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Research Article



Organisational Culture Attributes Influencing the Adoption of Agile Practices: A Systematic Literature Review

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ABSTRACT

Organisations have been adopting agile practices to deliver information system projects faster and create business value. Despite its advantages, many organisations battle to successfully adopt agile practices. While there are several challenges for agile adoption, organisational culture has been amongst the challenges on adopting agile practices. The objective of this study was to determine the organisational culture attributes which influence the adoption of agile practices within the organisation. The systematic literature review aimed to explore the organisational culture attributes which influence the adoption of agile practices. The review focused on papers published on organisational culture influencing the adoption of agile practices between January 2015 to December 2020. The search strategy retrieved 204 papers of which nine papers were selected for a detailed analysis. The study revealed five factors of organisational culture that influence the adoption of agile practices in the organization as: management control, team collaboration, market, values and creativity. These factors have a number of organisational culture attributes that influence the adoption of agile practices. This study contributes to the body of knowledge by providing organisational culture attributes which influence the adoption of agile practices. The results of the systematic literature review presented in this study will benefit researchers and practitioners of project management.

Keywords: Organisation culture, Agile practices, Agile adoption, Systematic literature review, Information Systems

INTRODUCTION

Organisations have purpose, structure and processes to accomplish specific goals. These goals can be achieved through the organisational culture that comprises of behavior, values, norms and beliefs shared by all employees of an organisation (Schein 1988). The organisational culture has an impact on customer satisfaction, productivity, communication, teamwork and creating strategic business value to sustain organisation's competitive advantage in the market (Genç 2013). According to Pinto (2010) organisational culture also has impact on project success rate such as it affects team performance and commitment towards project goals as well as allocation of resources to projects. However, organisational culture has been amongst the challenges on adopting agile practices (Anwar et al. 2016; Ghimire 2020; Raharjo & Purwandari 2020; VersionOne 2020). Other challenges are organisational resistance to change, inadequate management support and sponsorship (Ghimire et al. 2020; Raharjo & Purwandari 2020). As organisations continue adopting agile practices to increase success rates of their projects (PMI Pulse of the Profession 2017; Standish Group 2020), it is important for the organisation to recognize the organisational culture attributes that influence agile adoption.

In the literature there are studies published regarding the influence of organisational culture on agile adoption (Jivan et al. 2020; Othman et al. 2016; Soares & Brodbeck 2018). However, there are no specific systematic reviews that determine organisational culture attributes which influence the adoption of agile practices. This research originality lies in the fact that up to now, no attempt has been made to specifically understand what organisational cultural factors influence the adoption of agile practices. The main purpose of this study is to determine the organisational culture attributes which influence the adoption of agile practices within the organisation. This systematic literature review aims to answer the following research question:

What are the organisational culture attributes that influence the adoption of agile practices?

The systematic literature review was chosen as a review method to identify literature on organisational culture atributes

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that influence the adoption of agile practices for inclusion, data cleaning, analysis and synthesis the findings, and the presentation of results. The methodology used in systematic literature review was adopted from Kitchenham et al. (2009) where the review protocol guided the study.

The article is organized as follows: Section 2 provides an overview of the research methodology. Section 3 presents the results of the systematic literature review. A discussion of the results is provided in Section 4. Finally, conclusion and recommendations for future research are presented in Section 5.

RESEARCH METHODOLOGY

The present study reviewed the existing literature that were published in peer-reviewed journals, conference papers, books, book chapters and academic journals from January 2015 to December 2020. This is a period where most organisations have been adopting agile project management to improve the success rates of information systems projects (PMI Pulse of Profession 2017; Standish Group 2020).

