Challenges to Sustaining Agility: An Exploratory Case Study

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ABSTRACT

Many organisations have embraced agile software development to achieve high developer productivity, improve flexibility and shorten lead times through continuous improvement. While agile principles, methods, and practices have proved highly effective for software development teams and projects, whole organisations are now basing their agile transformations on these same principles. Some of these organisations have sustained their agility over many years, requiring significant commitment and ongoing change. However, there is limited empirical research on how agility is sustained in organisations. Based on an in-depth exploratory case study involving nine interviews with experienced agile practitioners across various roles, we identify 10 challenges faced by a single organisation in its efforts to sustain agility over six years.

CCS CONCEPTS

• **Software and its engineering** → Agile software development

KEYWORDS

Sustained Agile, Agile Sustainability, Organisational Agility

ACM Reference format:

M. Senapathi, D.E. Strode. 2024. Challenges to Sustaining Agility: An Exploratory Case Study. In *Proceedings of ACM SAC Conference, Avila, Spain, April 8 – April 12, 2024 (SAC'24)*, 8 pages. DOI: https://doi.org/10.1145/3605098.3635926

1 INTRODUCTION

Agile adoption has grown steadily in the last two decades, reaching over 80% of software development activity [1]. Agile methods are increasingly employed beyond the IT and software development domains in fields such as new product development, software delivered through the internet (e.g. Software-as-a-Service), and when developing for the increasingly pervasive mobile platforms and technologies on which such software runs [2, 3]. Given the well-known benefits of agile, such as the capacity to adapt to changing requirements and improved developer productivity, recent attention has turned to implementing large-scale agile variants to extend these benefits throughout the entire organisation [4]. As agile methods continue to expand, the challenges agile practitioners face have also evolved over time, and the focus has shifted to sustaining agility in the long term [5, 6]. Sustaining agility necessitates a continual transformation process, which entails implications for development practices, roles, and organisational structures. An organisation that has transitioned to an agile approach, or one that has only implemented agile practices in certain areas, may encounter unique challenges when it comes to sustaining agility compared to one that has been agile from the beginning [7][8].

However, as observed in recent studies, there is minimal empirical evidence on the challenges organisations face in sustaining agile across the whole organisation when the agility is based on agile software development principles [6]. This study aims to start addressing this gap in the literature by investigating one organisation's efforts to sustain agility. We present the background and context of the case organisation and the challenges that have arisen to sustain agility.

This paper is structured as follows. The next section presents a review of related work. Section 3 describes the research method including a case description, data collection, and analysis. The challenges of sustaining agility are discussed in section 4. Section 5 presents a discussion of our findings. We discuss the study's limitations and threats to validity in section 6. Section 7 concludes with ideas for future work.

2 RELATED WORK

Sustaining agility in organisations beyond their initial adoption requires understanding related research in agile software development, organisational agility, and what is currently known about sustaining agility.

Agile methods, jointly referred to as agile software development, emphasise dynamic, iterative, incremental, and non-deterministic thinking with significant involvement of end users. Agile methods are characterised by a continuous readiness to rapidly recognise change and embrace change while contributing to customer value [9]. Since the inception

SAC '24, April 8–12, 2024, Avila, Spain

979-8-4007-0243-3/24/04. . . $15.00;
DOI: https://doi.org/10.1145/3605098.3635926

of the Agile Manifesto [10], agile software development has gained significant momentum in both academic and practitioner settings. This growth has led to several agile methods (e.g., Scrum, XP), frameworks (e.g., Scaled Agile Framework (SAFe), Large-Scale Scrum (LeSS)), and implementation of large-scale agile variants to extend the benefits of agile software development beyond individual teams and projects to the entire organisation [4]. IT-centric organisations are involved in knowledge work involving intense teamwork and customer-centricity [11], so the philosophy, principles, and practices of agile software development could be more appropriate for them, rather than the ideas from the domains of agile manufacturing [12] or strategic agility [13], where organisational agility (also called enterprise agility or business agility) is also a key concern [7].

