A Thesis Submitted for the Degree of PhD at the University of Warwick

Permanent WRAP URL:

http://wrap.warwick.ac.uk/181425
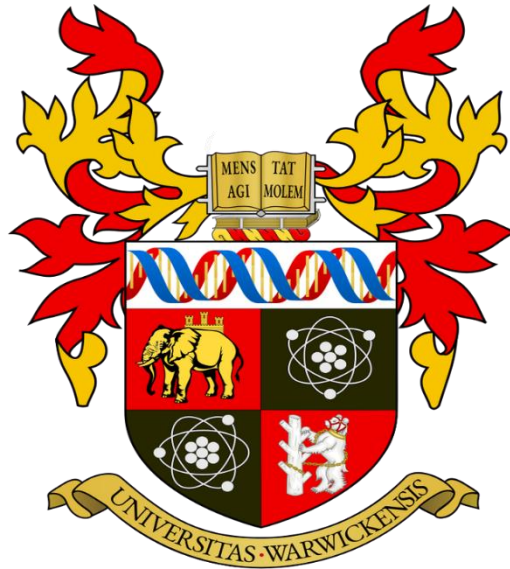
warwick.ac.uk/lib-publications

An Empirical Study on the Implementation of Agile Project Management Methods in Organizations.

by

Tyough Beetseh

Thesis

Submitted to the University of Warwick

in partial fulfilment of the requirements

for admission to the degree of

Doctor of Philosophy (Engineering)

Warwick Manufacturing Group

March 2023

Contents

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGEMENTS

First and foremost, I express my profound gratitude and reverence to my Lord and Savior, Jesus Christ, for His benevolent grace and for bestowing upon me the fortitude to undertake this challenging project during this phase of my life.

I sincerely appreciate my beloved spouse, Mayokun Beetseh, for her unwavering and remarkable support. At the same time, I endeavored to balance a full-time job, fatherhood, and a doctoral program. This thesis would not have been possible without her ceaseless cooperation, and I am grateful for her unwavering commitment. I dedicate this thesis to my three children, Civir, Hemen, and Gateh, who selflessly forewent numerous playtimes to enable their father to accomplish his academic pursuits. They have been a continuous source of inspiration throughout this journey.

I convey my deep sense of appreciation and gratitude to my esteemed supervisors. Dr. Kogila Balakrishnan deserves special mention for instilling faith in me and providing constant support and motivation to see this research to fruition. Professor Naomi Brookes also merits recognition for her valuable support, generosity with her time and expertise, and unwavering confidence in my abilities. Finally, I express my heartfelt appreciation to Professor Alok Chaudhary for agreeing to assist me in crossing the finish line.

I am also grateful to my parents, Dr. Clement Beetseh and Mrs. Susan Beetseh, for their instrumental roles propelling me to this point in my academic journey. My siblings were also instrumental in boosting my morale and offering their unwavering support at every juncture of this thesis. Their encouragement and motivation were invaluable in helping me achieve my objectives.

Furthermore, I wish to acknowledge the significant role played by my Uncle Christopher Beetseh in my tertiary education. I also express my gratitude to my colleagues in the doctoral program, who generously offered research insights whenever I required them. Finally, I extend my appreciation to all my friends who encouraged and supported me throughout the process of completing this thesis.

DECLARATION

All materials used in this thesis which are not my own work have been identified and highlighted, I can confirm that no similar material has previously been submitted and approved for the award of a degree by this or any other University.

ABSTRACT

Context: In an increasingly complex global environment, there is a necessity for organizations to understand the concept of agile and rationale for adopting agile. . However, it is also important that organizations realize whether their adoption of Agile methods and the different approaches (Crusaders, Dabblers and Tailors) align with their original motivations. The alignment between agile approaches and original motivation is crucial as this relationship identifies potential challenges and areas of improvement in the Implementation process; In addition, the link between agile approaches and motivation t also provides greater clarity to how adjustment of approaches could align better with organizational goals and motivations, resulting in in better outcomes.

Objective: This research Identified the motivations for the Adoption of Agile to develop software by organizations. Explored the Agile implementation approaches. Evaluated any differences in the level of importance of each identified motivation. Identified any relationships that exist between the motivations and the Agile implementation approaches and established a theoretical framework that informs future Implementations of Agile methods by organizations in the delivery of software (Addressed in Chapter 5.4)

Method: The study employed a mixed-method approach to identify the motivations of Agile; the relationships between the motivations of Agile (Enhance software quality, Improve Engineering discipline, Accelerate time to market, Increase Productivity, Reduce Cost, Enhance ability to manage changing priorities, Improve alignment between IT and business objectives, Enhance culture and boost morale, Reduce risk and Improve Project visibility) and three implementation approaches (Crusaders, Dabblers and Tailors). The research used data triangulation by collating data from literature, questionnaires, and Interviews.

Results: The results indicated that the motivations found in this research were similar to by previous researchers with regards to the type of adoption approaches. However, the research project also identified additional factors driving the Implementation of Agile by organizations. A correlation was found between the Senior Management Buy-in and the Level of Agile Knowledge or experience within an organization. An emergent categorization of the motivations for adopting agile was also found. These were Organizational motivations, People motivations, and Process motivations. The analysis of the level of importance of these motivations established that process motivations were the most important of the three categories. It was also established that the implementation approaches used by organizations could be categorized into three the Dabbler, Tailor, and Crusader approaches, and some of the motivations identified influenced the use of these approaches.

Conclusion: This study concludes by presenting a novel framework for agile adoption (Tyough Quadrant for Agile Adoption). This framework highlights the patterns and trends of Agile adoption motivations and the corresponding adoption approaches. The framework provides future adopters with valuable insights to guide their adoption of Agile and the alignment with their implementation approaches.

ABBREVIATIONS

PMM	Project Management Methods
IT	Information Technology
DSDM	Dynamic Systems Development Method
PMI	Project Management Institute
GE	General Electric
SSEM	Small scale experimental machine
NATO	North Atlantic Treaty Organization
UML	Unified Modelling Language
CPM	Critical Path Method
PERT	Program Evaluation and Review Technique
OGC	Office of Government Commerce
ASD	Agile Software development
TPM	Traditional Project Management
APM	Association of Project Management
SDLC	Software development Life Cycle
NASA	National Aeronautics and Space Administration
XP	Extreme Programming
FDD	Feature Driven Development
EVO	Evolutionary Project Management
RIPP	Rapid Iterative production prototyping
RAD	Rapid Application Development
DAD	Disciplined Agile Delivery
ITSM	Information Technology Service Management
BDD	Behaviour Driven Development
TDD	Test Driven Development
CSR	Corporate Social Responsibility
ARIAC	Agile robotics for industrial Automation
NIST	National Institute of Standards and

	Technology
UX	User Experience
AES	Advanced encryption standards
AI	Artificial Intelligence
CR	Critical Realism
RII	Relative Importance Index
BSREC	Biomedical and Scientific Research Ethics Committee
ROI	Return on Investment
PMO	Program Management Office
MVP	Minimum Viable Product

CHAPTER 1 INTRODUCTION

1.1 Research Background

"Agile" is a philosophy and an umbrella term for a set of values and principles by which its methodologies, such as SCRUM, DSDM, and its "practices," such as retrospectives and daily scrum, are bound (Costa et al., 2023). In recent years, Agile has received much attention, and several organizations are now adopting Agile methods to deliver software projects (Alami et al., 2022; Gustavsson, 2016; Khoza & Marnewick, 2021). Agile methods have grown in popularity over the years and continue to make an impact, especially in the software development industry. According to the Forrester Global Developer Technographic® Survey, Q3 2022, 35% of respondents stated that they had aligned their development processes to Agile methods, while only 34% stated that they use other (non-Agile related) methods, such as the traditional waterfall approach for the delivery of their projects. A recent survey found that over 65% of companies are reported to have used Agile methodologies for their software development projects. (Weichbroth, 2022). According to the 2021 annual survey by Digital.ai, over 45% of the respondents confirmed that Agile was used on at least one of their projects (Digital.ai Software, 2021). Organizations are increasingly combining Agile with other methods (sometimes referred to as "hybrid adoption") or adopting popular Agile frameworks as a "stand-alone" methodology in place of the Traditional waterfall approaches (West et al., 2022). This growing trend is also being experienced in the world of academia, as at least 20 publications related to Agile are reportedly being published annually (Vallon et al., 2020).

Implementing Agile is not a one-size-fits-all solution, and organizations often need help to select the most appropriate approach for their specific needs; several approaches to implementing Agile exist, each with its principles and practices. Agile methodologies have a set of guidelines on the number of phases, types of artifacts to be produced, etc. (DSDM-Consortium, 2019), and are being adopted either holistically in its "pure" form (Beck, 2004; Gregory et al., 2016; Gonçalves, 2018; Hammad & Inayat, 2019) or being tailored and combined with other methods (Campanelli & Parreira's, 2015; Smyth et al., 2015). Other elements of Agile, such as its practices, are being "cherry-picked" by practitioners and applied to activities and projects when required. (Noble et al., 2020). This is summarized in figure 5.

When an organization contemplates the adoption of Agile methodologies, it is confronted with an overwhelming array of implementation approaches to choose from (Tripp & Armstrong, 2014). The decision-making process in selecting an appropriate Agile implementation approach becomes an intricate endeavor due to the diversity of options available. The sheer number of approaches available to organizations embarking on an Agile transformation presents a complex landscape that requires careful evaluation and consideration. (Cram & Newell, 2016)

So far, a noticeable lack of scholarly research exists in unraveling the nuanced factors that drive organizations to adopt Agile differently and the specific manners in which they choose to do so. Existing scholarly investigations on Agile adoption have predominantly concentrated on exploring various implementation strategies, agile practices, and frameworks. While organizations embarking on Agile transformations are presented with a multitude of options, there is limited clarity on the determinants that guide their decision-making process.

Although a select few studies have provided valuable insights into this domain, such as Tripp and Armstrong's (2014) and (2018) studies on Organizational Adoption Motives, Tailoring, and Performance, a comprehensive investigation encompassing a broad range of implementation approaches remains conspicuously absent. Tripp and Armstrong's findings, while insightful, leave significant gaps that demand attention. Their study suggests that the decision by organizations to adopt agile in a "Tailored" approach is influenced by their motivations for adopting agile, but this prediction fails to consider other adoption approaches, such as the Dabbler and the Crusader approaches highlighted by Cram and Newell (2016), as such, their findings do not clarify if the decision to adopt agile using other approaches such as the Crusader and the Dabbler approach are also influenced by the organizations motivations for adopting agile. These unexplored avenues underscore the need for comprehensive research efforts to bridge the existing knowledge gap and ascertain whether the relationships posited by Tripp and Armstrong extend beyond the Tailored approach. In addition, a critical evaluation of prior studies highlights certain limitations that hinder the generalizability and current relevance of their findings. The motivations of Agile put forward by Tripp and Armstrong (2018) rely on data from the 2011 State of Agile Survey, this raises concerns about the representativeness and applicability of their results in the

present context. Also, the sample drawn for the study consisted only of Information security professionals working in various organizations and industries throughout the United States.

Considering that According to the 2022 state of agile report by Agile Alliance, 96% of the respondents stated that Agile is used mainly for software development projects. (Digital.ai, 2022) and the 2020 Project Management Institute's Pulse of the Profession report (PMI, 2020) found that most organizations using agile methods use it to implement software. The generalizability of the findings based solely on data from information systems raises concerns and warrants further examination which focuses on software implementation projects.

Furthermore, while studies such as Cram and Newell's (2016) identification of three categories - Tailor, Crusader, and Dabbler approaches – provide useful insights into the adoption approaches, their research predominantly centers on management fashion indicators, limiting the understanding of how other indicators or unique patterns may further enhance the comprehension of mindful adoption and utilization of Agile innovations. Thus, it remains uncertain whether additional adoption approaches exist beyond the ones identified by Cram and Newell (2016).

This research therefore investigates two critical aspects of Agile Implementation: Firstly, it investigates the organizational motivations behind Agile Implementation and secondly, it investigates whether these motivations are the drivers which determine the selection of an Agile implementation approach.

This knowledge gap represents a significant scholarly opportunity to delve into the multifaceted landscape of Agile adoption and shed light on the intricate interplay between the implementation approaches selected and the factors influencing their selection, with specific focus on their Motivations for adopting Agile.

By exploring these aspects in detail, the research seeks to enhance our understanding of how organizations can adopt Agile while shedding light on the factors influencing the implementation process. Ultimately, the findings of this research will contribute to developing more effective Agile Implementation strategies, which can help organizations achieve their desired outcomes in a more targeted and efficient manner.
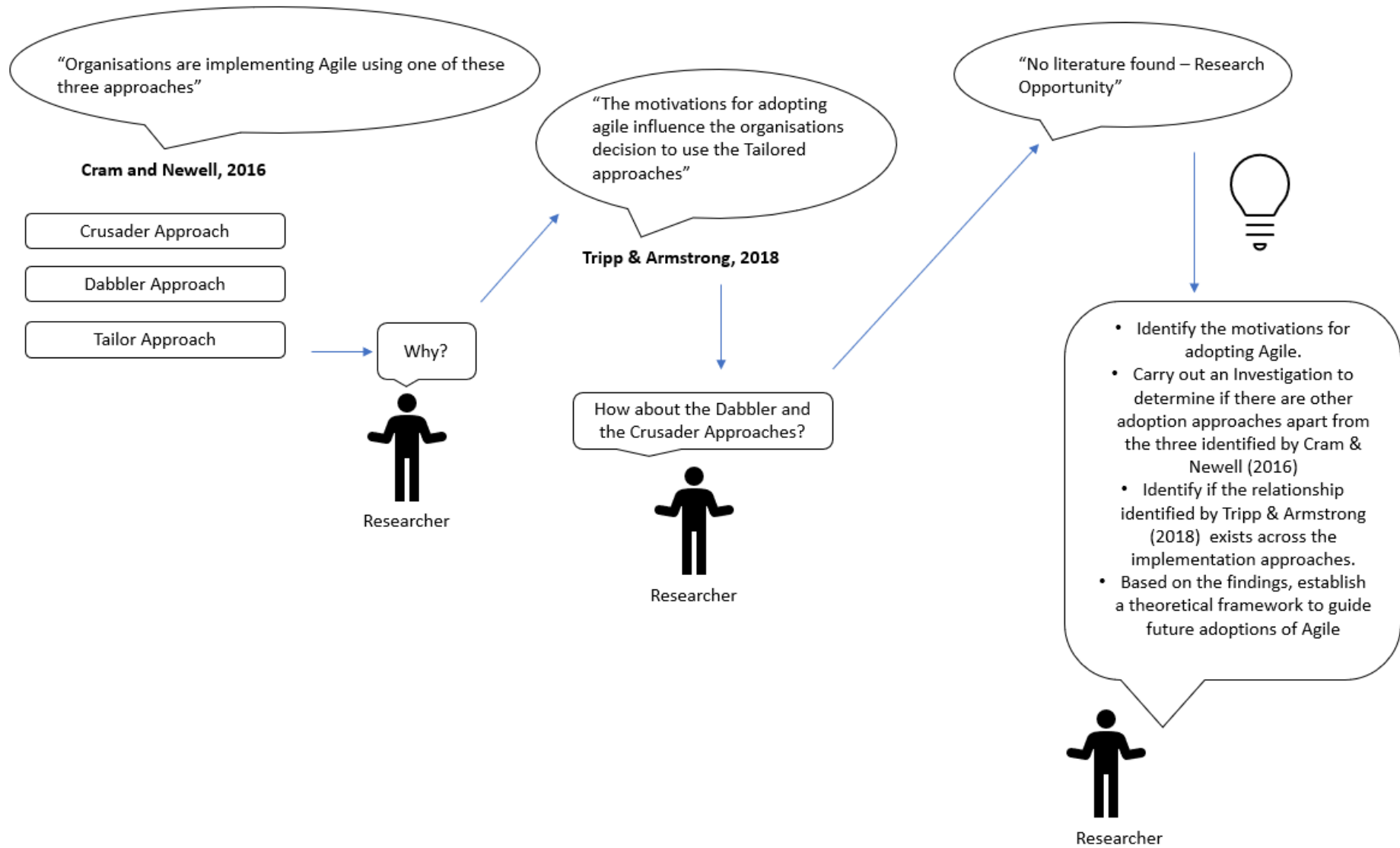
Figure 1: Summary of the Research Justification

1.2 Research Aim, Objectives, and Questions

1.2.1 The Research Aim

This research aims to identify and evaluate the organizational motivations for adopting Agile methods in the delivery of software and to understand whether the implementation approaches are influenced by their motivations or other factors. The following objectives will facilitate the achievement of this aim.

1.2.2 Research Objectives

1. Identify the motivations for the Adoption of Agile to develop software by organizations. (Addressed in Chapter 2.7)

2. Explore the Agile implementation approaches (Addressed in Chapter 2.5)

3. Evaluate any differences in the level of importance of each identified motivation (Addressed in Chapter 4.3)

4. Identify any relationships that exist between the motivations and the Agile implementation approaches (Addressed in Chapter 5.3)

5. Establish a theoretical framework that informs future Implementations of Agile methods by organizations in the delivery of software (Addressed in Chapter 5.4)

1.2.3 The Research questions

Motivations for adopting Agile.

The literature on the motivations underlying software organizations' Implementation of Agile methodologies could be more extensive. A few studies have previously mentioned some the reasons why organizations are choosing to adopt, but a lot of the reasons seem to be due to a reaction to changes in the business environment. (Manthou and Vlachopoulou, 2001; Faniran, Badru and Ajayi, 2017; Gunasekaran, et al., 2018) Consequently, this study needs to provide a comprehensive perspective on the motivations for adopting Agile. Furthermore, the research was aimed at presenting a ranked order of these motivations, thereby revealing the most significant drivers of Agile Implementation in the delivery of software. It is also worth noting that some of the studies mentioned above are not software implementation-specific, and in some cases, their findings were obtained from a broad sample. On the other hand, CollabNet VersionOne's (2019) investigation considers Agile Motivations from a more balanced viewpoint. The researchers conduct surveys with Agile practitioners, and their findings are ranked and specific to software projects. However, their data sources are limited to

the same cohort of organizations each year, and most of the respondents are practitioners of Scrum, which may restrict the scope of the findings to a single Agile methodology. F. Tripp and Armstrong (2018) undertook a study that builds on prior work by CollabNet VersionOne to rank the motivations behind Agile implementation. This empirical research effort ranked each of the motivations derived from CollabNet VersionOne's findings. However, it is worth noting that only 31.8% of the respondents in F. Tripp and Armstrong's study reported active utilization of Agile methods, and most respondents were Agile trainers. It is also important to mention that the rankings obtained in this study differ from those in CollabNet VersionOne's survey. As such, the motivations driving the Implementation of Agile methodologies for software delivery still need to be clarified.

It is worth mentioning that other scholarly works that highlight motivations for Agile Implementation are either not specific to software implementation or do not provide ranked data (Vijayasarathy and Turk, 2012). Therefore, this research seeks to scrutinize the motivations of Agile and explore the relative importance of motivators for Agile Implementation, specifically in the context of software project implementation.

RQ1.

    a. What are the motivations for adopting Agile methods?

      b. What is the relative importance of motivations for adopting Agile methods?

Agile implementation approaches.

Existing literature on Agile implementation suggests that organizations have varying approaches to their Implementation of Agile methods. This is evidenced by several research including those conducted by Zhang and Sharifi (2007) and Cram and Newell (2016), while some organizations adopt Agile methodologies based on clusters of taxonomical strategy groups, such as Quick, Responsive, and Active Players, others approach it based on organizational perspectives and commitment, using three categories linked to management theory, namely Crusaders, Dabblers, and Tailors.

