, both of which agile aims to address.

Quality concerns often stem from inadequate testing and review processes, which agile practices, with their iterative development and continuous feedback loops, seek to improve.

Cost overruns are another significant challenge, often resulting from poor planning and unexpected project scope changes. Agile methodologies emphasize incremental delivery and continuous stakeholder involvement, which can help in mitigating such financial risks. However, the lack of trained agile practitioners and effective implementation strategies in Nigeria makes it difficult to fully leverage these benefits.

Infrastructure limitations and funding issues further hinder the implementation of agile. The necessary technological infrastructure to support agile practices, such as collaborative tools and platform, may be inadequate or unreliable. Additionally, securing funding for agile training programs and resources can be challenging, particularly for small and medium sized enterprises (SMEs) that dominate the Nigerian software industry.

The shortage of qualified personnel is a critical barrier to the implementation of agile. Agile practices require skilled professionals who are not only proficient in the methodologies but also capable of fostering a collaborative and adaptive work environment. The current education and training environment in Nigeria does not sufficiently address this need, leading to a gap in the availability of qualified agile practitioners.

Resistance to change from traditional project management methods is another significant obstacle. Many software companies are accustomed to conventional, linear project management approaches and may be hesitant to adopt the more

flexible and iterative agile methodologies. This resistance can stem from a lack of understanding of agile benefits, fear of the unknown, or entrenched organizational cultures.

Moreover, the lack of a strong process specifically designed for Nigeria's unique socioeconomic environment complicates agile implementation. Agile methodologies while versatile, often require adaptation to fit the specific context of the region in which they are applied. Without a personalized approach, these issues make it more difficult to successfully incorporate Agile methods into the local software development culture.

The resulting disparity impacts these companies' abilities to maintain competitiveness in a fast-paced global market, where agility and time-to-market are critical performance indicators (Ilmudeen, 2022). In order to utilize APM's potential to improve project results, boost operational efficiency, and sustainably build Nigeria's software industry, finding and fixing the specific issues impeding its effective application (Jafari et al., 2023).

Furthermore, performance evaluations show various levels of success and maturity in Agile adoption among Nigerian software industries (Ardo et al., 2023). While some firms report improved productivity and customer satisfaction, others struggle to achieve project goals within Agile frameworks (Leeuw & Joseph, 2023). This disparity highlights the complexities of Agile implementation in Nigeria, as well as the need of conducting targeted research to identify best practices and areas for improvement.

Given these problems and performance gaps, it is critical to conduct research on the influence of Agile Project Management on software development outcomes in Nigerian software companies (Ardo et al., 2023). This research seeks to provide insights on the effectiveness of Agile methodologies, address current issues and contribute to enhancing the general level of performance and competitiveness of the Nigerian software industry.

1.3 Research Questions

1. How does the Nigerian software company implement agile project management practices?
2. What are the benefits and perceived challenges of implementing Agile project management in software companies in Nigeria?
3. How does agile project management impact the efficiency and speed of software development processes in Nigerian software companies?
4. How does agile project management enables Nigerian software companies to improve competitiveness by emphasizing flexibility, responsiveness, and customer collaboration?

1.4 Research Objectives

1. To evaluate the implementation of agile project management practices among software companies in Nigeria.
2. To identify the challenges and benefits of agile project management in Nigerian software companies.
3. To examine the impact of agile project management on the efficiency and speed of software development processes in Nigerian software firms.
4. To investigate the enablers of agile project management implementation.

1.5 Significance of the Study

The study on the implementation of Agile project management within Nigerian software companies like Sidmach Technology and Kredi Technology is significant because it sheds light on how these software companies implement Agile methodologies, providing valuable insights into their alignment with global best practices in software development. By exploring how agile project management impacts software development processes in Nigeria, the study aims to uncover both the benefits and challenges associated with agile implementation.

The study also investigates how Agile project management enables businesses to improve competitiveness by implementing approaches that emphasise flexibility, responsiveness, and customer collaboration, all of which are essential given the dynamic market conditions of today (Ciric Lalic et al., 2022). Understanding how agile practices enables improved competitiveness will provide Nigerian software companies with strategies to better navigate the competitive environment.

Additionally, the study seeks to identify the specific challenges that Sidmach Technology limited and Kredi Technology encounter when implementing agile project management. The results of this research hold the capability to enhance software development techniques and practices in Nigeria. The finding of this study can potentially serve as a future research reference for agile project management and software development in Nigeria.

1.6 Scope of the Study

The scope of this research aimed to examine Agile project management thoroughly as it related to software development in Nigeria.

- **Geographic Focus:** The study centred on software companies operating in Nigeria, both domestic (Sidmach) and foreign (Kredi). The both companies are located in Lagos, Nigeria.
- **Justification for Company Selection:** Sidmach Technology, a domestic company, is a leading provider of large-scale software solutions used across Africa. With over 30 years of experience, Sidmach had been crafting innovative technologies that effectively addressed complex business challenges. Kredi Technology, although a foreign based company in Nigeria, offers a comprehensive range of services to help businesses thrive in the digital environment, with expertise spanning from app development, software engineering, and API solutions. These companies were selected due to their prominent roles in the Nigerian software industry, their extensive use of Agile methodologies, diverse backgrounds (domestic vs. foreign) as well as the ability to easily access data and information about the companies. Sidmach's extensive experience and influence in Africa, along with Kredi's advanced technological services, provided a balanced view of agile adoption in different organizations.

The study evaluated the implementation of agile project management practices, with a particular focus on scrum master as the preferred agile methods in the implementation of agile practices, team structures, and development processes. It also considered data and information that is currently available, with an emphasis on current trends and advancements in the Nigerian software development industry. This scope aims to provide a solid grasp about subtleties

and dynamics related to software development results and Agile project management in the Nigerian setting.

The study utilized interviews as the primary data collection method. Through these interviews, the research aimed to gather detailed insights from practitioners within the selected companies. The collected data were analysed to identify the challenges that had greatest impact on the implementation of agile project management, specifically within the context of Sidmach Technology and Kredi Technology.

This comprehensive approach aimed to offer valuable insights into how agile project management was implemented, the challenges and benefits experienced, and its impact on the efficiency, speed, and competitiveness of software development processes in Nigeria. The findings are expected to enhance the understanding of the effectiveness of agile project management and its role in improving software development practices and competitiveness within the Nigerian software industry.

1.7 Operational Definition

Agile: is a modern way of project execution, especially with the use of technology characterized by flexibility, iterative processes, and rapid adaptation to changes.

Project Management: can be defined as the course of action of organizing, overseeing, and executing a project with the intention of achieving a specific objective.

Agile Project Management: is a project management methodology for managing software development projects and it emphasizes iterative progress, collaboration and flexibility.

Software: is a set rules or scripts which specify how things should be done by a computer.

Development: is an event constituting a new stage in a changing situation.

Software development: is an array of computer operations devoted to the development, design, implementation, and maintenance of software.

1.8 Organization of the Study

There are five chapters in this research paper. First chapter introduces research topic: "The Implementation of Agile Project Management at Software Companies in Nigerian with specific focus on Sidmach Technology and Kredi Technology." It outlines the dissertation structure, research goals, and questions. Chapter two delves into a literature review, exploring the theoretical framework and academic perspectives pertinent to agile project management in software development. This includes its implications and impact on software companies in Nigeria. Chapter three commences with a description of the research methodology, followed by sections detailing the study's design, methodology, data collection, analysis, and profiles of the respondents from Nigerian software companies. While chapter four presents the data analysis, and discusses the findings of the research. Chapter five discussed the limitations of the study, suggestions for future studies, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Agile project management (APM) serves as an incremental method of overseeing software development projects that emphasises flexibility, collaboration, and customer feedback (Binci et al., 2023). Unlike traditional waterfall techniques, agile allows for the continuous delivery of functional software by breaking projects into smaller units called iterations. Agile's usefulness in software development originates from its ability to adapt to changing requirements, improve teamwork, and increase customer satisfaction (Munteanu & Dragos, 2021).

Nigeria's dynamic tech environment is characterized by a vibrant entrepreneurial culture and a growing demand for innovative software solutions (Agbeyangi et al., 2024). With the growing digitization of organisations and services in industries such as banking, healthcare, education, and e-commerce, has increased the need for software solutions to manage local difficulties and meet changing client expectations (Saeed et al., 2023). The Nigerian government has actively supported this growth through initiatives such as the National Information Technology Development Agency (NITDA) programs, funding schemes, and regulations targeted at supporting innovation and entrepreneurship.

Nigeria's software development industry despite its growth potential, face various challenges, including infrastructure constraints, access to financing, intellectual property concerns, and talent retention (Mhlanga, 2022). Understanding the context is critical for investigating agile project management's impact on software development in Nigeria.

2.2 Agile Project Management

APM is an adaptable and continuous method to project management employed in software development and may be applied across a wide range of industries (Ciric Lalic et al., 2022). It has evolved as a popular method for managing projects, notably in software development. It focuses on adaptation, teamwork, and customer pleasure.

APM provides a practical, replicable strategy to building a strong but adaptive project process (Hron & Obwegeser, 2022). The agile manifesto outlines the essential ideals and principles that define APM, including adaptability, collaboration, value-driven delivery, and continuous improvement. These principles promote a culture of flexibility and responsiveness, placing a high value on timely and consistent software delivery to ensure customer satisfaction, encouraging close collaboration between cross-functional teams, stakeholders, and customers throughout the project lifecycle, emphasising reflection, learning, and adaptation through regular retrospectives and feedback loops, as well as embracing change and responding quickly to feedback and evolving.