Although entire organisations are now undergoing agile transformations [14], few empirical studies focus on *sustaining* agility in whole organisations, especially when their agility is based on the principles of agile software development [6, 8, 15]. For example, a few recent studies reveal that practitioners' interest is shifting from simply adopting agile principles to sustaining organisational agility [8, 15].

There is no unanimous agreement on the definition of organisational agility, the definition that aligns with our notion of sustaining agility is the ability of an organisation to successfully adapt and respond quickly to address a wide range of customer expectations [16]. Organisational agility comprises several interrelated factors including the organisation's ability to make continuous improvements, the alignment of its strategic, operational, and structural components, and organisational culture and leadership [7]. Although there is a growing interest in organisational agility that is based on agile software development principles, most of this research is conceptual with limited empirical evidence or research focusing on sustaining agility [7, 12]. For example, based on a review of studies on sustaining organisational change, Buchanan et al. [17] proposed a provisional model for the processes influencing sustainability. Although that review identified several financial, cultural, political, and temporal factors, it did not focus on concerns that may arise in sustaining organisational change when following agile principles such as customer orientation, adaptability to uncertain environments, and team empowerment [6].

Sustaining agility at an organisational level means maintaining agile methods at a certain level throughout the organisation [6]. This can involve extending agile methods from one organisational unit to other business units, which can present new challenges that differ from adopting agile at the individual team or project levels [18].

A few recent studies have focused on the sustained use of agile methods. Drawing from the traditional innovation diffusion models (e.g., diffusion of innovations, information system implementation, some have investigated sustainability as a post-adoptive phase where a change is accepted, routinised and infused into an organisation [8, 19, 20]. Barroca et al. [15] identified four themes based on practitioners' perspectives that defined agile sustainability: being completely agile (whole organisation, agile mindset, and agile principles), independent (learning and self-sufficiency), focused on business value and user or customer need, and being consistent across time (sustainable pace). Carroll et al. applied normalisation process theory (NPT) to examine the key challenges of embedding and sustaining large-scale agile methods [21]. Their research indicates that practitioners often rely too heavily on adherence to agile methods instead of identifying approaches to successfully embed and sustain the transformation process.

This review shows that sustaining organisational agility that is based on principles from agile software development is still an under-researched area lacking empirical research on the challenges organisations face in sustaining agile [6]. We, therefore, address this gap based on an in-depth case study to explore our research question; *what challenges do organisations face in sustaining agility?*

3 METHOD

The case study research method was chosen to address the research question to allow for an in-depth investigation of the business phenomenon in its natural setting and to support future theory building [22]. We followed the guidelines of Yin [22] in the case study design and execution. Ethical approval for the study was granted by the researcher's institutes (AUT and Whitireia-Weltec respectively).

Case selection was purposeful. We selected an organisation with at least five years of agile experience (i.e., in agile software development or agile project management). To locate a company, we contacted people in our professional network. One contact introduced us to a key contact in a suitable organisation that publicly espoused agile principles and practices, was established about two decades ago, and had followed agile principles and practices for more than five years. The key contact invited people with suitable experience that would allow them to give in-depth insights into how the organisation had sustained agility. Interviews were arranged with all those who volunteered to be interviewed.

The semi-structured interview protocol was based on the Critical Decision Analysis (CDA) method [25, 26]. The open-ended interview questions focused on sustainability challenges, changes, and examples. Questions were asked such as, 'What are the main challenges the organisation faces in sustaining an agile way of working?' and 'give an example of an experience, event or issue that was related to a specific challenge'. We also asked how the participant or team had addressed the issue, and for specific examples of significant

changes the organisation had made to sustain agility [23, 24]. The protocol involves first interviewing one person who has a broad knowledge of key events (e.g., the introduction of the Spotify model, versions of the operational model) and can provide a timeline, then following up on each event with interviews of people who have more in-depth knowledge of a particular event. Therefore, the first interview was with a senior manager who had been with the organisation since the agile initiative began and was instrumental in implementing the agile philosophy, principles, and practices at all levels. Following this interview, each participant was interviewed in turn. All interviews were online and took place with a single interviewee and two interviewers. Meetings were recorded and transcribed in MS Teams. Each interview was scheduled for 1 hour. The profile of the interviewees is shown in Table 1.