Data sources were from the following databases: The Association for Computing Machinery (ACM) Digital Library, IEEE Xplore, ScienceDirect, Scopus, Wiley Online Library, Springer Link, Emerald, Google Scholar and Sage Publishing. The choice of databases was based on the topic under review, the review question, methodological considerations and the bibliographic characteristics of scientific databases. These databases were used because they include multiple of highly ranked journals and conferences (Scopus 2020). These databases also have best literature coverage which contribute to comprehensiveness of the systematic literature review (Gusenbauer & Haddaway 2019). The review protocol by Kitchenham et al. (2009) was adapted in this study as shown in Figure 1.

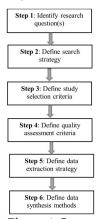


Figure 1. Systematic Literature Review protocol (Adapted from Kitchenham et al., 2009)

Table 1. Search results (2015-2020)

Papers remaining after title Papers remaining after Data source Papers remaining after applying exclusion criteria and abstract screening full text screening Association for Computing Machinery (ACM) 29 15 7 IEEE Xplore 5 3 ScienceDirect 7 88 1 9 11 2 Scopus Wiley Online Library 20 3 0 **Emerald Insight** 4 1 0 35 10 SpringerLink 1 0 0 Sage Journals 3 Google Scholar 9 6 1 **Total** 204 55

Step 1: Research question

The objective of this research is to determine organisational culture attributes that influence the adoption of agile practices. The following research question was defined to achieve the research objective:

What are the organisational culture attributes that influence the adoption of agile practices?

Step 2: Search strategy

The search strategy defined the search scope of studies by using the search string which was derived from the research question. The search string involved the following keywords with Boolean operators:

(("Organisational culture" OR "organisational culture" OR "Organisation culture" OR "organisation culture") AND ("cultural" OR "culture") AND ("adoption") AND ("Agile practices" OR "Agile practices" OR "Agile methods" OR "Agile methodologies" OR "Agile methodology" OR "Agile principle" OR "Agile principles" OR "Agile processes" OR "Agile processes" OR "Agile processes")).

This search string was used to search papers from electronic databases such as the Association for Computing Machinery (ACM) Digital Library, IEEE Xplore, ScienceDirect, Scopus, Wiley Online Library, Emerald Insight, SpringerLink, Google Scholar and Sage Publishing.

Step 3: Study selection criteria

A set of inclusion and exclusion criteria adopted from Kgoroeadira (2010) were used to reduce the number of studies by selecting the ones focusing on the purpose of the study. The exclusion criteria were:

- Abstract/ Title/Full text: Relevance to research question
- Date of publication: 2015 2020
- Language: Papers written in English
- Type of publications: Peer-reviewed journals, books chapters, conference and books
- Research method: Qualitative, quantitative, mixed method
 - Geographic location: Worldwide

The screening of papers was performed through an online search of research articles in scientific journals which involved both search string and exclusion criteria. Articles were selected after their titles were related to search criteria and search string. After applying the search criteria 204 papers were selected from the databases. **Table 1** shows the search results.

The eligibility criteria include both the search string and the exclusion criteria. The article screening process (as shown in **Figure 2**) aimed to ensure that the eligibility criteria are applied consistently to reduce the risk of introducing bias in an evidence synthesis.

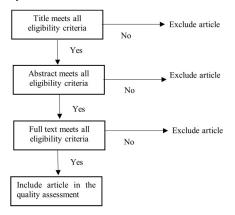


Figure 2. Eligibility screening process

The co-word (keywords co-occurrence) analysis using VOSViewer was then conducted to the selected 204 papers. The unit of analysis for co-word analysis was 'words' which were derived from authors' keywords (Donthu et al., 2021) using VOSViewer. A total of 545 keywords contained in 204 related papers have been analyzed. The emerged themes were the keywords with the greatest total link strength. The identified themes to focus on this review were organisational culture, agile software development, agile methodologies and agile. The keywords co-occurrence network visualization is as shown in Figure 3.

