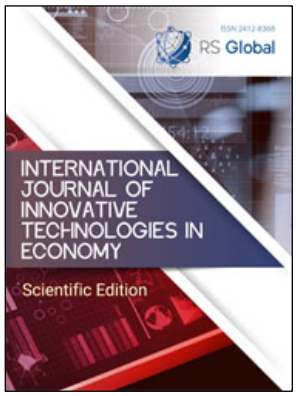

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INFLUENTIAL DRIVERS SHAPING THE UPTAKE OF AGILE METHODOLOGIES WITHIN NIGERIA'S MOBILE APPLICATION SECTOR

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ABSTRACT

The rapid evolution of Nigeria's mobile application sector presents unique challenges and opportunities, particularly in the adoption of Agile methodologies. This study explores the influential drivers shaping Agile adoption within this burgeoning industry, addressing key human, organisational, environmental, and technical factors. Through qualitative interviews with Agile professionals, the research identifies critical enablers such as team capabilities, customer involvement, and robust organisational culture. It also highlights constraints posed by limited resources, cultural misalignment, and technical barriers. Findings reveal that while technical tools and delivery strategies play a pivotal role, the interplay of management support, communication, and collaboration emerges as a decisive factor. The study underscores the necessity of tailoring Agile practices to align with Nigeria's socio-economic and technological contexts. By delving into the unique challenges faced by developers, this research provides actionable insights for fostering a sustainable Agile ecosystem in Nigeria. Its findings contribute to the broader discourse on Agile methodologies in emerging markets, offering a foundation for future frameworks that integrate cultural and contextual nuances.

KEYWORDS

Agile Methodologies Mobile Application Development, Software Engineering, Organisational Culture

CITATION

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Introduction

The mobile sector has had a remarkable upswing recently, creating practically endless possibilities for varieties of mobile apps. Mobile software applications have rapidly expanded due to the increasing use of mobile phones, especially smartphones and mobile broadband services (Kaleel & Ssowjanya, 2013). According to Idea Usher (2023), mobile apps are anticipated to produce over $935 billion in revenue by 2023. Furthermore, it is expected that by 2023, more than 5.7 million mobile applications will be available throughout the Google Play Store and Apple App Store combined. By 2025, mobile app revenue is expected to increase and reach around $613 billion. According to Buildfire (2023) statistics, 49% of people open an app at least 11 times daily. The number of projects for mobile application development services has greatly expanded along with the growth in demand for mobile applications (Flora et al., 2014).

In a resource-constrained and varied environment where high availability, efficient performance, and quick response times are necessary while still providing value to the end user, it might be difficult for mobile-specific apps to function well (Corral et al., 2013). In addition, developers need to produce apps rapidly and inexpensively to compete in a market with millions of users. These elements create a competitive, complicated, and error-prone market, raising the question of how to develop successful software solutions in the mobile sector (Liu et al., 2010). Surprisingly, only one or two developers are frequently in charge of overseeing the

whole development cycle for small or medium-sized mobile applications, from idea to formal release. However, only a few best practices have been implemented, and developers do not give the development process or the tracking of development activities enough priority (Kaleel & Harishankar, 2013).

The academic literature on software engineering presents a variety of frameworks for managing mobile software projects to solve the issue and guarantee adherence to precise mobile application development. Despite the availability of several methodologies, the bulk of these studies (Altuwaijri & Ferrario, 2022; Asfour et al., 2019; Flora et al., 2014) advocate an Agile-based convergent system. Over the last ten years, this strategy has drawn interest from software development teams and researchers throughout the globe and is thought to be a perfect match for the mobile app sector (Flora & Chande, 2013). Developers have often combined Agile techniques with those of other software development frameworks to overcome the limits of the methodology, producing excellent results (Corral et al., 2013).

The capacity to move quickly and fluidly is referred to as Agile. The Agile methodologies have grown in favour of software development and even in other endeavours like putting business resource planning systems into place (Stepanov, 2021). Its noteworthy features include an iterative and user-centric approach, which enables teams to prioritise, plan, and carry out work packages correctly (Łasińska, 2021). The Agile frameworks encourage tighter communication between software development teams, customers, and team leaders to produce high-quality products that quickly adjust to changing needs (Fernandes et al., 2021). According to Beck et al. (2001), Agile is founded on four ideals and twelve guiding principles. While present in software engineering methods everywhere, it is critical to understand that these ideals and concepts are rooted in Western civilisation. Since Nigeria and other nations with different value orientations may find it challenging to embrace Agile, the main goal and relevance of developing Agile are to highlight potentially essential social and technological elements that may fit the diverse business context (Winter et al., 2018, 2019). Therefore, this study examines the factors influencing how well Agile methodologies are used in the Nigerian mobile application development sector.