Table 1 Profile of the interviewees

Person Code	Age range	Duration (years, months)	Current role
A1	31-40	6	Retail OMA
A2	41-50	5, 2	Delivery coach
A3	41-50	4	Retail Operating Model Implementation Analyst
A4	>50	5	OMA
A5	31-40	4	PO Chapter Lead
A6	>50	3	OMA
A7	41-50	5, 6	Group Chapter Owner
A8	31-40	4	Platform experience owner
A9	>50	4, 6	Delivery coach

Table 1 Key

OMA – Operating Model Architect; PO – Product Owner
Duration – years working in the organisation in years and months; Age range – in years

Data analysis involved first cleaning the transcripts to ensure they were accurate. This involved listening to the recording and checking and removing any errors in the transcription. The data analysis followed the process described by Schreier [25] for qualitative content analysis. A coding frame was developed after both researchers independently coded the first transcript. The coding frame was then revised iteratively and jointly. That is, as the researchers coded each transcript in turn, they discussed adjustments to the codes. In discussion, codes were renamed, added, or merged into the coding frame. Categories of codes were then developed by grouping the codes. This grouping was discussed and agreed upon by the researchers. The outcome was a final list of challenge categories.

Additional material was collected that contributed to the background, history, and timeline of the organisation's agile adoption and the main changes made over time in sustaining agility. This included the organisation's public annual reports, public news reports, a video of a conference presentation describing the organisation's transition to agility, and PowerPoint presentations. The PowerPoint files were created to explain to the staff the organisation's agile adoption and changes to the operating model.

4 RESULTS

The organisation was a publicly listed New Zealand retailing company providing a critical product to individuals and businesses in New Zealand. The organisation had General, Wholesale, and Retail sections. The organisation was IT-centric because it relied heavily on information technology and had its own software development unit. In 2017, an agile approach to leadership was introduced by members of the executive management to improve the responsiveness of the organisation, although Agile methods were already in place in some teams. In 2019, agile ideas led to significant changes to the business operating model, the organisational structure, and the funding model. The Spotify model [26] of agility was introduced with teams organised into Chapters and Squads with Product Owners. A significant change was when project funding was devolved to the team level (Squads) to improve product quality. In 2020, a consultancy assessed the organisation, and their report provided the impetus for a change to an organisation-wide agile way of working. The Cynefin model [27] was used to evaluate what parts of the organisation would most benefit from the agile way of working and ideas from Team Topologies [28] were implemented by structuring teams into business value-stream aligned teams, platform teams, and technical teams. By this stage, the early challenges of getting executive backing, management backing, and changing the organisation structure had been met. In 2022, a new operating model called "*Retail ways of working*" was launched. In the Retail section, Agile was considered well embedded because it had been sustained for years even with significant changes in executive management, and it had caused significant changes in the way the organisation did things, "*provided we keep focusing on the things that are not working yet, and keep iterating on them, then I think we will have something that's quite solid and really good…we're on the right path*" [A9]. Interviewees noted that

the organisation had reached a level of agile maturity they had not observed in similar organisations. Next, we discuss the 10 major challenges the organisation encountered in their efforts to sustain agility during the transition from agile at the team level to organisational agility as "*we have focused a lot more on the kind of organisational system level, and that kind of organisation is much more agile than it was five years ago*" [A1].

Disparate levels of maturity: There was a lack of common understanding of what agile meant for the individual job roles in the organisation. For example, moving from managers to product owner roles was one of the most significant changes for many teams, "*you move from having managers to product owner… you're supposed to be in end-to-end squads that will enable a piece of work. I think a lot of these people were moved, but the journey was not quite there, where everyone actually understood what agile means for them*" [A8]. Non-technology teams were given agile roles and ceremonies, but they preferred to continue working in the same way as they did in their pre-agile roles. In addition, when new people were hired, some were fresh graduates who came with suitable agile knowledge (i.e., agile mindset, principles, and practices), some had no agile experience, while others came from organisations who had their own agile way of working, and these people had preconceived ideas of how agile should work. This created disparate levels of maturity in the organisation where some areas were more mature than others. This was perceived as a challenge in terms of designing a system so that teams could work together effectively.