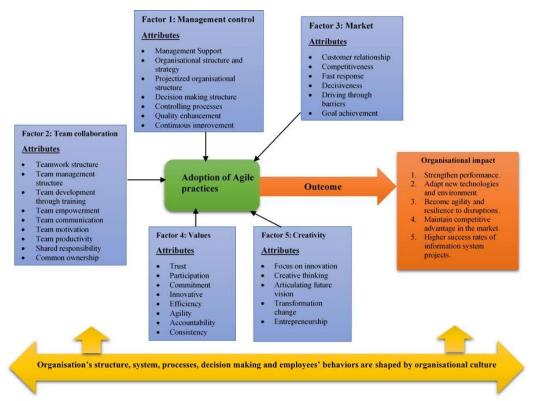


Figure 3. Organisational culture and agile practices adoption conceptual framework

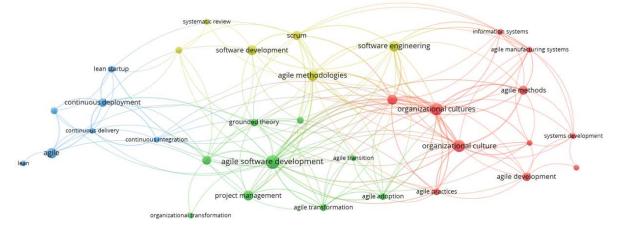


Figure 4. Keyword co-occurence network visualization (Year 2015-2020, n=204 papers)

Two filters of articles were applied: (i) manual reading of titles and abstracts to remove articles which are clearly irrelevant; and (ii) assessment of the full-text version of the article. First, titles and abstracts of the 204 selected papers were then screened based on exclusion criteria to include or exclude papers. The term co-occurrence analysis was also conducted using VOSviewer where the unit of analysis were title and abstract. The analysis created a term of occurrence map based on text data where 2768 terms were extracted from title and abstract fields of 204 papers. The minimum number of occurrences of a term was 5 of the 2768 terms, 129 terms met threshold as shown in **Figure** 4.

Fifty five papers remained after title and abstract screening. Second, these papers were examined based on the full text to identify papers focused on organisational culture influencing agile adoption. Nine papers remained after full text screening were subjected for study quality assessment. These papers were identified for quality assessment because they specific focus on linkage between organisational culture and agile practices in organisations. Thus, full texts of nine papers are aligned with the research question of this review.

Step 4: Quality assessment criteria

The quality assessment criteria were adapted from Dybå and Dingsøyr (2008) and Huff (1999). The nine primary studies (as shown in Appendix B) were assessed according to ten criteria as shown in **Table 2**.

Table 2. Quality assessment criteria

#	Question
Q1	Is the paper based on research (or is it merely a
	"lessons learned" report based on expert opinion)?
Q2	Is there a clear statement of the aim(s) of the research?
Q3	Is there an adequate description of the context in
	which the research was carried out?
Q4	Was the research design appropriate to address the
	aims of the research?
Q5	Is the research methodology well presented?
Q6	Was the data collected in a way that addressed the
	research issue?
Q7	Was the data analysis sufficiently rigorous?
Q8	Is there a clear statement of findings?
Q9	Does the conclusion relate to the aim of the study?
Q10	Is the study of value for research or practice?

The ten criteria as shown in Table 2 were used to assess the quality of the primary studies which covered four main parts:

- **Reporting:** Three criteria (Q1-Q3) were related to the quality of the reporting of a study's rationale, aims, and context.
- **Rigor:** Five criteria (Q4-Q7) were related to the rigor of the research methods employed to establish the validity of data.
- **Credibility:** Two criteria (Q8-Q9) were related to the assessment of the credibility of the study methods for ensuring that the findings and conclusion were valid and meaningful.
- **Relevance**: The final criterion (Q10) was related to the assessment of the relevance of the study for the software industry at large and the research community.

The numerical scale numbered with 0 for "no", 1 for

"partially" and 2 for "yes" was used to rank how well the questions were answered in each primary study. The detailed scores of the quality assessment for the primary studies are shown in the quality assessment checklist (Appendix B). The minimum score is 10 and if the primary study scored below 10, it is excluded. All nine papers scored more than 10 (as shown in Appendix B) which met the quality assessment criteria.