Agile methodologies have transformed software development by emphasising flexibility, cooperation, and iterative procedures. Numerous research has been carried out around the world in order to clarify the concepts and benefits associated with agile methodology. Agile methodologies, like Kanban, Scrum, and Extreme Programming (XP), founded on agile manifesto, that prioritizes flexibility, working software, collaboration with customers, people and relationships and adaptability over sticking to a fixed plan (Caldwell, 2021). However, Scrum and Kanban advocate for iterative development cycles, in which software is produced progressively in short iterations or sprints. This iterative strategy encourages ongoing feedback from stakeholders, enabling employees to adapt to evolving needs and produce results frequently.

Agile methodologies provide numerous benefits including faster time-to-market, enhanced customer satisfaction, improved product quality, and higher team morale. It also facilitates the quick release of essential features, helping items to reach the market sooner. This faster time to market gives teams a competitive advantage and helps them to seize market opportunities more efficiently.

APM is now prominent methodology for software development, providing an iterative and dynamic framework that prioritises client collaboration, adaptable planning, and incremental product delivery (Behrens et al., 2021). Agile approaches enable teams to adjust rapidly to changing requirements and market situations. This adaptability guarantees that the product remains relevant and fulfils the changing needs of the customer. Agile focuses on producing working software in short iterations, allowing users to provide frequent feedback. This iterative method ensures that the final product closely fits with consumer expectations, resulting in increased satisfaction levels.

Implementing agile frequently necessitates a considerable cultural transformation within organisations. Resistance to change from traditional hierarchical structures and processes might impede agile adoption. Agile requires committed cross-functional teams with the necessary skills and expertise. However, resource restrictions, such as a lack of experienced personnel or a limited budget, can inhibit agile deployment.

In the view of Najihi et al. (2022), APM requires continuous feedback and iteration, which may be difficult for stakeholders used to traditional waterfall processes with defined requirements and schedules. Managing stakeholder expectations and ensuring alignment throughout the project can be challenging. While agile is effective for small, co-located teams, extending agile methods to larger or dispersed teams offers new obstacles. Managing consistency, collaboration, and communication across different

teams can be difficult. Despite the challenges of APM, businesses discover that the benefits of agile outweigh the drawbacks, resulting in increased productivity, innovation, and customer satisfaction in software development projects.

2.3 Overview and Definition of Software Development

Software development is a systematic process of creating and maintaining software programmes, frameworks, and other software components. It is a multifaceted project that includes duties like conceptualization, data collection, planning, programming, evaluation, deployment, and management (Fagarasan et al., 2023). The purpose of software development is to produce a software solution that will satisfy users as well as stakeholders needs, is dependable, and remain intact throughout time.

Software development can be splits into distinct types, including:

1. Application Development: Developing software for specific user needs, such as word processors, games, or business applications.
2. System Software: Create software for core functions like operating systems, database management, and networking.
3. Web Development: Create web-based apps accessible via internet or intranet.
4. Embedded Systems Development: Integrating software into hardware devices, including firmware for consumer electronics, automotive control systems, and Internet of Things (IoT) devices.

A structure known as the software development lifecycle (SDLC) outlines the steps required to create software (Gurung et al., 2020). Although SDLC models vary, they usually comprise following phases:

1. Planning involves defining the scope, resources, and timetable for a software project.

2. Analysis requires gathering comprehensive requirements and understanding the needs of end-users.
3. Design: Architecting the system and developing requirements.
4. Implementation (Coding): Create code based on design documentation.
5. Testing: Ensures software functions properly and is free of flaws.
6. Deployment refers to releasing software to users.
7. Maintenance: Provide continuing support, updates, and upgrades.

The history of software development intricately connects with the history of computing. In the early days of computing, software was composed in machine code or assembly language, which was time-consuming and error prone (Mohapatra & Rath, 2020). The earliest high-level programming language like FORTRAN and COBOL, emerged in the 1950s and 1960s allowing programmers to write code in more natural language constructions.

As computers became increasingly common, the necessity for standardised ways to software development became clear. In the 1970s, structured programming approaches created with the goal of improving code clarity and quality (Galli et al., 2020). During this time, the waterfall model of software development arose, emphasising an orderly, systematic method for developing software.

The Agile movement began in the late 1990s and early 2000s, when methodologies like Scrum and Extreme Programming (XP) gained prominence. These methodologies emphasised iterative development, collaboration, and adaptability, challenging the traditional waterfall process.

In recent years, the software development industry has evolved significantly, with the adoption of DevOps practices that attempt to combine software development (Dev) and software operation (Ops) (Pandey & Pandey, 2021). The emphasis has shifted to continuous integration and delivery, automation, and cloud-based services. The history of software development demonstrates the field's adaptability and continual innovation. As technology evolves, software development processes and practices change to address new difficulties and capitalise on new opportunities.

2.3.1 Software Development in Nigeria

The Software industry in Nigeria is a dynamic and fast increasing sector that includes a diverse variety of activities such as software development, IT consulting, digital services, and technology-enabled innovation (Ochinanwata et al., 2024). The industry is rapidly expanding and transforming, owing to a variety of causes such as technology developments, increased internet usage, entrepreneurial energy, and government assistance.

Nigeria's software sector has a broad ecosystem of players, including startups, small and medium-sized enterprises (SMEs), multinational corporations (MNCs), and government organisations (Baldin, 2023). Nigeria's software industry is still considered young yet quickly expanding. With a population of over two hundred (200) million people and a sizable youth demographic, there is an increasing demand for software solutions to meet a variety of societal and business requirements. The increased acceptance of digital technologies, expanding internet penetration, and growing need for software solutions are propelling the Nigerian software market forward.

Nigeria has a vibrant and thriving entrepreneurial ecosystem, especially in the technology industry. Various startups and technology companies have formed,

specialising in software development, mobile applications, fintech, e-commerce, healthtech, and other fields. Multiple technology centres, incubators, and innovation centres established in Nigeria's major cities, including Lagos, Abuja, and Port Harcourt. These hubs offer support, resources, mentorship, and networking opportunities to companies and software developers.

Nigeria has seen a tremendous increase in mobile and internet penetration in recent years, owing to widespread smartphone usage and low-cost data plans. This development has given opportunities for software developers to produce mobile applications and digital solutions to serve an expanding user base. The Nigerian government has initiated different efforts in promoting an expansion of the technology industry and promote digital innovation (Adeosun & Shittu, 2022). The National Information Technology Development Agency (NITDA) initiatives, the National Startup Bill, and the Nigeria Technology Innovation and Entrepreneurship Acceleration Programme (NI-TEAP) all aim to foster a community which encourages technology-driven entrepreneurship and creativity.

Despite its potential for expansion, Nigeria's software industry confronts problems such as inadequate infrastructure (e.g., reliable electricity, internet connectivity), limited access to capital and investment, intellectual property concerns, regulatory hurdles, and talent gaps (Abubakar et al., 2022). Addressing these difficulties is critical to the software industry's long-term growth and competitiveness. Nigerian software developers and entrepreneurs are receiving global recognition for their innovative solutions and contributions to the technology sector. Various Nigerian firms have garnered investment and developed overseas, demonstrating the country's software industry's global potential.

Nigeria's software industry is set for future growth and innovation, due to a combination of indigenous talent, entrepreneurship, technology advancements, and supportive measures. With the appropriate investments, infrastructure, regulations, and ecosystem support, Nigeria has the potential to become a software development and digital innovation hub for Africa and beyond. There are various software development processes and practices used in Nigerian companies, which are impacted by both global trends and local environment.

According to Akbar et al. (2020), agile methodologies like Scrum, Kanban, and Extreme Programming (XP) are increasingly being used by Nigerian software development companies. Agile's iterative and collaborative approach complements the changing nature of projects and customer requirements. Scrum is one of the most popular agile approaches in Nigerian companies. It provides a framework for iterative development, including roles such as scrum master, product owner, and development team. Sprint planning, daily stand-ups, sprint reviews, and retrospectives are standard practices

While agile approaches are gaining popularity, some Nigerian firms continue to use traditional waterfall methodologies, particularly in fields such as government, banking, and major enterprises. Waterfall's sequential method to development includes distinct stages including data collecting, planning, execution, evaluation, as well as deployment. Overall, Nigerian companies use a combination of traditional and agile techniques, complemented by modern development practices and tools, to provide high-quality software solutions that suit the needs of their clients and end users (Apiola & Sutinen, 2021).

2.3.2 Factors affecting Software Development

Software development is influenced by a multitude of factors that can affect the efficiency, effectiveness, and success of the development process (Butler et al., 2020). These impacts can be broadly classified as technological, methodological, human, and environmental in nature. Empirical evidence from research studies and industry experiences sheds light on how these factors affect software development.

Technological factors such as programming language selection and framework structure can have a substantial impact on development speed, maintainability, and scalability. Empirical research has demonstrated that languages with strong type systems can reduce runtime mistakes while also improving code quality. Development Tools like version control systems, Integrated Development Environments (IDEs), and automated build devices improve developer productivity and collaboration. Research shows that tool assistance is critical for managing complicated projects and ensuring consistent code quality (Bryda & Costa, 2023). The rise of cloud computing and the use of containerisation technologies such as Docker have altered how software is produced, delivered, and scaled. Studies have shown that cloud services save initial infrastructure costs and enable rapid growth.

Methodological factors, which include Software Development Methodologies like empirical evidence has demonstrated that agile approaches like Scrum and Kanban improve project management and change responsiveness. When compared to older approaches such as waterfall, research has shown that agile offers an advantage in terms of customer satisfaction and team productivity. Continuous integration (CI) and continuous delivery (CD) Quality Assurance procedures linked to improved software quality and faster release cycles (Banala, 2024). Empirical research supports the idea

that automated testing and frequent integration can result in fewer defects and integration challenges. Previous research has revealed that effective communication, proper planning, and risk management are essential elements influencing project outcomes (Tam et al., 2020).

Human Factors, on the other hand, refer to the talents, experience, and diversity of groups of software developers, which significantly influence the development process. Research has demonstrated that diverse teams can generate more inventive solutions, and that team cohesion is positively connected with project success. Individual developers' competence influences the quality and pace of software development. Empirical studies indicate that investments in training and skill development can result in improved performance and code quality. User participation in the development process is critical for producing software that satisfies user needs. User-centred design research show that involving users early and often results in increased user satisfaction and usability (Tam et al., 2020).