This study contributes to the body of knowledge on Agile adoption by providing insights into the facilitators and difficulties affecting Agile adoption in Nigeria's mobile software development industry. From the standpoint of software engineering methods, the findings may be utilised to support judgments on the adoption of Agile approaches in Nigeria and the African setting. These findings may impact future Agile adoption framework design and development that is more suited to Nigeria's mobile software development industry. From the perspective of software engineering research.

The study's remaining sections are organised as follows. A review of the pertinent literature is given in the next section. The research methods are then described. After the results are presented, discussed, and the conclusion is made.

Literature Review

Agile Mobile Application Development

According to Larman and Basili (2003), the use of iterative and incremental software development methodologies increased dramatically in the second half of the 1990s. These methods were later adopted by new software development processes, favouring adaptable project rules and focusing on human interactions. According to Cockburn (2007), Agile was adopted at the beginning of 2001 to characterise software development approaches that followed these criteria. However, it can be argued that the advent of software methodologies and techniques like Extreme Programming (XP), Scrum, eXtreme Testing, Crystal Family of Methodologies, Dynamic Systems Development Method (DSDM), Adaptive Software Development (ASD), and Feature-Driven Development (FDD) marked the beginning of the emergence of Agile methodologies. Since then, as noted by Marchenko and Abrahamsson (2008) and Boehm (2002), Agile software development methodologies have grown in popularity and become increasingly important to many software development businesses. A survey conducted in the USA and Europe found that 14% of companies currently use Agile methods, and 49% of businesses aware of Agile methodologies are interested in adopting it. Similarly, Agile methods have quickly attracted significant interest from the software industry due to their promise to increase customer satisfaction, lower failure rates, speed up development time, and be able to adapt to quickly changing needs (Boehm & Turner, 2004; Dybå and Dingsøyr, 2008; Lindvall et al., 2008; Mann & Maurer, 2005).

Agile Development Process

Agile is an expansive set of principles for software development that includes a theoretical foundation for software engineering. Through iterative and incremental interactions throughout the project's life cycle,

the framework moves from the initial planning phase to the deployment phase. The Agile approach's primary goal is to reduce the overhead in the software development process by allowing changes to be adopted without jeopardising the procedure or necessitating a lot of rework (Al-Saqqa et al., 2020). The Agile framework's four values and principles, as introduced by the homogeneous group of software practitioners Agile to the world, are discussed as follows:

*Individuals and interactions over processes and tools***:** This suggests that it is erroneous to consider software development as purely dependent on abstract formal procedures and their technical surroundings. Instead, the focus should be on interaction, communication, and the calibre of human software developers that these elements support.

*Working software over comprehensive documentation***:** While documentation is essential to any Agile software development process, it is important to manage and optimise the time and resources allocated to it to avoid overwhelming the software development process.

*Customer collaboration over contract negotiation***:** Agile software development requires flexibility to respond to needs and changes at any point in the process. This is why, rather than relying exclusively on formal agreements and contracts, client input, discussion, and engagement with the development team are typically necessary throughout the process.

*Responding to change over following a plan***:** As software development advances, both consumers and developers get a deeper understanding of the system. As a result, adding or removing some specific criteria could be required.

The Agile Manifesto outlines twelve guiding principles for the Agile development-based approaches in addition to these four ideals, including:

Principle 1: Customer satisfaction is the top focus of the mobile application development firm through regular and timely delivery of high-quality software.

Principle 2: Even late in the development process, accept changing needs. Agile methodologies harness change for the benefit of the customer's competitiveness.

Principle 3: Deliver functioning software regularly, with a preference for shorter timescales of a few weeks to a few months.

Principle 4: Throughout the project, businesspeople and developers must collaborate daily.

Principle 5: Build projects around motivated people and trust them to do the task,

Principle 6: Face-to-face communication is the most efficient and successful way to share information with a development team.

Principle 7: Progress is measured mainly by usable software.

Principle 8: Sustainable development is promoted through agile methodologies. It should be possible for the sponsors, developers, and users to keep up the current pace indefinitely.