Step 5: Data extraction

A data extraction form was developed to extract data from the nine primary studies. The data extraction form is presented in Appendix C. The form is divided into three sections. The first section is for the study identification that has seven elements, the second section is for description of the study that has nine elements and quality assessment section that has one element. Study identification includes unique id for the study, title, author(s), publication year, type of article, volume/issue/page number and database.

Description of the study includes study aim(s), study objective(s), design of the study (surveys, case studies, theoretical and conceptual papers, literature reviews, modelling papers), research method (qualitative, quantitative, mixed research method), underlying theories/ frameworks/models, identified organisational culture attributes, findings and conclusion. The quality assessment includes the total score for paper quality. Data records were kept in Microsoft Excel for synthesizing the extracted data.

Step 6: Data synthesis

Data synthesis summarized and presented the findings of the nine primary studies in answering the research question. This phase is aimed at synthesizing the identified concepts and drawing a conclusion. The primary studies were analyzed and grouped into the identified organisational culture attributes which influence the adoption of agile practices. The following section presents the results.

RESULTS

Table 3 presents the identified organisational culture attributes from the primary studies which influence the adoption of agile practices.

Table 3. Organisational culture attributes identified from primary studies

Factors	Organisational culture	Primary
	attributes	studies
Management	 Management support 	Baham 2016;
control	 Organisational 	Dikert et al.
	structure and strategy	2016; Jivan et
	 Projectized 	al. 2020
	organisational	
	structure	
	 Decision making 	
	structure	
	 Controlling processes 	
	 Quality enhancement 	
	 Continuous 	
	improvement	

		T = •
Factors	 Organisational 	Primary
	culture attributes	studies
Creativity	 Focus on innovation 	Baham 2016;
	 Creative thinking 	Othman et al.
	• Articulating future	2016; Jivan et
	vision	al. 2020
	 Transformation 	
	change	
	 Entrepreneurship 	
Market	 Customer relationship 	Baham 2016;
	 Competitiveness 	Othman et al.
	 Fast response 	2016; Jivan et
	 Decisiveness 	al. 2020
	• Driving through	
	barriers	
	 Goal achievement 	
Values	• Trust	Gupta et al.
	 Participation 	2019; Othman
	 Commitment 	et al. 2016;
	 Innovative 	Soares &
	 Efficiency 	Brodbeck 2018;
	 Agility 	Šmite et al.
	 Accountability 	2020
	 Consistency 	

The identified organisational culture attributes are explained as:

Management control

Management control is a management function that helps implementing strategies to achieve organisational goals. Anthony and Govindarajan (2004:7) define management control as "the process by which managers influence other members of the organisation to implement the organisation's strategies." Management control can be viewed as a system which comprises of the organisational structure and strategy, organisational culture, core control practices and management information systems (Johnson & Gill 1993; Heath 2001:94).

Team collaboration

A team consists of two or more individuals who work together interdependently with a shared vision to achieve some common goals. For instance, the project team is a cross-functional team from different departments in the organisation to implement project activities to achieve project objectives. Teamwork involves knowledge, attitude and skills (Xiao, Parker & Mauser 2013). Knowledge should have team mission, objectives, problems, norms and resources. The skills define the behavior within the team such as coordination, performance evaluation, communication and cultural values among team members (Xiao et al. 2013).

Market

Market is externally oriented, and the organisational structure is strengthened by mechanisms of control to meet the stakeholders' expectations. To assist high levels of performance, clear objectives and reward systems are developed and put in place in the organisation.

Values

Values guide the organisation and support its vision, shape the organisational culture and impact the business strategy. Organisational values provide the guiding principles of the organisation's culture that determine employees' behaviors and organisational success (Hofstede 2001).