The culture of an organisation can either help or impede good software development. According to research, a positive organisational culture that encourages creativity, learning, and cooperation is a facilitator of successful software projects (Zeb et al., 2021). Market demands and economic factors might influence the pace and priority of software development. Empirical research reveals that market-driven development might result in shorter innovation cycles, but it can also increase pressure and increase the risk of burnout among developers. In areas, such as healthcare and banking, regulatory compliance can have a considerable impact on software development techniques. Studies have emphasised the difficulties of designing software that meets tight regulatory criteria while remaining agile and innovative.

Software development is a multidimensional activity influenced by a variety of circumstances. Empirical research from diverse studies sheds light on how these elements influence the development process and consequences. Understanding these factors are critical for organisations and practitioners that want to optimise their software development techniques and achieve successful project completions.

2.3.3 Issues of Software Development in Nigeria

Software development, while a driving force in technological innovation, is not without its hurdles. The industry faces a wide range of difficulties, which may significantly influence the outcome for software initiatives. As software systems become more complex, managing complexity becomes increasingly important. Complexity can develop from a variety of causes, including advanced functionality, integration with different systems, and meeting a diverse set of user needs. Empirical research demonstrates that high complexity might result in more errors, higher maintenance costs, and longer development durations (Kaufmann & Kock, 2022). With the rising frequency of cyber threats, security is a top priority in software development. Ensuring software security against assaults and user data protection is an ongoing concern. Research has underlined the importance of integrating security practices throughout the software development lifecycle (SDLC) nonetheless, various organisations fail to properly adopt comprehensive security safeguards.

Studies have shown that if technical debt is not adequately managed, it can drastically slow down future development, resulting in a decline in software quality and productivity (Paradkar, 2021). Technical debt is the cost of extra work that results from choosing a quick fix over a more effective, time-consuming solution. This accumulates when teams make corners to meet deadlines or fail to refactor code. The rapid speed of

technological improvement implies that software development tools, platforms, and best practices are always improving. Keeping up with these developments necessitates continuous learning and adaptability. According to the literature, rapid technological development can result in skill gaps and the obsolescence of old systems, posing issues to both developers and organisations.

In today's competitive market, there is a need to produce software swiftly. However, rushing the development process can occasionally jeopardise software quality. Empirical research has investigated the conflict between the necessity for speedy delivery and the goal to maintain high-quality standards, with findings indicating that striking this balance is difficult without established development methods (Nägele et al., 2023). The demand for competent software developers frequently exceeds supply, resulting in a skills shortage in the sector. This problem is compounded by the quick pace of technology advancement, which can expand skill gaps. According to studies, a skills shortage can lead to project delays, higher expenses, and less creativity (Carvalho et al., 2021).

The growing popularity of virtual work and team collaborations creates both opportunities and challenges for software developers. While remote work might provide access to a larger talent pool, it also raises challenges of communication, cooperation, and project management. Studies on remote software development teams have found excellent practices for managing distributed work, but they also highlight the risk of diminished team cohesion and productivity if not effectively managed (Ozkan et al., 2020). The success of software products depends on providing a favourable user experience (UX) and assuring usability. However, including UX design into the production process can be tricky. Research has highlighted the significance of

user-centred design and the need for developers to work closely with UX professionals to produce intuitive and user-friendly software (Akhmedov, 2023).

The effects of software development on the environment, including energy consumption and technological waste, is a growing problem. As environmental awareness develops, so does the importance of sustainable development techniques. Reviews of sustainable software engineering techniques are beginning to investigate how to reduce the environmental impact of software products throughout their lifecycle (Pargaonkar, 2023). Addressing these difficulties necessitates a multidimensional approach that involves adopting best practices, investing in training and development, using innovative technology wisely, and cultivating a culture of continuous improvement. By recognising and addressing these difficulties, the software development industry may continue to evolve and innovate responsibly.

2.4 Overview and definition of Agile Project Management

Agile project management is an approach that emphasises flexibility, cooperation, customer feedback, as well as quick iterations. It serves as a project management approach for overseeing software development projects that integrates development with customer needs and company objectives (Al-Saqqa et al., 2020). Agile project management distinguished using incremental, iterative work sequences called sprints or iterations.

According to Cobb (2023), the core ideas of Agile project management are outlined in the Agile Manifesto, which places an emphasis on people and relationships over procedures and technology, functional software over extensive documentation, client cooperation over contract negotiations, and adapting to change rather than following a set plan. Examples of Agile techniques that provide particular frameworks and

procedures for implementing Agile project management concepts are Scrum, Kanban, and Extreme Programming (XP).

2.4.1 The Influence of APM on Software Development

The influence of APM on software development is significant and has been widely studied and documented globally. While specific studies targeted on Nigeria may be scarce, the general impact of Agile can be described using larger study findings and industry perspectives. Agile approaches encourage iterative development and frequent feedback loops, helping teams to better respond to changing requirements and market situations (Ozkan et al., 2020). This adaptability allows software development companies adapt quickly with growing customer demands as well as emerging opportunities.

Throughout the project's lifecycle, Agile promotes close communication across cross-functional teams, stakeholders, and customers. This collaborative method promotes greater communication, objective alignment, and shared ownership of project outcomes, which leads to increased team dynamics and productivity. Agile approaches ensure that the final product closely corresponds with customer expectations by putting customer collaboration first and delivering working software in short iterations. This leads to enhanced customer satisfaction and a greater possibility of project success (Al-Saqqa et al., 2020).

Agile practices like continuous integration, automated testing, and regular retrospectives help to improve software quality and reduce project risk. Agile teams can better identify and reduce risks by addressing them early in the development process and incorporating stakeholder feedback. It also facilitates the quick release of essential features, helping items to reach the market sooner. This quicker time to market gives

businesses a competitive advantage and allows them to seize on market possibilities more quickly.

Agile principles such as self-organizing teams, empowerment, and continuous improvement enable team members to accept responsibility for their work and make autonomous decisions (Malik et al., 2021). This autonomy generates feeling of possession, drive, and responsibility among team members, which leads to an increased engagement and job satisfaction. Adopting Agile frequently necessitates a cultural shift within organisations, away from old hierarchical structures and processes and towards a more collaborative and adaptive mindset. This organisational shift can be difficult, but it is necessary to reap the full benefits of Agile project management.

Agile project management has a significant impact on software development, transforming how teams communicate, generate value, and adapt to customer needs. While specific studies on its influence in Nigeria are sparse, global research and industry best practices show that Agile methodologies have a major impact on improving software development processes and outcomes.

2.4.2 Key Factors that Influence the Successful Adoption and Implementation of Agile Project Management in Nigeria

2.4.2.1 Organization Culture and Change Management

An organization's culture must frequently change significantly in order to adopt agile working practices, moving away from traditional hierarchical structures and inflexible procedures (Crnogaj et al., 2022). Agile requires a culture that values adaptability, cross-functional cooperation, and ongoing development in order to succeed. Effective change management strategies are essential for

overcoming opposition, gaining buy-in, and influencing the required changes in perspective among stakeholders and teams (Okolie & Memeh, 2022).

2.4.2.2 Top Management Support and Leadership

For agile adoption to be effective, top management and leadership must actively support and commit to the process. Agile principles must be embodied by leaders, who must also set the vision, clear organizational obstacles, and foster a culture of team empowerment. Teams may become resistant to agile projects if there is a lack of support from the leadership. Agile leaders must adopt a servant-leadership mentality in order to support teams and encourage self-organization, replacing their previous command-and-control style (Janowski, 2021).

2.4.2.3 Team Expertise and Training

Effective implementation of agile methodologies requires teams embracing agile practices to have the necessary skills, training, and expertise. Ineffective or incomplete adoption can result from a lack of knowledge about agile principles, frameworks (such as Scrum, Kanban), and technical practices (e.g., test-driven development, continuous integration) (Ibrahim, 2022). Investing in coaching, continuous learning, and agile training is crucial to equipping teams with the skills they need.

2.4.2.4 Project Characteristics and Complexity

Although agile can be used for a variety of project kinds, some project types may present unique challenges or lend themselves more to the use of agile (Munteanu & Dragos, 2021). Agile, for example, might be more effective in projects with changing requirements than in those with very fixed ones. A

project's size, complexity, level of innovation, and team composition (remote or co-located) can all affect which agile principles are used and how they are tailored.

2.4.2.5 Embedded Processes and Legacy Systems

The gradual and continuous approach of agile processes might make them difficult for organizations with deeply ingrained waterfall procedures, extensively written requirements, and legacy systems. Smooth adoption might be impeded by technical debt, integration issues, and the requirement to maintain legacy systems during the shift to agile (Sithambaram et al., 2021).

2.4.2.6 Customer and Stakeholder Involvement

Agile practices prioritizes close collaboration with customers and stakeholders throughout the whole development process (Al-Saqqa et al., 2020). But maintaining continuous availability for customers and stakeholders, controlling their expectations, and persuading them to accept iterative delivery can be difficult, particularly in settings where waterfall methodologies are the norm.

2.4.2.7 Tooling and Automation Support

Agile teams can greatly benefit from tools and automation that support agile principles, such as project management software, continuous integration/deployment pipelines, test automation frameworks, and collaboration platforms, even though they are not necessary (Block, 2023). The availability and effective application of these tools can improve traceability, productivity, and the overall implementation of agile. Organizations may improve their chances of successfully implementing agile, reduce typical obstacles, and eventually profit from agile project management

in producing high-quality software by proactively addressing these crucial elements.