Principle 9: Agility is improved through an ongoing focus on technical excellence and clever design.

Principle 10: Simplicity--the art of maximising the amount of work not done--is essential.

Principle 11: The finest requirements, designs, and architectures come from self-organising teams.

Principle 12: The team regularly evaluates how to be more productive, then adapts and modifies their behaviour.

A Model for Measuring the Effectiveness of Agile Methodologies

Chow and Cao (2008) proposed a theoretical framework to identify the critical factors that determine success using Agile methodologies (see Figure 1). They identified several essential elements that might affect the success or failure of an Agile software project.

(i) People factors include team capability, training and learning, and customer involvement.

(ii) Organisational factors include organisational culture, management support, and communication and collaboration.

(iii) Environmental factors include organisational environment, physical environment and national culture.

(iv) Technical factors include tools and technologies, delivery strategies, and Agile techniques.

The model is suitable for this study due to its wide application and predictable effectiveness in diverse contexts. Four model constructs are used in this investigation: human, organisational, environmental, and technological aspects.

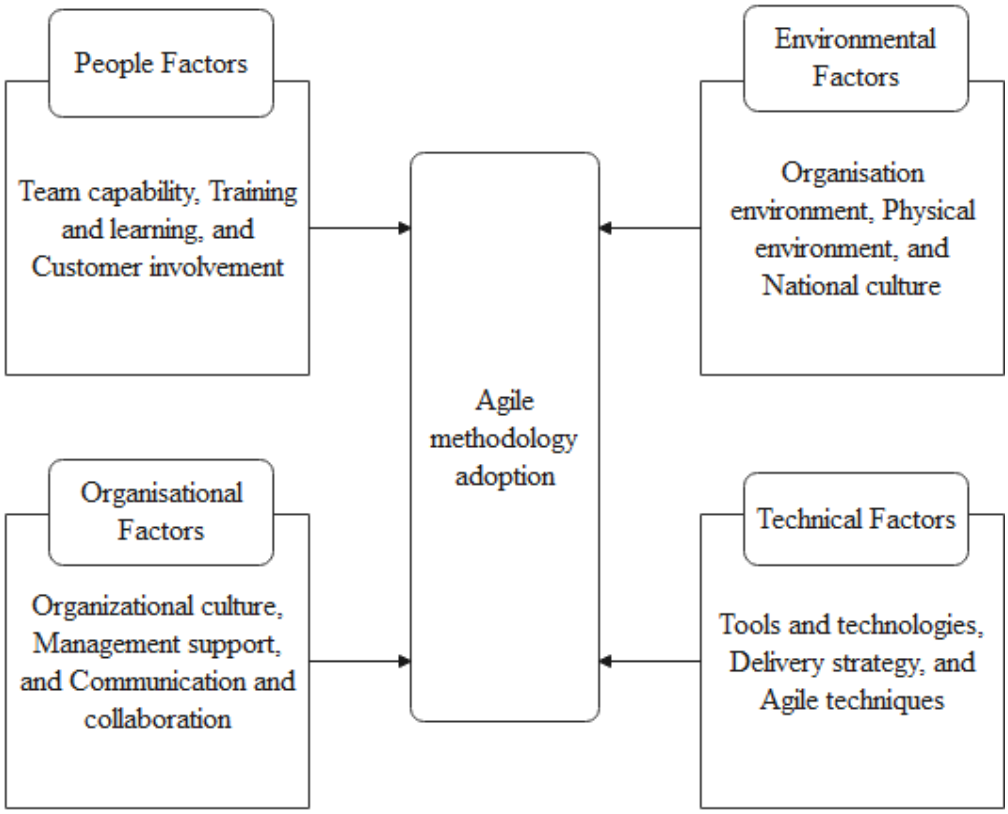

Fig. 1. *The proposed Agile methodology adoption model.*

Mobile Application Development Process

Mobile application development is the process of developing mobile applications for smartphones or mobile devices. Users can download these applications from app stores or are pre-installed by mobile application manufacturers. A generally adopted mobile application development process is shown in Figure 2. This process has five phases: Initiation, Design, Development, Acceptance, and Support (Kaur, 2016).

