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From Adoption to Sustainability: A Journey of Large-Scale Agile Implementation

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Abstract. This research delves into the transformative journey of a prominent Malaysian multinational telecommunications company as it implements and maintains Agile methodologies on a large scale. The goal is to provide a comprehensive understanding of the challenges and complexities of scaling Agile practices in the rapidly evolving digital age, where Agile methodologies are increasingly seen as essential tools for enhancing organizational agility and customer-centricity. The study utilized qualitative research approach using semi-structured interviews and thematic analysis to unravel the many facets of agile adoption, from its initial stages of comprehension and implementation to the long-term sustainability of its practices. The research revealed that agile methodologies triggered significant organizational changes, including shifts in team dynamics, leadership paradigms, and cultural ethos. These changes underscore the critical importance of continuous learning and adaptability in maintaining Agile methodologies, particularly within a holistic organizational framework. The findings of this research have significant implications for agile practitioners, consultants, and scholars alike. The study provides practical insights that can aid in adopting and scaling agile practices within organizations, emphasizing the need for a robust and flexible organizational culture to support such transformations. Additionally, the study highlights the need for further research to investigate the nuances of Agile adoption and scaling in various organizational contexts. Overall, this research contributes to the growing body of knowledge on agile methodologies, providing critical insights that can inform and shape future research and practice.

Keywords: Agile adoption; Agile implementation; Agile transformation; Large-scale agile; Organizational transformation

1. Introduction

This paper aims to delve into an innovative approach within the realms of industry and business. While we focus on the transformational journey of a telecommunications company based in Malaysia that adopted Agile methodology, our intention is not to provide a mere success story. Instead, we aim to extract valuable insights that extend beyond the confines of a specific organizational context. Agile methodology is frequently employed to enhance an organization's responsiveness and customer-centricity. However, our research delves into the intricacies and subtleties of implementing Agile practices on an enterprise-wide scale. Rather than

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presenting a simple case study on best practices, we closely examine this journey's underlying challenges, adaptations, and broader implications within the rapidly evolving digital landscape (Grishunin *et al.*, 2022).

Agile principles were initially developed to enhance business value by delivering functional software to consumers, as articulated in the "Agile Manifesto" (Fowler and Highsmith, 2001). Over time, these principles have found relevance in various industries beyond software development, indicating their potential to enhance organizational agility (Oprins, Frijns, and Stettina, 2019). With their adaptability, iterative processes, and responsiveness to changing market dynamics, Agile methodologies have gained popularity in organizational transformations. Critical considerations in such transformations include cross-functional teams, agile leadership, adaptive planning, transparency, and customer-centricity (Esbensen *et al.*, 2019).

The telecommunications industry has undergone significant technological and business changes in the last five decades. From telegraph and voice telephony, it has evolved into today's multi-device mobile environment, offering seamless phone, data, and multimedia services. However, the emergence of Over-The-Top (OTT) service providers has challenged the industry's revenue streams, catching many telecom companies off guard (Sujata *et al.*, 2015). Telco companies increasingly turn to Agile Methodology (AM) to improve their organizational transformation and meet market demands. However, implementing AM can be challenging, given the scale and complexity of these organizations. Customization is critical, and scaling up the practice while ensuring long-term viability presents significant challenges (Friedrich *et al.*, 2022; Friedrich *et al.*, 2021).

This study focuses on a Malaysian multinational telecom company that has transformed to remain competitive. The company adopted the Agile methodology in 2018 and gradually implemented it across the organization by 2021. Though it has been practicing Agile for six years, it has yet to embrace it fully. Nonetheless, the company is acknowledged as a leader in Agile adoption. Given the significant resource investment, assessing its efficacy in attaining traction and sustainability is imperative.

This study aims to conduct a "pulse check" of the current program and assess the value of Agile practices in the company's transformation efforts. The aim is to guarantee the fulfillment of program objectives and pinpoint any necessary corrective measures. With more than 1,200 employees engaging in the Agile ecosystem and contributing to over 40% of the company's revenue, this research provides valuable insights into the long-term viability of Agile practices within the organization.

2. Literature Review

Our research emphasized on the scientific importance of Agile methodologies beyond their practicality as a roadmap for organizational change. Although Agile practices have revolutionized numerous industries, we emphasize viewing Agile as a change agent rather than a mere solution. By tackling the complexities of scaling Agile, our study aims to add to the academic conversation by revealing the far-reaching consequences of widespread Agile implementation that surpass the boundaries of a singular organization.