Preliminary results from a study conducted by Tripp and Armstrong (2014) indicate that the rationales behind the Implementation of Agile methodologies have a significant influence on the approaches taken by organizations in their Implementation of such practices. According to their findings, Tripp and Armstrong (2014) suggest that selecting specific Agile practices is influenced by three distinct categories of motivational factors:

the motivation to enhance efficiency, the motivation to enhance effectiveness, and the motivation to improve software quality. An assertion that corroborates this observation can be found in a case study by Cappelli and Tavis (2018), where General Electric (GE) incorporated Agile methodologies in their pre-existing human resources recruitment procedures to hasten the recruitment process. A scrum master was assigned to work with cross-functional teams to iteratively fill vacancies by delivering in multiple sprints. In this instance, the motivation for adopting Agile was to expedite the process to market, which appears to have influenced the Implementation paradigm employed in this case, this can be considered a "tailor" approach as described by Cram and Newell (2016). The study conducted by F. Tripp and Armstrong (2018) tentatively suggested a connection between Agile motivations and Agile Practices, this can be considered a "Dabbler" approach as described by Cram and Newell (2016), i.e., the dabbler approach. Clearly, there remains a gap in the literature regarding the potential relationship between Agile motivations and implementation approaches. Therefore, further investigation is warranted to determine if such a relationship exists. As such, the second research question is:

RQ2 – Is there a relationship between the Motivations for adopting Agile and the Agile implementation approaches?

Comprehending the rationales behind adopting agile, ascertaining the significance of these motivations within software delivery projects, and identifying any potential linkages between the motivations for adopting Agile and the implementation approaches are crucial. These efforts will equip the researcher with the tools to construct a theoretical framework that can guide organizations' Implementation of Agile methods in the future.

1.3 Research design

As highlighted in section 1.2, this study is designed to identify the motivations of Agile and the implementation approaches and determines if there is a relationship between the

7

motivations for adopting Agile and the corresponding implementation approaches
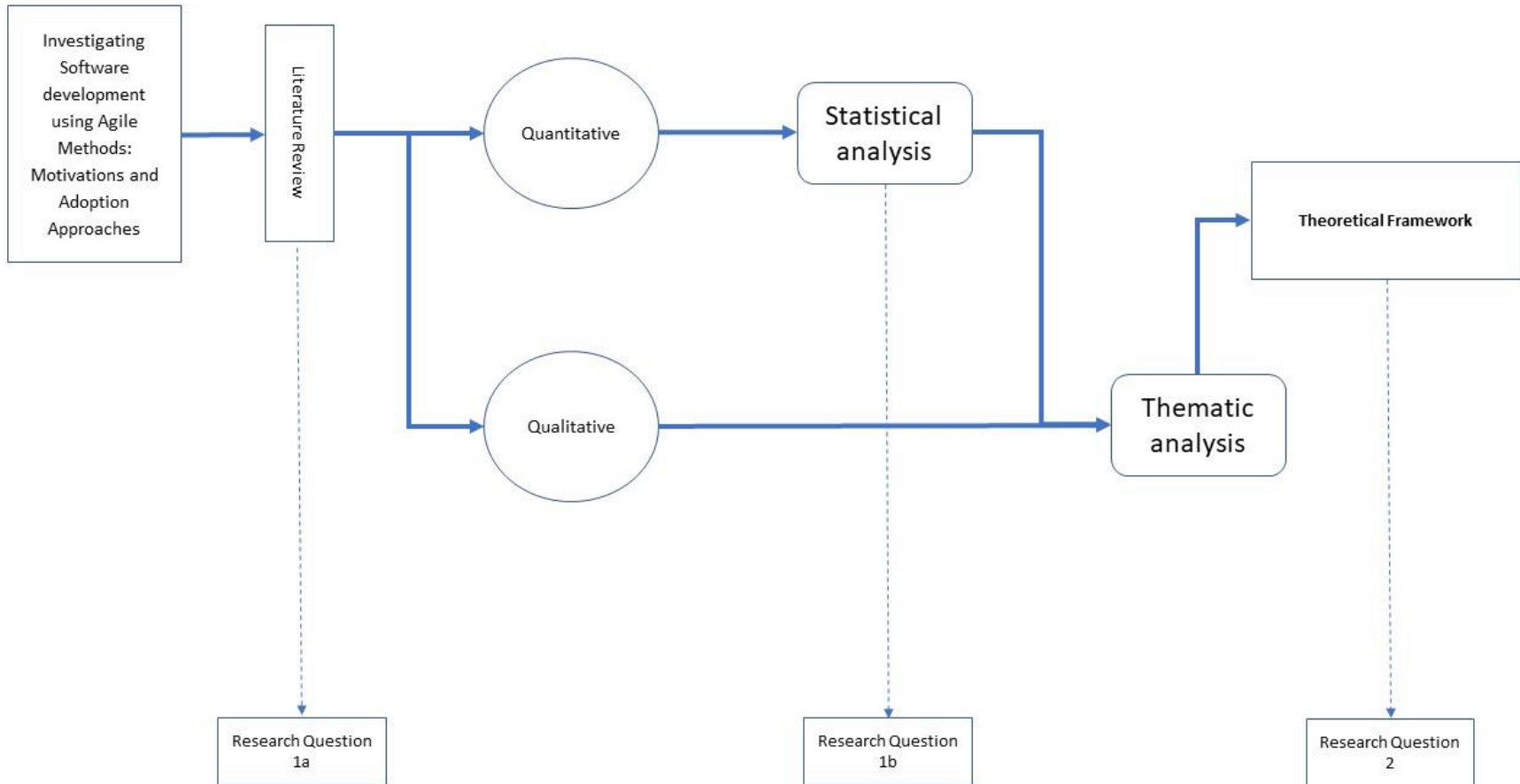
Figure 2: Research Design

used.

1.4 Structure of this thesis

Chapter 1: Introduction		
Background	Research aims,objectives and questions	Research design

Chapter 2: Literature review		
About Agile methods (Overview)	Motivation for adopting Agile	Agile Implementation approaches

Chapter 3: Methodology		
Research philosophy	Research approach	Research strategy & Research methods

Chapter 4: Results and Analysis	
Survey Results: Relative Importance of Agile motivations	Interview Results: Relationship between Agile Adoption and Motivations of Agile

Chapter 5: Discussion	
Discussion on Motivations of Agile and the Implementation approaches	Discussion on the relationship between Agile Motivations and the Implementation approaches

Chapter 6: Conclusion	
Theoretic contributions	Practical insights

Table 1: Structure of Thesis

The background and introduction of this research are covered in this chapter; the rest of this thesis is structured as follows:

Chapter 2 covers the review of literature on Agile as Project Management Methodology, covering subtopics which include the history of Agile methods, types of Agile methods, cases of Agile implementation within the software and non-software projects, and positive and negative experiences of Agile. The chapter concludes by reviewing the literature on the Agile implementation approaches and the Motivations of Agile. Chapter 3 provides insight into the research methodology. This includes the Research philosophy, approach, research

strategy, and methods. Chapter 4 presents the results from the surveys and the semi-structured interviews; these are then discussed in detail as part of chapter 5 based on the quantitative and qualitative results. Chapter 6 concludes the entire research, presenting the practical and academic contributions; it also highlights the limitations of this research and makes suggestions for further research.

1.5 Chapter Summary

This chapter serves as an overview of the thesis in the following pages. It provides the background and context of the research and outlines the main motivations and objectives that have driven the study.

The motivation behind this research was formulated based on the increasing interest in the subject matter and the need to gain a deeper understanding of the topic. The rapid development of technology, changing societal values, and increasing global interconnectedness have all contributed to the need for further exploration and investigation in this area. The research objectives were formulated to examine the motivations of Agile and Agile implementation approaches comprehensively. The objectives were designed to address critical questions and concerns within the field and to identify areas for future research and development. The research questions were proposed to guide the study and to provide a framework for the analysis and interpretation of the findings.

The research design for this study was based on a mixed-methods approach, which combines qualitative and quantitative methods. This approach was chosen because it allows for a more comprehensive examination and provides a more in-depth understanding of the complexities and nuances of the subject matter.

The rationale for this study was based on the need to contribute to the current understanding of Organizational motivations for adopting Agile and Agile implementation approaches. The overall structure of the research is presented in this chapter, with a detailed overview of each of the main sections presented in the following chapters. The main aspects of the study are introduced, including the research design, data collection, and analysis methods, and the expected outcomes and conclusions.

CHAPTER 2   LITERATURE REVIEW

2.1 Introduction

This section aimed to interrogate all aspects of Agile methods as a Project Management methodology for software development. The section highlighted the historical roots of Agile, values, characteristics, methodologies, and practices, and critically evaluated the theoretical perspectives of previous researchers by examining the motivations for agile Implementation.

This literature review chapter is structured into four parts.

Sections 2.1 to 2.4 provided a comprehensive overview of software development and project management methodologies, highlighting the evolution of these methods towards adopting Agile.

Section 2.5 delved into the historical and contextual background of Agile, providing an overview of its various types, methods, and frameworks. Furthermore, this section synthesizes existing literature on the experiences of Agile implementation.

Sections 2.6 and 2.7 review the Agile implementation approaches and motivational factors for adopting Agile, as reported in previous studies.

Section 2.8 discussed the conceptual framework developed based on the literature reviewed and details how the research question was scoped.

It is imperative to acknowledge that the literature on project management, particularly Agile, continuously evolves. As a result, the terminologies used in project management literature tend to be inconsistent, which could vary across industries. For instance, the terms "methods," "methodologies," and "approaches" are often used interchangeably to describe the same thing (Cram and Newell, 2016; F. Tripp & Armstrong, 2018). Although these terms are technically distinct, this research will not attempt to differentiate between them but remain consistent with the prevailing practice in literature.

Another pertinent issue is the distinction between "models" and "methods." Technically, models are descriptive and specify what to do, while methods are also prescriptive as they specify what to do and how to do it. However, within software development literature, these terms are often used interchangeably when referring to the same thing. Therefore,

this research employs the term "software development methods" as an umbrella term, encompassing both models and methods.

2.2 Historical Background and Evolution of Agile Methodologies

Prior to the emergence of "Agile," The "Traditional" or "Waterfall" approach was predominantly used by practitioners in managing different types of projects (Bahli & Zeid, 2005). The term "Waterfall" was first mentioned in a 1970 article by Winston Royce. (Royce, 1970). The Waterfall method is based on a structured, plan-driven, "command and control" approach, with a lengthy requirements-gathering process and the need for detailed documentation prior to development (build). This concept assumes that; 1. All the requirements are known upfront. 2. The requirements are likely to stay the same, and even if they do, a rigorous change control process is put in place to control changes, change requests are raised between project phases, and the plan is altered. This has often led to cost, schedule overruns, and failed and canceled projects. (Fitzgerald, 2000; Larman and Basili, 2003; Bahli and Zeid, 2005; Nelson, 2005) Attributes the early adoption of the waterfall approach by project practitioners in managing projects to the following: 1. Straightforward to explain and remember. 2. Creating an illusion of orderliness and accountability with milestones driven by documentation. 3. Being heavily promoted within software literature and considered appropriate. However, as organizations were confronted with more dynamic circumstances, unpredictability, and constantly changing customer requirements with more uncertainties, practitioners began to seek alternative development methods. These traditional approaches were unsuitable for various circumstances and project environments, especially software development projects. (Moran, 2013; Berkani, Causse & Thomas, 2019).

The roots of Agile ideas can be traced back to 1957 (Binder et al., 2014; Larman & Basili, 2003); following this, a 1978 article by Harlan Mills titled "Top-down programming in large systems" also advocated for the use of iterative development, although they never prescribed any of the commonly used Agile techniques today (Cohen et al., 2004).

Tom Gilb introduced EVO in 1985 in his paper "Evolutionary Delivery versus the 'Waterfall Model.' In that article, they outline three principles like Agile values. 1. Deliver something to the end user. 2. Measure the added value. 3. Adjust both design and objectives based on observed realities.

Another method, Rapid Iterative production prototyping (RIPP), was created by the DuPont Company in 1988 for rapid software development. James Martin later modified this into Rapid application development (RAD). His approach was based on four phases. A. The requirements B. planning. C. User design and D. Construction and implementation. He recommended delivery in increments (time-boxes) for the first three phases and for iterations to be carried out within each of the time boxes. Each time box was to last 12 weeks and comprise a team of one to five. (Abbas et al. 2008) RAD is the basis upon which the DSDM Agile methodology is predominantly based.

2.3 Introduction to Agile Methodologies and Frameworks:

Agile methods are a group of similar alternative approaches to traditional methods. They emerged more recently in 2001 and have been coined "Agile. " They have well-documented processes and have become quite prominent within the project management industry. (Highsmith 2004), they deemphasize formal delivery processes, insist on minimal documentation, and embrace change; they also encourage lighter documentation and focus on customer satisfaction and frequent delivering (West et al., 2012). Methods under this category include Extreme Programming (XP) (DeCarlo, 2004; Wysocki, 2007), Lean software development (Williams, 2005), and Scrum (Dalcher & Raffo, 2009). DSDM (Kuusinen et al., 2016), Kanban (Iqbal et al., 2019), Feature-driven development (FDD) (Dingsøyr et al., 2012), and Scale Agile Framework (SAFe).(Kowalczyk, et al. 2022)

Some Agile methods transcend software development lifecycles and processes as they consider other factors, such as organizational culture and team dynamics. These Agile methods also represent a philosophical shift from traditional project management. As such, infusing agility into the entire project management lifecycle is considered Agile Project Management. While the software development methods mentioned above are considered the most relatively popular methods, some other lifecycle methods worth mentioning include Wheel and spoke model, the unified process model, and Rapid application development. Most of which are secondary adaptations of the waterfall approach. These software development methods emerged due to a reaction to traditional (Waterfall) methods or a response to the changing business environment. (Beck, 2004; Javdani Gandomani et al., 2014).

According to Larman & Basili, (2003), one of the first established Agile methods was the Dynamic Systems Development Method (DSDM) which emerged as an evolved version of the RAD (Rapid Application Development) framework in the early 1990s; this was followed by the Extreme Programming (XP) which was created as an output of the Chrysler C3 project in 1996 and then later updated in 2004 to become XP2 (Beck, 2004). Subsequently, other Agile methods have emerged, such as Crystal development, Lean, and Feature-driven development (Dybå & Dingsøyr, 2008). More recently, Scrum, Kanban, and frameworks such as SAFe emerged (Hossain et al., 2009). However, XP, Scrum, and DSDM are the most popular as they are widely accepted and have a large and vibrant community. (Beck and Andres, 2004; DSDM-Consortium, 2014) Kanban, FDD, Adaptive software development (ASD) and Crystal (Tam et al., 2020). This historical evolution of Agile is summarized in Figure 3 and Figure 4 below.
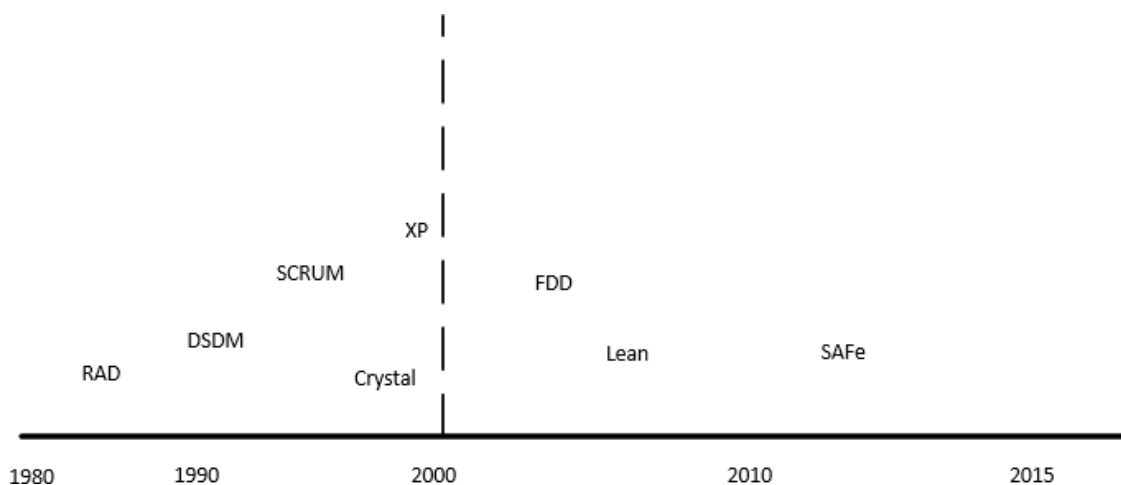
Figure 3: Historical development of types of Agile Methodologies (Adapted from Moran, 2013)

Agile methods combine a unique set of principles, roles, artifacts, practices/techniques, and phases referred to as methodological dimensions. Although these methodologies are interpreted differently, they share many similarities, and considerable overlap exists between the Agile methods and their processes. (Dybå and Dingsøyr, 2008). Several of their core practices are the same, and they appear to have a common interpretation even when the precise terminology differs (Examples are; Iteration, daily stand-ups, incremental delivery, release planning, and unit testing) (Schwaber, 2004). Agile methodologies are categorized into two, a. Lightweight methodologies such as Scrum, Crystal development, Lean development, and Feature-driven development (FDD), the scope of these methods only focus on the product development phase b. Heavyweight methodologies such as DSDM

cover extensive processes beyond product development. i.e., they cover all the pre-development, development, and post-development phases. (Dybå and Dingsøyr, 2008; Moran, 2013). It is worth mentioning that the DSDM was found to be the only method that provides a framework for project management and controls across the project management lifecycle (Abrahamsson et al., 2002; Hossain et al., 2009). As evidence in the literature suggests, the DSDM, XP, and Scrum frameworks are the most popular and well-documented methodologies; they also cover a broader scope of the various project phases than other Agile methods. (Dybå and Dingsøyr, 2008; Hossain et al., 2009). More recent methods integrate aspects of the project management lifecycle, including risk configuration and quality management (Moran, 2014). Nevertheless, even among these four methods, Scrum appears to be the most popular as, according to a recent survey by Hammad and Inayat (2019), 58% of companies adopting the Agile methodology use the Scrum framework. This aligns with data collated from the 13th annual State of Agile report published in 2018 which reported that 54% of their respondents, who are Agile practitioners, use the Scrum method. (CollabNet VersionOne, 2019).
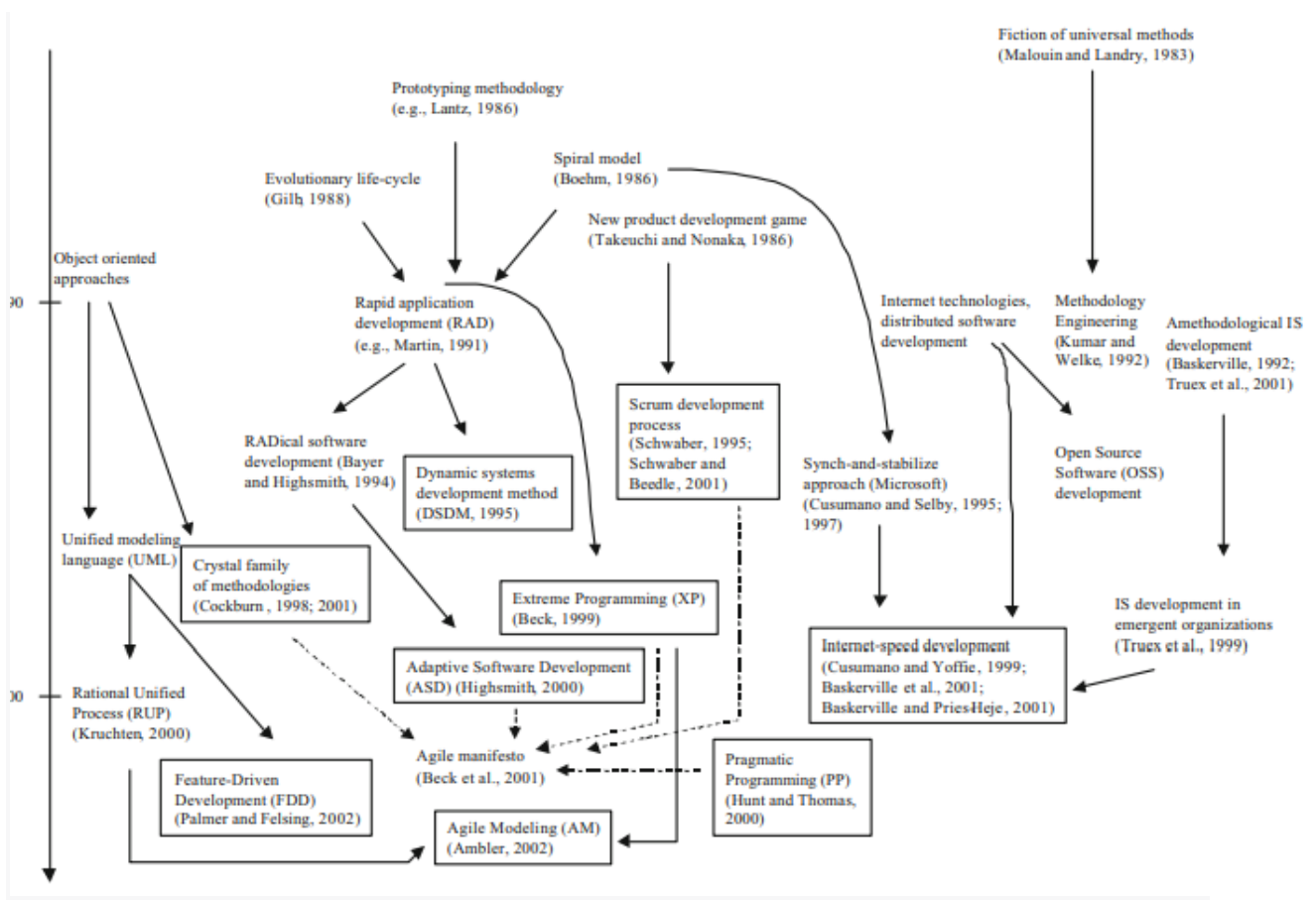
Figure 4: Evolution of Agile Methods (Misra et al., 2012)

2.4 Differences between Agile and Waterfall projects

Unlike Traditional teams, agile teams thrive in conditions where requirements are likely to change; solutions are initially unclear, there is a possibility of collaboration within proximity of the end users, and there is less bureaucracy and more room for creativity. (Sutherland, Darrell K and Noble, 2018).