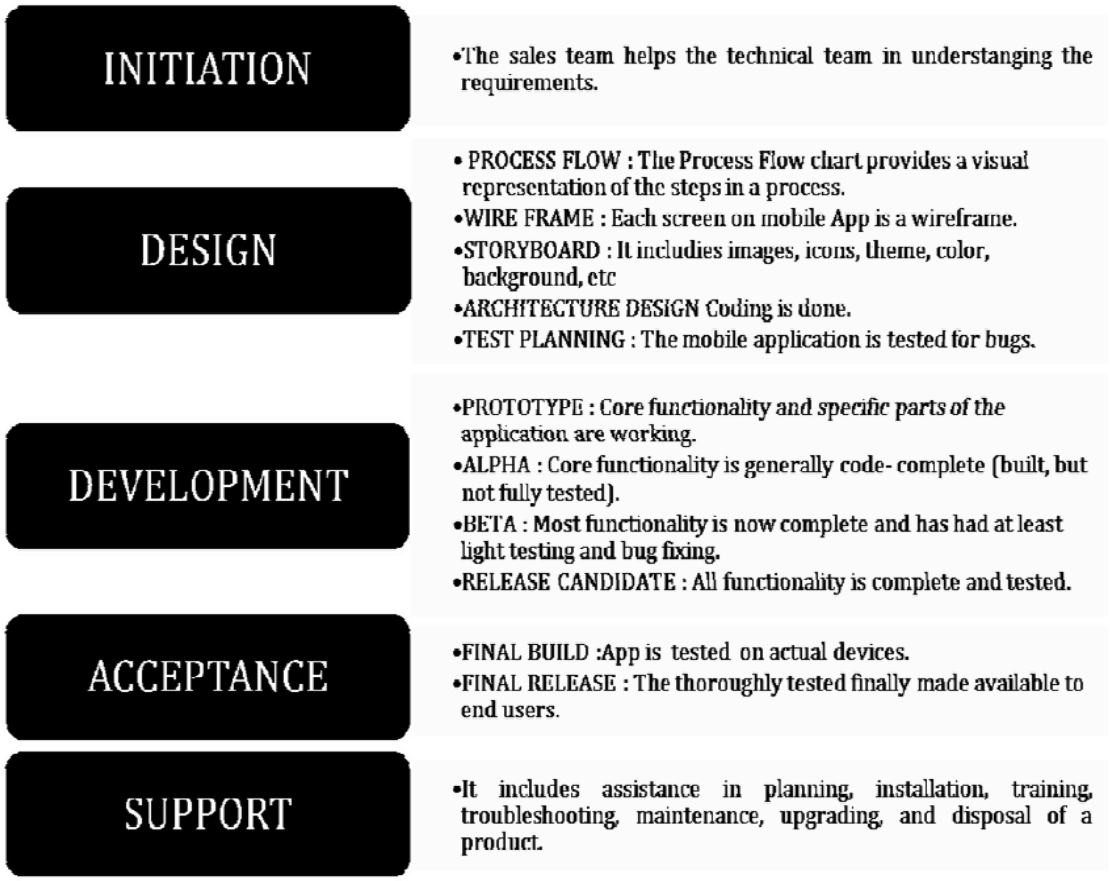

Fig. 2. *Mobile application development process.*
Adopted from Kaur (2016).

Traditional vs Agile Methodology

The conventional software development techniques (heavyweight) and agile software development methods (lightweight) differ in some ways. Figure 3 offers a systematic classification and illustration of these traits.

Traditional Approach	Agile Approach
Process-oriented with formal hand-offs between roles	Emphasizes values and principles rather than process
Sequential approach: Requirements > Design > Development > Test	Iterative approach produces working software early
Changes are nearly impossible without starting over	Project properties and requirements are re-evaluated at the end of each iteration
Risks mitigated later in the development lifecycle	Risks mitigated earlier in the development lifecycle

Fig. 3. *Traditional Vs Agile Methodologies*
Adopted from Kaur (2016).

Methodology

The current study is founded upon interviews with Nigerian mobile application industry members. All the professionals who provided input for this study were engaged in projects at the selected organisation that were developed utilising an Agile approach. A qualitative research method is employed, which was deemed appropriate due to its open-ended nature, with a particular focus on the contextual reality of the situation to achieve the study's aim (Godoy, 1995). The qualitative approach is known for its ability to delve deeply into issues, thereby preserving the originality of findings and investigations (Parente & Federo, 2019). An organisation that complied with the following criteria was sought in order to guarantee that the study's criteria were met: A) the use of Agile project management techniques; B) the company's simple access to experts who can answer questions about software projects created using the Agile methodology. Three teams that worked on software projects created using the Agile methodology were the subjects of Zoom interviews with a set time constraint of 30 minutes. There were nine interviewers overall because all team members (see Table 1) were invited, and those who qualified might join more than one team. Data gathered from the interviewee took place between March and April 2023.