Agile emerged in the '90s as a modern system development methodology (SDM) for fast-paced business dynamics (Laanti, Salo, and Abrahamsson, 2011). It differs from traditional SDMs by offering a more streamlined solution. At that time, only about half of businesses strictly adhere to the traditional SDMs (Glass, 1999), which can lead to project failures (Gupta *et al.*, 2019).

In the meantime, the Agile methodologies prioritize the "people factor" (Cockburn and Highsmith, 2001) by entrusting significant responsibilities to both software engineers and users alike. Developers can determine the essential system features for each development cycle through collaborative efforts with customers (Nerur, Mahapatra, and Mangalaraj 2005). This contrasts with traditional SDMs, where users have limited involvement, while Agile enables continual adaptation to user demands and emerging technologies (Chan and Thong, 2009).

2.1. Agile Implementation Beyond Software Development Settings

The adoption of AM in software development has significantly transformed project management processes over the years (Lunesu *et al.*, 2021). Agile approaches have increased efficiency and quality (Livermore, 2008), reduced lead times, and prioritized client needs (Petersen and Wohlin 2009). As a result, both management and developers generally view Agile approaches favorably due to their ability to optimize processes and eliminate overhead compared to traditional software development strategies (Nisa and Qureshi, 2012).

Companies are implementing AM outside of software development contexts due to Agile's success in software development. According to earlier studies (Tse *et al.*, 2016), Agile has a good effect on financial performance and operational indicators, which has been the main driver of this transition. Agile implementation has been shown to improve team dynamics, such as team inter-operability (Grass, Backmann, and Hoegl, 2020), individual outcomes, including reduced role ambiguity, work exhaustion, and stress (Pfeiffer *et al.*, 2019), as well as organizational outcomes, such as improved time to market and satisfied stakeholder (Dikert, Paasivaara, and Lassenius, 2016).

These benefits align with the practical insights of Esbensen *et al.* (2019) from McKinsey's international management consulting firm. Their team found that companies adopting Agile practices are 50% more likely to outperform their competitors financially. Additionally, adopting agile directly helps businesses get products to market faster, increase customer happiness, increase productivity significantly, and alter the employee experience to attract and retain top talent. Agile businesses can swiftly adapt and respond to shifts in consumer demand, enhancing their products' responsiveness (Shekarian, Nooraie, and Parast, 2020).

2.2. Agile Methodology (AM) in Organizational Transformation

In the context of organizations, transformation refers to the process of change. It typically involves a strategic approach to identify future organizational needs, define an ideal state, and implement changes to achieve these goals. Initially designed for small, single-team projects (Dikert, Paasivaara, and Lassenius, 2016). The organization's transformational process often leverages the Agile method. Agile methods demonstrated and projected benefits have made them desirable beyond their original setting, especially for larger enterprises (Dikert, Paasivaara, and Lassenius, 2016). As a result, the number of businesses implementing Agile techniques is rapidly increasing (Schmitt and Hörner, 2021).

The growing pressure to shorten cycle times, improve quality, and quickly respond to changing customer needs has also contributed to the rising popularity of AM among both large and small businesses. New processes like workflow, allocation, and performance management have been improved by using Agile, which trickle down to individual team members (Annosi *et al.*, 2022). AM can help established or rigid organizations become more adaptable (Lindvall *et al.*, 2004) and develop greater flexibility, innovation, and agility to overcome bureaucratic control inertia (Khanagha *et al.*, 2021).

Transitioning to Agile methodologies can be a challenging endeavor. Resistance from management and limited resources can hinder the process, making it difficult for companies to adopt Agile practices successfully. Addressing common obstacles, such as managing people, refining processes, and implementing new technology, is crucial for success. According to Abdulameer, Yaacob, and Ibrahim (2020), the 'leagile' supply chain, which fuses lean methodologies with Agile, can offer a promising solution. Effective information sharing and coordination on a large scale are key components for successful Agile implementation. By incorporating sustainable practices, the leagile approach can provide lasting benefits for organizations seeking to adopt Agile methodologies at a large scale.