Project Managers:

In Agile projects, Project managers take an advisory role, providing training and support to the team. Helping to resolve issues with risk management and removing distractions. Unlike traditional methods where planning is left to the project manager, the responsibility for planning is shared between the team members and the project manager in agile. Project managers still track and communicate the status, continuously providing meaningful information. (Gandomani et al., 2014).

Projects:

Agile methods advocate more collaboration than traditional methods. Decision-making in traditional methods is lengthy; stakeholders are also overtly involved in the delivery process, sometimes becoming a bottleneck, whereas Agile depends on rapidly making decisions (West et al., 2012). Agile teams are cross-functional and self-organizing. They typically consist of small, co-located teams with all the necessary skills and expertise to complete the project. Waterfall project teams are often structured in a hierarchical manner with clearly defined roles and responsibilities. Each team member has a specific role, and tasks are typically divided based on their expertise.

Teams:

Agile teams promote frequent and open communication. Collaboration and face-to-face interactions are highly valued. There is a focus on delivering a working product incrementally and continuously seeking feedback. Waterfall projects rely on formal documentation and predetermined communication channels. Communication often occurs through written reports and formal meetings, with less emphasis on regular face-to-face interactions.(Wells, Dalcher and Smyth, 2015)

Planning:

Compared to traditional development methods, which focus on extensive planning before development. Agile methods focus on rapid development and small but frequent

incremental changes with continuous interaction and feedback. Agile projects follow an iterative and incremental approach. The project is divided into short iterations or sprints, usually lasting 1-4 weeks, where specific goals are set. Planning is done at the beginning of each iteration, allowing for flexibility and adaptation as the project progresses. Waterfall projects follow a sequential approach with distinct phases, such as requirements gathering, design, development, testing, and deployment. Planning is done at the beginning of the project, and each phase depends on the successful completion of the previous one. (Gandomani et al., 2014).

Requirements:

Agile requirements are often high-level and flexible. They are captured as user stories or features that describe the desired functionality from a user's perspective. The emphasis is on delivering value incrementally and continuously adapting to changing requirements throughout the project. Waterfall project requirements are typically detailed and fixed upfront. They are documented in a comprehensive requirements specification that outlines all the functionality and design aspects of the project. Changes to requirements are generally discouraged once the project is underway. (Sutherland, Darrell K and Noble, 2018).

Change:

Agile projects embrace change and have a flexible change management process. Changes can be introduced at any time during the project and are typically handled through the backlog and prioritization process. Agile teams expect and welcome change, considering it as an opportunity for improvement. Waterfall projects have a more formalized change management process. Changes are generally discouraged once the project enters the execution phase. If a change is deemed necessary, it usually requires a formal change request, evaluation, and approval process before implementation. (Kowalczyk, et al. 2022).

Table 2 summarizes the differences between agile and waterfall projects.

Category	Traditional	Agile	References
Project Managers	Projects are managed against scope, time and cost and are tracked against planned baselines, Focus is on risk reduction and the preservation of time. and budget constraints.	Focused on delivering business value. Focused on the delivery of a product at the expense of process adherence	(Gandomani et al., 2014).
Projects	Projects are clearly defined, scope and requirements are well understood upfront	Requirements are discovered by iterative development which reduces uncertainty. This makes it more of a higher risk, but it provides flexibility to adjust to changing requirements	(West et al., 2012).
Teams	Can support distributed teams with acombination of senior and junior staff	Agile teams are more effective when co-located. Distributed agile team members are required to be more committed as they take on greater responsibility in their projects.	(Wells, Dalcher and Smyth, 2015)

Planning	Plan driven prediction	Adaptive response to change that. emergences	(Gandomani et al., 2014)
Requirements	A detailed set of requirements are defined and committed to early in the project	Focus on workable functionality required to deliver business. benefit	(Sutherland, Darrell K and Noble, 2018).
Change	Change averse	Open to change	(Kowalczyk, et al. 2022).

Table 2: Differences between Agile and Waterfall (Fernandez and Fernandez, 2008)

2.5 Benefits of using Agile

So far, implementing Agile methods or using its practices by organizations for project delivery has had positive reviews. (Javdani Gandomani et al., 2014; Serrador and Pinto, 2015). One of the earliest pieces of empirical evidence found was based on an organization's implementation of the Extreme programming method in a software development project for eight months which was observed by (Svenson & Host, 2005), their report following this observation found that the introduction of Agile methods led to increased trust of the software development team amongst each other but more importantly with the stakeholders as well, there was improved communication, and it enhanced collaboration as a whole. (Budzier and Flyvbjerg, 2013) Later analyzed a data set of software delivery projects and found that using Agile methods improved the time of delivery of the projects sampled. Another notable example is a study carried out by (Serrador & Pinto, 2015) across multiple industries using data from 1002 projects which found that the use of Agile methods had a positive effect on the satisfaction of the stakeholders, improved the perception of project performance and efficiency of the project team irrespective of project team experience or the perceived complexity of the project and improved the time of delivery of the projects sampled.

In the study "Understanding Agile in Project Management" conducted by Nicholls et al. (2022), their findings indicated that a significant proportion of the surveyed population (76%) reported a positive impact resulting from the implementation of Agile practices.

The 2015 CHAOS report found that 83.8% of software projects were being reported as needing to be completed on time. Within budget, the chances of success for Agile projects were higher than that of other projects which used traditional methods. (Standish Group, 2015). Findings from the case study of a software implementation project in a Brazilian pharmaceutical company observed that using Agile project management methods led to a highly motivated and satisfied project team and increased product quality. They reduced the development time by 75%. (Azanha et al., 2017). In another case study of Agile deployment at Lockheed Martin to support a delivery systems project, Agile practices were used to enhance four areas that Management was looking to improve. 1. Managing Changing requirements 2. They increased team productivity. 3. More frequent incremental delivery, and four meeting equality standards (Dove et al., 2018).

Overall, there appears to be a perception that projects which adopt some forms of Agile elements are more likely to succeed. (Pedersen and Henriksen, 2017), This perception is supported by a quantitative study by (Serrador & Pinto, 2015), whose findings found a correlation between Agile methods and higher project success rates.

Study	Benefits of Agile found
Svenson & Host (2005)	Introduction of Agile methods (Extreme programming) led to increased trust among team members and stakeholders, improved communication, and enhanced collaboration.
Budzier and Flyvbjerg (2013)	Analysis of software delivery projects showed that using Agile methods improved project delivery time.
Serrador & Pinto (2015)	Study across multiple industries with data from 1002 projects found that Agile methods had a positive effect on stakeholder satisfaction, perception of project performance and efficiency, and project delivery time.
Nicholls et al. (2022)	Survey results indicated that a significant proportion (76%) reported a positive impact resulting from the implementation of Agile practices.
CHAOS Report (Standish Group, 2015)	83.8% of Agile projects were reported as being completed on time and within budget, indicating a higher success rate compared to traditional methods.
Azanha et al. (2017)	Case study in a pharmaceutical company found that Agile project management methods led to a highly motivated and satisfied project team, increased product quality, and reduced development time by 75%.
Dove et al. (2018)	Case study at Lockheed Martin using Agile practices led to improvements in managing changing requirements, increased team productivity, more frequent incremental delivery, and meeting quality standards.
Pedersen and Henriksen (2017)	Perception supported by quantitative study showing a correlation between Agile methods and higher project success rates.

Table 3: Benefits of Agile.

2.6 Challenges and Limitations of Agile

Despite the success stories, it is worth mentioning that several drawbacks and challenges to adopting Agile have been highlighted; these include factors that could lead to failure and challenges faced by implementing an Agile approach. Transitioning from traditional waterfall to Agile methods is challenging (Javdani Gandomani et al., 2014). The factors that lead to failure in Agile projects found in the literature have been classified into four categories: technical factors (such as inappropriate tools), People factors (lack of skilled expertise), organizational factors (such as lack of senior leadership support), and process factors (such as poor requirements definition).

A systematic literature review by (Dybå & Dingsøyr, 2008) found that some teams had highlighted challenges faced using Agile techniques such as pair programming and lean development. The respondents from this study also mentioned that having the customer onsite to improve collaboration, as recommended by the principles of Agile, was demanding and financially unsustainable; however, they acknowledged that the opportunity it provided for rapid response to change and feedback was valuable. (Bahli and Zeid, 2005) Part of the study on integrating XP into a project mentions that managing plans and reporting progress was quite demanding. The approach required the project manager to have an overall lifecycle plan, a plan for the current iteration, and another for the next iteration. Some practitioners also consider the process of migrating from Traditional methods to Agile methods time-consuming. (Javdani Gandomani et al., 2014).

A report by (Wells et al., 2015) found Implementation challenges related to organizational culture as the responses from the senior leadership managers they surveyed suggested some level of discomfort with the idea of incremental delivery. Two separate studies found following a study of an Agile team using XP for eight months and from interviewing 16 practitioners within the automotive industry reported that existing processes within an organization were a hindrance to successful Agile Implementation and introduced difficulty in understanding how it could be applied in specific contexts and complex environments. Integrating Agile into their departments took a lot of work. (Svenson and Host, 2005; López et al. 2016). Another survey carried out by Robbins et al. (2016) identified challenges like working with teams that are geographically dispersed, buy-in from all the relevant

stakeholders, and organizational culture (flexibility to change) as Agile methods tend to flourish in more flexible, less bureaucratic environments and familiarity with the Agile principles. All four papers also reported that communication was difficult within more prominent teams, and smaller teams were more successful than larger teams.

Study	Key Challenges and Drawbacks
Javdani Gandomani et al. (2014)	Transition from traditional waterfall to Agile methods is challenging. Failure factors include technical factors (inappropriate tools), people factors (lack of skilled expertise), organizational factors (lack of senior leadership support), and process factors (poor requirements definition).
Dybå & Dingsøyr (2008)	Challenges faced in using Agile techniques like pair programming and lean development. The presence of the customer onsite, although valuable for collaboration, can be demanding and financially unsustainable. Managing plans and reporting progress in Agile projects can be demanding, requiring multiple levels of planning.
Bahli and Zeid (2005)	Challenges in integrating XP into a project, including the time-consuming process of migrating from traditional methods to Agile methods.
Wells et al. (2015)	Implementation challenges related to organizational culture, with discomfort from senior leadership managers about incremental delivery.
Svenson and Host (2005)	Existing processes within organizations can hinder successful Agile implementation and make it difficult to understand how Agile can be applied in specific contexts and complex environments.
López et al. (2016)	Challenges in integrating Agile into departments within the automotive industry, requiring significant effort and work.
Robbins et al. (2016)	Challenges include working with geographically dispersed teams, obtaining buy-in from all relevant stakeholders, adapting organizational culture to be flexible to change, and familiarizing with Agile principles. Communication difficulties in larger teams compared to smaller teams.

Table 4: Key challenges of Agile

2.7 The Impact of the changing business environment

Globalization has opened new markets and intensified competition, while technological advancements have accelerated the pace of innovation and disrupted traditional business models. (Damian et al., 2012; Hossain et al., 2009; Jalali & Wohlin, 2010). Customers have become more demanding, seeking personalized products and services delivered with speed and quality (Recker et al., 2017). These changes necessitate an agile response from organizations to remain competitive and adaptable in the face of uncertainty. Furthermore, modern-day business environments encompass various complexity, scope, and duration initiatives. Organizations face more domestic and international competitors, which has led to shorter product life cycles and increased pressure to deliver products and services quickly. Technological advancements have accelerated at an unprecedented pace. New technologies, such as artificial intelligence, blockchain, cloud computing, and the Internet of Things, have emerged, offering opportunities for disruptive innovation. (Götz & Jankowska, 2020). Customer expectations have also evolved dramatically. Customers now demand personalized products and services, seamless digital experiences, and quick response times (Yeganeh, 2019). This creates an expectation for organizations to understand and address their unique needs, resulting in a shift towards customer-centric approaches. The business environment has become more uncertain and complex. Organizations must navigate economic fluctuations, regulatory changes, geopolitical issues, and environmental concerns. These factors introduce volatility and require organizations to be agile and responsive in their decision-making and project execution (Hariri et al., 2019; Sharma et al., 2020). This uncertainty and complexity have raised a Need for Flexibility and Adaptability.

The advancement of technology has facilitated remote and distributed work arrangements (Hafermalz & Riemer, 2021). Cloud-based collaboration tools, virtual meeting platforms, and online project management software enable teams to collaborate effectively regardless of physical location (Davies, 2021). This has expanded the talent pool, allowing for cross-functional teams, and enabled organizations to work with geographically dispersed stakeholders, aligning with the Agile value of customer collaboration. As a result,

Collaboration and interconnectedness have become essential in the modern business environment. Organizations increasingly collaborate with partners, suppliers, and customers to leverage expertise, resources, and market reach.

It has become increasingly clear that Organizations must adapt to these technological advancements to remain competitive. Delivering products and services quickly is needed to capitalize on market opportunities and meet customer demands. Slow and lengthy development cycles, as often seen in the waterfall approach, are no longer feasible. These factors have aroused the intent of several organizations to adopt Agile (Mkpojiogu et al., 2019) and are at the core of the decision to adopt Agile in the first place. (F. Tripp & Armstrong, 2018).

While these changes in the business environment are likely to have forced organizations to take a more Agile approach to deliver their projects, Organizations are adopting agile; differently; their implementation approaches vary, and so far, the factors influencing this decision are unclear.

2.8 Agile implementation approaches

As mentioned in section 2.3, several Agile methods or methodologies exist, such as SCRUM, DSDM (Dynamic System Development Method), Lean Start-Up, etc. In addition, many frameworks have been created to implement Agile; some of these frameworks have been aligned to specific industries such as Manufacturing.(Gunasekaran, 1998; Manthou & Vlachopoulou, 2001; Zhang, 2007), Software Engineering (Bhavsar* et al., 2020; Conboy & Carroll, 2019), Construction (Ahmed & Mohammed, 2019; Lalmi et al., 2021), and other non-industry-specific related frameworks. (Leffingwell et al., 2017; Sidky & Arthur, 2007)

These Agile methods combine a unique set of principles, roles, artifacts, practices/techniques, and phases referred to as methodological dimensions. It is essential to highlight the differences between "Agile methods" and "Agile practices or techniques" as these are sometimes erroneously interchanged within the literature. However, they mean entirely different things. Agile methods are a prescribed set of related, often interdependent practices which are formulated with the intent of improving planning and project execution". (Cohen, Lindvall, and Costa, 2004; Altameem, 2015) while Agile Practices are defined as a "habit, custom or a way of doing things" (Moran, 2013; Javdani Gandomani & Ziaei Nafchi, 2016). This research considers the likes of Scrum, Extreme Programming (XP), and DSDM, etc., to be Agile methods. In contrast, Agile practices are used within these Agile methods to describe a way of doing things (such as the daily stand-ups, Sprint Iterations, etc.). An Agile method consists of a set of Agile practices. These definitions align with a

description of these two terminologies within the literature description of these two terminologies. (Jalali & Wohlin, 2010; Repenning et al., 2017; Vallon et al., 2016).

Agile Methodologies
(Such as Scrum, DSDM, XP, Lean, FDD, etc)

(Bhavsar* et al., 2020; Gonçalves, 2018; Dalcher & Raffo, 2009; Gregory et al., 2016; INDU, 2010; Kupiainen et al., 2015)

Agile Frameworks for Software Engineering

Agile Frameworks for Construction

Agile Frameworks for Manufacturing

Non-Industry Specific Agile Frameworks

(Bhavsar* et al., 2020; Conboy & Carroll, 2019)

(Ahmed & Mohammed, 2019; Lalmi et al., 2021)

(Gunasekaran, 1998; Manthou & Vlachopoulou, 2001; Zhang, 2007)

(Leffingwell et al., 2017; Sidky & Arthur, 2007)

Agile Practices and Techniques

(Such as Kanban boards, Retrospectives, Sprints/Iteration planning, Refactoring, Static Analysis, Unit test, Product Road mapping, etc)

(Digital.ai Software, 2021;Dalcher & Raffo, 2009; Gregory et al., 2016)

Figure 5:Agile Methods, Frameworks and Practices

29

The implementation approaches taken by organizations in implementing the Agile methods, Agile frameworks, or Agile practices defer. Agile implementation approaches are the various ways an organization chooses to implement Agile. This includes factors like the mindset, philosophy, strategies, and perspectives the organization adopts to deliver Agile. These approaches dictate the type of Agile framework, processes, and tools the organization will use. Only one previous study (Cram and Newell, 2016) was found to classify these different types of adoption approaches into categories consistent with the various ways organizations implement agile.