2.4.3 Agile Project Management and Theory Associated with Agile Project Management

Different theories and conceptual frameworks support Agile project management principles and explain their efficacy in software development (Ciric Lalic et al., 2022). Agile methodologies are primarily based on empirical process control theory, which values transparency, inspection, and adaptation. According to this theory, in complicated situations where not everything is known or predicted, an empirical method based on observation and experimentation is more effective than a prescribed process control that presupposes a predictable environment. This theory provides a framework for understanding how agile practices contribute to improved project outcomes, product quality, and team satisfaction by emphasizing the need for adaptability in rapidly changing conditions (Röck et al., 2022).

Additionally, the Innovation Diffusion Theory is critical in understanding the implementation and spread of agile methodologies within organizations. This theory explains the process, reasons, and pace at which innovative ideas as well as technologies such as agile methods, can be used to guide the implementation of agile methods within organisations (Spagnoletti et al., 2021). In the context of agile project management, this theory helps to illuminate how agile practices are introduced and spread within the Nigerian software industry, with early adopters proving the benefits and inspiring others to follow. By applying this theory, the study will examine how agile project management has been embraced in Nigeria and its impact on the industry's growth and competitiveness (Cobb, 2023).

These theoretical foundations of agile project management give a solid framework for analysing the impact of agile project management on software development. These theories explain why agile practices can improve project outcomes, provide higher-quality products, and increase customer and team member satisfaction. They also provide a prism through which to examine and modify agile methodologies for increased efficacy in the ever-changing context of software development.

2.4.4 The relationship between Agile Project Management with Software Development (Theoretical and Empirical)

Theoretical Relationship

According to Cobb (2023), the theoretical relationship between APM and software development founded on the Agile Manifesto's basic concepts, which promote continuous improvement, consumer cooperation, and flexibility. These principles are intended to address the complexities and uncertainties of software development. Agile's iterative approach is consistent with the Incremental Model of software engineering, which proposes that software should be produced and deployed in small, manageable increments. This allows feedback and adjustments to be integrated throughout the development process, resulting in a more refined product.

The Agile principle of customer collaboration above contract negotiation is supported by the User-Centred Design (UCD) philosophy, which holds that incorporating customers throughout the development process results in more usable and satisfying software solutions. Agile's adaptability to change is based on Change Management theories, which emphasise the significance of flexibility and responsiveness in project management to accommodate changing project scopes and user requirements.

Empirical Relationship

Empirical research suggests that Agile project management improves software development outcomes. Numerous research works have examined the impact of Agile techniques on different elements of software development, such as project success rates, quality, and team dynamics. Research has demonstrated that Agile project management can result in higher project success rates than traditional techniques. Agile emphasis on customer satisfaction, frequent delivery, and iterative improvement all contribute to its success (Gaborov et al., 2021).

Empirical studies have shown that Agile approaches, such as Test-Driven Development (TDD) and Continuous Integration (CI), can enhance software quality by reducing defects and encouraging refactoring. Agile emphasis on self-organizing teams and cooperation has been shown to increase team dynamics, communication, and job satisfaction among software developers (Khan et al.).

2.5 Expertise in Agile Methodologies

2.5.1 Overview and Definition

Expertise in Agile Methodologies refers to an individual's or team's ability to comprehend and use Agile principles and practices in software development projects (Khalil & Khalil, 2020). This expertise includes knowledge of Agile frameworks such as Scrum, Kanban, and Extreme Programming (XP), as well as experience conducting Agile procedures like as sprints, stand-ups, retrospectives, and continuous integration. Expertise in agile methodologies encompasses more than just technical knowledge. It also includes the ability to cultivate an Agile attitude that values adaptability, cooperation, and customer focus. Agile specialists excel at fostering team dynamics, managing stakeholder expectations, and directing continuous improvement initiatives.

2.5.2 Expertise in Agile Methodologies and Theory Associated with Expertise in Agile Methodology

According to Ouriques et al. (2023), theories relating to expertise in agile methodologies frequently draw on educational psychology, organisational behaviour, and knowledge management. The few applicable theories include:

1. Cognitive Load Theory:

This theory contends that human working memory has a finite capacity and that educational methods should avoid overloading it to promote learning. In the context of agile expertise, this theory advocates for incremental and iterative learning of agile practices, allowing individuals to develop competence over time without becoming overwhelmed (Dank, 2024).

2. Experiential Learning Theory:

According to experiential learning theory, knowledge develops by transforming experiences. Agile approaches, which encourage reflection and adaptation, are in line with this idea, as practitioners learn and improve their abilities through direct experience and retrospection (Ozkan et al., 2020).

3. Communities of Practice:

This social theory of learning emphasises the value of social interaction and information sharing within a community. Agile experts frequently arise from communities of practice, where they share their experiences, learn from one another, and add to the collective knowledge of Agile methodology (Ouriques et al., 2023).

4. Dreyfus Model of Skill Acquisition:

The Dreyfus concept outlines five skill development levels: beginning, competent, proficient, expert, and advanced. Individuals with agile expertise go through these stages as they gain experience and a better knowledge of Agile principles and practices (Cobb, 2023).

2.5.3 The Relationship Between Expertise in Agile Methodologies with Software Development - Theoretical and Empirical:

Theoretical Relationship:

Theoretically, expertise in agile methodologies should improve the software development process by allowing teams to execute Agile practices more effectively, resulting in better project outcomes. The Human Capital Theory, which states that investing in education and training increases individual productivity and performance, lends support to the notion that growing expertise in agile approaches can lead to improved software development practices and results (Alavi & Aghakhani, 2023).

Empirical Relationship: Empirical research has investigated how agile expertise affects software development. According to the findings, teams with more agile competence have improved project performance, enhanced productivity, and higher-quality deliverables (Cornide-Reyes et al., 2021). Agile expertise has also been demonstrated in studies to have a good impact on team dynamics, with expert agile practitioners promoting greater communication, collaboration, and problem-solving within teams.

2.6 Conceptual Framework

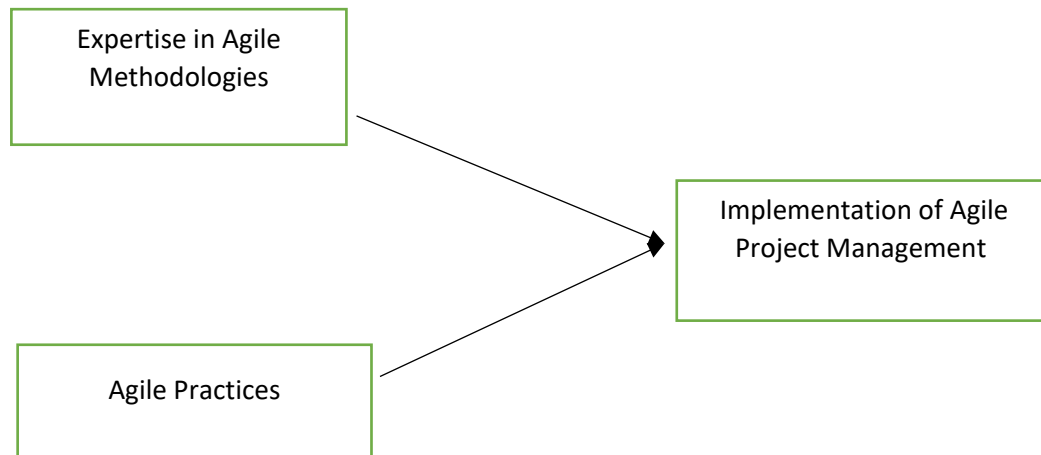


Figure 2.1: Conceptual framework

2.6.1 Implementation of Agile Project Management: The implementation of agile project management provides a solid framework for analysing its impact on software development (Binci et al., 2023). The implementation of APM significantly impacts software development by enhancing project outcomes, delivering higher-quality products, and improving both customer and team satisfaction. This approach makes it possible for continuous refinement and adaptation of agile methodologies for increased efficacy in the ever-changing context of software development.

2.6.2 Expertise in Agile Methodologies: Expertise in agile methodologies is a critical factor that influences the successful implementation of agile project management in Nigerian software companies. It plays a vital role in overcoming challenges, realizing benefits, improving efficiency, and enhancing competitiveness. (Kuzminov et al., 2019).

Expertise in agile methodologies contributes to organisational success by increasing team productivity, innovation, and value generation in software development.

Organisations that invest in creating and using expertise in agile practices can successfully leverage the potential of their human capital to create long-term growth and competitive advantage.

2.6.3 Agile Practices: The implementation of agile practices is crucial for the successful adoption of agile project management (APM) in Nigerian software companies. These practices such as iterative development, continuous feedback, and cross-functional collaboration, enhance project speed, efficiency, and overall competitiveness (Khalil & Khalil, 2020). By effectively integrating agile practices, companies can overcome challenges, realize the benefits of agile methodologies, and swiftly adapt to market demands, which directly supports the study's objectives of evaluating the implementation, identifying challenges and benefits, and improving project outcomes in Nigerian software industry.

One of the key benefits of agile in software development is its focus for regular feedback and progress. Frequent inspections and feedbacks allow members to evaluate the methods, practices, as well as products in real time and make appropriate improvements. This not only improves the software's quality, but also develops a learning and adaptability culture among the team members.

2.7 Chapter Summary

This chapter presented a detailed overview of agile project management and its application in Nigerian software development, including conceptual frameworks, and empirical evidence, to guide future study and practice. The preceding review of literature provided a rationale for delving deeper into the implementation of agile project management on software development through different approaches such as

evaluating team collaboration, customer satisfaction and expertise concerning the practical application of agile methodologies and theory.

Drawing insights from the literature review, different areas emerged as requiring further exploration. While project management literature adequately covered APM methodologies and practices, the extent of understanding within software development organisations and among teams regarding these practices remained unclear.

In contrast to prior research, which focused on factors influencing software development (including success and failure rate), there seems to be a broad classification of these factors into technological, methodological, human, and environmental in nature. Software development while a driving force in technological innovation faces a wide range of challenges that could significantly affect the software success. Research further showed that if technical debt is not adequately managed, future development would drastically slowdown, resulting to a decline in software quality and productivity.