2.3. Scaling Agile/ Large Scale Agile

Agile techniques focused on flexible and iterative planning were developed as an alternative to the conventional project and organizational management methodologies. They are valuable for communicating essential competencies like uncertainty, adaptability, creativity, dialogue, respect, self-confidence, emotional intelligence, responsibility, and systemic thinking because they are firmly rooted in participatory, collaborative, and constructionist principles (López-Alcarria, Olivares-Vicente, and Poza-Vilches, 2019). "Scaling Agile" refers to the practice of extending the application of Agile principles from small teams to larger organizational units or large-scale projects. This procedure sometimes entails changing or adapting Agile methodologies to handle the complexities and difficulties of large-scale development (Paasivaara *et al.*, 2018). In the context of Agile, the word "large-scale" can relate to factors such as the number of individuals or teams, project budget, code base size, and project duration. When two to nine teams work together on a project, it is deemed large-scale; when there are more than 10, it is considered highly large-scale (Edison, Wang, and Conboy, 2022). However, "large-scale" can vary depending on the context and the individual providing the definition. For instance, some academics and practitioners define a large-scale project with up to 50 participants. In contrast, others describe it as one with a workforce of between 100 individuals and half of it, including all involved in the project (Dikert, Paasivaara, and Lassenius, 2016).

The challenges of scaling Agile entail the need for working teams to coordinate their work and communicate with other organizational units (Dikert, Paasivaara, and Lassenius, 2016). The transition to large-scale Agile involves addressing recognized challenges and relying on critical success factors identified through comprehensive literature reviews of large-scale Agile changes in the industry. The most essential elements for a successful deployment are the management's support, the choice and adaptation of the Agile model, training and coaching, and mindset and alignment. However, recent studies have indicated that Agile may have unforeseen impacts and have begun considering factors that may lead to suboptimal results (Begum *et al.*, 2022). When businesses use Agile techniques extensively, like at the organizational level, this problem is more evident since they are more prone to miss potential drawbacks (Dikert, Paasivaara, and Lassenius, 2016; Janes and Succi, 2012). The scaling-up practice has the potential to damage an organization's capacity to foster innovation over the long term and has been recognized as a side consequence of the exercise (Annosi *et al.*, 2022).

2.4. Agile Post-Adoption (Sustainability)

As organizations focus on implementing Agile methodologies and overcoming the associated challenges, practitioners often become more engrossed in adopting rather than sustaining Agile practices within the organization (Gregory *et al.*, 2016). In the literature, the post-adoption phase of Agile is sometimes referred to as "post-acceptance"

(Bhattacherjee, 2001) and "sustained" (Senapathi and Drury-Grogan, 2017; Overhage, Birkmeier, and Schlauderer, 2012). Agile methods become a regular element of daily operations (Bhattacherjee, 2001) and organizational practices (Abrahamsson, Conboy, and Wang, 2009) once they have moved past the adoption stage and started to integrate. Four case studies on implementing Agile practices (Scrum & XP) were undertaken by Wang, Conboy, and Pikkarainen (2012), focusing on the post-adoption phases, or the reception, routinization, and integration of Agile methods in organizations. Their findings imply that teams that have adopted Agile methods do not always linearly progress through the assimilation phases and that the implementation duration of Agile practices does not proportionally affect the teams' integration level. In a study on the long-term adoption of an Agile methodology (Scrum), Overhage, Birkmeier, and Schlauderer (2012) identified several post-acceptance criteria, including comparative benefits, compatibility, and complexity. Senapathi and Srinivasan (2017) provided a methodology highlighting crucial components for applying Agile practices after adoption. According to their research, top management backing, a team-oriented mentality, technical competence, relative advantage, and championing are the critical components for a company to implement Agile practices. However, the requisite study is still lacking in post-adoptive agility. According to Mamakou (2023), scholars and practitioners have varied perspectives on maintaining agility and using inconsistent language. However, over time, more research has investigated post-adoption usage.

3. Methods

The research process of this study, as depicted in Figure 1, comprises six distinct steps. To acquire valuable insights, we utilized semi-structured interviews and conducted thematic analysis.