Resistance to change: There was a lack of buy-in from senior leaders who could not see the benefits of changing to agile, "*lack of buy-in from senior leaders or managers… to how they are used to working. They are very … traditional hierarchical, and now you are asking them to flip that to being self-organising, …and what it means to be a leader in that space*" [A2]. Some value stream and platform owners who came from a traditional environment felt that agile was impeding the development process. The value stream owners who were accustomed to directing the team were resistant to teams and product owners making customer-centric decisions, "they are not used to people coming back and disagreeing with them or challenging their thoughts, they are used to saying, hey, this is what I think you should work on. We think you should do… and our product owners and teams are going, it is not what our customers are asking from us" [A6].

As illustrated by the quotes above, resistance to change existed at different levels from senior management to value stream owners and individual teams.

Competing priorities: This was perceived as a challenge in sustaining agile principles that emphasise focusing on customer value, which is an important principle in organisational agility [29]. There were about 50 different business units across the whole of Retail. This created a lot of silos where everyone had competing priorities. At the time of the interviews, when there were already 130 large pieces of work in progress, people wanted to start another 56 pieces of work due to competing priorities. This was because their Key Performance Indicators (KPI) were measured on financial results rather than the value that was delivered to customers, "*especially our leadership team have KPIs which are measured on financial results … and so everyone was out for themselves, rather than what was best for the organisation and the customers*" [A6]. This challenge was identified by the operating model architects who were working at the system level (rather than at the team level) to support the value streams to work more effectively.

Lack of team empowerment: Senior and executive leaders often made decisions without understanding the implications for team empowerment within the business. Some value stream owners were accustomed to directing the team and making priority decisions in their previous roles. This was well expressed by one of the operating model architects, "*they tell the team what they want them to do and to work on, and what that leads to then is an unempowered team. They don't have autonomy; they don't have empowerment"* [A7]. They were not used to the teams or product owners challenging or disagreeing with their decisions. This lack of empowerment at the team level, i.e., by those who were doing the work, clashed with the agile values such as doing what the customer wants or being customer centric. At the time of the interviews, the operating model architects were working towards aligning the work to the strategic goals and supporting the empowerment and autonomy capability of the teams.

Dependencies between teams: At the time of the interviews, the value stream structure had increased the number of teams from 9 to 40. Furthermore, many decisions were linked to other teams or business areas such as billing, legal, and technology. This created multiple dependencies that were difficult to address effectively, "*so some other squad out there may be waiting for a technology squad to do your thing. And we are not big enough to have lots of those people to be shuffled as different projects come up and down …so, we have those challenges and …what is most important to me may be quite different to what is most important to you and …right now I might be waiting for the billing team to do… and then I might be waiting for legal to do something and then someone might be waiting for me to get this API's published…"* [A8]. As the system continues to grow, dealing with issues that come with scaling and with the growing number of dependencies was perceived as an ongoing challenge by many interviewees in terms of sustaining agility.

The challenge of onboarding people to the agile way of working: Several interviewees identified the issues associated with onboarding new people into the agile way of

working. Although some new recruits had previous agile exposure, they lacked the experience and mindset to work in self-organising teams and they were unfamiliar with the organisation's unique agile way of working. So, 'Agile at [organisation]' sessions were held for all newcomers as part of their induction and onboarding. And "*every time you get a new person into a team, they are like, why are we doing it this way?*" [A6]. In addition to the need for constant agile education, supporting teams through the stages of forming, storming, norming, and performing [30] was an ongoing challenge, as they learned to work together to achieve common goals. And "*as turnover increases the volume of needing to [teach the agile way of working] increased and we've got fixed capacity in terms of, at the moment what we can spend, how much time we can spend doing that*" [A7]. This was recognised as a recurring challenge that hindered the sustained use of agility in the organisation.