Despite the relevance of APM, and its challenges in ensuring customer satisfaction and stakeholders alignment, the roles of project management and behaviours of software developers in agile project management processes were not explicitly addressed. Identifying knowledge gaps in agile project management practices underscores the necessity for investigating the quality of software development definitions at the project's outset. Expertise in agile methodologies, supported by empirical process control theory and innovation diffusion theory, frequently drew on educational psychology, organizational behaviour and knowledge management, which helped cultivate agile attitudes that valued adaptability, cooperation, and customer focus.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter covered in detail the approach that was employed in the study to address the research objectives. The chapter highlighted several key points, including the qualitative research method, research design, data collection, the approach used in the study, data analysis, and chapter summary.

The study intended to advance both theory and practice in areas of software engineering and project management by offering thorough insights into the implementation of agile project management on software development outcomes in Nigerian software companies through the use of this methodology.

3.2 Research Design

Previous studies indicate that there is no single, perfect research project design. As highlighted by Johnson et al. (2020), the overall logic and coherence of a research design determines the quality of its numerous components. The research process involved a systematic approach depicted in Figure 3.1, which illustrated the step-by-step methodology that began with defining the research problem, selecting participants, conducting interviews, analysing the data, and concluding with a discussion of findings.

This study adopted a phenomenological approach to investigate the implementation of agile project management (APM) at software companies in Nigeria. the selection of phenomenology allowed for a thorough investigation and understanding of the lived experiences and perceptions of stakeholders in APM practices.

The experiences and opinions of stakeholders about agile Project Management (APM) in Nigerian software companies were best explored through a qualitative research design. Understanding societal phenomena, personal experiences, and the interpretations people attached to them were all important aspects of qualitative research. Because APM is intricate and multidimensional, qualitative approaches provided a detailed examination of the viewpoints and lived experiences of stakeholders in agile projects.

Researchers gained a profound understanding of participants' experiences, motives, and viewpoints using qualitative research techniques like semi-structured interviews. Rich, intricate insights that might not have been immediately obvious using quantitative approaches alone were captured by researchers using these methodologies. Through interactive dialogues with relevant parties, scholars identified underlying causes, conflicts, and situational subtleties affecting how well APM techniques were applied.

The process began with the identification of the research problem related to the challenges and outcomes of implementing agile methodologies in the Nigerian software industry. Following this, participant selection was conducted focusing on individuals directly involved in agile projects, such as product manager, and software engineer. The data collection phase involved conducting in-depth, semi-structured interviews to capture participants' experiences and perspectives on agile practices. In the data analysis stage, the collected data was systematically analysed using thematic analysis to identify key themes and patterns related to the impact of APM on software development. The discussion of findings then integrated these themes to form a comprehensive understanding of how agile methodologies were implemented in this specific context.

In terms of data collection and analysis, qualitative research provides flexibility and openness particularly phenomenology, that allowed scholars adjust the methodology in accordance with fresh findings as well as trends (Mashuri et al., 2022). As opposed to study using numbers (quantitative study), which frequently uses pre-established metrics and assumptions, qualitative research promotes an iterative and exploratory methodology. For a deeper knowledge of emerging themes, researchers could delve into unexpected discoveries, modify their methodologies, and get a full comprehension of the research issue. Researchers are able to capture the intricacy and dynamic character of agile project management in the context of software companies in Nigeria because of this flexibility.

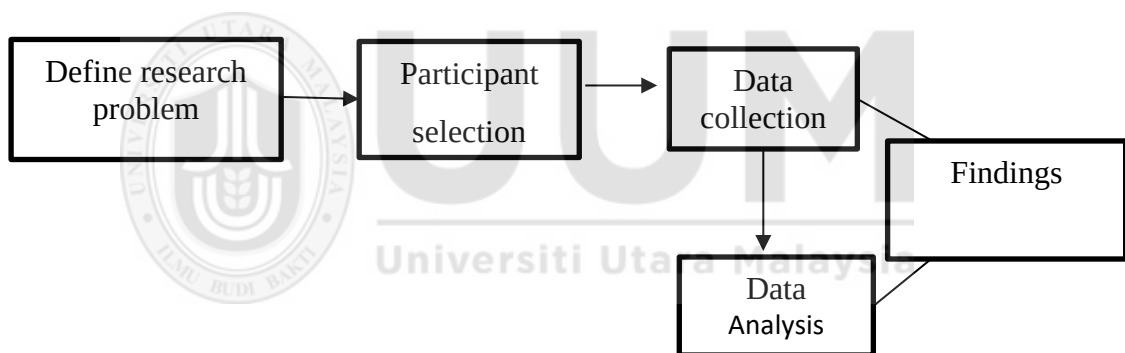


Figure 3.1 Planned Research Process

3.3 Research Method

To tackle the study objectives mentioned in preceding chapter, researcher decided to use a qualitative research method as a means to gather and evaluate data for this study. The primary goal of this approach was to gain insight into the varying experiences and viewpoints of stakeholders engaged in Agile project management in Nigerian software firms. Because qualitative research methods reflect the complexity and depth of participants' experiences and views, these methods were highly suitable

for the study of intricate phenomenon, such as the impact of Agile project management (Griebenouw, 2021).

Qualitative research methods could be identified via facts, data, assertions, remarks, assumptions, concepts, rules, symbols, perceptions, metaphors and feelings. All information sources, including manuscripts, newspapers, diaries, photos, official and personal letters, and artefacts, were used to gather information. Some persons were interviewed, and study participants were analysed through the use of ethnography (Madondo, 2021).

Qualitative methods aligned closely with the research objectives of this study, which aimed to investigate stakeholders' experiences with agile project management in Nigerian software companies. With this approach, researcher examined the implementation of agile project management in-depth and from multiple perspectives, identifying underlying factors, challenges, and opportunities related to the adoption and implementation of Agile.

3.4 The Approach used for the Study

In order to investigate the lived experiences of stakeholders in agile projects inside Nigerian software companies, this study will employ a phenomenological approach. A qualitative research approach called phenomenology aimed to capture the essence of human experiences as they are experienced and understood by specific people (Williams, 2021). The researcher sought to understand the underlying meanings, motives, and perspectives of stakeholders about agile project management by adopting a phenomenological approach. As described by Hopp (2020), phenomenology holds that the role of the philosopher is to clarify different facets of experience, with an emphasis on awareness, the imagination, social interactions, and the position of the

human subject in society and history. The goal of phenomenology is to reveal aspects of people's nature and environments.

A crucial component of the approach employed for this study is participant-centred research, which prioritizes the voices and perspectives of those directly involved in agile project management. Product manager, and software engineer, with at least five years professional experience was among the participants who fully engaged with the study process and effectively convey their experiences, difficulties, and triumphs with agile methodology. This strategy aimed to give participants more voice in influencing the research findings by acknowledging their agency and area of expertise.

In order to collect data for the research on the challenges that Kredi and Sidmach Technologies encountered in implementing agile project management into practice, the focus was on understanding how the companies integrated agile methodologies into software development projects. Furthermore, the methods these companies employed for the planning and execution of agile projects were investigated. To gain more understanding about the experiences, practices, and opinions of the respondents about APM in the Nigerian software industry, semi-structured interview questions were presented to respondents.

A manual data analysis procedure was used after the interviews. In accordance with Emerson (1995) advice, this study did not fully analyse all of the interview transcripts. Instead, important words and stories that are pertinent to the theory or research issue were identified and selected (Alam, 2021). The information was then sorted, filtered, and shown in tabular form. Summaries of these conclusions, emphasizing the most significant findings from the investigation, were included in the final report (Ellingson & Sotirin, 2020).

Phenomenology examines people's everyday experiences while putting the researcher's preconceptions about the phenomenon aside. Although other sources of data (such as documents and observations) were also used, interviews are typically done with people who have personal knowledge of events, situations, or experiences. This approach can be used to build a universal understanding of experiences, events, and circumstances, which will help one grasp the phenomenon on a deeper level.

The phenomenology method works best when the study is examined in greater detail and depth. Because of the unique features of Kredi Technology and Sidmach Technologies, the research, which centred on the implementation of agile project management at software companies, requires further investigation. Questions need to be direct and clear in order to guarantee interviewees' understanding and precise answers. This method makes phenomenology as a research tool more understandable and emphasized the need of using reading comprehension techniques when interpreting spoken accounts of individual experiences that are contained in transcripts.

3.5 Data Collection

The process of obtaining information from target respondents using different methodologies, especially primary sources was essential to gain understanding of study factors requires data collection (Pandey & Pandey, 2021). The primary method of gathering qualitative data for this research would be interviewing important participants in agile projects at Kredi Technology and Sidmach Technology Nigeria through semi-structured interviews conducted online. The decision to use semi-structured interviews was based on the need to explore the participants' experiences, perspectives, and challenges. These participants include the product manager at Kredi Technology, and the software engineer at Sidmach Technology, who had first-hand experience with agile

project management techniques. Semi-structured interviews allow participants to express their opinions and experiences in their very own words while also facilitating a guided conversation by achieving stability with structure as well as flexibility (Mashuri et al., 2022).

In order to encourage participants to openly share their experiences, perspectives, and thoughts, the interview procedure was open-ended and flexible. Key subjects covering agile project management, including perceived impacts on software development outcomes, benefits, and implementation challenges, were covered in the questions. On the other hand, participants were urged to elaborate on their answers, offer anecdotes, and bring up any other pertinent issues. This methodology guarantees the acquisition of rich, nuanced data that accurately reflects the varied experiences and viewpoints of the participants.