Table 1. Respondents' demographic information

Company code	Respondent's code	Respondent's position	Experience developing mobile applications (in years)	Years of Agile Development experience
Team A	R1	Project manager	10	5
	R2	Developer	8	4
	R3	Developer	8	4
Team B	R4	Project manager	12	7
	R5	Developer	10	8
	R6	Analyst	9	5
Team C	R7	Project manager	11	7
	R8	Developer	10	5
	R9	Designer	8	3

By characterising emergent themes (see Table 2) and patterns within the data, the qualitative data was easily and understandably evaluated thematically (Braun & Clarke, 2006). Using the Microsoft MS Word transcription tool, the interview recordings were transcribed thematically verbatim from the transcript, using the data to infer patterns and themes.

Table 2. The interview data themes

Factor type	Description	Sub-themes
People Factors	People factors, such as mobile app practitioners and customers, relate to individuals and teams.	Team capability, Training and learning, and Customer involvement.
Organisation Factors	Organisational factors relate to the firm level and the way organisations operate.	Organisational culture, Management support, and Communication and collaboration.
Environmental Factors	Environmental factors relate to the context in which organisations and teams operate.	Organisation environment, Physical environment, and National culture.
Technical Factors	Technical factors related to the process, tools and technologies that support Agile methods.	Tools and technologies, Delivery strategy, and Agile techniques.

Data Analysis and Results

In order to identify significant themes related to the four predetermined types of factors—people, organisational, environmental, and technical—that might influence the adoption of Agile methodologies within the Nigerian software development domain, the study conducts a content analysis of interview transcripts using a thematic approach. The findings for each type of factor were highlighted in the sections that followed the display of the study's results.

People Factors

Research Question 1: How do team capabilities, training and learning, and customer participation affect your team's adoption of Agile methodologies?

The answers from the interviews highlight how essential elements like team capability, training and learning, and customer influence are for enabling the successful application of Agile methodology. The majority of participants stated that these characteristics had a significant impact on Agile methodologies adoption, emphasising their crucial responsibilities. Respondent 1 said, *"Customer involvement is the most influential factor as they are integral to feature development processes."* While training and learning have an influence, respondent 5 asserted that *"team capability has a more pronounced impact because subpar team performance can impede delivery, leading to project failure."* Respondent 7 also agreed that *"team capability influences decision-making concerning specific tasks and that product managers, who can be considered customers, assist in product survey and market research."* In conclusion, team effectiveness and customer participation both have an impact on the adoption of Agile approaches. The third respondent (9), who repeated the previous statement, said, *"Team capability, training and learning, and customer involvement are all crucial factors in achieving success."*

Organisational Factors

Research Question 2: How does your team's adoption of Agile methodologies depend on the following organisational factors: organisational culture, management support, communication, and collaboration?

According to the interview findings, adopting Agile practices is hinged on management support, organisational culture, and communication and collaboration. While some respondents posit that the impact of corporate culture and management support may vary, communication and cooperation are generally perceived to influence Agile adoption significantly. As an illustration, Respondent 3 confirms that *"management support, communication, and organisational culture are pivotal to adopting Agile for application development."* Furthermore, Respondent 4 regards *"hierarchy as a crucial influential factor in Agile methodology adoption."* According to Respondent 8, *"a culture of responsibility and excellent communication facilitated and safeguarded every mobile application development process."* Respondent 9 attests that *"failure to pay attention to these factors (organisational culture, management support, and communication and collaboration) constitutes the biggest organisational bottleneck."* Respondent 6 infers that *"all the factors are relevant in adopting Agile software, and their influence on adopting Agile is significant."*

Environmental Factors

Research Question 3: How do the national culture, physical surroundings, and organisational environment affect your team's adoption of agile methodologies?

The responses gathered from the interviews suggest that the impact of the organisational environment on Agile adoption is moderate. However, the perceived influence of the national culture and physical environment is low. It is worth noting that there is some variation in the respondents' perceptions in this regard. For instance, Respondent 2 asserts that *"the organisational environment strongly influences Agile methodologies adoption."* Respondent 4 contends that *"if the organisation already adheres to a specific culture, none of these factors should affect Agile methodologies adoption."* Respondent 6 maintains that *"only the organisational environment impacts Agile adoption."* Finally, Respondent 7 observes that *"none of these factors appears to affect Agile methodologies adoption."*

Technical Factors

Research Question 4: How do the tools and technology, delivery approach, and agile approaches affect your team's adoption of agile methodologies?