In the article "Mindful Revolution or Mindless Trend? Examining Agile Development as a Management Fashion," the authors discuss three approaches to adopting Agile: crusaders, dabblers, and tailors. Crusaders are considered adopters who are deeply committed to Agile principles and advocate for their wholesome Implementation and Implementation throughout the organization where prescribed—those who adopt Agile in its raw, unblended form. On the other hand, Dabblers adopt Agile practices superficially without fully understanding or embracing the underlying principles. Those who follow their existing legacy approaches but include some Agile activities and practices. Tailors are individuals who modify Agile practices to fit their organization's specific needs rather than adopting Agile in its original form. Those who blend traditional and Agile approaches to fit their conditions. They suggest that while all three approaches have their strengths and weaknesses, the most effective approach is a mindful Implementation of Agile that balances a commitment to Agile principles with an understanding of the unique context and needs of the organization. (Cram and Newell, 2016).
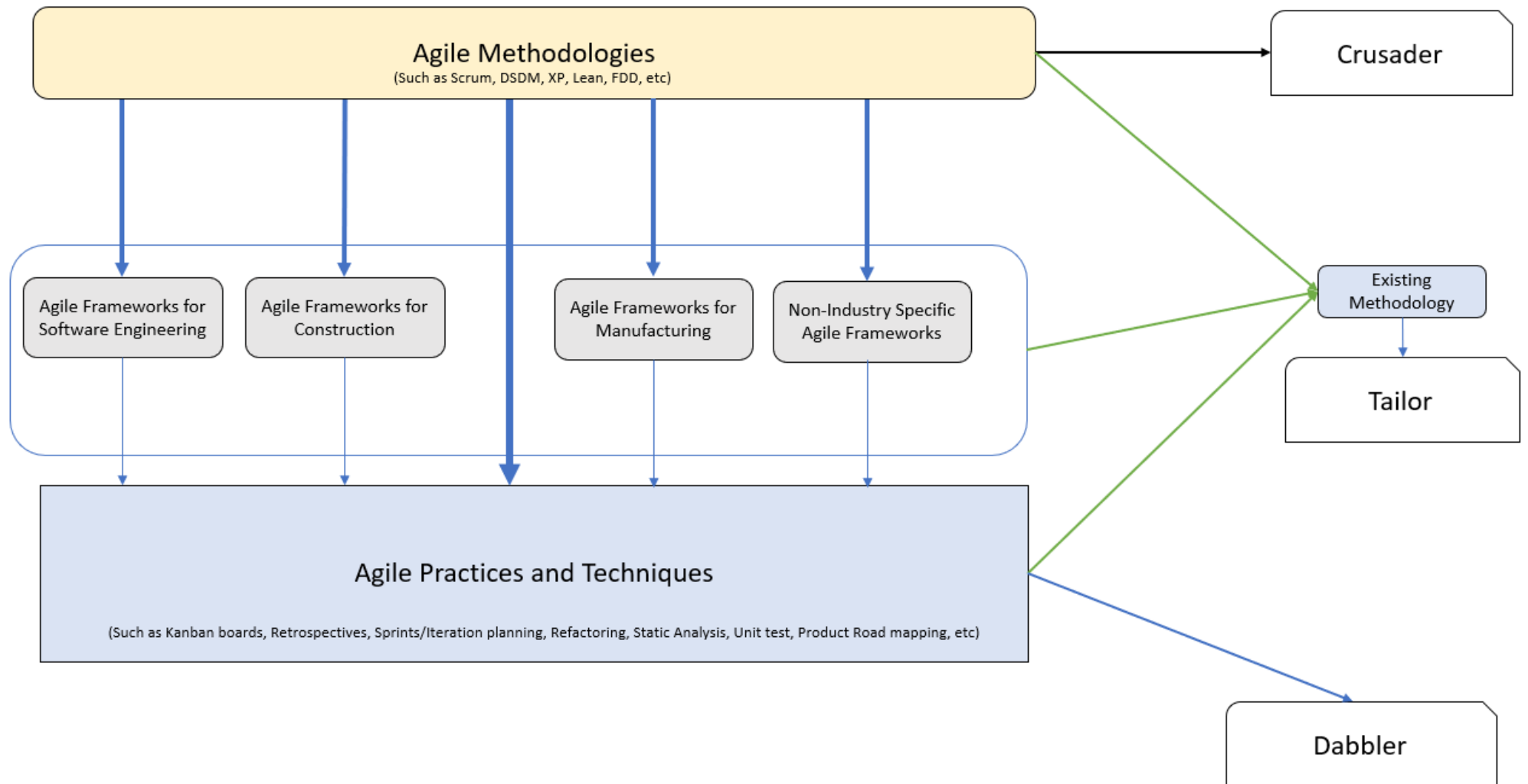
Figure 6: Crusaders, Tailors, and Dabblers

The Crusader

Organizations falling within this category have a higher tendency to embrace Agile methodologies in their raw, unadulterated form. These entities, referred to as Crusaders, adopt a comprehensive approach to Agile implementation by diligently adhering to a specific Agile methodology's principles, artifacts, phases, and practices. This contrasts with other organizations that may be more relaxed or cautious towards Agile Implementation. These organizations are open to the broad scope of adjustments required during Implementation. This could involve "organizational mutation," which entails significantly changing the organization's structure, culture, roles, and responsibilities (Cram & Newell, 2016; Javdani Gandomani et al., 2014; West et al., 2012). Even as highlighted by Wells (2015), some organizations express keen interest in incorporating Agile's philosophy but do not necessarily follow the rigorous guidelines of a specific framework or methodology. Furthermore, it should be noted that adopting Agile methods in their purest form can be a costly endeavor (Dorairaj et al., 2010; Gold & Vassell, 2016)

The Tailor

Tailoring in the context of the Agile methodology refers to integrating Agile practices with existing organizational methodologies. This paradigm is driven by a desire to customize Agile practices to fit seamlessly into the software delivery processes already in place within the organization. Factors such as team size and project complexity often dictate the selection of the appropriate combination of methodologies. (Cram and Newell, 2016; Boehm and Turner, 2003; Vineker et al., 2006). This approach to Implementation is prevalent among organizations, as many projects leverage different frameworks alongside Agile practices. According to George et al. (2018), this inclination towards tailoring is due to the belief that no single delivery method can perfectly fit complex project environments. Researchers have also shown interest in tailoring and combining Agile practices with other methods, with some recommending specific criteria and factors to consider. (Campanelli and Parreiras, 2015; Wells, et al. 2015; Tripp and Armstrong, 2014)

The Dabbler

The third category of Implementation paradigms pertains to organizations that, despite adhering to a non-Agile delivery approach by default, incorporate certain Agile activities and

practices to attain specific objectives. This entails adopting various techniques (e.g., Daily stand-ups or Retrospectives) from one or more Agile methodologies. Such organizations tend to choose or combine practices that align with their priorities based on their realities. Although limited research has been conducted on this implementation approach, some case studies have illustrated the utilization of one or more Agile techniques to complement an existing method. For instance, George et al. (2018) and Przybilla et al. (2018) have reported using Agile practices in such scenarios.

2.8.1 Gaps Identified

While it must be acknowledged that Cram and Newell's (2016) study offers valuable insights into the adoption approaches of agile methodologies, it is essential to acknowledge the possibility that their study might have yet to capture all the potential categories of adoption approaches. This thesis investigates any additional adoption approach categories that may need to be considered in their study. By conducting further research, this thesis seeks to contribute to a more comprehensive understanding of the various adoption approaches of agile methodologies beyond what has been previously determined by Cram and Newell if they exist. One notable omission in Cram and Newell's (2016) study is the need for an explanation regarding the factors that drive adopters towards specific agile adoption approaches. There needs to be more literature exploring why organizations adopt agile methodologies using these approaches. However, a noteworthy contribution to this field was made by Tripp and Armstrong (2014) in their research, which delved into the relationship between organizational adoption motives and the tailoring of agile methods. They found that the motivations underlying adopting agile methodologies significantly influence organizations' approaches when implementing them. The authors also acknowledged the presence of additional complex factors that influence how organizations adopt agile, aside from the motivations for adoption. However, these factors were not explored in their study. This observation raises a compelling question that forms the core focus of the present thesis: What are these motivations of Agile, and do they influence the choice of adoption approaches in organizations? Moreover, are these other potential influencing factors (which are not motivations) likely to influence the agile adoption approaches?

By addressing these questions, the thesis will shed light on the factors that shape the selection and Implementation of agile methodologies by organizations, thereby

contributing to a deeper understanding of the intricate dynamics at play in the agile adoption process.

2.9 Motivations for Adopting Agile

Although there appears to be a common consensus that industries are adopting Agile methods due to changes in the business environment (Changes in competition criteria, changes in Market, changes in customer requirements, changes in technology, changes in social factors) to deliver quicker and more frequently to customers (Islam & Storer, 2020), this is likely because modern software development methods such as Agile emerged as a response to more rigid, traditional methods and also due to the evolution of business environments (Vijayasarathy & Turk, 2012). These are also referred to within literature as "Agile drivers." However, the literature suggests less generalized reasons why organizations are adopting Agile; as such, this research uses the term "motivations for adopting Agile methods. "These drivers influence the organization's Implementation of Agile methods ((Gunasekaran et al., 2018; Elkins et al., 2004).

Motivations for adopting Agile methods are different and vary widely by organization. (F. Tripp and Armstrong, 2018; Mkpojiogu et al., 2019).

State of Annual Agile reports
The earliest and most prominent reports found within the literature that provide some context around organizational motivations for adopting Agile are the "State of Annual Agile Report" surveys conducted annually. The first of these reports date to 2006. These reports are based on surveys sent out to Project management practitioners to understand their perceptions of their organization's motivations for adopting Agile. Based on the most recent version of this report, which is the 15th state of annual Agile reports (Digital.ai Software, 2021). Twelve motivations for adopting were identified.

The following was found as the organization's motivations for adopting Agile. Enhance ability to manage changing priorities, Accelerate to Market, increase team productivity, improve business and IT alignment, improve project visibility, Reduce project risk, Better respond to volatile market conditions, Improve culture and boost team morale, Improve engineering discipline, Better manage distributed teams, Reduce project cost, Increase software maintainability.

The empirical data used to generate these reports were from IT and Non-IT projects. Only 86% of the responses were related to software development projects. This number was

much less for previous reports. It is also important to mention that according to Digital AI, the publishers of this report, these surveys were carried out across the same organizations each year, predominantly based on the scrum methodology; as such, the relevance of the motivations to software development needs to be clarified.

Other relevant studies

Some other relevant studies were found that investigated the motivations of Agile. Tripp and Armstrong (2014) and F. Tripp and Armstrong (2018) based their studies on an earlier state of the Agile report, the 13th state of the annual Agile report (Collab Net VersionOne, 2019). They surveyed respondents' perceptions of Agile motivations and the practices used within those organizations. The exploratory study was aimed to be representative of all industries, as such, was not aligned with software delivery. Their findings highlighted organizational motivations for adopting agile. Enhance software delivery, enhance software maintainability/extensibility, improve/increased engineering discipline, accelerate time-to-market, increase team productivity, reduce cost, enhance the ability to manage to change priorities, and Improve alignment between IT and business objectives. F. Tripp and Armstrong's (2018) research also categorized Agile's motivations into three motive factor clusters. C1 – Improve Software quality (These are motivations specific to software quality improvement.; C2 – Improve efficiency; (These are motivations that improve the ability to achieve the end goal with minimal waste of time and effort). C3 - Improve effectiveness (These are motivations that improve the ability of the project to meet the outlined objectives)

Motivations (C1) - Improve Software Quality

- Enhance software delivery

- Enhance Software Maintainability/extensibility

- Improve/Increase engineering discipline

Motivations (C2) – Improve Efficiency

- Accelerate time to Market

- Increase Productivity

- Reduce Cost

Motivations(C3) – Improve Effectiveness

- Enhance ability to manage to change priorities

- Improve alignment between IT and business objectives.

Mkpojiogu et al. (2019) surveyed 64 respondents across 25 business incubators to identify motivations for Agile within software startups in Saudi Arabia. This study measured the importance of the motivations found by (F. Tripp & Armstrong, 2018a) by triangulating these with questionnaire surveys. Respondents ranked the motivations using a 4-point Likert scale from Not Important to Highly Important. This study made conclusions based on descriptive statistics. It concluded that Accelerated product delivery, enhanced ability to manage change priorities, increased software maintainability, simplified development process, and need for enhanced delivery predictability are the top five motivations for Agile Implementation. This study was also limited to a specific country, the Kingdom of Saudi Arabia; in addition to the respondents being from software startups, it was unclear if they possessed the required experience in software deliveries and Agile project management. Abrar et al. (2019) conducted some work that aimed to identify the motivations of Agile using a systematic literature review; although the study was based on Tripp and Armstrong's (2014) 's motivations, however, the outcome of their work identified 21 critical success factors which, although likely to influence the Implementation of Agile cannot categorically be considered as motivations for Implementation Agile methods. In a separate paper, 31 project managers were interviewed across various industries. Collyer et al. (2010) concluded that adopting Agile was primarily due to accelerating to Market and managing changing environments. Both of which are consistent with the Digital AI reports. Other references to motivations of Agile Implementation include a 2012 case study of an Australian university that adopted Agile methods due to a need to reduce Risk and manage changing environments. (Elabor8, 2019). Another research by Vijayasarathy and Turk (2012) found that organizations are likely to consider adopting Agile if there is a need to keep the business and the IT delivery team aligned throughout the project and the need to ensure project visibility. However, they also mentioned that this was only possible in cases with senior leadership buy-in. They also mentioned that Agile methods were sometimes adopted because they allowed culturally diverse and distributed teams to collaborate seamlessly, further boosting their morale. Other motivations for adopting Agile found within other literature include Increase team productivity, enhancing software delivery, Reaction to complex and dynamic environments, responding to an evolving market, improving

business discipline, Senior leadership buy-in, and availability of resources (Carmel & Agarwal, 2001; Könnölä et al., 2016; Lopez-Martinez et al., 2016; Pedersen & Henriksen, 2017). The outcomes of a multi-case investigation entitled "Understanding Agile in Project Management," conducted by Nicholls et al. (2022), reveal that the Implementation of Agile methodologies can bring various benefits such as enhanced quality, enhanced ability to manage changing priorities, shortened delivery time, improve customer satisfaction, Reduce Risk in changing environments, increase project visibility, Improve team morale and productivity. (Nicholls, et al. 2022).

While these benefits were not explicitly cited as motivations for implementation, they could serve as motivations for other entities contemplating implementing Agile. Table 3 exhibits a comprehensive compilation of sixteen distinct motivations for adopting Agile methodologies identified through a review of the extant literature. All prior research in this domain has relied on the motivations delineated in the work of F. Tripp and Armstrong (2018), which were based on the 13th Annual State of Agile report (Collab Net VersionOne, 2019). However, the current investigation extends the purview of this inquiry by integrating the motivations outlined in the most recent Annual State of Agile report (Digital.ai Software, 2021) and those identified in other relevant literature. The research scope and its boundaries are explained in Section 2.8.1.

Given the many motivations identified in the existing literature, it is worthwhile to investigate whether specific motivators hold more influence over others. This exploration would result in a more specific and ranked list of the most influential motivations. By examining the relative importance and impact of different motivators, this research will provide a more nuanced understanding of the motivations that significantly shape the adoption of agile methodologies. The resulting rankings will offer valuable insights into the prioritization of motivators and their respective roles in driving organizations toward agile adoption.

S/N	MOTIVATION	DEFINITION	SOURCE
1	Enhance software quality	Refers to the adoption of agile in order to improve the quality the software being delivered	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)
2	Improve Engineering discipline	Refers to the adoption of agile as it provides the ability to tailor engineering processes in order to deliver incremental capabilities	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)
3	Accelerate time to market	Refers to the adoption of agile in order to reduce the time it takes to deliver the product to the market.	(Digital.ai Software, 2020);(Collyer et al., 2010); (F. Tripp & Armstrong, 2018); (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)
4	Improve alignment between IT and business objectives	Refers to the adoption of agile as in order to improve collaboration between the IT delivery team and the business	(Digital.ai Software, 2020);(Vijayasarathy and Turk, 2012); (F. Tripp & Armstrong, 2018)
5	Enhance ability to manage changing environments	Refers to the adoption of agile as it provides improvement in the flexibility to manage frequent changes within the environment	(Digital.ai Software, 2020); (Collyer et al., 2010); (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)
6	Increase Productivity	Refers to the adoption of agile as for the purpose of increasing the ability of the project to be effective and in increasing the rate of productivity	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)
7	Enhance software maintainability	Refers to the adoption of agile as for the purpose of increasing the ease with which software can be modified and its performance improved	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018); (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)
8	Reduce Project Cost	Refers to the adoption of agile as for the purpose of the reducing the overall project expenditure	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018);
9	Improve reaction to complex and dynamic environments.	Refers to the adoption of agile as for the purpose of improving the project's ability to react effeciently to the complex and dynamic changes	(Pedersen and Henriksen, 2017). (Pedersen and Henriksen, 2017).
10	Responding to an evolving market	Refers to the adoption of agile as for the purpose of increasing the flexibility of the project to change the product based on the changes in the market	(Pedersen and Henriksen, 2017). (Pedersen and Henriksen, 2017).
11	Reduce Project Risk	Refers to the adoption of agile as for the purpose of reducing the risks which could lead to project failure	(Elabor8, 2019). (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)
12	Better respond to volatile markets	Refers to the adoption of agile to provide adequate flexibility in the project , in order to react to changes within the environment	(Elabor8, 2019); (F. Tripp & Armstrong, 2018)
13	Improve Project visibility	Refers to the adoption of agile as for the purpose of the improvement of project visibility across all layers of the organisation and across distributed teams	(Vijayasarathy and Turk, 2012); (F. Tripp & Armstrong, 2018)
14	Enhance culture and boost morale	Refers to the adoption of agile as for the purpose of increasing the ability to collaborate in a culturally diverse environment and boosting the morale of the team	(Vijayasarathy and Turk, 2012); (Elabor8, 2019).
15	Simplified development process	Refers to the adoption of agile as it provides a simpler process for delivering software	(Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019);
16	The need for enhanced delivery predictability	Refers to the adoption of agile because the outcomes are more predictable.	(Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019); (F. Tripp & Armstrong, 2018)

Table 3:Summary of all organizational motivations for adopting Agile as found within literature.

2.9.1 Other Factors influencing the adoption of Agile.

It is worth noting that in addition to the motivations for adopting Agile, the conceptual framework asserts that other factors are influencing the pattern of Agile Implementation. (Sidky, 2007)'s Ph.D. study suggests that discontinuing factors influence the implementation approaches and might not be classified as "Motivations"; these could include lack of funding or support from the business. However, at the time of this study, no research has identified any of these factors based explicitly on empirical findings. As part of research question 1b, this research will seek to understand if there are other motivations or additional factors influencing the Implementation patterns.

While these motivations highlight the motivational factors for selecting Agile as a delivery approach, these motivations were not exclusive to software-related projects. Therefore, as part of this research, the relative importance of these motivations for adopting Agile in software delivery projects will be identified. The outcome of this objective will clarify which of these motivations are relevant to software delivery.

Furthermore, this research will identify any relationship between the identified motivations for adopting Agile, and the implementation approaches. This will enable the researcher to develop a theoretical framework for future organizational Implementation of Agile methods.

The following section provides the conceptual framework derived from the findings within literature. In addition, it explains how the scope of this research has been framed to ensure the research questions are answered.