Creativity

Creativity has been used by organisations to generate new ideas to add value to their products or services as well as problem solving. Employees in the organisation spearhead the creativity processes to retain its competitive advantage in the market (Parjanen 2012). There are various characteristics in the organisation that support employees' creativity such as organisational strategy which focuses on innovation, leadership and organisational culture.

Based on the above explanations, the organisational culture attributes which have influence on agile adoption are summarized as shown in **Figure 5**.

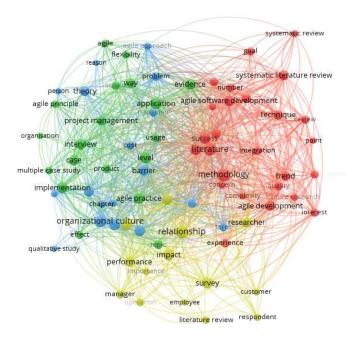


Figure 5. Term co-occurrence network visualization (n=204)

DISCUSSION

Organisations have been adopting agile practices to deliver information system projects faster and create business value. Despite its advantages, many organisations battle to successfully adopt agile practices. While there are several challenges for agile adoption, organisational culture has been amongst the challenges on adopting agile practices. This systematic literature review presented the findings of the nine selected primary studies on influences of organisational culture on the adoption of agile practices. The analysis of the primary studies showed that management control, team collaboration, creativity, market and values (as illustrated in Table 3) are important factors with attributes that influence the adoption of agile practices. Organisational culture has been used as a tool for management to control, motivate and enhance employees' performance in the organisation (Oweyemi & Ekwoaba 2014). Thus, management

control ensures the achievement of organisation's objectives and goals. This research identified the organisational culture attributes which influence the adoption of agile practices that focused in the management control as: management support, organisational structure, projectized organisational structure, decision making structure, controlling processes, quality enhancement and continuous improvement (Baham 2016; Dikert et al. 2016; Jivan et al. 2020). Team collaboration included organisational culture attributes which influence the adoption of agile practices such as teamwork structure, team management structure, team development through training, empowerment, team communication, team motivation, team productivity, shared responsibility and common ownership (Baham 2016; Dikert et al. 2016; Ghimire et al. 2020; Gregory & Taylor 2019; Jivan et al. 2020). For creativity, this research identified a number of organisational culture attributes which influence the adoption of agile practices as: focus on innovation, creative thinking, articulating future vision, transformation change and entrepreneurship (Baham 2016; Othman et al. 2016; Jivan et al. 2020). The research also identified organisational culture attributes which influence the adoption of agile practices focused on market as customer relationship, competitiveness, fast response, decisiveness, driving through barriers and goal achievement (Baham 2016; Othman et al. 2016; Jivan et al. 2020). The present research identified several organisational culture attributes which influence the adoption of agile practices that focused on values as: trust, participation, commitment, innovative, efficiency, agility, accountability and consistency (Gupta et al. 2019; Othman et al. 2016; Šmite et al. 2020; Soares & Brodbeck 2018). The findings of this study indicated that an organisation's structure, system, processes, decision making and employees' behaviors are shaped by organisational culture (Suda 2007). The organisation with strong organisational culture tends to strengthen their performance, adapt to new technologies and environment, become agility and resilience to disruptions as well as maintaining their competitive advantage in the market. Information systems projects that are aligned with organisational culture have higher success rates (Suda 2007).

The review protocol was adapted to ensure the validity of the study. The number of databases were searched using the search string to retrieve relevant studies on how organisational culture influences the adoption of agile practices. Threats to publication bias were covered by including only the published papers in the period under review (2015-2020). The findings and conclusion are reviewed by the authors and improvement were made.

CONCLUSION

This study presented the systematic literature review of the organisational culture attributes which influence the adoption of agile practices.

Contributions of the Study

First, the theoretical contribution of this study is to provide organisational culture attributes which can be used by organisations to adopt agile practices. Second, this study contributes to the body of knowledge in agile project management by providing project management practitioners with attributes for organisational culture that influence the

adoption of agile. The results of the systematic literature review presented in this study will benefit researchers and project management practitioners.