Throughout the interview process, participants were asked to elaborate on the problems and challenges specific to agile project management within Kredi and Sidmach Technologies. Participants were also encouraged to provide insights into how these companies successfully implemented agile methods into their software development projects. To capture the richness of these discussions, an audio recorder was utilized with the consent of the interviewees, ensuring an accurate and detailed account of the insights shared during the interviews (Jacobs et al., 2021). This approach aimed to gather comprehensive and nuanced information on the companies' agile methods employed base on Software development.

3.5.1 Population and Sampling Method

The population targeted in this study consisted of software companies in Nigeria, a country which has a rapidly growing technology sector with numerous firms adopting

various software development methodologies, like agile methods. The software companies in Nigeria are estimated to be over 1,000. These companies range from small startups to large established firms, all contributing to the country's growing tech ecosystem. For this research, Kredi Technology and Sidmach Technology were selected from this broader population.

However, Kredi Technology and Sidmach Technology were specifically chosen for this research due to several factors. Firstly, both companies have prominent reputations in the Nigerian software industry and have successfully implemented agile project management in their projects. These companies were identified as leading innovators in the adoption of agile practices, making them suitable for this study in order to understand the impact of agile project management in the Nigerian context. Additionally, these companies were chosen due to the researcher's easy access to data and information, which facilitated the smooth collection of data, ensuring that the study could be conducted effectively within the available resources and time frame.

The method for selecting samples involved purposive sampling method which was used to select the participants for this study. This non-probability sampling technique was chosen because it allows the researcher to intentionally select individuals who are most knowledgeable and experienced with the research topic. In this study, the product manager at Kredi Technology and the software engineer at Sidmach Technology were selected based on their involvement in agile projects and their ability to provide valuable insights into the implementation and outcomes of agile project management.

By focusing on these selected participants, the research aimed to gain a detailed understanding of agile project management practices within the Nigerian software industry, particularly regarding how these practices influences software development.

Table 3.1: Primary and Secondary sources of data collection

Primary Sources	Secondary Sources
<u>Interview</u> In order to collect data and information, an in-depth interview was utilized as the interviewing format with participants and the interview generally lasted for 1 hour 20 minutes.	<u>Articles</u> The research was supported by the collection and interpretation of relevant papers.

3.6 Data Analysis

According to Islam and Aldaihani (2022), open-ended questions are a scientific way of obtaining evidence for qualitative research. To analyse this data, qualitative data analysis is necessary. In thematic analysis, comprehending the meaning of the data is crucial. Respondents who fulfilled these characteristics are given coded allocations once the data are categorized.

Thematic analysis, a qualitative method for finding recurrent themes, patterns, and insights in the data, was used to analyse the transcripts of interview (Kiger & Varpio, 2020). By using this method, the narratives of participants may be systematically examined to find recurring themes and underlying meanings about how agile project management influences software development outcomes.

Key findings from the interview data were extracted via a methodical procedure of data coding, categorization, and interpretation. This entailed coding text passages, dividing the material into digestible chunks, and classifying the pieces into relevant groups. Through iterative coding and analysis, themes and patterns related to agile project management techniques and how they affect software development results were revealed.

3.7 Validity and Reliability

To ensure the trustworthiness of the study findings, several techniques were employed with a focus on validity and reliability. Because validity was so important, the researcher made sure to carefully select tools and research methods that directly addressed the research issues. With this strategy, the study's objectives were achieved, and the general validity of the findings was strengthened by ensuring that the data was relevant and accurate.

The study approach was reflexive and transparent in order to address any biases and risks to validity, such as researcher bias or participant reaction (Jacobs et al., 2021) . Throughout the study, reflexivity entails the researcher critically examining their own presumptions, viewpoints, and prejudices to ensure it doesn't unnecessarily interfere with collection and analysis of data. To assess the study's validity and reliability, transparency in reporting entailed precisely recording the research methodologies, procedures, and decision-making processes.

Throughout the research process, consistent and standardized methodologies were adopted due to the paramount concern of reliability. A consistent procedure was used, whether conducting interviews or sending out surveys to reduce variances in the data that was gathered. In addition to supporting the study's dependability, this methodical

and consistent approach made it possible for the research procedure to be replicated, which guaranteed accurate and consistent findings. The study intends to improve the reliability and credibility of its findings by showcasing the coherence and integrity of the research process.

3.8 Ethical Assurances

To ensure transparency and voluntariness, informed consent was requested from each participant before any data was collected. In addition to being able to leave the study at any time without consequences, respondents received comprehensive explanations on the research's objectives, the methods, possible danger, and benefits (Pietilä et al., 2020).

Participants' privacy and confidential data were protected during the study by meticulously upholding their confidentiality and anonymity. All gathered data was safely saved, only available to approved researchers, and any personally identifiable information was removed or anonymized to avoid revealing participant identities (Pascale et al., 2022). The study adhered to ethical guidelines and research conduct rules, ensuring that participants' rights and well-being are prioritized at all times. The study was carried out with honesty, integrity, and respect for the autonomy and dignity of the participants by the researchers. Any ethical concerns or issues that arose throughout the study were addressed right away and dealt with in compliance with established ethical standards.

3.9 Chapter Summary

The main elements of the research approach and methodology for examining the implementation of agile project management on software development outcomes in

Kredi Technology and Sidmach Technologies were described in this methodology chapter. The chapter began with a discussion about the research design, which employed a qualitative technique to investigate how stakeholders viewed and experienced agile project management. This decision was justified by emphasizing how well it fits the requirements for obtaining in-depth, deep insights and comprehending intricate processes.

Semi-structured interviews were used as the primary method to acquire data. Interviews were conducted with important stakeholders in Kredi and Sidmach Technologies located in Nigeria. The methods for selecting samples, gathering data, and using audio recording to guarantee that the insights discussed during the interviews were accurately recorded. The chapter also discussed the thematic analysis strategy used for data analysis, focusing on the methodical process of data coding, classification, and interpretation to identify important discoveries about agile project management techniques and their influence on software development results. In order to guarantee the validity of the findings, methods like member verification, peer debriefing, and process transparency were used to address validity and reliability measurements. The chapter concluded with a discussion of ethical assurances included getting informed consent, keeping information private, and following moral standards all during the research.

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents and analyzes the data obtained on investigating the implementation of agile project management at software companies in Nigeria with specific focus on Kredi Technology Limited and Sidmach Technology Limited. The study specifically sought to evaluate the implementation of agile project management practices in the organization, the challenges involved, the benefits as well as the impacts agile project management practices have on software development in Nigeria, and particularly within the context of their organizations.

Therefore, this chapter presents the data obtained from two respondents who are software project management experts at Kredi Technology Limited and Sidmach Technology Limited. The interviews were conducted using a semi-structured format, allowing for in-depth exploration of the participants' experiences and perspectives.

4.2 Demographic Characteristics

Data was gathered through an in-depth interview with two key individuals, one from each company. The respondents with a deep understanding and experiences of APM, provided a valuable insight into agile practices within their organizations.

The table below summarizes the respondents' demographic characteristics as well as their job role and years of experience.

Table 4.1: Respondents' profile

ID	GENDER	ORGANIZATION	ROLE/DESIGNATION	YEARS OF EXPERIENCE
Respondent A	Female	Kredi Technology Limited	Product Manager	5
Respondent B	Male	Sidmach Technology Limited	Software Engineer	7

4.3 Data Analysis

The data obtained from the two participants through the semi-structured interview were analyzed using thematic analysis which was employed due to its effectiveness in filtering complex qualitative data into key themes that capture the essence of the participants' responses.

The procedure began with an initial reading of interview transcripts to familiarize the content, followed by coding significant features of the data that were relevant to the research questions. These codes were then organized into potential themes, which were reviewed and refined to ensure they accurately reflected the data. The selected themes were carefully studied to gain better understanding of how agile project management practices were implemented in these companies and how these practices impacted software development outcomes. The findings were then linked back to the research objectives and existing literature, providing a full understanding of the function of agile project management in Nigerian software development.

4.3.1 Theme 1: Flexibility, Iteration and Customer Satisfaction

The participants were asked about the implementation of agile project management practices in their company. *“Can you describe how agile project management are currently being implemented in your company?”*

In order to understand and appreciate the implementation of agile project management methodology in their company, the two respondents opined that they implemented agile project management practices within the scope of its flexibility and iterative process that help in desirable customer satisfaction.

Respondent A revealed that their company utilizes Agile project management to enhance software development, focusing on step-by-step development, customer collaboration, and adaptability. Regular training sessions and workshops ensure team members understand and adhere to Agile principles.

"Our company uses Agile project management to improve how we develop software. We have included Agile principles in our work by focusing on developing in steps, working closely with customers, and being flexible to changes...", emphasized Respondent A.

Respondent B equally noted that their company has adopted Agile project management, focusing on continuous improvement and team collaboration. They use daily stand-ups, sprint planning, reviews, and retrospectives to align teams and address obstacles, ensuring each team understands their goals.

"Our company has embraced Agile project management across all teams, with a strong emphasis on continuous improvement and team collaboration. We

utilize daily stand-ups, sprint planning, sprint reviews, and retrospectives to ensure everyone is aligned and obstacles are addressed promptly...".

Table 4.2: Participants' response on the implementation of agile project management practices.

Question 1	Respondent	Implementation Focus	Agile practices	Key Insights
Can you describe how agile project management practices are currently being implemented in your company?	Respondent A	Implemented for its flexibility, and iterative process in enhancing customer satisfaction.	Focuses on step-by-step development, customer collaboration, and adaptability. Regular training sessions/workshops to ensure adherence to agile principles.	Agile principles are deeply integrated into the company's workflow, with a strong emphasis on customer feedback and adaptability.
	Respondent B	Implements agile project management with a focus on continuous improvement	Utilizes daily stand-ups, sprint planning, reviews and retrospectives to align team and addresses challenges.	Emphasizes continuous improvement and collaboration, ensuring team alignment and

		and team collaboration.		prompt resolution of challenges.
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4.3.2 Theme 2: Team-building

The participants were asked how their company transitioned to agile methodologies and the initial step taken. *“How did your company transition to agile methodologies? What was the initial steps taken?”*

When asked about how their organizations transitioned to implementing agile project management practices, the respondents harped on the essence of building a formidable and adaptable team as a precondition to achieve a successful transition to agile project management practices.