2.10 Conceptual Framework

From the review of literature, the Implementation patterns are different for strategic reasons (Zhang and Sharifi, 2007) but also due to other factors (Sidky, 2007). According to (Cram and Newell, 2016), some organizations are "mindfully" adopting Agile, while others are adopting Agile "mindlessly." This study proposes that the motivations for selecting Agile as a delivery approach influence the approaches organizations are taking to adopting Agile. To further investigate this theory, this thesis will aim to answer two questions that will confirm or invalidate the assertion made within this conceptual framework in Figure 12.
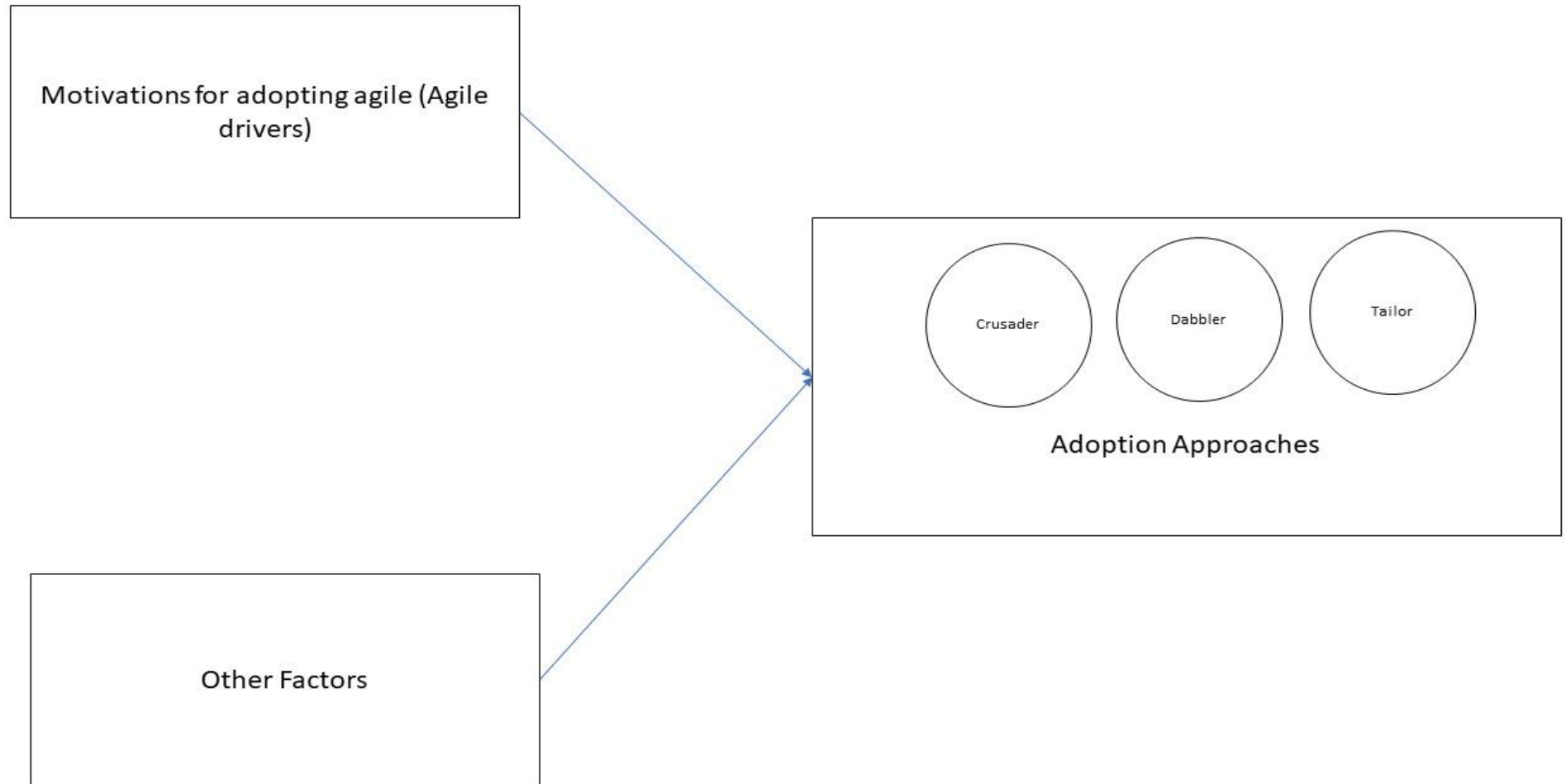
Figure 7: Conceptual Framework (Motivations of Agile and the Implementation approaches)

RQ1.

    a. What are the motivations for adopting Agile methods?

    b. What is the relative importance of motivations for adopting Agile methods?

RQ2. Is there a relationship between the motivations for adopting Agile and the Agile implementation approaches?

2.10.1 Framing the Scope of Research question 1
Motivations of Agile

This study posits that organizations are motivated to adopt Agile methods for various reasons. So far, sixteen motivations for adopting Agile have been found within literature from various sources; however, these have been streamlined within this study. Similar to the approach carried out by previous studies (F. Tripp and Armstrong, 2018; Mkpojiogu et al., 2019; Mohamed, 2014). The motivations highlighted within the 15th annual state of Agile were prioritized, and other motivations found from other literature sources were included. Some of these motivations were found to be close in meaning and definition; to provide clarity of meaning when carrying out the empirical research, such motivations were grouped within the same category, and their definitions were expanded.

Enhance software maintainability was merged with Enhance software delivery as the definition of software maintainability (the ease with which the software can be modified) was closely related to quality enhancement. Responding to an evolving market and Improving reaction to the complex and dynamic environment were also merged under the motivation "the ability to manage to change environments," These all share similar definitions and refer to the ability to react flexibly within dynamic environments. Enhancing the ability to manage changing environments and better respond to volatile markets were considered very close in meaning and were grouped as part of enhancing the ability to manage changing environments. The simplified development process was omitted as this was only found from one source.

The final list of motivations to be reviewed within this research is provided in table 5. These motivations have also been clustered into F. Tripp and Armstrong's (2014)'s three high-level categories. Motivations (C1) - Improve Software quality, Motivations (C2) – Improve Efficiency, and Motivations(C3) – Improve Effectiveness.

S/N	CODE	MOTIVATION	DEFINITION	SOURCE	MOTIVATION CLUSTER
1	M1	Enhance software quality	Refers to improving the quality the software being delivered	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)	Improve Software quality
2	M2	Improve Engineering discipline	Refers to ability to tailor engineering processes in order to deliver incremental capabilities	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)	Improve Software quality
3	M3	Accelerate time to market	Refers to reducing the time it takes to deliver the product	(Digital.ai Software, 2020);(Collyer et al., 2010); (F. Tripp & Armstrong, 2018); (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)	Improve Efficiency
4	M4	Increase Productivity	Refers to increasing the ability of the project to be effective and in increasing the rate of productivity	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)	Improve Efficiency
5	M5	Reduce Project Cost	Refers to the reduction of the overall project expenditure	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018)	Improve Efficiency
6	M6	Enhance ability to manage changing priorities	Refers to improving the flexibility to manage frequent changes within the environment	(Digital.ai Software, 2020); (F. Tripp & Armstrong, 2018); (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)	Improve effectiveness
7	M7	Improve alignment between IT and business objectives	Refers to improving collaboration between the IT delivery team and the business	(Digital.ai Software, 2020);(Vijayasarathy and Turk, 2012); (F. Tripp & Armstrong, 2018)	Improve effectiveness
8	M8	Enhance culture and boost morale	Refers to increasing the ability to collaborate in a culturally diverse environment and boosting the morale of the team	(Vijayasarathy and Turk, 2012); (Elabor8, 2019).	Improve Efficiency
9	M9	Reduce Project Risk	Refers to the reducing the risks which could lead to project failure	(Elabor8, 2019). (Mkpojiogu, Lailyhashim, Al-Sakkaf, & Hussain, 2019)	Improve Efficiency
10	M10	Improve Project visibility	Refers to the improvement of project visibility across all layers of the organisation and across distributed teams	(Vijayasarathy and Turk, 2012); (F. Tripp & Armstrong, 2018)	Improve effectiveness

Table 4: Combined list of Motivations for adopting Agile

2.10.1.1 Motivations (C1)

Enhance software delivery (M1)

One of the critical motivations for organizations to adopt Agile methods identified within literature is its ability to enhance software enhancement (Mkpojiogu et al., 2019; Digital. ai Software, 2021; F. Tripp and Armstrong, 2018b). This motivation refers to increasing the quality of the Software being delivered, the ease with which Software can be modified, and its performance improved.

Agile provides organizations with a flexible and efficient framework for developing Software, enabling them to respond quickly to changing customer needs and market conditions. One of the key benefits of Agile methodology is its ability to promote continuous improvement and enhancement of Software (Highsmith, 2002). A study (Madhavji., 2017) found that agile practices help organizations improve software quality by promoting a focus on customer needs and continuously delivering value to stakeholders. They also found that agile methodologies help to reduce waste in development processes, which leads to higher-quality Software. In another study by Carmel and Agarwal (2001), the authors found that agile methodologies increase collaboration, communication, and accountability among team members, leading to better software quality and development processes. They also found that agile methodologies help foster a culture of continuous improvement, contributing to better software quality. Agile methods encourage teams to regularly review and reflect on their work, identify areas for improvement, and make changes as needed. This continuous improvement cycle helps organizations stay ahead of the curve in software development and ensure that their products remain competitive in the Market. A study (by Govuzela and Mafini, 2019) also supports the idea that agile methodologies can help organizations to enhance software quality. The authors found that agile methodologies promote a more collaborative and cross-functional approach to software development, leading to better results and higher satisfaction among stakeholders. They also found that agile methodologies can help organizations reduce the time to market software products, a critical factor in today's fast-paced business environment.

Improve Engineering discipline (M2)

Improve Engineering discipline was identified as an essential motivation for organizations to adopt Agile (Digital. ai Software, 2021; F. Tripp and Armstrong, 2018b).

Improving Engineering discipline refers to the practices and processes engineers use to ensure that projects are completed to the highest standards of quality and Efficiency; this includes the ability to tailor engineering processes to deliver incremental capabilities.

A study Madhavji (2017) found that agile practices help organizations to improve their engineering discipline by promoting a focus on customer needs and continuously delivering value to stakeholders. They also found that agile methodologies help to reduce waste in development processes and improve the alignment of IT projects with business goals. Another study by Shankarmani *et al.* (2012)also supports the idea that agile methodologies can help organizations to improve their engineering discipline. The authors found that by improving the engineering discipline, agile methods promote a more collaborative and cross-functional approach to software development, leading to better results and higher satisfaction among stakeholders.

2.10.1.2 Motivations (C2) – Improve Efficiency

Accelerate to Market (M3)
Accelerate to Market was an important motivation for adopting and refers to reducing the time it takes to deliver the product. In a study by Gunasekaran, *et al.*(2018) the authors found that agile methodologies can lead to the more frequent and efficient delivery of software products. They also found that agile methodologies help organizations respond more to changing customer needs and market conditions.

Another study by Misra, et al. (2009) supports the idea that agile practices can help organizations to reduce the time to market software products. The authors found that agile methodologies promote a customer-centric approach to software development, leading to faster market time. They also found that agile methodologies lead to improved collaboration and communication among team members, which helps organizations to respond more quickly to market changes and customer needs. A study by (Abrahamsson, et al. 2017) also found that agile methodologies can help organizations to reduce the time to market software products. The authors found that agile practices lead to a more flexible and adaptable development process, which allows organizations to respond more quickly to changing customer needs and market

conditions. They also found that agile methodologies promote continuous improvement and learning, which helps organizations to improve software quality and reduce the time to market software products.

Increase team productivity – (M4)

Increasing team productivity was also found to be an essential motivation for the Implementation of agile methods. This refers to increasing the ability of the project to be effective and increasing the productivity rate.

Studies have shown that agile methodologies improve team members' collaboration and communication. (Mkpojiogu et al., 2019; Digital.ai Software, 2021; F. Tripp and Armstrong, 2018b). This improved collaboration and communication is a crucial factor in increasing team productivity, as it helps teams to avoid duplication of effort and to resolve issues more quickly.

Reduce project cost (M5)

Reducing project cost refers to the reduction of the overall project expenditure. Agile methods can reduce project costs by emphasizing flexibility, collaboration, and continuous improvement (Mkpojiogu et al., 2019; Digital.ai Software, 2021; F. Tripp and Armstrong, 2018b). With Agile, requirements and solutions evolve through the collaborative effort of self-organizing and cross-functional teams. This leads to better and more cost-effective solutions since the team can respond to changes and adjust the scope of work as needed. Additionally, Agile prioritizes delivering a minimum viable product as soon as possible, reducing the time and resources spent on unnecessary work. In this way, Agile helps to minimize waste and maximize value, leading to lower project costs in the long run. (Schwaber and Sutherland, 2015)

Improve culture and boost team morale (M8)

Improving culture and boosting team morale was considered a motivation for agile and referred to the boosting of the morale of the team and the ability to collaborate effectively in a culturally diverse environment. (F. Tripp and Armstrong, 2018b)

Agile methodologies are based on flexibility, adaptability, and continuous improvement. They encourage teams to work together collaboratively, breaking down traditional hierarchical structures and promoting a culture of transparency and trust (Merisalo et al. 2011). This creates a positive work environment where team members feel valued and empowered, leading to increased motivation and engagement.

Another key benefit of agile methods is that they allow teams to work at a faster pace and with greater flexibility. This helps to break down silos and encourages teams to work together more effectively. The focus on collaboration and continuous improvement also helps foster a culture of innovation, where team members are encouraged to share their ideas and contribute to the organization's overall success. (Gustavsson, 2016)

Agile methods clarify what is expected from each team member and their role in the organization. This helps reduce confusion and minimize misunderstandings, leading to a more positive and productive work environment. Focusing on continuous feedback and improvement also helps boost team morale and promote a culture of accountability, where team members are motivated to work harder and more effectively. (Hoda et al. 2012)

Reduce project risk (M9)

Reducing Project risk was identified as an important motivation for adopting agile and refers to reducing the risks which could lead to project failure. (Mkpojiogu et al., 2019; Digital.ai Software, 2021; F. Tripp and Armstrong, 2018b) Agile methodologies emphasize regular feedback, collaboration, and continuous improvement. This helps to reduce the risk of project failure by allowing teams to adapt and make changes as necessary rather than following a rigid plan that may not account for unexpected challenges. By working in short sprints, teams can quickly identify and address any issues that arise, reducing the risk of project delays or failures. (Coyle and Conboy, 2009). In addition, Agile methodologies also promote transparency and communication, which helps to reduce project risk by ensuring that all team members are on the same page and working towards the same goals. This helps minimize misunderstandings and miscommunications, often leading to project delays or failures. Another key advantage of the Agile methodology is that it encourages teams to work in a collaborative and interdisciplinary manner, promoting cross-functional teamwork. (Schröter et al. 2012) This helps reduce project risk by ensuring that all team members are aware of potential challenges and working together to address them. These potential risk reduction capabilities by Agile methods are likely to influence its Implementation by organizations.

Enhance ability to manage changing priorities (M6).

This refers to enhancing the ability to manage changing priorities and the flexibility to manage frequent changes within the environment. (Digital.ai Software, 2021; F. Tripp and Armstrong, 2018b). This motivates organizations to adopt Agile due to the need to respond quickly to changing customer needs and market conditions. In today's rapidly changing business environment, organizations must adapt quickly to new market conditions and customer requirements. Agile provides organizations with a flexible framework that allows them to respond quickly to changes and make changes to their projects on-the-fly (Highsmith, 2002). This agility can be critical in ensuring that organizations can remain competitive and responsive to the needs of their customers. Several researchers identified the need to enhance the ability to manage changing priorities as a motivation for organizations— (Digital. ai Software, 2021; F. Tripp and Armstrong, 2018b).

Improve business and IT alignment (M7)

The literature considered improving the alignment between the business and IT an essential motivation. It refers to improving the understanding and collaboration between the IT delivery team and the business teams— (Digital. ai Software, 2021; F. Tripp and Armstrong, 2018b).

One of the key characteristics of Agile methods is the potential to increase collaboration which can promote alignment between business and IT teams. In traditional software development methodologies, these teams often operate in silos, with little interaction or communication (Vishal et al. 2009). This can lead to misunderstandings, misaligned goals, and projects that fail to meet the needs of the business. Agile, on the other hand, emphasizes regular collaboration between business and IT teams. This helps ensure that everyone is working towards the same goals and that the Software developed is aligned with the business needs by promoting a shared understanding of requirements and goals, as described by Hong et al. (2021). Agile can help organizations avoid many common pitfalls when business and IT teams are not aligned.

Improve project visibility (M10)

Improving project visibility refers to improving project visibility across all layers of the organization and distributed teams. (Digital.ai Software, 2021; F. Tripp and Armstrong, 2018b). Project visibility is a critical aspect of software development that can

significantly impact a project's success (Könnölä et al., 2016). Traditional software development methodologies can often result in poor project visibility, with teams working independently and with little interaction or communication between them. This can lead to misunderstandings, missed deadlines, and projects that fail to meet the needs of the business. (Vasudeva and Rathod, 2017). According to (Uwadi et al. (2022), adopting the Agile methodology can solve this problem effectively by improving project visibility and promoting better alignment between business and IT teams. Some of the key benefits of the Agile methodology is its focus on regular, continuous communication between all stakeholders. Agile requires teams to hold regular check-ins, demos, and retrospectives, providing business and IT teams better visibility into each other's work (Mkpojiogu et al., 2019). This helps ensure that everyone is working towards the same goals and that the Software developed is aligned with the business needs. Another key aspect of Agile that promotes project visibility is its emphasis on customer focus. Agile requires teams to regularly demonstrate the Software they are developing to stakeholders, giving the business greater visibility into what is being developed and how it will meet their needs. This helps ensure that the Software developed is aligned with the business goals and that the business is getting the desired outcomes. (Digital.ai, 2020 ; Campanelli and Parreiras, 2015a). In Agile, projects are broken down into smaller, more manageable pieces, and teams are required to deliver working Software at the end of each sprint. (Molina-Ríos and Pedreira-Souto, 2020). This provides the business with greater visibility into the progress of a project and helps ensure that the project is on track to meet its goals. Agile encourages teams to identify and address risks early in the project, helping to ensure that the project stays on track and that any potential roadblocks are addressed before they become significant issues.

Research question 1a. The researcher will identify the relative importance of these ten motivations concerning software implementation projects.

Research question 1b. The researcher will aim to identify any additional motivations of agile related to software implementation but still need to be included among the ten motivations in this research.

2.10.2 Framing the Scope of Research question 2.

Implementation approaches

The approaches found within literature, such as the Big Bang Implementation, Incremental Implementation, Hybrid Implementation, Agile pilots, Lean startup approach, and Agile coaches focus more on the overall strategy or paradigm for introducing and integrating Agile principles into an organization. As such, they provide a higher-level strategic framework for adopting agile and not necessarily implementation. For example, agile coaches might need to materialize in implementing agile. A Big bang approach will likely cover the high-level strategy for Implementation but not the details of doing agile work. In contrast, approaches like that of Cram and Newell (2016)' focus on the practical details of doing agile work in a specific context. There also needed to be more pre-existing evidence found within literature on whether organizations were adopting Agile using Zhang and Sharifi's (2007) approaches, the quick, responsive, and active player approaches; in comparison, several researchers have explored approaches identified by Cram and Newell. Specifically, the 'tailor' and use of Agile techniques - dabbler approach. (Campanelli and Parreiras, 2015a; Könnölä et al., 2016); some case studies have also explored the use of Agile methods and frameworks in their 'purest' forms (Crusaders) (Kowalczyk et al., 2022; Schwaber and Sutherland, 2015). This provides foundational evidence for exploring the implementation approaches. Secondly, Zhang and Sharifi's (2007) implementation approaches are strategic approaches to adopting agile methods focused on investigating manufacturing industries. Their sample was restricted to a limited number of sectors in the United Kingdom.

In contrast, Cram and Newell's (2016) data was non-industry specific and was based on a broader sample. Consequently, the basis for Zhang and Sharifi, 2007's analysis is limited, as there may be other unique patterns of Agile implementation outside the three identified in their research (Quick, Responsive, and Active Players). Therefore, there needs to be more evidence to conclude that these Agile implementation approaches are consistent with what is practiced in specific industries, such as software development.

Also, the definitions of the Crusader, Tailor, and Dabbler categories encompass a more comprehensive range of Agile adopters than the narrower definitions of the quick, responsive, active approaches and even big bang or lean startup. Therefore, based on these justifications, the scope of this research will investigate the implementation

approaches based on the categorization from work by Cram and Newell (2016), the Crusader, Dabbler, and Tailor categories. The limitations of this approach are duly acknowledged and reported in section 6.3 of the research. The potential impact of this limitation was mitigated by including specific questions in the research methodology aimed at validating this assumption.

2.10.3 Relationship between Implementation approaches and the Agile Motivations

Numerous studies have explored the success factors in adopting and utilizing Agile methodologies in a general context (Chow and Cao, 2008; Nerur et al. 2009; Kumar et al. 2009). However, there is no empirical evidence on whether the motivations for adopting Agile impact the various approaches used in Agile Implementation. The initial findings from the research conducted by Tripp and Armstrong (2014) suggest that the reasons for adopting Agile practices impact the implementation approaches taken by organizations. Their study revealed a positive correlation between the reasons for adopting Agile and the implementation of Agile techniques and practices, which aligns with the dabbler approach as defined by Cram and Newell (2016). Thus, the research carried out by Tripp and Armstrong (2018) appears to provide some evidence that the motivations for Agile are influencing organizations to adopt the dabbler approach to Agile implementation.