Limitations of the Study

This study was limited because of the small sample size (five years) covered from January 2015 to December 2020. Further research is needed to collected data in a larger sample size (more than five years to understand how organisational culture influences the adoption of agile practices. Other limitation is most of the selected primary studies applied competing value framework which is specific for organisational culture but did not develop a new conceptual framework. The search criteria did not include proportion of countries with research in the area, this is among the limitations of this study.

Future Research

The future research will detail the proportion of countries with research in the area and the period with the greatest dissemination and visibility of the studies. Further research will also develop a new framework that integrate organisational culture and the adoption of agile practices.

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Declaration of interest: The authors declare that they have no competing interests.

Data availability: The authors confirm that the data supporting the findings of this study are available for sharing when requested to authors.

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Appendix A: List of primary studies

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Appendix B: Quality Assessment Checklist

(Scale: 0 is "No", 1 is "Partially" and 2 is "Yes". Minimum total score is 10)

		Qual	ity of Re	eporting	Rigor				Credil	oility	Relevance	Total	
Paper #	Reference	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score	Rank
P1	Dikert et al. 2016	2	2	1	1	2	2	1	2	1	1	15	4
P2	Gregory & Taylor 2019	2	1	1	2	2	1	1	1	1	1	13	5
P3	Jivan et al. 2020	2	2	1	2	2	2	2	2	1	1	17	2
P4	Ghimire et al. 2020	2	2	2	1	1	2	2	2	1	1	16	3
P5	Gupta 2018	2	1	1	2	1	1	1	1	1	1	12	6
P6	Soares & Brodbeck 2018	2	2	2	2	1	1	1	2	2	2	17	2
P7	Šmite et al. 2020	2	1	1	2	2	1	1	1	1	1	13	5
P8	Othman et al. 2016	2	2	1	2	2	2	1	2	2	2	18	1
P9	Baham 2016	2	2	2	2	1	1	1	2	2	2	17	2

Appendix C: Data Extraction Form

Section A: Study Id	lentification								
Unique ID for the									
study	P1	P2	P3	P4	P5	P6	P7	P8	P9
Title	Challenges and Success Factors for Large-scale Agile Transformations - A Research Proposal and a Pilot Study	Defining Agile Culture: A Collaborative and Practitioner-Led Approach	Influences of organisational culture in the agile adoption	Scaling Agile Software Development Approach in Government Organisation in New Zealand	Relationships between IT department culture and agile software development practices: An empirical investigation	For some places more than others - Agility and organisational culture	"When in Rome, Do as the Romans Do": Cultural Barriers to Being Agile in Distributed Teams	Organisational culture and the acceptance of agile methodology	The Impact of Organisational Culture and Structure on the Routinization of Agile Software Development Methodologies
Author (s)	Kim Dikert, Maria Paasivaara and Casper Lassenius	Peggy Gregory and Katie Taylor	Jivan, K.P., Marnewick, A.L., and Joseph, N.	Dipendra Ghimire, Stuart Charters, and Shirley Gibbs	Manjul Gupta, Joey F. Georgeb, Weidong Xia	Soares, L.P., and Brodbeck, Â.F	Darja Šmite, Javier Gonzalez- Huerta, Nils Brede Moe	Hanen Ben Othman ; Mahmo ud Zouaoui ; Moham ed Hamdoun	Corey Baham
Publication year	2016	2019	2020	2020	2019	2018	2020	2016	2016
Type of article	Journal article	Conference paper	Conference paper	Conference paper	Journal article	Conference paper	Conference paper	Conference paper	Conference paper
Volume/issue/pag e number	Volume 119, pp. 87- 108			pp. 100-104	Volume 44, pp. 13- 24	pp. 121-133	pp. 145-161	pp. 16-23	pp.29
Database	ScienceDirect	IEEE Xplore	IEEE Xplore	Association for Computing Machinery (ACM) Digital Library	Scopus	Scopus	SpringerLink	IEEE Xplore	Google Scholar
Section B: Study Do	escription	1		7 0 3	1	1	ı	1	1
Study aim(s)	To understand the identified challenges and success factors of large-scale agile transformations by targeting a larger population of companies	To explore how a group took a collaborative and practitioner-led approach to developing a definition of Agile Culture and a set of tools to aid cultural assessment	To investigate the influence of organisational culture in the adoption of agile	To investigate the factors that are important in the public sector for a successful project and compares against results for the private sector	To examine the relationships between four competing cultural forms and two types of agile practices - social and technical	To explore the relationship between selected basic cultural assumptions of organisations and agile practices	To explore re the cultural barriers impeding agile ways of working in distributed teams with members from a hierarchical culture	To understand how culture can influence on the acceptance of agile methodology within Tunisian enterprises in the software development sector	To contribute to the current body of Agile Software Development (ASD) research by providing an understanding of gap between perceived ASD success (at acceptance) and ASD routinization