Lack of role clarity: There was a lack of clarity about some key roles such as Product Owner and Product Manager roles which were not clearly defined. They had, "*product managers that probably did product owner work and vice versa*" [A9]. So *"a lot of the time product owners are wearing both hats of delivery and working on strategic product decisions and within the squads…they are acting a little bit more like market leads, and they are not distinctly managing products and the commercials of those products that they would then recommend to a product owner"* [A5].

The tasks related to each role had been unclear for a while and the evidence came mainly from people who felt that their responsibilities were unclear (e.g., Product owners, delivery coaches). The participants deemed it was important that people have a well-defined and clear understanding of their respective roles to sustain agility.

Staff turnover: Several interviewees identified the negative impact of the need for new and ongoing employee orientation and training on sustaining agility. While the organisation invested a lot in agile training, the constant need to train new people and relearn the organisation's agile way of working increased, "*I think the real challenge we are seeing now in terms of sustaining agile is actually everything that has happened in the last two years with Covid, and therefore the labour market. That we, like everyone, have had turnover probably at higher levels than historically. So, the challenge of maintaining the working level of knowledge and agile knowledge [caused by staff turnover] it becomes more difficult."* [A7].

In addition, there were insufficient resources for maintaining value streams and agile knowledge. For example, a squad or a team would be working on one of their highest priority items, but due to insufficient resources would go to another team for support, but that team's road map would already be full for about six months. So, "*the next question is, well, why don't we just give the team the resource that it needs to be able to do it, but we cannot give the team the resource to be able to do it because that resource is so scarce in the first place and also expensive that you just back into square one"* [A5].

The evidence related to staff turnover and lack of resources came mainly from Chapter owners (e.g., PO Chapter lead, Group Chapter owner) who were responsible for people management and product management.

Balancing responsibilities: This challenge was related to the changes made to the structure when a new operating model was introduced. This new model created several chapters (i.e., a group of specialists) such as the Agile chapter, Business Analyst chapter, Product Owner chapter and Product Management chapter, and roles such as Value Stream owners and Chapter leads. There were concerns about balancing the commitment and responsibilities between the different types of work, for example, the percentage of time that a chapter member should spend on Chapter work (e.g., fixing a broken process that affects all teams) versus business-as-usual (BAU), which was the work of a value stream, "*We have still got a bit of a struggle here to work out exactly what the remit of the chapter is because originally it was to spend time helping the members of the chapter hone and improve their skills. But what's happened with some of the chapters is that there is a whole bunch of systems and processes that no single team is responsible for that are broken, and they have taken it on themselves to start fixing those"* [A9]. While this may be a good way of supporting each other but, "*you can only have so much percentage of time to do that because we also have our business-as-usual work that needs to be attended to. Nobody has actually made the decision yet about what additional time, if any, should be devoted to chapters who are working on improving their processes"* [A9].

Incompatible funding model: Several interviewees identified the misalignment between the agile way of working, which is based on task priority, and how finances were organised and allocated. For example, some of the senior leaders who had a budget allocation (e.g., CapEx, OpEx) to do projects in a specific application platform were pressurising the teams to build their features first, "*for example, if the [AppX] team were entirely funded by this project money, the leaders would do, well, 'I want my feature built. Here's a project budget to build that feature, and I want in June deliver', and the team would say 'we are already doing these three other features for these three other leaders for their project budgets', and the 4th leader would say, 'Well, I am going to spend my project money on something else then'"* [A7]. When the teams recognised the deficit in their funding, they would panic and chase after other project money which resulted in two things: (i) real fluctuations in velocity and output, and (ii) focusing on building new features rather than on application stability and

performance, resulting in reduced product quality.

Another issue related to funding was that, if a piece of work took a few additional sprints to complete, more than the initial estimate, though it did not make a huge difference from a delivery perspective, it raised concerns from a finance perspective about the increased costs and whether the benefits were still relevant, "*from a financial business case benefit perspective we still have not figured a way that works well for both the business and the delivery teams"* [A8].

The 10 challenges are summarised and defined in table 2.