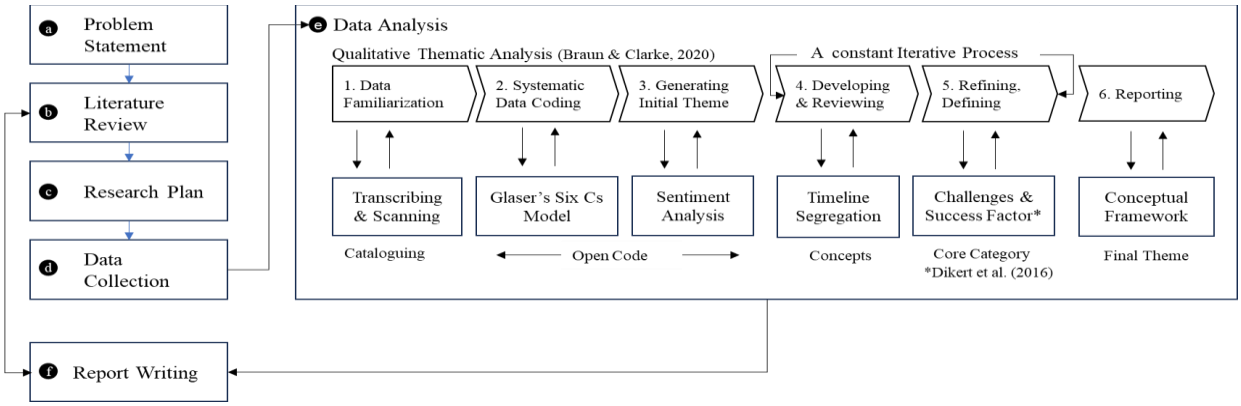

Figure 1 Research Process

This study sits on an interpretive research paradigm. Qualitative research method was used to investigate the phenomenon. Unit of analysis is individual. The population of study is agile practitioners. Semi-structured interviews were conducted to obtain detail feedback from the practitioners. The targeted company's agile ecosystem comprises over 1,200 employees directly or indirectly involved with the firm's agile practices. These individuals range from users, agile team members, product owners, supporters, team leads, and project sponsors, all grouped into squads or tribes depending on the deliverables or targets set by the organization. The operationalization of these agile groups is led by Agile Coaches (ACs), who act as project managers while championing the agile methodologies (AM). ACs are also known as Scrum Masters, as commonly indicated in the literature findings.

In this study, we chose to focus on the HACs (Head of Agile Coaches) group, given their unique perspective on both operational and management matters. An AC and Agile Transformation (Tx) representative was also included in the sampling to baseline the responses. Utilizing non-probability purposive sampling, we posed two key inquiries to assess the current state of Agile practice: 1) How would you describe the current state of Agile practice in light of the company's 6th year of transformation? 2) What would you change to improve the Agile practice? These insights will prove invaluable in determining the viability of AM for a Telco company. Our data analysis is based on Braun and Clarke (2020) six-step Thematic Analysis. To achieve our predetermined objectives, we analyzed each theme thoroughly. The initial step involved scanning the interview transcripts to identify possible patterns and ensure that the data met the analysis requirements.

4. Results and Discussion

4.1. Profile of Respondents

The data was collected from six certified Agile practitioners or Scrum Masters, each with over two years of practical experience in the company. Each respondent manages an Agile Coach (AC) team and has their own divisional area of responsibility. The respondent profile is detailed in Table 1.

Table 1 Profile of Respondents

Respondent	Agile Role	Work Scope Area	Team members (AC)	Years of practical Agile involvement
P1	*HAC*	*Customer Experience & Marketing*	*9*	*5*
P2	*HAC*	*Consumer (B2C) & SME (Small Medium Ent)*	*3*	*6*
P3	*HAC*	*Enterprise (B2B) & Enablers*	*3*	*4*
P4	*HAC*	*Center of Excellence (CoE) & Human Capital*	*2*	*6*
P5	*Agile Tx*	*Company-wide*	*3*	*2*
P6	*AC*	*Enterprise (B2B)*	*3*	*4*

4.2. Success Factors of Large-Scale Agile

Table 2 Success Factors of Large-Scale Agile

Factors	Key Points and Sample Quotes from the Excerpt
1. Executives' Leadership and Management Support	The success of an agile transformation heavily relies on the support and endorsement of executive leadership and management. This aligns with the literature, highlighting leadership's crucial role in driving organizational change. *"... and having CEO as a strong supporter of agile. It helps a lot for agile at scale in the company."* HAC, P2. *"... but we must make sure that the HQ people understand before we. We can go down to state, so after we flip the SME in HQ, we did, I think, around after three months, then we start to do the states"* HAC, P4.
2. Organizational Commitment to Change	Achieving agile transformation success hinges on the unwavering commitment of an organization to change, which its employees must embrace. Management's commitment to agile practices is pivotal and, without room for compromise, subject to regular assessment. Adequate preparation for change is crucial for the successful execution of this endeavor. *"... this time around, we rectify a lot of things. Last time, the house, the Blue House, if you remember, we had seven elements. So this time around, we had 10. So we improvised, and we added in three more elements that we think the workstreams*." HAC, P4. "Meaning when we talk about agile, people know that, at least at the theme level. What agile is and how it would be done in terms of the ceremony, the basic ceremonies and the basics scrums and all that." Agile Tx, P5.