“...We began with small pilot projects to test Agile methods and collected feedback from our teams. The first steps included training our staff, and reorganizing teams to work better together across different functions”, said Respondent A.

Similarly, Respondent B was also quoted saying:

"Agile methodology has been our methodologies. The company provided all teams with a comprehensive procedure and project management tool for team collaboration".

Table 4.3: Participants' response on how their company transitioned to implementing agile practices in their projects

Question 2	Respondent	Transition to APM	Actions Taken	Key Insights
How did your company transition to agile practices? What were the initial steps taken?	Respondent A	Emphasized on the importance of building a formidable and adaptable team as a key precondition for a successful transition.	Started with small pilot projects to test agile methods, gathered feedback, staff training, and reorganization.	The transition was gradual beginning with pilot projects and focusing on team reorganization and training.
	Respondent B	Stressed that agile methodology has been firmly fixed in their practices.	The company provided comprehensive procedures and tools for team collaboration.	The company ensured a smooth transition by equipping teams with the necessary tools and procedures

				for collaboration.
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4.3.3 Theme 3: Agile Scrum

The respondents also gave their opinion on the specific form of agile methods they adopt in their respective organizations. *“What specific agile methods (e.g. scrum, kanban) is your company using, and why?”*.

The two respondents' opinion align with the agile scrum method, a framework for project management that provides teams with a set of values, principles, and practices to help them organize and manage their work.

Respondents A noted:

“...the step-by-step approach of Agile helps us find and fix problems early, improving quality. Compared to traditional project management, Agile has shortened our time to deliver products and helped us use resources more effectively, leading to better cost management.”

This above opinion is also similar to that of Respondent B who outrightly stated their company adopts a scrum method of agile due to its structured approach.

“We primarily use the Scrum framework, e.g. (Jira, Trello). Chosen for a project with clear deliverable, and where iterative development is beneficials. Its structured approach helps us maintain focus and deliver value incrementally”, said Respondent B.

Table 4.4: Participants' response on the specific agile method

Question 3	Respondent	Agile Method Used	Key Benefits
What specific agile methods (e.g. scrum kanban) are you using, and why?	Respondent A	Agile scrum framework	Early identification and problem-solving, improved quality and better cost management.
	Respondent B	Scrum framework (e.g. Jira, Trello).	helps maintain focus, deliver value incrementally, and manage work effectively.

4.3.4 Theme 4: Organizational Factor and Human Factor as Challenge

In a bid to understand the challenges the organization face in trying to implement agile project management methodology, the participants were asked;

What have been the main challenges your company has faced in implementing agile practices? And how have you address these challenges?

The respondents believe that organizational factor and human factor remain the biggest challenge. For instance, Respondent A believe that inability to adapt to changes and blending with the Organizational culture remains a "nightmare" in achieving integration of agile project management methodology.

"Some main challenges were people resisting change, fitting Agile practices into our company culture, and needing constant training...", said Respondent A.

Similarly, Respondent B also averred that the challenges relate to the need for onboarding (training) as well making team members get integrated into the new organizational culture (i.e. implementation of agile method).

"Training and highlighting benefits, ensured consistent Agile practices and cross-team meetings...", said Respondent B.

Table 4.5: Participants' responses to the Challenges in Implementing Agile Practices

Question 4	Respondent	Challenges Faced	How Challenges were Addressed
What have been the main challenges your company has faced in implementing agile practices? And how have you	Respondent A	Organizational and human factors.	Addressed through ongoing training, adapting practices to fit company culture, and overcoming resistance to change.

addressed these challenges?			
	Respondent B	Onboarding and cultural integration.	Managed by providing training, highlighting the benefits of agile, and facilitating cross-team meetings for better integration

4.3.5 Theme 5: Organizational Support, Team Training and Tooling

The participants were asked if there were any key enablers provided in overcoming challenges related to the implementation of agile.

“What key enablers (internal or external) have been most helpful in overcoming challenges related to agile implementation?”

In the implementation of agile project management practices, the two respondents have identified leadership support, team training and tooling as great enabler of achieving effective and successful implementation. Respondent A stated that sufficient training and organizational support at all levels have been instrumental to the success achieved.

"Support from our leaders and the dedication of our teams have been key in overcoming challenges. Also, external help from Agile coaches, consultants,

and joining Agile communities and forums has given us valuable insights and guidance", Respondent A noted.

Respondent A further said that these supports have been helpful in managing and mitigating challenges across board. She was quoted saying as follows:

"We dealt with these by promoting openness, offering continuous support and training, and involving everyone in the transition process".

In the same vein, Respondent B has opined that the organization has provided a virile ground for reviews at intervals of time for improvement as well as provision of adequate tools.

"...all teams meet to talk about how each team has been following the agile methodologies. During this time, feedback is provided by each team manager using the write tools to explain".

Respondent B equally highlighted that the support system has been useful in managing series of onboarding challenges.

"...and managed tool integration through dedicated support teams", said Respondent B.

Table 4.6: Participants response to support/resources provided in overcoming issues related to agile implementation

Question 5	Respondent	Key Enablers	Application of Enablers
What support or resources (internal or external) have been most helpful in overcoming challenges related to agile implementation?	Respondent A	Leadership support, team training, and external help.	Utilized strong leadership backing, continuous training, and insights from agile coaches and communities to overcome challenges and ensure successful implementation.
	Respondent B	Regular reviews and adequate tooling.	Conducted periodic reviews and provided necessary tools supported by dedicated teams, to ensure adherence to agile methodologies and address onboarding challenges.

4.3.6 Theme 6: Cost/Product Optimization, Timely Delivery and Customer Satisfaction

In a bid to understand the benefits and impact of agile project management methodology on software development, the two respondents have averred that it brings about enhanced collaboration, high level of productivity leading to cost optimization, quality and timely delivery as well as customer satisfaction.

"...our project results have improved a lot. For example, a recent project was finished early and under budget because of good sprint planning and constant feedback in Scrum. Agile practices have also boosted team morale and collaboration", said Respondent A.

Also, in conversing the above opinion, Respondent B noted that:

"Enhanced collaboration improved teamwork and project execution, while faster time-to-market reduced development cycles and sped up product delivery".

The two respondents further opined that the impact has been positive owing to the iterative nature of the agile project management practices which allows flexibility and continuous stakeholder's' inputs in the project cycle.

"There has been a noticeable increase in team productivity. Agile's emphasis on regular feedback, clear goals, and collaborative work environments...", said Respondent A.

Respondent B also averred in similar vein as captured in the below quotation:

"The regular feedback and agile iteration process have helped teams to quickly adapt to changes and continuously improve their processes..."

Furthermore, the two respondents have also emphasized the preeminence of localization process in impact adoption of agile project management practices, as every agile practice is tailored along the standards and conditions of Nigerian software development market as well as organizational specificities. Overall, they argued that agile project management methodology has been has had a significant positive impact on the software development in Nigeria in the view of necessary Key Performance Indicators (KPI's).

In line with the aforesaid. Respondent A said:

"Using Agile Project Management has greatly helped us successfully deliver software products. Key performance indicators (KPIs) like project completion time, customer satisfaction, and defect rates have improved a lot..."

Respondent B was also quoted saying:

"The adoption of Agile Project Management has significantly improved the delivery of software products in the Nigerian software industry, with Agile-managed projects showing faster time-to-market, higher quality, and increased customer satisfaction..."

Table 4.7: Participants' response on the Benefits and Impacts of agile project management

Respondent	Benefits and Impacts	Key Insights
Respondent A	Enhanced collaboration, cost optimization, timely delivery, and improved KPIs.	Agile practices have led to better project outcomes, such as early and under-budget completion, increased team morale, and improved KPIs like project completion time and customer satisfaction.
Respondent B	Improved teamwork, faster time-to-market, higher quality.	Agile methodologies have shortened development cycles, increased team productivity, and enhanced customer satisfaction through iterative processes and regular feedback.

4.3.7 Summary of Findings

The table 4.8 presents a summary of key findings based on the responses of the two participants involved in the study. The purpose of this summary is to it easy locate the key findings. The responses highlight the implementation, challenges, benefits as well as the impact of agile project management practices in the respective companies with

particular emphasis on the implementation strategies, overcoming challenges, and overall benefits observed.

Table 4.8: Summary of findings

Questions	Findings	Significant Discovery
1	Implementation of agile practices	Successful implementation with a focus on flexibility, adaptability, and customer satisfaction.
2	Transition to agile methodology	Building strong adaptable teams was crucial for a smooth transition to agile practices.
3	Agile Scrum	Agile scrum was the preferred framework due to its structured approach, leading to better project outcomes.
4	Challenges	Organizational and human factors were the primary challenges, addressed through leadership support and continuous improvement.
5	Benefits and Impacts	Agile methodologies resulted in enhanced collaboration, cost optimization, timely delivery, and improved customer satisfaction.

4.4 Discussion of Findings

This study seeks to unravel the implementation of agile project management practices, its challenges, benefits and impacts on software development in Nigeria software companies particularly within the context of Kredi Technology Limited and Sidmach Technology Limited. In order to achieve this, a semi-structured interview was adopted with two respondents who are experts in software development coming from the respective organizations.

After the thematic analysis of the data, the adoption of agile project management practices in Kredi Technology Limited and Sidmach Technology Limited is hinged on its significance of flexibility, iterative process and customer satisfaction. It was also found out that team-building remains the fulcrum of adopting such method, while scrum method has been favored to be a good method. The foregoing is found within the literature as Ciric Lalic et al. (2022), noted that APM is a flexible and iterative approach to project management used in software development. It has evolved as a popular method for managing projects, notably in software development. It focuses on adaptation, teamwork, and customer satisfaction. Agile project management (APM) is now a well-known methodology in software development, providing a flexible and iterative framework that prioritises client collaboration, adaptable planning, and incremental product delivery (Behrens et al., 2021). Agile approaches enable teams to adjust rapidly to changing requirements and market situations.