In addition to previous studies examining success factors in adopting Agile practices in general, F. Tripp and Armstrong (2018) leveraged data on the motivations of Agile identified in the VersionOne State of Agile 2011 survey to understand how these motivations influence the tailoring of projects within organizations. Their findings indicated a relationship between motivations and the decision to tailor projects, thus supporting the assertion in the conceptual framework. This current study aims to build on this research and explore whether this relationship exists across all three motivational approaches (crusaders, dabblers, and tailors). To date, no research has investigated the factors that drive the different implementation approaches and their outcomes. As such, by taking a broader perspective and examining how the identified Agile motivations influence each of the three implementation approaches, this study can significantly contribute to this area of research.

The second research question seeks to ascertain whether the motivational factors of Agile influence the hypothesis positing that the implementation approaches adopted by

organizations can be substantiated or disproved. The study aims to test two hypotheses, namely.

H0 – There is no relationship between the motivations of Agile and the Agile implementation approaches.

This postulates that there is no correlation between the motivations of Agile and the Agile implementation approaches, and.

H1 – There is a relationship between the motivations of Agile and the Agile implementation approaches.

This asserts that a relationship exists between the motivations of Agile and the Agile implementation approaches.

In the next chapter, the research methodology and research strategies for an empirical study are presented. The current study can contribute to closing the research gap.

2.8 Chapter Summary

This chapter illustrates the findings from an in-depth review of the extant literature closely related to this thesis. The literature falls in the scope of reviewing the history of Agile methods and understanding Types of Agile methods, including frameworks and tools; it also investigates the uses of Agile methods, positive and negative experiences of Agile methods as well as the motivations of Agile and the implementation approaches.

Two primary objectives are achieved by reviewing the existing literature. Firstly, the motivations of Agile are identified; secondly, the implementation approaches of Agile are assessed, and some fundamental relationships between the motivations and the Agile implementation approaches are identified, which provide the foundations of a conceptual framework and contribute to understanding the fundamental concepts of this research.

A conceptual framework is presented in this chapter based on the theoretical findings within literature. This chapter also clarifies the research scope which provides the basis for the research methodology discussed in the next chapter.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

The Research Methodology chapter describes and explains the methodology used in this exploratory study. It discusses the research questions, hypothesis, research design, sample, data collection, data analysis, data validity, data reliability, and ethical considerations.

This research aims to understand why organizations are motivated to deliver software projects using Agile methods and whether these motivations influence their implementation approaches.

This research focused on exploring the answers to the following questions:

RQ1.

    a.   What are the motivations for adopting Agile methods?

    b.   What is the relative importance of the motivations for adopting Agile methods?

RQ2. Is there a relationship between the motivations for adopting Agile and the Agile implementation approaches?

The research question leads to five objectives which are:

- Identify the motivations for the adoption of Agile to develop Software by organizations. (Addressed in Chapter 2.7)

- Explore the Agile implementation approaches (Addressed in Chapter 2.5)

- Evaluate any differences in the level of importance of each identified motivation (Addressed in Chapter 4.3)

- Identify any relationships that exist between the motivations and the Agile implementation approaches (Addressed in Chapter 5.3)

- Establish a theoretical framework that informs future Implementations of Agile methods by organizations in the delivery of Software (Addressed in Chapter 5.4)

The first section of this chapter introduces the research philosophy, and the second section highlights it. It justifies the research approach to this research, and the third section discusses the data collection methods, how the samples were collected, and how the data was analyzed. The final section discusses the ethical considerations, such as

how consent was gained from participants and the safety of the participants was promoted. This chapter concludes with a summary.

3.1 Research philosophy

The Research philosophy outlines the underlying beliefs and values of the research, which then serves as a guide for other aspects of the research methodology; these include the research design, the collection of data, and the approach to analyzing the data. Several researchers believe that scientific research should be based on philosophical assumptions that consider the research's nature, the available evidence to support the research, and the method used (Djamba and Neuman, 2002; Myers, 1997; Orlikowski and Baroudi, 1991). Research philosophy is described from an ontological or epistemological perspective, as summarized in table 5. Ontology focuses on the nature of reality, whereas epistemology on how we can determine reality. Research philosophies tend to operate based on ontological and epistemological assumptions such as Positivism, Interpretivism, pragmatism, constructivism, and critical realism. (Creswell, 2003). While positivism highly rates objectivism and takes the approach that immutable laws govern human laws. It is focused on the need to prove and disprove the hypothesis and is firmly rooted in foundationalism and empiricism. In contrast, Interpretivism is considered the direct opposite, with a varying philosophical position more aligned with subjectivism. On the other hand, critical realism is a philosophy concerned with an ontology that argues that statements about the world cannot be reduced to our knowledge about the world.

A hybrid philosophical position is adopted within this research, the researcher tilts more toward critical realism. The quantitative aspect of the research is viewed in line with postpositivist perspectives, with the development of instruments, variable measurement, and the assessment of statistical results. After this, a more constructivist perspective is integrated as the research moves towards a qualitative phase.

	Ontology (nature of reality or being)	Epistemology (what constitutes acceptable knowledge)	Axiology (role of values)	Typical methods
Positivism	Real, external, independent; One true reality (universalism); Granular (things); Ordered	Scientific method; Observable and measurable facts; Law-like generalizations; Numbers; Causal explanation and prediction as contribution	Value-free research; Researcher is detached, neutral and independent of what is researched; Researcher maintains objective stance	Typically, deductive, highly structured, large samples. Measurement, typically quantitative methods of analysis, but a range of data can be analyzed
Critical realism	Stratified/layered (the empirical, the actual and the real); External, independent; Intransient; Objective structures; Casual mechanisms	Epistemological relativism; Knowledge historically situated and transient; Facts are social constructions; Historical causal explanation as contribution	Value-laden research; Researcher acknowledges bias by world views, cultural experience and upbringing; Researcher tries to minimize bias and errors; Researcher is as objective as possible	Retroductive, in-depth historically situated analysis of pre-existing structures and emerging agency. Range of methods and data types to fit subject matter
Interpretivism	Complex, rich; Socially constructed through culture and language; Multiple meanings, interpretations, realities; Flux of processes, experiences, practices	Theories and concepts too simplistic; Focus on narratives, stories, perceptions and interpretations; New understandings and worldviews as contribution	Value-bound research; Researchers are part of what is researched, subjective; Researcher interpretations key to contribution; Researcher reflexive	Typically inductive. Small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be interpreted
Postmodernism	Nominal; Complex, rich; Socially constructed through power relations; Some meanings, interpretations, realities and dominated and silenced by other; Flux of processes, experiences, practices	What counts as 'truth' and 'knowledge' is decided by dominant ideologies; Focus on absences, silences, and oppressed/repressed meanings, interpretations and voices; Exposure of power relations and challenge of dominant views as contribution	Value-constituted research; Researcher and research embedded in power relations; Some research narratives are repressed and silenced at the expense of others; Researcher radically reflexive	Typically deconstructive - reading texts and realities against themselves; In-depth investigations of anomalies, silences and absences Range of data types, typically qualitative methods of analysis
Pragmatism	Complex, rich, external; 'Reality' is the practical consequences of ideas; Flux of processes, experiences and practices.	Practical meaning of knowledge in specific contexts; 'True' theories and knowledge are those that enable successful action; Focus on problems, practices and relevance; Problem solving and informed future practice as contribution.	Value-driven research; Research initiated and sustained by researcher's doubts and beliefs; Researcher reflexive.	Following research problem and research question; Range of methods: mixed, multiple, qualitative, quantitative, action research; Emphasis on practical solutions and outcomes.

Table 5: (Source: Saunders et al., 2015, p. 136)

Critical Realism

Critical Realism (CR) is a philosophical concept developed by Roy Bhaskar which differentiates the "real world" and the "observable world", it originated as a criticism of positivism. A critical realist is considered as having three layers, the real domain, the actual domain, and the empirical domain. The "real" domain is unobservable and separate from human theories, constructs, and perceptions. From a critical realist's perspective, the world as we know it is a construction drawn out of our experiences and perspectives through things that are "observable". The "real" domain has structures that distribute authority to different people within social settings. The actions taken by people, or their inactions create events (or non-events) within the "actual" domain. Events that are observed are considered to have occurred in the empirical domain. Critical realism attempts to strike a balance between the emphasis on language and culture of social constructivism and the hard science of positivism (Bhaskar, 1994).

Motivations of Agile and the implementation approaches are subjective and will vary by individual and/or organization, social factors such as culture are complex and not predictable. This is in line with a critical realist's philosophy which considers the social world an open, deep, and complex system that can be explored and explained (not predicted).   Critical realism argues that there is a reality beyond events and reality is not necessarily how it appears to us, therefore critical realists need to consider it.

Causality and meaning

This research intends to explore causality and meaning, which is in line with the critical realist philosophy, the aim is to understand what causes project practitioners or organizations to adopt Agile and what that means for the project (implementation approach).

Structure and agents

We will aim to understand the social context of the decision-making process on Agile Implementation, are the motivations for adopting Agile are driven by the organization or the individuals.

Relations between people and relations between ideas.

It is important within the context of this study to understand the relationships between the motivational factors and how that links to the implementation approaches adopted.

This will also reveal any correlation between the source of the decision to adopt Agile and the implementation approach.

3.2 Research approach

Two broad methods of reasoning as highlighted by (Trochim, 2007) are deductive and inductive research approaches. Deductive research is considered a "top-down" approach, it begins with theory, leading to a hypothesis and then data that either aligns with or contradicts the theory. Inductive research is considered a "bottom-up" approach, in this research approach, data extracted from the views of the respondents are used to build broader themes theory is then generated to link the themes. (Clarke and Creswell, 2018)

3.2.1 Deductive and Inductive

This research combined both a deductive and an inductive approach. This approach intends to test general explanations by checking each evidence case. Furthermore, it aims to give more detailed and fine-grained explanations than the available knowledge can do.

Thomas, (2003) mentions that an inductive approach intends to "develop new theory from the observation of empirical reality, whereas a deductive approach "entails the development of a conceptual and theoretical structure that is then tested by observation." The foundations of this research are based on the deduction, the Motivations of Agile and Agile implementation approaches as derived from existing literature to create a conceptual framework. Yin (2004) recommends that the researcher uses theory development to develop their data collection protocol, then organize their initial data and analysis strategies.

To address the research question, as explained in figure 13, the first part of the research takes a more descriptive research purpose, addressing the "what" question and primarily testing the established hypothesis through deductive reasoning. This was a non-experimental explanatory design, intending to provide an unbiased result generalized to the research question. Quantitative Research designs adopt a deductive approach and generalize the research problem with a focus on investigating the relationships across the variables (Sousa et al., 2007)
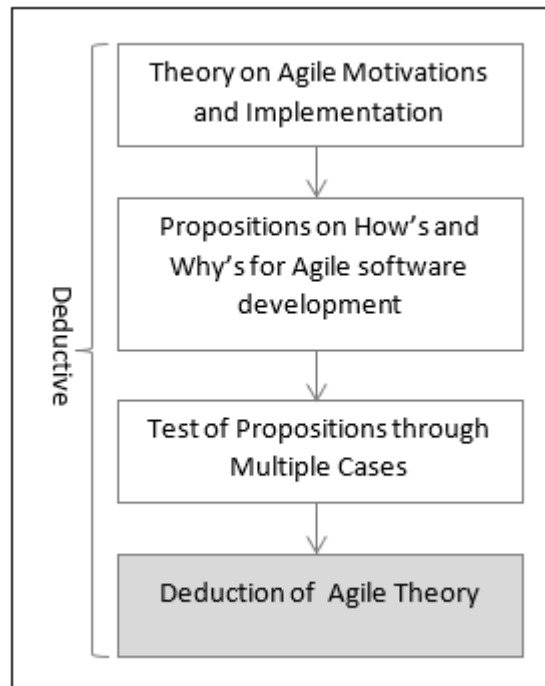
Figure 8: Deductive Process

The second part of the research takes an inductive approach, as explained in figure 14. Thomas, (2003)

Yin (2004) highlights three purposes of using an inductive approach: to summarize general raw data into a brief, establish connections between the varied and raw data, and develop a theoretical model based on the underlying structure of experiences drawn from the data received. The intention of Inductive approaches supports the researcher in deciphering complex data by developing summary themes from the raw data. To address research question two, the second part of this research takes a more exploratory research purpose in answering the "why" question Earl Babbie, (2002) by attempting to understand if there are specific motivations behind the Agile approach taken when delivering a project (Tailor, Dabbler or Crusader). As established from the literature, while literature highlights existing motivations for adopting Agile and implementation patterns, it is still being determined if a pattern exists between the motivational factors and the implementation approaches. There is, therefore, a need to build knowledge within this specific area.
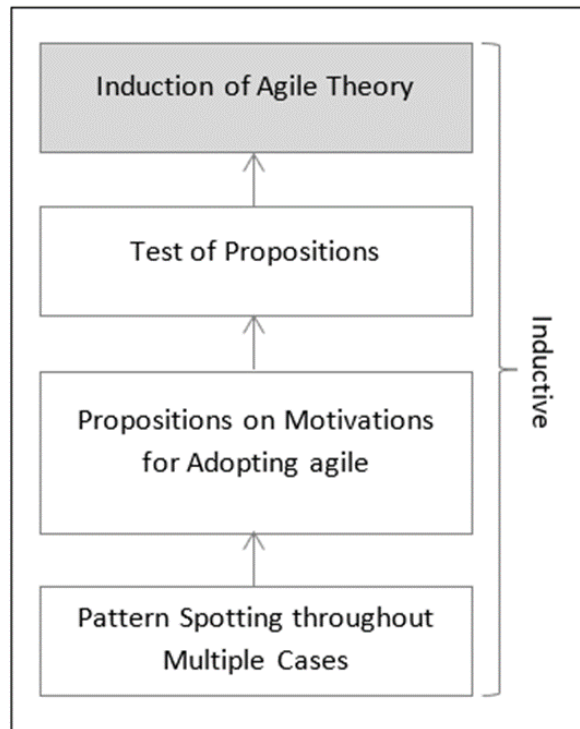
Figure 9: Inductive process

In this research, the reviewed theory led to the determination of six propositions. This provided the basis for the data collection to establish if there is an alignment or contradiction with the theory.

3.2.2 Mixed methods

A mixed-method approach refers to integrating qualitative and quantitative methods (Guest and Fleming, 2014). (Bergman, 2008) Mixed methods are "the combination of at least one qualitative and one quantitative component." This research employed a mixed method approach to elaborate on the findings from the quantitative analysis and qualitative analysis to determine the relationship between motivational factors and implementation approaches. The basis for adopting a mixed method approach within this research was that it provided a fuller understanding of the motivations for adopting Agile and the corresponding implementation approaches.

It was important to mix a quantitative with a qualitative approach as it provided complementarity and "explanation" (Abdar et al., 2014; Bryman, 2016). Although the findings from the quantitative results were sufficient to be considered conclusive, there was

a need to seek elaboration and further clarify the quantitative research results via a qualitative approach.

For example, establishing why a project practitioner adopted a tailor, dabbler, or crusader approach will provide valuable insight into the root of their motivations; this could potentially highlight external factors and relationships between the constructs (motivation, implementation approach) which were not captured initially as part of the quantitative research. Maxwell, (2003) argued that a mixed methods researcher should weigh five interconnected components before engaging in a mixed method study: the purpose, conceptual framework, research question, methods, and validity.

Approach to design

This research takes an explanatory sequential design, as described by Creswell et al. (2004); the steps taken are illustrated and summarized in Figure 15. The first phase involves the collection and analysis of quantitative data, followed by the second phase, which is the collection and analysis of qualitative data; the purpose was to build on the findings within the first phase. This was on the backdrop of an emergent mixed method approach mainly because a quantitative approach was initially planned, however as the research was underway, the need to elaborate on the quantitative findings became clearer as qualitative data was needed to explain the results of quantitative findings, leading to the inclusion of a qualitative strand.
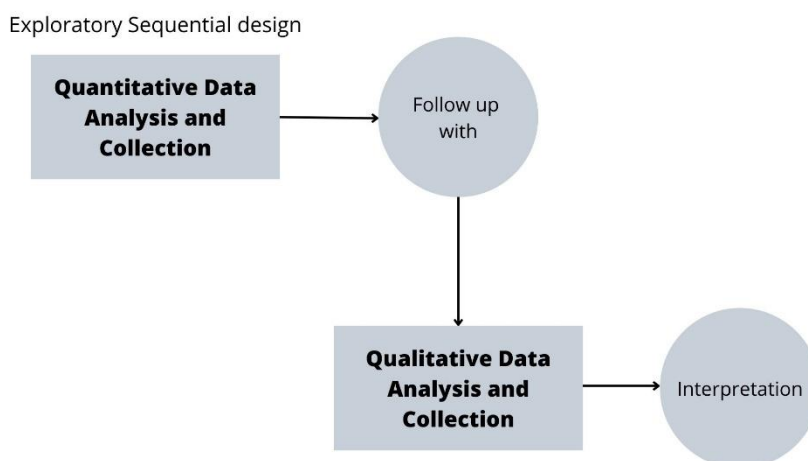
Figure 10: Exploratory Sequential design

Level of interaction

(Creswell et al, 2014) posits that there exist two levels of interaction between qualitative and quantitative strands within mixed-method research. It was determined that there exists an interactive level of interaction between the qualitative and quantitative strands of this study. While RQ1 and RQ2 do not require any interactivity with the qualitative strand, the interaction between both the qualitative and quantitative strands can be identified within RQ3. (What is the relationship between Agile and the Implementation approaches?), there is a dependency on the results of the quantitative findings to elaborate further on this question.

Priority of the strands

This research emphasizes the quantitative study as this method clarifies the two research questions (RQ1 and RQ2). However, the qualitative method is used in a secondary role, as it is only required as part of RQ3. Data from the quantitative research analysis is connected to data collection (via interviews) in the qualitative research.

Timing

The data collection was sequentially timed, and the strands were implemented in two distinct phases. The collection and analysis of quantitative data were collected first, and then subsequently, the collection and analysis of the qualitative data were completed. The two data sets were combined during the data collection using a strategy of 'connecting' as the quantitative results were built to collect the qualitative data in the second strand.

3.3 Research Strategy

The research strategy is defined by Saunders et al. (2009) as "the general plan of how the researcher will go about answering the research questions," as it outlines the process by which the research is carried out and stipulates the overall direction. (Rimenyi et al;2003).

Saunders et al. (2009) recommend that the research strategy be selected based on four key considerations:

- The research questions and objectives

- The amount of time and resources available

- The foundational philosophy of the research

- The current knowledge level within the subject area

Although several research strategies exist, they tend to overlap, so selecting the most appropriate and advantageous strategy is crucial for any research. (Yin, 2003). Some of the most common research strategies include Surveys, action research, grounded theory, ethnography, and case study (Easterby-Smith et al., 2008; Saunders and Tosey, n.d.) The research strategy adopted within this research combines a case study and a survey. This approach was taken as it corresponds with the research questions. All questions raised within this research fall within the "what," "how," and "why" categories, and according to Yin (2018), a case study, as well as a survey, are appropriate for studies of this nature.

3.3.1 Survey

According to Isaac and Michael (1997, p.136), Survey research is.

"*used to answer questions that have been raised, to solve problems that have been posed or observed, to assess needs and set goals, to determine whether or not specific objectives have been met, to establish baselines against which future comparisons can be made, to analyze trends across time, and generally, to describe what exists, in what amount, and in what context*."

Kraemer (1991) mentions that an important use of survey research is quantitatively describing specific characteristics of a given population. This aligns with the objectives of this research, which aims to identify the organizational motivations of agile.

