

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

Elizabeth Sylvester Mkoba^{1*}, Carl Marnewick²

¹School of Computational & Communication Science and Engineering, The Nelson Mandela African Institution of Science and Technology, Tanzania

²Department of Applied Information Systems, University of Johannesburg, South Africa

*Corresponding Author: elizabeth.mkoba@nm-aist.ac.tz

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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 attributes

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**.

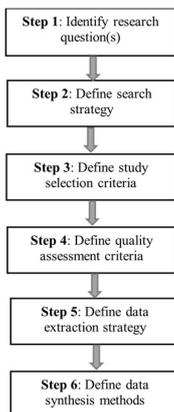


Figure 1. Systematic Literature Review protocol (Adapted from Kitchenham et al., 2009)

Table 1. Search results (2015-2020)

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

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 practice” OR “Agile methods” OR “Agile method” OR “Agile methodologies” OR “Agile methodology” OR “Agile principle” OR “Agile principles” OR “Agile processes” OR “Agile process”)).

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 Kgoroedira (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.

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 Dingsøy (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 attributes	Primary studies
Management control	<ul style="list-style-type: none"> • Management support • Organisational structure and strategy • Projectized organisational structure • Decision making structure • Controlling processes • Quality enhancement • Continuous improvement 	Baham 2016; Dikert et al. 2016; Jivan et al. 2020

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, team 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 that 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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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)

Paper #	Reference	Quality of Reporting			Rigor				Credibility		Relevance	Total Score	Rank
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
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 Identification									
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, A.F	Darja Šmite, Javier Gonzalez-Huerta, Nils Brede Moe	Hanen Ben Othman ; Mahmoud Zouaoui ; Mohamed 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/page 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 Description									
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/models	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 communication 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

Findings	The top success factors for Large-scale agile transformation include: ensure management support (29%) and coach teams as they learn by doing (29%), and customize the agile approach carefully (26%).	Collective ownership of goals refers to shared responsibility for goals	The most dominant type of culture is of a market culture (31%), followed by clan culture (26%), then adhocracy culture (24%) and finally is hierarchy culture (19%).	Successful Agile development teams require product ownership both from within the team and within the organisation that understands and supports the iterative nature of the Agile process	Found a significant positive relationship between rational culture and social agile practices usage	"Pragmatism", "Favors communication" and "participative" are the ones that correlate more with agile practices. These cultural dimensions are aligned with the four values of the Agile Manifesto	Found that culture of the outsourcing vendor did not confirm with the highlighted values and management style	The results revealed three types of culture noted; group culture, development culture and rational culture promote the acceptance of agile methodology	Hierarchical Organisational Culture tends to restrict team autonomy through rigid formal controls, the arrangement of skill-based versus team-based working structures, the subjection to both project managers and functional managers, and the top-down decision-making structures that disrupt a team's ability to develop unique solutions to complex issues
Conclusion	The study identified a set of challenges and success factors. To validate and deepen our findings from the literature review and to understand the completeness of the identified factors, we plan to conduct a large-scale survey aimed at practitioners of largescale agile development.	The study provided an overview of the development process used by a practitioner-led collaborative team to develop a definition of Agile culture, a brief description of the artefacts produced, and an analysis of the team process using the Interdisciplinary Collaboration Model	The effect of individual's culture norms has on the cultural behaviour at work that has not been considered as the cultural characteristics. The individual's cultural characteristics can be studied to determine how it affects organisation in adopting agile methodologies.	The finding from this study suggests that the main common challenges for successful agile adoption between the public and private sectors are organisation culture, communication, feedback and confidence.	The findings contribute to the extant literature by integrating the competing values model of culture into the literature on factors affecting agile development at the IT department level.	The study contributed to a deeper exploration of the theme by suggesting significant correlations between the adoption of agile practices and cultural assumptions of different organisations	The study suggests that the empowering culture and democratic leadership from Sweden encourage the trust and transparency based behaviour among the offshore members	Group culture, the culture of development and rational culture promote the acceptance of the agile methodology, while the hierarchical hinders acceptance culture. Further, customer satisfaction can be considered as an important factor in the acceptance of the treaty methodology	Study adds to the literature on Agile Software Development (ASD) assimilation by providing insights concerning a key ASD assimilation gap. This study provides a novel understanding of ASD assimilation beyond the acceptance stage
Section C: Quality Assessment									
Quality total score	15	13	17	16	12	17	13	18	17