3. Iterative Implementation Approach	The Iterative Implementation Approach is a crucial component of effective agile practices. By gradually implementing changes and allowing for adjustments along the way, it fosters a sense of confidence in the benefits of agile. Ultimately, this approach aligns perfectly with the agile principle of iterative development. "That time is like patches of agile. For example, why I say patches of agile practices because of, you know, if Sales want agile, we do for sales only*." – HAC, P3.* *"When we started, we only took a part of the whole company, which was B2C (Consumer) and at that only SME (Small Medium Enterprise), and we only started with a state."- HAC, P4.*

4.3. Success Factors of Agile Sustainability

For sustained success, organizations must persist in utilizing agile practices even after adoption. This section delves into the key success factors that act as a guide to preserving agile practices and maximizing the advantages of agile transformation over the long term.

Table 3 Success Factors of Agile Sustainability

Factors	Key Points and Sample Quotes from the Excerpt
1. Agile Leadership	In order to effectively implement agile practices post-adoption, it is imperative to identify individuals who can serve as "change leaders" in addition to receiving coaching. The presence of a key individual who can guide the transition is vital. Emphasizing agile leadership, with a focus on cultivating and sustaining agile practices, is a fundamental component of achieving success. "*When GM level believes in agile, they will practice agile through their AGM and manager. So that's the escalation*." HAC, P3. "*… to liberalise. Meaning that when people understand, people can be liberalized on their own in their own division or in their own need, business needs so that it can move concurrently and …"*Agile Tx, P5.
2. Continuous Training & Coaching	Continual training and coaching are essential for achieving agility in the workplace. Research demonstrates that training significantly improves the likelihood of success, and individuals who undergo training tend to be more open to adopting new methodologies. "*Upgraded means both training-wise and practical. Training wise like business acumen. Agile coaches only upskilling their knowledge on business …"* -HAC, P3. "*So we included in AA (Agile Accelerators), so when they in AA if got any questions with regard of the squad, the coaches in AA can assist*."- HAC, P4.
3. Organisational Mindset and Cultural Alignment	Having cultural alignment is paramount in maintaining sustainable agile practices. A critical aspect of this is comprehending the values that underpin agile methodologies. Unfortunately, many inexperienced coaches tend to prioritize practice execution, overlooking this crucial aspect. "*Umm to achieve ratings, which is important to us fast to speed to market, customers centricity, satisfaction and also definitely our business objective. And that is align with when we decided last year to move towards the what …*" HAC, P1. *"* To ensure that everyone in the organization understands what "agile" means, there are two key aspects to consider. First, it's important to clarify the benefits of agility for the company. Second, it's crucial to convey the specific frameworks or approaches that will be used to implement agile within the organization. As mentioned in Agile Tx, Page 5.

4.4. Challenges in Large-Scale Agile

Implementing agile practices on a large scale presents significant challenges despite identified success factors. This section explores the obstacles and difficulties encountered in organizations' agile transformation journeys.