According to Akbar et al., (2020), Agile methodology such as Scrum is increasingly among the best methods being used by Nigerian software development companies. Agile's iterative and collaborative approach complements the changing nature of projects and customer requirements. Scrum is one of the most popular agile approaches

in Nigerian companies. It provides a framework for iterative development, including roles such as development team, product owner, and scrum master. Standard practices include daily stand-ups, sprint planning, sprint reviews and retrospectives. In view of Cobb (2023), the implementation of agile method aligns with the postulation of Innovation Diffusion Theory, as a new innovation that facilitates discovering and resolving bottlenecks in the development process.

Furthermore, the study also reveals that organizational factor and human factor are the biggest challenge experienced in the implementation of agile project management methodology, while organizational support, training and tooling have been identified as the best enablers of achieving successful adoption of agile project management practices. Research has demonstrated that diverse teams can generate more inventive solutions, and that team cohesion is positively connected with project success. Individual developers' competence influences the quality and pace of software development. The culture of an organisation can either help or impede good software development. According to previous research, a positive organisational culture that encourages creativity, learning, and cooperation is a facilitator of successful software projects (Zeb et al., 2021). The argument of organizational support is reinforced by the opinion of Janowski (2021), who has posited that Agile leaders must adopt a servant-leadership mentality in order to support teams and encourage self-organization, replacing their previous command-and-control style.

Ibrahim (2022) also noted that the effective implementation of agile methodologies requires teams embracing agile practices to have the necessary skills, training, and expertise. Ineffective or incomplete adoption can result from a lack of knowledge about agile principles, frameworks (such as Scrum, Kanban), and technical practices (e.g., test-driven development, continuous integration). Furthermore, agile teams can greatly

benefit from tools and automation that support agile principles, such as project management software, continuous integration/deployment pipelines, test automation frameworks, and collaboration platforms, even though they are not necessary (Block, 2023).

In the same vein, it is also shown that the iterative and the adaptable nature of agile project management practices particularly that allows for localization, have brought about beneficial and positive impact on software development through enhanced collaboration, high level of productivity leading to cost optimization, quality and timely delivery as well as customer satisfaction. This is in tandem with the position of Ozkan et al. (2020), arguing that agile approaches encourage iterative development and frequent feedback loops, enabling teams to adapt more effectively to shifting market conditions and requirements. This adaptability allows software developers to react quickly to evolving customer demands as well as emerging opportunities.

In line with the findings of Röck et al. (2022), the agile practices are consistent with intrinsic motivation theories like as Empirical Process Control Theory which emphasises transparency, inspection, and adaptation. This theory provides a framework for understanding how agile practices contribute to improved project outcomes, product quality, team satisfaction by emphasizing the need for adaptability in rapidly changing conditions. Agile practices, including continuous integration, automated testing, and regular retrospectives, enhance software quality and reduce project risk. Early risk identification and stakeholder feedback aid in addressing risks. This expedites the release of essential features, giving businesses a competitive advantage and enabling swift market entry.

Table 4.9: Discussion of Findings

No	Findings	Literature Review
1.	Implementation of Agile Project Management	The implementation of APM in Kredi and Sidmach is driven by flexibility, iterative processes, and customer satisfaction, which aligns with Ciric Lalic et al. (2022) and Behrens et al. (2021).
2.	Use of scrum method	Both organizations favour scrum as an agile method supporting Akbar et al. (2020) and Cobb (2023), who connect its usage with Innovation Diffusion Theory for project improvement.
3.	Challenges in Implementation	Organizational and human factors are key challenges; success depends on leadership support, training and tooling, as supported by Zeb et al. (2021), Janowski (2021), and Block (2023).
4.	Benefits and Impact of agile practices	Agile practices lead to enhanced collaboration, productivity, cost optimization, timely delivery, and customer satisfaction. This is consistent with Ozkan et al. (2020) and aligns with Empirical Process Control Theory, as discussed by Röck et al. (2022), emphasizing the need for adaptability in rapidly changing conditions.

4.5 Chapter Summary

This chapter has presented the data analysis in line with thematic analysis of all the responses obtained from the two respondents who are experts in the field software development project management. The thematic analysis showed six key thematic points covering the idea of the study objectives ranging from the implementation of APM practices, the challenges as well as the benefits and impacts on software development in Nigeria particularly within the context of Kredi Technology Limited and Sidmach Technology Limited.



CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This research has investigated the implementation of agile project management on at software companies in Nigeria with specific focus on two software companies; Kredi Technology Limited and Sidmach Technology Limited. The study showed that the agile project management methodology has a positive impact on the software development of the two organizations as an alternative to traditional method. This is not unconnected to the iterative model, flexibility and customer satisfaction which remain the centerpiece of APM which led to the adoption of the project management method in line with Innovation Diffusion Theory. Scrum method has also been identified as a veritable and effective form of agile project management practices adopted in the software development companies. This has also brought about collaboration, teamwork, high quality products as well as transparency and adaptation, as canvassed by the Empirical Process Control Theory, leading to cost optimization, quality and timely delivery as well as customer satisfaction.

5.2 Recommendations

Based on the findings of this research, the following are recommended:

As effective and productive agile project management methodology can be, there is a need to pay adequate attention to human factor and organizational factor that may hinder its success. Stakeholders including team members and customers must be well carried along in the project cycle, while management should enhance strategies for achieving a positive organizational culture and support.

Localization is very important in adoption of agile method, especially in the company, project, role specification and other related. Before adopting agile methods, a project manager should take into account the project's specific features. For example, if an extensive group of less experienced developers is being deployed for a project with a mature process, there are several aspects which hinder the implementation of agile methods.

5.3 Limitations and Suggestions for Future Studies

This study is a small-scale study which is limited in data collection. Only two respondents were accessed. This implies that this constraint can be well improved by a large-scale study which can be performed by a future study. Similar to this, although theorists and practical project managers widely employ APM techniques, empirical study on effects of utilizing agile resources and methods remains lacking, hence further studies are required. Also, as this study focused on two organizations, there was a limit to carry out a comparative analysis which is a good point of research. Therefore, future studies can consider performing a comparative study.

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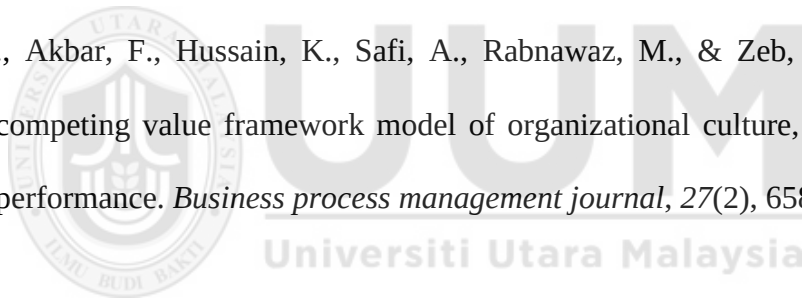
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APPENDIX



Interview Consent Form

Research Project Title: The Implementation of Agile Project Management at Software Companies in Nigeria;

Research Investigator: Olive Yadirichi Onyekachi (829537)

Research Supervisor: DR. SURIA BINTI MUSA

Programme: Master of Project Management

Participants: 2

Participants A: Product Manager

Participants B: Software Engineer

We appreciate your willingness to participate in an interview for the aforementioned study. You have been invited to speak with us today on the influence of Agile Project Management on Software Development of Software Companies in Nigeria of which your company was selected. Our research focuses on the adoption, implementation, challenges and benefits of Agile Project management practices on software developments. This research does not seek to assess your experiences or techniques, rather our aim is to understand the challenges that software companies encounter in this exceptional times and ideally enhance our approach to solving them.

This interview is planned to last no longer than 1 hour and to speed up the interview process, we would like to audio record our conversations today. Please sign the consent form and be assured that ethical guidelines for conducting academic research from **Universiti Utara Malaysia (UUM)** necessitate the need for respondents to fully consent to be interviewed and to the use of the information they provide in the interview. We need this permission form in order to make sure you understand why you are participating in this research and that you accept the conditions of your participation.

It should be noted that the document confirms;

1. It will be an audio-only interview of which a transcript will be generated afterwards.
2. All information will be held confidential and only accessible by the interviewer.
3. Involvement is entirely non-compulsory, and you can stop whenever you wish if it causes any discomfort.
4. We have no intention to harm you.
5. After the materials have been transcribed, the original recording will be deleted.
6. Part of the content of your interview may be used in academic papers or articles.

Thank you.

Name: _____

Signature: _____

Date: _____

INTERVIEW QUESTIONS

1. Can you describe how agile project management practices are currently being adopted and implemented in your company?
2. How did your company transition to agile methodologies? What were the initial steps taken?
3. What specific agile frameworks (e.g. scrum, kanban) are you using, and why did you choose them?
4. How does the implementation of agile project management methodologies in your company impact the efficiency, and speed of software development processes in your company?
5. What have been the main challenges your company has faced in implementing agile practices? And how have you addressed these challenges?
6. What key enablers (internal or external) have been most helpful in overcoming challenges related to agile implementation?
7. What are some of the significant benefits your company has experienced since adopting agile methodologies? Can you provide examples of how agile practices have improved project outcomes?
8. Have there been any noticeable changes in team productivity since implementing agile practices?
9. How has your company adapted agile project management methodologies to fit the specific needs of the Nigerian software industry?
10. To what extent does the implementation of agile project management contribute to the successful delivery of software products, and how do key performance indicators (KPIs) vary between Agile-managed and non-Agile-managed projects within the Nigerian software industry?