5 DISCUSSION

This single case study has explored the challenges encountered when sustaining organisational agility in an IT-centric organisation that introduced agility six years ago. The organisation was primarily basing its agility on ideas from agile software development. Analysis of the case found 10 challenges. Many of these challenges are proposed in theoretical studies or found in empirical studies.

Table 2: Summary of challenges

Challenge	Description
Disparate levels of maturity	Different levels of agile knowledge and maturity (e.g., agile mindsets, principles, and practices) between teams or organisational units
Resistance to change	People unwilling to adopt unfamiliar ideas and practices (e.g., ego problems, lack of buy-in from senior leaders)
Competing priorities	Priorities vary between different parts of the organisation (e.g., priorities based on financial outcomes rather than what is valuable for customers)
Lack of team empowerment	Lack of understanding of the implications of decision-making on team empowerment.
Dependencies between teams	Difficulty in addressing multiple dependencies between a large number of teams
Onboarding people to the Agile way of working	Issues with onboarding and integrating new people into the Agile way of working
Lack of role clarity	People unclear about the responsibilities associated with their new roles
Staff turnover	Issues related to the shortage of staff with the required expertise in maintaining value stream work and agile knowledge
Balancing responsibilities	Concerns in balancing the staff commitment and responsibilities between the different types of work (e.g., chapter work versus squad work)
Incompatible funding model	Misalignment between the agile way of working based on task priority and traditional funding allocation

The challenge of *resistance to change* commonly occurs when an organisation undergoes change [31]. Kalenda et al. [32] and Dikert, et al. [14] reported this challenge when scaling up agile in organisations, and Denning [33] proposed that management buy-in would be a problem for organisational agility, which is what we found in our case.

Four of the challenges we found are reported in studies of sustaining agility. *Competing priorities* are reported by Strode, et al.[7] where the challenge was to balance distributing authority to teams (i.e. empowerment) with fulfilling wider organisational goals. Our challenge was about competing priorities but was concerned with the priorities of meeting the KPI goals versus providing value to customers. *Onboarding people to the agile way of working* was reported by Gregory, et al. [34] who found that finding the right people with agile experience or training was a challenge. Barroca, et al. [6] identified a factor called 'knowability', which determines how easily new team members integrate into a team and its work. According to Babb, et al. [35], the need for *continuous learning* is a quality in agile software development that is non-trivial to achieve and then sustain. They argue that agile software development works best within a learning organisation [36].

In our case, the funding model was not suitable for agile projects, so funding was devolved to Squads to provide more consistent funding for ongoing projects. This challenge of an *incompatible funding model* was also found by Senapathi and Drury-Grogan [8] and contributes to their model of sustained agile usage.

Three of the challenges are reported in agile projects and teams usually from the perspective of agile adoption rather than sustainability. In our case, the *lack of team empowerment* was a two-way challenge as managers had to give up power and teams had to learn to be empowered. This challenge was identified by Stray et al. [37] in agile practitioner workshops leading to a call for research to find out "*How to change the mindset of the wider organisation to adopt agile autonomous teams*". In organisation studies, Silver et al. [38] identified 10 lessons for sustaining empowerment in organisations, although their two case studies were not involved in agile transformations. They found that sustaining team empowerment is a recognised issue requiring championship, leadership and management support and training. Team level empowerment, in their view, is imposed on teams by management rather than occurring naturally or by choice

within teams or groups, which tends to be the view that emerges from agile project and team studies.

Problematic *dependencies between teams* were a challenge. Dependencies between teams are reported in large scale agile transformations by Dikert et al. [14], Berntzen et al. [39], and Berntzen et al. [40]. They concur in finding that dependencies make coordinating the work of multiple agile teams more difficult.

In our case, introducing value streams and a team topologies structure [28] led to new roles and a *lack of role clarity*. When roles are not clear this can lead to problems with authority and delegation in agile teams [41]. There is also evidence that a lack of role clarity can be detrimental in individual agile teams and lead to problems with effective collaboration [42]. However, evidence that role clarity is a general problem in organisations, rather than individual teams when sustaining agility, is currently lacking.