Table 4 Challenges in Large-Scale Agile

Factors	Key Points and Sample Quotes from the Excerpt
1. Complexity of Agile Implementation	Despite encountering several challenges in large-scale agile adoption, the difficulty of implementing agile practices was regarded as a significant issue due to its complexity. "*… it's a bit slower than than them, even though we started first*." HAC, P2. "*… we see that the understanding is there. It is just that we have not seen it materialized in terms of numbers yet. Suppose we look at performance-wise. Yeah, the recent result is still in the red"* HAC, P4.
2. Hierarchical Management & Organizational Boundary	The adoption of agile practices encountered noteworthy obstacles stemming from hierarchical management and organizational boundaries. The conventional structures and departmental divisions posed challenges in embracing agile methodologies. The organization's internal divisions of specialized expertise created issues for implementing agile practices, underscoring the urgency of restructuring to ensure successful adoption. "*You know, the bureaucracy is very hierarchical in the company, and we are quite big compared to the other companies that are doing agile." – HAC, P2*. "*Working in silo-ness and hierarchy is very apparent in the states*." - HAC, P2.
3. Integration of Agile Practices in Cross-Functional Environments	Implementing Agile practices in cross-functional environments can prove to be a daunting task as some individuals may resist change or struggle to keep pace with incremental delivery. Therefore, fostering collaboration across departments is imperative for success. *To deep dive, what are the root causes that are causing the gaps at the state level? And then, together they come to an agreement on how to solve those issues." – HAC, P2.* "*So this time around the focus is on the business, the core business first. So when it is done and then the COEs we did not include. But it can come later. Like procurement, finance …".* - HAC, P4.

4.5. Challenges in Agile Sustainability

Although having a roadmap for sustaining agile practices is essential, it is equally important to anticipate potential challenges that may arise during the post-adoption phase. This section explores the possible obstacles and difficulties organizations may face in sustaining their agile practices.

Table 5 Challenges in Agile Sustainability

Factors	Key Points and Sample Quotes from the Excerpt
1. Resistance to Change	While agile practices have identified key success factors, the post-adoption phase can present obstacles. One notable challenge is resistance to change, as employees may be hesitant to adopt and sustain these practices. It's common for individuals to be slow to change unless they have compelling reasons to do so. Even organizations with adaptable cultures may encounter resistance when implementing change. *then, now at the third level, or the VP, and all the GMs in B2B Enterprise. So, that's the mindset. If there are no changes in all these things, because when there are changes, everybody knows what to do, and it's a mindset change." - HAC, P3*. "*But at below now is people part that has yet to materialise. The upper part already started. "* HAC, P4.
2. Sustained Investment in Agile Practices	Investing in Agile practices is crucial for sustainable success, but it can be challenging due to the resources and training required. It's important to note that a lack of coaching and support can impede progress when implementing Agile on a larger scale. "*Thirdly are the agile coaches. So, like the skillset has to improve. Like some of us study diligently and practice but because of level .. "*. – HAC, P3. "*not including existing at HQ, many more. So it keeps on adding. So that is the one thing if possible to improve better, we need more coaches at the same time."*- HAC, P4

3. Agile Integration in Non-core Functions	The incorporation of agile methodology in non-core functions can prove to be quite a challenge. These areas tend to resist the agile approach, which often results in conflict. In order to fully reap the benefits of a transformation, widespread adoption of agile practices is imperative. "*… we heading to is to be to what, to create a more sustainable model for the company, regardless of if it is in the transformation agenda or not. But it has become a more sustainable operating model for all the employees and also the process of ecosystem. In delivering values.* " - HAC, P1. "*… all the squad members, like POC, have to be aligned. So, their KPI will not be under your unit but under your squad under their tribe. If not, you'll do things half-hearted, not getting things done. So the alignment has to be there*."-HAC, P3.

5. Discussion

The discussion is structured into four main sections: emerging quadrants, interpretation of results, comparison with existing literature, and implications for practice and future research.

5.1. Emerging Quadrants

The results were organized into four subsections of a framework (Figure 2), each addressing a specific aspect of the study's findings. The framework consists of twelve final themes discovered during the study. These themes were then clustered into two perspectives: timeline and sentiment. The timeline perspective refers to whether the theme is currently present or anticipated in the future. The sentiment perspective captures the positive or negative sentiments associated with each theme. This dual perspective resulted in four quadrants, Q1 to Q4, each representing a unique combination of timeline and sentiment.