The interview responses suggest that tools and technologies, delivery strategy, and Agile techniques play significant roles in adopting Agile practices. Tools and technologies have a strong influence on Agile

methodologies adoption. At the same time, delivery strategy and Agile techniques have mixed perceptions, with some respondents indicating a high impact and others perceiving a medium-level result. For instance, Respondent 5 submitted that "*the two factors (tool and technologies and delivery strategy) listed here can highly influence Agile adoption because the team must learn the advantages and disadvantages of the available tools/strategies and use it to their maximum to ensure a successful process.*" Respondent 7 affirmed that "*tool and technologies, as well as delivery strategy, influences Agile adoption.*" Respondent 4 attested that "*all the three factors have a medium influence on Agile adoption.*"

Discussion of Findings

This study examined factors affecting adopting Agile in the Nigerian mobile software development industry through in-depth interviews with nine Agile experts from three teams in different software organisations. In this section, the researcher discusses the interview findings and summarises contributions to practice and research.

People Factors: Most respondents recognised these factors as highly influencing Agile adoption, emphasising their crucial roles in the process. These findings are consistent with those reported in numerous studies (e.g., Altuwaijri & Ferrario, 2022); Lindsjørn et al., 2016; Vithana et al., 2018; Sheffield and Lemétayer, 2013). One of the necessities of Agile adoption is having professional team members with skills such as self-organisation and motivation. They also have to be open and willing to learn and train continuously. These results are similar to Cockburn and Highsmith (2001), who indicate that Agile is more about people than anything else.

Organisational factors: Some respondents believe that organisational culture and management support have varying degrees of effect, but communication and cooperation are generally perceived as having a substantial influence on Agile adoption. The results align with those of Mudarikwa and Grace (2018), who found that organisational culture had a substantial impact on adopting Agile in their research. Mkoba and Marnewick (2022), who found that top management support, cooperation, and communication have a beneficial effect, particularly in the success of adopting Agile methodologies, provide more evidence for this conclusion. According to Maiga (2017), this conclusion was consistent, confirming the need for organisational support in an Agile setting. The findings of Reginaldo and Santos (2020) also support these findings.

Environmental factors: Organisational environment has a medium influence on Agile adoption. National culture and physical environment are perceived to have a low impact. These findings may be associated with the management favouring formal communication against many organisations' open communication and risk-averse culture. Similarly, the limited availability of tools and technologies may impede the seamless adoption of Agile methodology. These findings do not agree with that of Altuwaijri & Ferrario (2022), Livari and Livari (2011), and Stankovic et al. (2013), who reported in their study that environmental factors increase the morale of project managers, especially when adopting Agile methods.

Technical factors: Technical factors have a strong influence. At the same time, delivery strategy and Agile techniques have mixed perceptions, with some respondents indicating high impact and others perceiving a medium level of impact. These findings corroborate that of Chow and Cao (2008), who found that technical factors influenced Agile adoption methods in organisations in Europe and the United States of America in their study. Chiyangwa and Mnkandla (2017) discovered that technological issues significantly affect the adoption of Agile methodologies in South Africa. A significant relationship between technology elements and Agile management was discovered by Bernsmed et al. in 2022. In contrast, Tsoy and Staples (2020) discovered that technical aspects of Agile approaches were not necessary for the success of Agile in their research.

Conclusions

In conclusion, this study employed qualitative interviews with Agile specialists from various teams to delve into the complex landscape of Agile adoption within the Nigerian mobile software development market. The results highlight the complex interplay of factors affecting Agile adoption. The study highlights the crucial roles of organisational dynamics, environmental, technological, and human factors in determining the effective integration of Agile techniques. In line with previous work, team effectiveness, customer participation, and ongoing training were crucial factors in adopting Agile. The study emphasises the necessity of cooperative organisational culture, solid managerial support, and excellent communication and cooperation as essential Agile practice enablers. Technical aspects, notably tools and technology, emerged as important facilitators of Agile adoption, whereas organisational and contextual elements showed different degrees of impact. The study contributes to a better understanding of the complex aspects that support the effective use of Agile techniques within the dynamic environment of Nigerian software development by providing insightful information for practitioners and scholars alike.