Using surveys, data can be obtained from large samples of the population. Bell (1996, p.68) mentions that surveys can probe for information about perspectives that are otherwise difficult to measure using other techniques like observation.

The survey method used in this research was carried out in the form of semi-structured questionnaires. A set of questions were developed and presented to project practitioners with experience in software delivery to understand their perspectives on the level of importance of the organization's motivations for adopting agile. A survey was relevant within this context, as the analysis of their responses provided insight into the relative importance of the motivations of agile identified within the literature.

Considering that the motivations of Agile and the Agile implementation approaches were identified within extant literature, the use of Likert scale questions within the questionnaire

further validated the motivations of Agile and the Agile implementation approaches, further enhancing the legitimacy and credibility of the data collected. It is essential to acknowledge that with surveys, biases could occur; this could be due to the accuracy of the received responses. In the case of this research, respondents may have difficulty assessing the organization's perception of the motivations for adopting Agile.

3.3.2 Case Study

This section highlights the reasons for adopting the case study strategy alongside the survey approach and, subsequently, the detailed design; this includes the case selection unit of study, a unit of measurement, data sources, data collection, and data analysis.

A case study is referred to as an empirical investigation of a particular phenomenon within its real-life context using multiple methods of data collection (Yin, 2009)

3.3.1.1 Rationale for selecting a case study strategy.

It satisfies the criteria for selecting a case study strategy. Yin (2003) mentions three critical things to consider when considering a research strategy. 1. The type of research question 2. The extent of the researcher's control over the actual behavior, and 3. The level of focus on contemporary. A case study is suitable for research questions that include "how" and "why ."(Yin, 2009). The first research question (R1b) aims to understand how the motivations are ranked in relative importance. The second question aims to determine if motivations influence the implementation approaches taken by organizations and why. Based on the second point to consider, the researcher had no control over the behavioral events. The motivations and the implementation approaches are also contemporary, which satisfies the third consideration.

It accommodates different research techniques. A Case study can also accommodate a variety of research techniques and is used to obtain in-depth information on a particular phenomenon. Within case studies, both qualitative and quantitative data can be used simultaneously, which provides a quality mix of data for research study but is also suitable for the approach taken by this research (Yin, 2018). Based on the objectives of this research, a combination of techniques in data collection and analysis was favored. The use of a questionnaire survey was considered suitable in determining the relative importance of the motivations of Agile. In contrast, semi-structured interviews were considered more

suitable for determining the relationship between Agile motivations and the implementation approaches.

It is appropriate for investigating the current research. The amount of empirical research on Agile methods is comparatively low, and research around the motivations and the Implementation strategies of Agile methods is scanty; this thesis intends to extend the current understanding and knowledge of Agile methods as a software development method by adopting broader methods and theories. This research will look to generate a theory and elaborate on the theory based on the results from the surveys and interviews. According to Eisenhardt (1989), this strategy is suitable for theory testing and elaboration. Three core strengths of case study research are laid out by Meredith (1998) as follows. "(1) the phenomenon can be studied in its natural setting and meaningful, relevant theory generated from the understanding gained through observing actual practice; (2) the case method allows the question of why, what, and how to be answered with a relatively full understanding of the nature and complexity of the complete phenomenon; (3) the case method lends itself to early, exploratory investigations where the variables are still unknown and the phenomenon not at all understood". In addition, Yin (2008) also asserts that the case study strategy is very effective in social science research. The case study strategy has been criticized as sometimes lacking rigor and challenging to generalize. However, four tests proposed by (Yin,2003; Fellow and Liu, 2008) as enhancements are construct validity, internal validity reliability, and external validity.

Based on these points, this research conducts an exploratory mixed-method case study to investigate the motivations of Agile and their relationship with Agile implementation
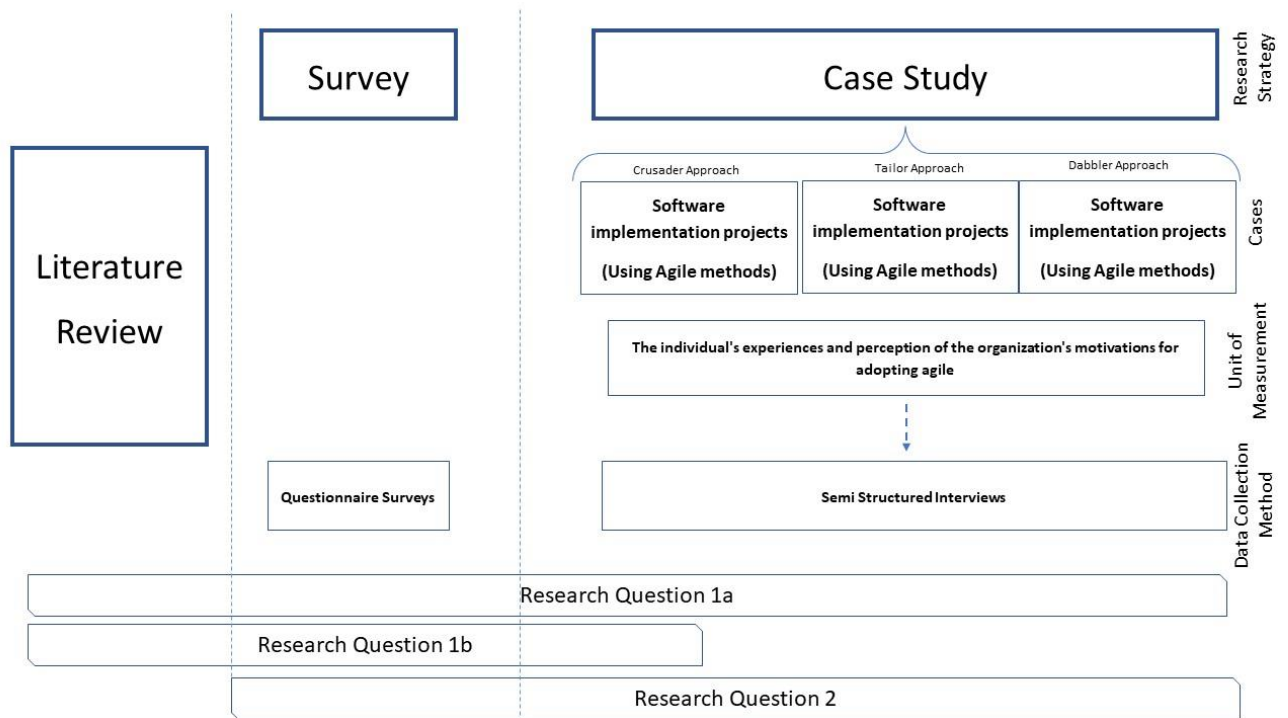
approaches.

Table 6: Research Strategy

3.3.1.2 Case selection

A multi-case study approach was adopted to ensure direct replication and the analysis of contrasting situations. According to (Hollweck, 2016), using multiple cases can improve internal and external validity. He also highlights that the use of multi-case approaches aids in resolving the issues of 'quality' and will provide an opportunity for replication which is vital to develop a firm basis for the findings and essential to achieving theoretical saturation while converging on a valid theory. A theoretical sampling approach which is a type of purposive method was adopted in this research. Unlike random sampling, which uses statistical principles to represent the target population, purposive sampling methods, also referred to as judgmental sampling, follow substance principles and the use of judgment to determine the case that suits the nature of the research.

3.3.1.3 Case Questions

Based on this research question, the following case questions were investigated.

- Why are organizations adopting agile?

- How is agile being implemented?

- Is the adoption of Agile having any impact on their projects?

- Does this impact align with their expectations?

3.3.1.4 Case Selection Criteria

As suggested by (Yin, 1996), the criteria for selecting cases were also ascertained; it was determined that the first criterion for selecting a case was that the case must involve software development. The second criterion was that the case being investigated must have involved the use of Agile methods in the delivery of the project; it was also determined that cases across multiple types of software delivery projects would be sampled; this is to ensure cross-case analysis is established. Barratt et al. (2011) define 'cross-case analysis as comparing the patterns emerging from a range of cases. A study of the lifespan of separate teams (Gersick, 1988) applied a similar approach by sampling eight diverse teams to enhance the potential of their model being more generally applicable. Taking this approach will help define the limits for generalizing the information that will be found. To ensure direct replication and the analysis of contrasting situations, It was determined that cases across multiple software delivery projects would be sampled. According to (Hollweck, 2016), using multiple cases can improve internal and external validity. He also highlights that the use of multi-case approaches aids in resolving the issues of 'quality' and will provide an opportunity for replication which is vital to develop a firm basis for the findings and essential to achieving theoretical saturation while converging on a valid theory. This criterion ensured that a diverse range of projects were included in the study, such as projects of different sizes, industries, domains, or complexities. By including a variety of cases, the research can capture a broader understanding of Agile implementation across different contexts. The selection criteria also considered the potential for cross-case analysis. The cross-case analysis involves comparing patterns or themes that emerge from multiple cases. (Yin, 2018) By selecting cases that allow for cross-case analysis, the research identified commonalities, differences, and trends across different projects, enhancing the validity and generalizability of the findings. Similar cases were identified across the Gaming technology industry, the Manufacturing industry, and the Software Industry. The multi-case approach was adopted to enable the analysis of contrasting situations. By including these multiple cases, the research examined different aspects, such as the challenges and outcomes experienced in Agile implementation, thereby providing a more comprehensive

understanding of the phenomenon. The cases were selected to capture a range of Agile implementation practices. By including cases from different types of software delivery projects, such as projects of varying sizes, industries, or complexities, the research can explore the diverse ways Agile methods are applied in different contexts. This variation enhanced the richness of the findings and provided insights into the adaptability and effectiveness of Agile in different settings.

3.3.1.5 Contextual Factors:

The contextual factors considered within this case study include Organization, Project characteristics, Stakeholder dynamics, and Technology environment.

Organizational Context: No limitations to organizational context were considered within this case study. It is worth mentioning that the organizational context of this case included factors such as the organization's size, structure, culture, and industry. These factors can significantly influence the motivations for adopting Agile and implementation approaches. For example, an organization operating in a highly regulated industry may have different motivations for adopting Agile, such as compliance or risk management, compared to a startup in a dynamic and fast-paced industry. Organizations with small and large teams were considered; the research also considered the types of industries these organizations were categorized as.

Project Characteristics: The main characteristic of the projects considered within this case study was the delivery type, which was focused on software delivery projects. The characteristics of the software development projects under investigation, such as project scope, complexity, and timeline, can shape the motivations and implementation approaches related to Agile. Projects with tight deadlines and evolving requirements may prioritize Agile principles of iterative development and continuous feedback, while projects with stable requirements may focus on efficiency and predictability.

Stakeholder Dynamics: It was important within this case study to collect data from project managers or equivalent project leads, considering the unit of measurement was the "individual's perception of the organization's motivations for adopting agile," understanding the stakeholder dynamic was crucial in determining the level of accuracy of this perception. The relationships and dynamics between the case organization and its project team can

impact the motivations for adopting Agile and the chosen implementation approaches. Stakeholders may include clients, customers, end-users, project managers, and development teams. Factors such as the level of involvement in the development process can influence strategic decisions regarding Agile adoption.

Technological Environment: Indications of the environment were crucial to understanding some factors that influenced the motivations of Agile and the Agile implementation approaches. Factors such as the availability of tools, infrastructure, and technical expertise, can influence the motivations and approaches for Agile implementation. Factors such as compatibility with existing systems, the need for collaboration tools, or adopting DevOps practices can impact the case organization's decision-making process and execution of Agile methodologies.

3.3.1.6 Unit of Analysis

Yin (2004) suggests that to begin understanding a case, it is essential to determine the unit of analysis or units of observation and the related subtopics which need to be covered as part of the related case study. The first question in this research seeks to identify and evaluate the relative importance of the motivations for Agile Implementation in software development projects. In contrast, the second question seeks to identify existing relationships between the motivations and the implementation approaches. Therefore, the unit of analysis will be the project manager's experiences and perception of the organization's motives. This will be interpreted as a project which involves the development, testing, and deployment of software or an application. The boundaries of the software development project will be delineated through systemic consideration.

Based on the above, the case study aimed to collate and measure the project manager's experiences and perception of the organization's motives in delivering a Software development project. This was carried out across multiple cases and various industries to allow the replication of findings.

3.4 Data collection

3.4.1. Methods

Closed response surveys

The first phase of the study used a survey with closed-ended questions to collate information from respondents to determine the relative importance of the ten motivational factors highlighted by (Digital.ai, 2020; Cottmeyer, 2011) and establish any statistical relationship that might exist between the motivations of Agile and Agile implementation approaches highlighted by (Tripp and Armstrong, 2014). The first part of the survey focused on deductive reasoning rather than an in-depth understanding of human behaviors (Clarke and John W. Creswell, 2018; Sousa et al., 2007).

The questionnaire was created using Qualtrics, an experienced management software platform, which was also used to deliver the survey to the recipients. All communication with participants was via private messaging on the linkedin.com website or via email. The communication included a link to the consent form, which explained and clarified the objectives and any risks associated with the study.

Survey questionnaire development

The questionnaire in this study was informed by the motivations found by (Digital.ai Software, 2021) and the implementation approaches mentioned by (Cram and Newell, 2016). The questionnaire is attached as Annex …. The questionnaire was categorized into three sections. The questionnaire comprised a total of 16 questions which were subdivided into four sections. The first section included the consent statement, the second section listed the ten motivations of Agile found within the literature, along with a 5-point Likert type scale, A numeric score assigned to each with the lowest end of the scale marked as "not important" is a one and the highest end of the scale marked as "extremely important" is a 5. The third section sought to determine if the Agile approach used by the respondents were consistent with any of the three implementation approaches suggested by (Cram and Newell, 2016). Crusaders, Dabbler, and Tailors. A radio button was provided to the respondents along with the three options. The final section focused on collecting general information about the respondent. This included their names, email contacts, and the project title. Out of 16 questions, 13 were used for data analysis.

The questionnaire was available to the participants for 70 days, from February 07, 2022, to April 18, 2022. The collected data was left on the Qualtrics database. The participants were not anonymous; however, the questionnaire instrument only stored the participants' names and email addresses. The questionnaire and rationale are summarized in Table 7.

S/N	Question	Type	Purpose of the question	Research question it aims to address
1.	How important were the following motivations in your organization's decision to adopt agile methods in the delivery of your project? – All 10 motivations were listed	Likert Scale (0-5) (Not important at all to Extremely Important)	The purpose of the question is to assess the relative importance of various factors that contributed to the decision to adopt Agile methods in a specific project. This question seeks to understand the weight and significance of each motivation in the overall decision-making process, and to gain a deeper understanding of why the organization chose to adopt Agile. Overall, the question was aimed at capturing the individual's perception of the level of importance of the identified motivations to the organisation. The answer to this question will provide valuable insights into the priorities and goals of the organizations. This information will be useful for evaluating the effectiveness of the Agile Implementation, improving future Implementation	RQ1b

			processes, and making informed decisions around the use of Agile methods in future projects.	
2.	Describe any other organisational motivations for adopting agile methods on your project?	Free form	The purpose of the question is to gather information on the reasons why an organization has chosen to implement Agile methodologies in a specific project. This question was aimed at capturing any motivation for adopting agile, other than the motivations identified within literature. By asking for additional motivations, the researcher is looking to gain a deeper understanding of the driving forces behind the decision to adopt.	RQ1a
3.	How would you describe your approach to adopting agile methods?	Multiple Choice (Crusader, Tailor, Dabbler, None of the above)	This question was aimed at understanding if the implementation approaches used by the respondents to deliver their projects were considered a crusader approach, dabbler approach, a Tailor approach or none of the above. This information will provide valuable insight into the	RQ2

			organisation's overall approach to adopting and implementing Agile in their work environment.	
4.	Project Information (Type of project, what was your role on the Project)?	Free Form	This question was aimed at capturing information on the type of project (Software, Otherwise) and the role of the respondent. The purpose of asking for project information and one's role on the project is to gain an understanding of the individual's experience and skills related to the project. This information can be used to evaluate their suitability for similar projects in the future and to assess their level of expertise in a particular field or domain. It also helps to contextualize the individual's work history and provides insight into their contributions to the project.	N/A
5.	Participant Information (First Name, Surname, contact email, Contact	Free form	These questions were aimed at capturing general information about the respondent for contact purposes.	N/A

| | Number)? | | The purpose of asking for participant information such as first name, surname, contact email, and contact number is to identify and communicate with individuals who are participating in a particular event, program, or activity. This information can be used to create a contact list for future communication, to personalize communication with participants, and to keep track of attendance or participation. It may also be used to verify the identity of the participants, to ensure that they meet any eligibility criteria, and to track their progress or performance throughout the program or activity. | |

Table 7: Research questions from questionnaire

Semi-Structured Interviews

Polkinghorne (2005) highlights three primary sources of qualitative data: interviews, observations, and documents. Interviews are more widely used and are considered as a technique of gathering data from humans by asking them questions and getting them to react verbally" according to (Potter et al., 2010), it enables the researchers to acquire a detailed account of the experiences of the participant based on the investigation under study. To further address RQ1 and RQ2, semi-structured interviews were carried out. The purpose of these semi-structured interviews was to enable the respondents to elaborate on the statistical findings established from the questionnaire survey. It also aimed to understand, in more detail, their perceptions of the organization's motivations for adopting Agile and the implementation approaches used to deliver the software project.

The questions for the semi-structured interviews were conceptualized based on the statistical findings. Two primary interview questions were formulated. Respondents were shown the results of the rankings of their perceptions of the organization's motivations for adopting Agile and were asked to explain why they had ranked them that way. They were also asked to elaborate on their reasons for using the Agile implementation approach they had selected in their responses to the survey. These two questions were aimed at meeting two objectives of this research. Investigate the motivations for the Implementation of Agile in the development of software by organizations and identify any relationships between the motivations and the Agile implementation approaches. Where required, the respondents were asked to elaborate further through additional questions. The interview questions are summarized in Table 8.

S/N	Question	Purpose	Research Question it aims to address
Q1.	What were the motivations for considering/adopting Agile?	The purpose of this question is to understand the reasons why organizations have chosen to adopt Agile methodologies in software development and project management. This question seeks to uncover the drivers behind the Implementation of Agile practices. The answer to this question can provide insights into the benefits and value that organizations see in using Agile and help to inform future decisions around the Implementation of Agile practices.	RQ1a and RQ1b.
Q2.	Why did the organization use this implementation approach?	The purpose of the question is to understand the reasoning behind a specific implementation approach taken by an organization. This question is asking for the goals and objectives that drove the organization to choose a particular approach for adopting agile. The answer to this question will provide insights into the organization's priorities help to understand the factors that influenced the choice of implementation approach. This information will be useful in informing future decisions around Implementation processes.	RQ2.

Table 8: Interview Questions

The Semi-structured Interviews were carried out via video teleconference using Microsoft teams. The participants were selected from the pre-existing sample of participants who participated in the survey. Participants were selected based on the respective implementation approaches they identified with as part of the survey. A total of four Tailors, three Dabblers, and three Crusaders were interviewed as saturation point was reached when additional sources of information did not offer any "useful re-enforcement" (Guba and Lincoln, 1982). The participants were contacted via email and provided informed consent before the interview. As part of the introduction to the interview, the participants were informed of the procedure for the interview, and the interview proceeded once they accepted those agreements.

The questions were semi-structured, and the interviews lasted an average of 35 minutes each. The interviews were conducted between March 20th, 2022, and July 22nd, 2022.

The recording and transcripts were transferred to the researcher's university computer via a secured internet connection at the end of the interviews. This information was securely stored in a password-protected location throughout the data analysis phase. After this phase, all data was securely retained and stored per the policy and regulations of the University of Warwick.