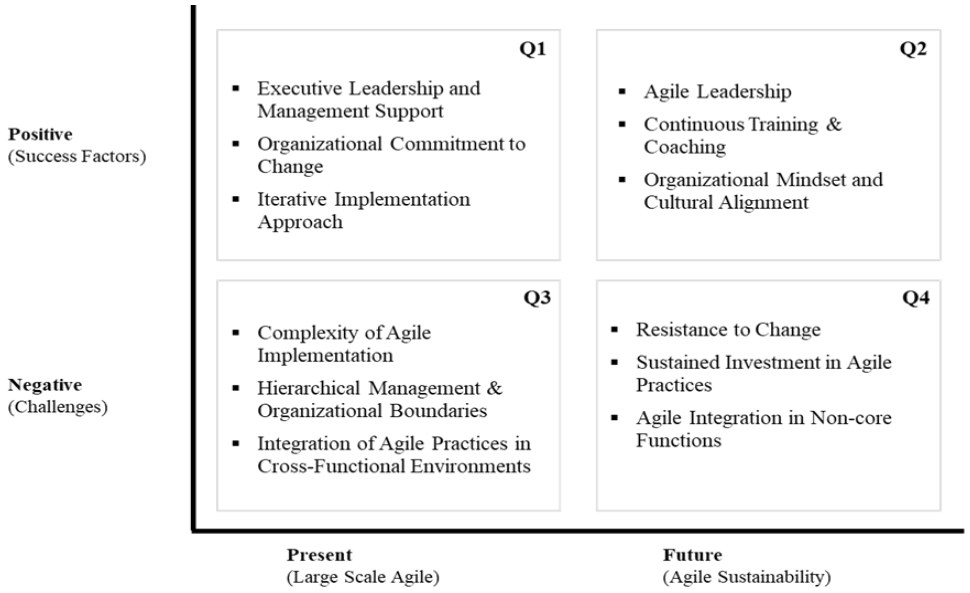

Figure 2 Four Quadrants of Timeline and Sentiment

Our analysis reveals that successful implementation of agile practices requires three key drivers: Executive Leadership and Management Support, Organisational Commitment to Change, and an Iterative Implementation Approach. These factors underscore the significance of strong leadership, organizational readiness for change (Chumnumporn *et al.*, 2022), and a flexible, iterative approach to large-scale agile transformation.

When considering these drivers alongside Kischelewski and Richter (2020) systematic literature review findings, implementation strategy emerges as the most critical success

factor for large-scale agile. Management and organization play a crucial role in this, followed by iterative planning and execution. This contrasts Kischelewski and Richter's primary success factors of communication transparency and knowledge management.

Moreover, we identified several challenges, including the complexity of agile implementation, hierarchical management and organizational boundaries (Chumnumporn *et al.*, 2022), and integration of agile practices in cross-functional environments. These challenges align with the communication and inter-team coordination challenges outlined by Kischelewski and Richter (2020).

For the future, organisational mindset and cultural alignment, continuous training and coaching, and agile leadership were identified as the linchpins for sustaining agile practices. This emphasizes the importance of agile leadership, continuous mentoring, and cultural alignment for the longevity of agile transformation.

5.2. Implications to Practice

The implications of our study extend beyond the organization we examined and into the wider industry and academic field. Our findings revealed that the challenges and success factors in undergoing an agile transformation are universal, regardless of an organization's size or field. By addressing these challenges and leveraging the success factors, organizations can ensure a smoother and more effective transition to agile, leading to improved operational efficiency, customer satisfaction, and competitive advantage.

Moreover, the insights gained from our study can serve as a blueprint for academic research, curriculum development, and training programs focused on agile methodologies. By integrating these findings into academic curricula, we can better equip future professionals to handle the real-world challenges of undergoing an agile transformation.

Our study also opens several intriguing avenues for future research. Granular insights can be gained by delving deeper into the tactics and conditions that enable a successful agile transition at scale. Additionally, understanding the factors that influence the sustainability of agile practices across diverse organizational contexts would be enlightening. Exploring the role of cultural alignment, training, and coaching in helping teams navigate the complexities of sustaining agile practices can also provide actionable insights for both practitioners and academics.

6. Conclusions

Our research delved into the complexities of implementing agile methodologies on a large scale, shedding light on the critical success factors and challenges faced in both present and future contexts. Our study provides a nuanced understanding that is valuable to practitioners, decision-makers, and academics alike. The findings highlight the multifaceted nature of agile transformation at scale, emphasizing the vast scope for further exploration in this domain. While crucial for industry professionals, our insights also highlight disparities and commonalities with existing literature, further accentuating the evolving nature of agile methodologies and the need for continuous research. It is essential to recognize the limitations of our study, given the dynamic and intricate landscape of large-scale agile implementation. Our findings may not apply universally across all organizational contexts. Nonetheless, the depth and breadth of our research provide a robust foundation and catalyst for subsequent studies in this realm. In short, our research not only enhances our understanding of large-scale agile implementation but also encourages academic and industrial communities to engage in a deeper, collaborative exploration to unleash the full potential of agile methodologies.

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