REFERENCES

1. Al-Saqqa, S., Sawalha, S., & AbdelNabi, H. (2020). Agile software development: methodologies and trends. *International Journal of Interactive Mobile Technologies, 14*(11), 246-270.
2. Altuwaijri, F. S., & Ferrario, M. A. (2022). Factors affecting Agile adoption: An industry research study of the mobile app sector in Saudi Arabia. *The Journal of Systems & Software, 190*(2022), 111347.
3. Asfour, A., Zain, S., Salleh, N., & Grundy, J. (2019). Exploring agile mobile app development in industrial contexts: A qualitative study. *International Journal of Technology in Education and Science, 3*(1), 29-46.
4. Beck, K., et al. (2001). Manifesto for Agile software development, Agile Manifesto. [Online]. Available: http://agilemanifesto.org/.
5. Bernsmed, K., Cruzes, D. S., Jaatun, M. G., & Iovan, M. (2022). Adopting threat modelling in agile software development projects. *Journal of Systems and Software*, *183*(12), 111090.
6. Boehm, B. (2002). Get ready for agile methods with care. Computer, 35, 64-69. http://dx.doi.org/10.1109/2.976920.
7. Boehm, B., & Turner, R. (2004). *Balancing agility and discipline: Evaluating and integrating agile and plan-driven methods.* Proceedings of the 26th International Conference on Software Engineering, 718-719.
8. Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise, and Health*, *11*(4), 589-597.
9. BuildFire (2023, December 20). *Mobile App Download Statistics & Usage Statistics (2023)*. https://buildfire.com/app-statistics/#:~:text=Key%20Mobile%20App%20Statistics%20for%202023&text=21%25%20of%20Millennials%20open%20an,and%2030%20apps%20each%20month.
10. Chiyangwa, T. B., & Mnkandla, E. (2017). Modelling the critical success factors of agile software development projects in South Africa. *South African Journal of Information Management*, *19*(1), 1-8.
11. Chow, T., & Cao, D-B. (2008). A survey study of critical success factors in agile software projects. *The Journal of Systems and Software, 81,* 961–971.
12. Cockburn, A. (2007). *Agile software development: The cooperative game.* Boston: Addison-Wesley.
13. Cockburn, A., & Highsmith, J. (2001). Agile software development, the people factor. *Computer (Long. Beach. Calif). 34*(11), 131–133.
14. Corral, L., Sillitti, A., & Succi, G. (2013). Agile software development processes for mobile systems: Accomplishment, evidence and evolution. *Lecture Notes in Computer Science*, 90–106. https://doi.org/10.1007/978-3-642-40276-0_8.
15. Dybå, T., & Dingsøyr, T. (2008). Empirical studies of Agile software development: A systematic review. *Information and Software Technology, 50*(9-10), 833-859.
16. Fernandes, F. M., Belfort, R., & Campos, F. (2021). Agile CMII: A methodology for assessing social project impacts within agile contexts. *AHFE, 9,* 356-362. doi:10.1007/978-3-030-80876-1_45.
17. Flora, H. K., Chande, S. V., & Wang, X. (2014). Adopting an agile approach for the development of mobile applications. *International Journal of Computer Applications, 94*(17), 43-50.
18. Godoy, A. S. (1995). Pesquisa qualitativa: tipos fundamentais. *Revista de Administração de Empresas*, 35, 20-29.
19. Idea Usher (2023, April 13). *Mobile App Industry 2023: Trends And Statistics*. https://ideausher.com/blog/mobile-app-industry-trends-and-statistics/#:~:text=Mobile%20App%20Industry%3A%20The%20Most%20Important%20Statistics,-By%202025%2C%20revenue&text=In%202023%2C%20mobile%20apps%20are,than%202.2%20million%20mobile%20applications.
20. Kaleel, S.B., & Harishankar, S. (2013). Applying agile methodology in mobile software engineering: android application development and its challenges. *Computer Science Technical Reports.* Paper 4. http://digitalcommons.ryerson.ca/compsci_techrpts/4.
21. Kaur, A. (2016). Review on Agile approach to mobile application development. *International Journal of Computing and Technology, 3*(4), 240-243.
22. Larman, C., & Basili, V. R. (2003). Iterative and incremental development: A brief history. *Computer, 36*(6), 47-56.
23. Łasińska, N. (2021). An agile methodology for managing rail transport projects. *Rail Vehicles/Pojazdy Szynowe, 3,* 12-19. https://doi.org/10.53502/RAIL-142230.
24. Lindsjørn, Y., Sjøberg, D. I., Dingsøyr, T., Bergersen, G. R., & Dybå, T. (2016). Teamwork quality and project success in software development: A survey of agile development teams. *Journal of System Software, 122,* 274–286.
25. Lindvall, M., Muthig, D., Dagnino, A., Wallin, C., Stupperich, M., Kiefer, D., May, J., & Kahkonen, T., (2004). Agile software development in large organisations. *Computer, 37,* 26-34.
26. Liu, Z., Gao, X., & Long, X. (2010). *Adaptive random testing of mobile application*. 2010 2nd International Conference on Computer Engineering and Technology; https://www.semanticscholar.org/paper/Adaptive-random-testing-of-mobile-application-Liu-Gao/198f382e2a7060c0cc6c849ad13c282fb26c0687.