For two of the challenges, we could not identify prior research. The challenge of *balancing responsibilities* occurred for people who were members of a Chapter and a Squad. This challenge appeared to be a side-effect of the matrix structure of the Spotify model [26]. The final challenge, the *disparate levels of agile maturity* occurred as agile principles spread out from one part of the organisation to another. This disparity had a negative effect when the teams and organisational units depended on one another to complete work, mainly because the lack of transparency in non-agile teams led to perceived holdups and tensions between teams. Although many agile maturity models exist [43], they tend to focus on agile teams rather than the whole organisation and do not consider agile maturity that is not uniform across the organisation.

This study contributes to knowledge about challenges that can occur when an organisation aims to sustain agility. Some of these challenges are recognized in prior research, but they have not previously been shown to all occur in a single organisation. For practitioners, these challenges highlight potential issues that organisations should be aware of when they seek to achieve agility by extending agile software development principles to the whole organisation. Adopting agile principles is only the first step, an organisation may encounter further challenges in sustaining agile principles over time. For theorists, these challenges are starting points for further research as we explain in section 7.

6 LIMITATIONS AND THREATS TO VALIDITY

This study has limitations. This was a single case study, indicating that further case studies, longitudinal studies, or quantitative studies are needed to confirm and extend these 10 challenges. The small number of interviews is another issue, although we ensured that most interviewees had long experience in the organisation and had experienced much of the agile transformation. In addition, because the interviewees were recalling events from up to six years prior to the interviews, this could mean that more recent events tended to receive more emphasis and explanation. This issue was mitigated somewhat by triangulation, with multiple interviewees, some people recalled and described the same event.

We examine the validity of our research from three viewpoints: internal validity, construct validity, and external validity. Internal validity does not apply to our study as it does not focus on theory testing [44]. To address construct validity, the researchers conducted all the interviews using the same interview guide for each interview [22]. This consistent interview protocol included explaining the purpose of the interview, inviting clarification questions at any stage, and explaining the main terminology. Prior to conducting interviews, the researchers reviewed the questions for biases and ambiguities. To avoid leading the interviewees to answers, the interviewers retained a neutral stance about the interviewees' explanations and descriptions. To reduce researchers' biases influencing the interpretations of the qualitative analyses of the interview data, as discussed in section 3, the data analysis was collaborative, and the results were discussed between the two researchers until a consensus was reached. The external validity of case studies is generally low due to the uncertain effects of changing contextual factors such as structure, project, and team characteristics. The findings from our single case study do not claim to be generalizable to other contexts. However, the findings may provide valuable insights for organisations in similar contexts.

7 CONCLUSION AND FUTURE WORK

This study identifies 10 challenges that an organisation may encounter in sustaining agility. Although 8 of the 10 challenges have been identified or proposed in the extant literature, we have provided empirical evidence that they can exist in one organisation actively involved in sustaining their agility.

Future work on sustaining agility has many potential avenues. Ranking the challenges based on their relative impact using a Delphi study would be useful. Research into the chain of events in sustaining agility would be useful. That is, when a new agile idea is introduced, this leads to change that can cause a challenge. A challenge often leads to more change or an effective solution. Therefore, a study of changes, challenges, and solutions might lead to a better understanding of practices that organisations can use to sustain agility. Further empirical research might also seek to better understand the specific qualities of an agile organisation that has sustained agility, especially in IT-centric retail organisations that have built their organisational agility by extending the principles of agile software development to the

whole organisation. This type of agility might be of a different nature to that of the traditional agile manufacturing organisation on which much of the knowledge on organisational agility is based [12].

Future work should establish theory on sustaining agility in organisations by proposing and testing theoretical models. Barroca et al. [6] posed three theoretical lenses (i.e., shared mental models, alignment, and situation awareness), and Senapathi and Drury-Grogan [8] provided a theoretical model for sustaining agility by identifying team, technology, and organisational factors, but the nuances of sustaining organisational agility are still not fully understood. Given the significant commitment in cost and effort organisations put into agility, this topic deserves further research.

ACKNOWLEDGMENTS

We thank our participants in the case organisation.

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