Study objective(s)	To validate and deepen findings from the literature review	To provide an overview of the development process used by a practitioner-led collaborative team to develop a definition of Agile culture	To describe the culture that is conducive to the realization of the benefits of agile	This study compares the main challenges in the public and the private sector	To determine how does IT department culture affect the use of social and technical agile practices	Correlation between the cultural dimensions researched and selected agile practices	To explore what are the specific cultural barriers, what resulting behaviours impede agility, and whether these behaviours prevail among offshore engineers working in distributed agile teams	To identify critical factors that affect the acceptance of agile methods, and to analyze the influence of organisational culture on the acceptance of the Agile methodology toward users	To articulate a model that explains the impact of organisational culture and structure on the routinization of agile methods
Design of the study	Survey	Interviews, observation, document review, and personal reflections	Case study	Survey	Survey	Survey, Case study	Case study	Interview	Documents review
Research method	Quantitative	Qualitative	Quantitative	Mixed method	Quantitative	Quantitative	Mixed method	Qualitative	Qualitative
Underlying theories/ frameworks/mode ls	None	Bronstein's Interdisciplinary Collaboration Model	Competing Value Framework	None	Competing values model	Adapted Schein's Model of organisational culture	None	Competing values framework for organisational culture	Competing values framework for organisational culture and theoretical model
Data collection	Questionnaire	Interviews	Questionnaire	Questionnaire and interview	Questionnaires	Questionnaire	Questionnaire and Interviews	Interviews	Literature review
Identified organisational culture attributes	Management support; Providing training on agile methods; Showing strong commitment to the transformation; Creating and communicating positive experiences in the beginning.	Behaviour, norms and mindset	Market, clan, adhocracy, hierarchy	Self-managing teams with shared responsibility, development team with common ownership	Governance and implementation plan, behaviour, values, understand cultural profiles of stakeholder, develop a shared cultural profiles, communication	Pragmatism, Favors communicatio n and participative.	Behaviour, trust, transparency	Group culture, development culture, hierarchical culture and rational culture	Organisational culture dimensions are organisational strategy, organisational structure, artifacts and values, project scope, team management structure, decision making structure, team work structure, control mode. Developmental and hierarchical organisational culture

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dactors for Large-scale agile transformation include: ensure management support (29%), and coach teams as they kear by doing (29%), and graph and coach teams as they kear by doing (29%), and graph and success factors. To outlife the definition for undinding from the ilentature review and to understand the completeness of the identified factors, we aplan to conduct a large-scale agile and evelopment. The study identified a set of challenges and success factors. To outlife the activation and to understand the completeness of the identified factors, we aplan to conduct a large-scale survey of individual a large-scale survey of large	Findings	The top success	Collective	The most	Successful Agile	Found a	"Pragmatism",	Found that culture	The results	Hierarchical Organisationa
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