27. Livari, J., & Livari. N. (2011). The relationship between organisational culture and the deployment of Agile methods. *Information and Software Technology, 53*(5), 509-520.
28. Maiga, Z. B. (2017). *Knowledge sharing among academics in selected universities in Tanzania.* Ph.D. Thesis submitted to the University of KwaZulu-Natal, South Africa.
29. Mann, C., & Maurer, F. (2005). *A case study on the impact of scrum on overtime and customer satisfaction*. ADC '05: Proceedings of the Agile Development Conference. Washington, DC, USA: IEEE Computer Society, pp. 70-79.
30. Marchenko, A., & Abrahamsson, P. (2008). *Scrum in a multi-project environment: An ethnographically-inspired case study on the adoption challenges in Agile.* AGILE '08. Conference, August 2008, pp. 15-26.
31. Mkoba, E. S., & Marnewick, C. (2022). Organisational culture attributes influencing the adoption of agile practices: A systematic literature review. *Journal of Information Systems, Engineering, and Management, 7*(1), 1-11.
32. Mudarikwa, G., & Grace, T. D. (2018). Agile system development methodologies usage and acceptance in South African banking firms: An exploratory analysis. [Conference paper]. The annual conference of the South African Institute of Computer Scientists and Information Technologists, pp. 248-257.
33. Parente, T. C., & Federo, R. (2019). Qualitative comparative analysis: justifying a neo-configurational approach in management research. *RAUSP Management Journal, 54*(4), 399-412.
34. Reginaldo, F., & Santos, G. (2020). *Challenges in Agile transformation journey: A qualitative study.* [Conference paper]. SBES 20: 34th Brazilian Symposium on Software Engineering, October 21-23, Natal, Brazil, ACM, New York, NY, USA, pp. 1-10.
35. Sheffield, J., & Lemétayer, J. (2013). Factors associated with the software development agility of successful projects. *International Journal of Project Management, 31*(3), 459–472.
36. Stankovic, D., Nikolic, V., Djordjevic, M., & Cao, D-B. (2013). A survey study of critical success factors in agile software projects in former Yugoslavia IT companies. *Journal of Systems and Software, 86*(6), 1663-1678.
37. Stepanov, D. Y. (2021). *Using agile methodology in ERP-system implementation projects.* International Conference on Information Technologies (InfoTech), Varna, Bulgaria, 2021, pp. 1-4, doi:10.1109/InfoTech52438.2021.9548342.
38. Tsoy, M., & Staples, D. S. (2020). Exploring critical success factors in agile analytics projects. Proceedings of the 53rd Hawaii International Conference on System Sciences, 984-993.
39. Vithana, V. N., Asirvatham, D., Johar, M. G. M. (2018). *An empirical study on using agile methods in global software development.* 18th International Conference on Advances in ICT for Emerging Regions, ICTer 2018 - Proceedings. pp. 150–156. http://dx.doi.org/10.1109/ICTER.8615505.
40. Winter, E., Forshaw, S., Ferrario, M. A. (2018). *Measuring human values in software engineering.* Proceedings of the 12th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement. pp. 1–4. http://dx.doi.org/10.1145/3239235.3267427.
41. Winter, E., Forshaw, S., Hunt, L., Ferrario, M. A. (2019). Advancing the study of human values in software engineering. 2019 IEEE/ACM 12th International Workshop on Cooperative and Human Aspects of Software Engineering. CHASE, pp. 19–26. http://dx.doi.org/10.1109/CHASE.2019.00012.