Respondent Code	Industry	Type of Project	Role	Implementation approach
R1	Manufacturing	Software Implementation	Project Manager	Tailor
R2	Manufacturing	Software Implementation	Project Co-ordinator	Crusader
R3	Game development	Software Implementation	Scrum Master	Crusader
R4	Broadcasting	Software Implementation	Project Lead	Tailor
R5	Software development	Software Implementation	Project delivery Lead	Crusader
R6	Retail	Software Implementation	Scrum Master	Tailor
R7	Manufacturing	Software Implementation	Programme Manager	Tailor
R8	Software development	Software Implementation	Project Manager	Dabbler
R9	Software development	Software Implementation	Scum Master	Tailor
R10	Manufacturing	Software Implementation	Scrum Master	Tailor
R11	Software development	Software Implementation	Project Manager	Dabbler

Table 9: Interview Participant Characteristics

3.4.1 Target Population

The targeted population for this study was individuals who had held the role of a project manager or other similar roles and had previous project management experience in delivering software development projects using Agile methods. Although other members of a project team, such as testers or technical architects, could have been included in the sample, the Researcher opted not to include such roles as it was determined that roles involved in deciding the project delivery approach were more likely to have the relevant experience required and a more reliable perception the organization's motive. (Eisenhardt, 1989) also recommends specifying a population, as this will reduce the irrelevant and unrelated variations.

The population met the following criteria.

a. Respondent has the role of a project manager or equivalent role.
b. Respondent has previous experience in managing the delivery of a software development project using Agile methods.

The following criteria eliminated participants from the study.

a. The Respondent has yet to gain experience working within a project team.
b. The Respondent has never been part of a delivery project from start to finish.

3.4.2 Sampling
Sampling Frame

Sampling involves selecting a representative subset to improve the accuracy of the Research; the method used in sampling determines whether the research findings can be generalizable (Amankwaa, 2016). Probability and Non-probability sampling represent the two main types of sampling methods. While Probability sampling uses randomization to determine the probability that a sample is representative of a population, non-probability sampling mainly involves subjectivity and judgment (Steinmetz, 2016). Although probability sampling was initially the preferred technique for this Research, the Researcher faced several challenges with using a probability sampling method. They include:

Accessibility – The COVID-19 pandemic significantly impacted this Research and other research activities, particularly regarding the accessibility of sample populations. In the case of the United Kingdom, several travel bans and government shutdowns were implemented

to contain the spread of the virus. These restrictions made accessing a sample population selected through strict randomization difficult, as the movement was restricted during the pandemic.

The Researcher was faced with limited options for accessing the population, as traditional methods such as face-to-face interaction were no longer feasible. As a result, they had to explore alternative approaches to sampling, such as online surveys or phone interviews, to reach the target population.

These changes in the sampling approach may have implications for the generalizability of the research findings, as the selected sample may not represent the larger population due to the limitations imposed by the pandemic. However, using alternative sampling methods allowed researchers to continue their work and collect valuable data during a challenging time while highlighting the importance of adapting research methods to changing circumstances.

A small population – Agile methods are still relatively new, and very little is known about Agile methods. One challenge faced within this Research was the limited pool of project managers who have delivered software projects using Agile and who possess the necessary experience and knowledge to contribute to the Research. This was partly because Agile methods are still in the early stages of Implementation, and many organizations must fully integrate them into their development processes. As a result, finding project managers with the right qualifications to participate in Research proved difficult. This Research broadened its search beyond traditional channels to identify practitioners with Agile experience in non-traditional settings, such as startups or small consulting firms. Additionally, the Researcher relied on personal networks and referrals to identify potential participants. Despite these challenges, the limitations were addressed, and suitable respondents participated in the data collection process.

The nature of the Research - Considering that this is mainly exploratory as it seeks to understand if the motivations of Agile have any relationship with the implementation approaches, it was necessary to identify suitable respondents with relevant experience. This would not have been easy to achieve using only probability techniques.

The Researcher opted to use Linkedin.com, considered the most active and popular professional social networking platform, with over 700 million registered users and 300 million monthly active users (Shahani-Denning, 2014). The Researcher acknowledged that there are limitations that could impact the credibility of the results obtained when using a website such as Linkedin.com to access the sample population. These could include pseudo-accounts, bots, and potential spamming. As such adequate measures were put in place to ensure that all respondents were not bots or pseudo-accounts and that the sample was as representative as possible. To determine the suitable sample for this Research, the Researcher used a combination of probability and non-probability sampling.

Simple Random Sampling

The keyword "project manager" was typed into the LinkedIn.com website search bar" and a total of 17,300,000 results were displayed; the Researcher then adjusted the title to the role "software project manager," which displayed a total of 1,010,000 results. Furthermore, these results were filtered under the service categories, selecting the software development option. A total of 680 results were displayed. Following an analysis of the results, only 54 were project managers. The Researcher connected with these contacts and contacted them using the LinkedIn Premium InMail. Non- randomized sampling approaches were also adopted. Snowball sampling, Purposive Sampling, and Convenience sampling techniques.

Purposive and Snowball Sampling

Based on the Researcher having previous experience in the delivery of software projects and being a Project management consultant. He relied on his professional judgment and leveraged his professional network; he initially reached out to five individuals who fit the category of the sample population to seek their voluntary participation. These initial contacts also referred other project managers within their network so that the Researcher could contact 11 key respondents.

Convenience sampling

The Researcher reached out to all the individuals within his LinkedIn network. A total of 142 individuals with the title project manager were filtered from the list of 500 LinkedIn contacts.

Participants were manually selected based on the tiles on their LinkedIn profiles per the sample frame. The Researcher invited participants via private messaging on LinkedIn, and this invitation contained the link to the survey. As part of the introduction to the survey, the terms and definitions, risks and benefits were clarified, and the consent form was provided. The next part of the survey was made available to the participants once they accepted those agreements.

Using convenience sampling provided direct access to the target population, project managers who had previously delivered software projects. These sampling techniques are also suitable for specialists in Agile software development where required. Tonelli et al. (2013) have previously used this approach in their investigation of the perceptions of software professionals and their relationship with Agile practices.

Limitations of using Nonprobability Sampling.
The nonprobability sampling approach has been criticized as it has a high risk of sampling bias; as such, inferences which can be made about the population are considered weaker than those of a probability sample (Zide et al., 2014). Therefore, the Researcher made efforts to ensure objectivity and combine these sampling techniques to ensure the sample population was as representative as possible, 98% of the people contacted were previously unknown to the Researcher and questions were designed to avoid any wording bias. Some of the limitations of using Nonprobability sampling as part of this research included:

Limited Generalizability: Non-probability sampling methods do not allow for the generalization of findings to the broader population. The sample selected through non-probability methods may not be representative of the entire population, which limits the ability to make inferences about the larger population. This reduces the external validity of the research findings. To mitigate this limitation, this research implemented a multi-case study approach, the sample size was also increased, and it was ensured that the data collection was only stopped after theoretical saturation was reached.

Sample Bias: Non-probability sampling can introduce bias into the sample selection process. The Researcher's judgment or convenience may influence the selection of participants, leading to a biased sample that does not accurately represent the target population. This can undermine the validity and reliability of the research outcomes. (Steinmetz, 2016). To

mitigate this limitation, explicit inclusion and exclusion criteria were defined; this ensured that the individuals chosen were based on relevant characteristics and attributes.

Difficulty in Statistical Analysis: Non-probability sampling can make statistical analysis challenging. Since the sample is not selected randomly, it may not adhere to the assumptions required for specific statistical tests (Lamm & Lamm, 2005). This can limit the ability to draw statistically valid conclusions or perform specific quantitative analyses. This research mitigated this limitation by complimenting the quantitative data with qualitative data to support the findings derived from the statistical analysis.

Difficulty in Sample Size Determination: Non-probability sampling methods need tovide a clear basis for determining the appropriate sample size. Unlike probability sampling, where sample size can be determined based on statistical principles, non-probability sampling often relies on practical considerations or researcher judgment (Acharya et al., 2013). This can make ensuring an adequate sample size for reliable results challenging. To mitigate this limitation, the Researcher collected data until theoretical saturation was reached.

Potential for Self-Selection Bias: In non-probability sampling, participants may self-select to participate in the study. This self-selection introduces the possibility of self-selection bias, where individuals with specific characteristics or experiences are more likely to volunteer for the study. (Lamm & Lamm, 2005) This can limit the sample's representativeness and introduce bias into the findings. With the Researcher being an experienced project manager, this potential for self-selection bias was prominent. As a result, the Researcher maintained reflexivity by continually examining their own beliefs and potential biases; the methodology was also transparently reported and documented. This includes the data collection procedures and analytical techniques.

Sample Size

Based on the sampling approach adopted, no statistical sample size calculation was used to determine the sample size. For the first phase of this Research, the questionnaire survey, the Researcher aimed to collect data from respondents until theoretical saturation was reached. Eisenhardt (1989) mentions that "we must mobilize further case studies to approach theoretical saturation asymptotically." It was determined that where the data collected was reviewed until considered insufficient. As suggested by Lopez & Whitehead,

(2005), sampling size can sometimes be determined based on available resources. Additional responses will be investigated until theoretical saturation is reached.

The second survey phase was qualitative, and eleven people were interviewed. (Yin., 1996) recommends considering 6 to 10 cases, while Eisenhardt (1989) suggests that theoretical saturation is usually reached when around 7-9 cases are studied. Figure 17 summarizes the overall research methodology.
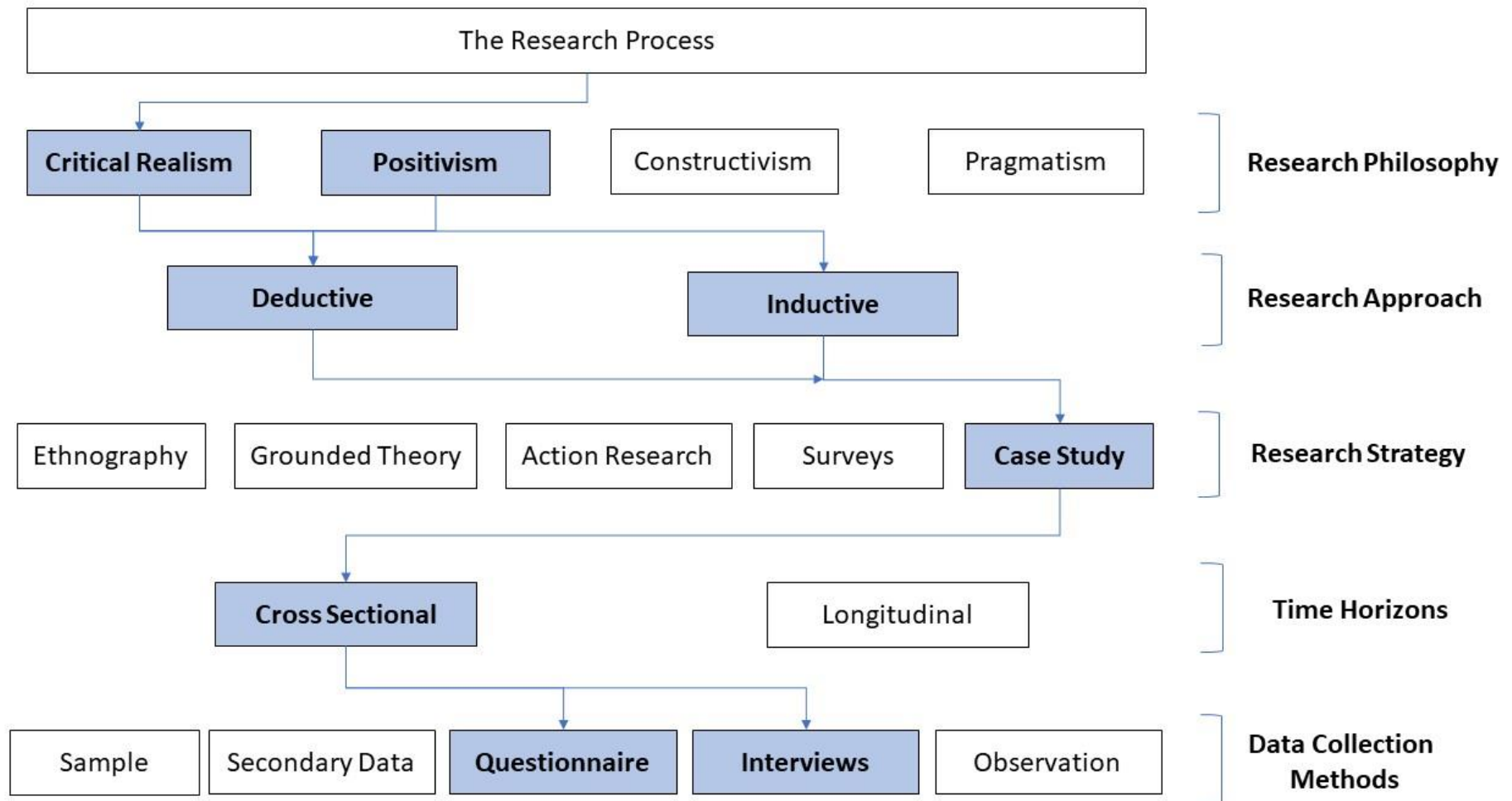
Figure 12: The research Methodology - Adapted from (Saunders and Tosey, 2013)

3.5 Data Analysis

3.5.1 Storing the Data

At the end of the data collection period, 720 people were contacted to collect data on the relationship between the motivations of Agile methods and the implementation approaches used in software development. Out of the 720 people contacted, 309 responses were received. However, incomplete responses and respondents with no previous or current experience with Agile project management were removed to ensure the quality of the data collected. After filtering out these responses, a total of 140 responses were deemed helpful for the study.

In addition to the survey, semi-structured interviews were conducted with a subset of the respondents. Eleven interviews were transcribed, and the resulting data were analyzed along with the survey data. To ensure the security of the collected data, all data was transferred to the researcher's university computer via a secure internet connection and saved to an encrypted drive. The information stored was password protected and only accessible to the researcher during the analysis phase of the study. Once the study was completed, the data was stored per the policy and regulations of the University of Warwick to ensure the privacy and confidentiality of the participants. Overall, the data collection process for this study involved a rigorous and thorough approach to ensure the validity and reliability of the collected data. They used a survey and semi-structured interviews, which allowed for a comprehensive understanding of the research question and the secure handling of the data ensuring the privacy and confidentiality of the participants.

3.5.2 Analyzing the Data

In the first stage of the research, the data collected from the survey were subjected to descriptive statistics and inferential statistical analysis; a Relative Important Index (RII) was also applied to establish the relative Importance of the motivations for adopting Agile in the delivery of software projects. Inferential statistical analysis methods were applied to the data to determine if there was any statistical relationship between the motivations and the implementation approaches found. In the second stage, following the completion of the open-ended Interviews. A thematic analysis technique was then used to elaborate on the relationships between the motivations and the implementation

approaches. Braun and Clarke (2006) mention that thematic analysis is a method for "identifying, analyzing, and reporting patterns within data."

3.5.2.1 Analyzing the Survey Results

Descriptive statistics

Once the data received was considered to have reached theoretical saturation, all the raw data was extracted from Qualtrics into Microsoft Excel, and sections of the data with no direct relevance to the research analysis were removed. (e.g., contact information). Statistical techniques such as the mean and standard deviation were used to analyze the excel data to interpret the trends found in the data and identify the distribution of the values; the central tendency and the dispersions were also established and described. In their empirical study of the impact of Agile and cost management success factors, Iqbal et al. (2019) used this technique; they determined the average score of respondents based on three questions on Agile methodologies (Extreme Programming, Scrum, and Kanban), then compared the individual scores against this average to determine which of the three methodologies was considered more impactful and whether the impact was positive or negative. The standard deviation scores were then used to determine whether there were considerable differences in the responses received for each methodology. In another similar study of the preference for Agile software development (Bishop and Deokar, 2014), they analyzed the empirical result of five-factor models based on 195 responses. The overall mean was then calculated. The mean Scores of each factor model were compared with the total mean; where the factor model scores were above the overall mean, this was considered a higher preference, and where it was lower, this was considered a low preference calculation.

Like both studies, the average mean of the scores for all ten motivations was calculated in this research; this was then compared to the mean scores to determine if the motivation was considered a motivation of Higher Importance or Lower Importance. Motivational Mean scores above the overall mean scores were considered motivations of high Importance, and mean scores below the overall mean score were considered motivations of low Importance. The standard deviation results were then used to determine the average distances from the mean, which highlighted whether there were considerable differences in the responses given. The standard deviation for Motivations

that scored lower than the average standard deviation was considered less deviated and, as such, had less difference. In contrast, the standard deviations for motivations that scored higher than the average standard deviation were considered to have considerable differences in the responses. All motivations were then classified into three categories. Motivations with a higher level of Importance were motivations that had mean values higher than the average mean and were less deviated. Motivations of Lower Importance were motivations that had values lower than the average mean and were less deviated. A third category was considered inconclusive. These were motivations that had a high level of deviation, and this was because a higher level of deviation meant that the respondent's views could not be determined based on the findings.

Relative Importance Index: A relative Important Index (RII) was then calculated to determine the relative Importance of the motivations of Agile. A relative importance Index is a statistical approach used to calculate the rankings of different factors; weight (numeric score) is assigned to each point of the Likert scale, and the mean of perceptions of the respondents is calculated using the following formula.

Relative Importance Index (RII)

RII = Sum of weights $(5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1)/$ A x N

n_5 = Number of respondents who found it extremely important

n_4 = Number of respondents who found it very important

n_3 = Number of respondents who found it moderately important

n_2 = Number of respondents who found it slightly important

n_1 = Number of respondents who found it not important at all

A (Highest weight) = 5

N (Total number of respondents) = 141

Relative Importance Index Formula - (Man Li, 2022)

This statistical approach has been used previously by several researchers in other similar studies. A relative importance index was used in empirical research by (Tavasszy, 2018)

to rank indicators for Logistics performance and used, Relative importance index to rank risk factors according to their probability and likelihood of impact within construction projects in the Oil and gas sector. (Ismail, 2018) They also used this tool to determine the importance of construction activity criteria for green highways.

The RII formula was applied to the data, and the motivations were ranked in importance from the motivation with the highest score to the motivation with the lowest score.

Test of Relationship (Motivations for adopting Agile and Agile Implementation approaches)

The same data was then transferred to SPSS, where inferential statistical analysis was carried out, and the survey analysis was carried out using a Chi-Square (X2) test of independence. According to Ugoni and Walker (1995), a Chi-squared test was used to determine if a relationship exists between two categorical variables. The goal was to understand whether independent variables (motivations of Agile), as determined by literature, had any relationship with the dependent variables (Implementation approaches). Inferential statistical analysis helps analyze the underlying data distribution in population samples (Denis, 2018). Non-parametric testing was preferred for this study as no sample distribution is required. Non-parametric tests are used when the assumption of normality is not met. This was the case for the dependent and independent variables. (Field, 2009).

Siegel and Wagner (2022) mention that a chi-squared test for independence is a functional, statistical test to identify if a relationship might exist between two variables.

Several research studies of a similar nature were also found to use the Chi-Squared test of independence to determine relationships between two variables. In a

In a study by (Talír, 2021) to understand the development trends in organizational and management structures, a chi-squared test was used to establish the relationship between the size categories and the organizational structure. In another research carried out by (Bateman, 2002) to understand the hierarchical taxonomy of top manager's goals, 75 industry leaders were surveyed against 5 goal levels (ultimate, enterprise, strategic, project, and process), a chi-squared test was used to determine the relationships that existed between the goals and the hierarchical level. Ge et al. (2021) also explored the

relationship between the public risk perception of floods and exposure. The chi-squared

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

formula is shown below.

Figure 13: Chi-Square Test Formula

Where:

- X^2 is the chi-square test statistic

- Σ is the summation operator (it means "take the sum of")

- *O* is the observed frequency

- *E* is the expected frequency

Chi-Squared Assumptions

A chi-squared test is applied when the following assumptions are met a. The variables are categorical b. The cell data are frequencies and not percentages c. The study groups are independent. d. The categories are mutually exclusive, and e. The value of the expected cells is five or more in at least 80% of the cells. (McHugh, 2012).

While all these assumptions were met in some of the results, the assumption that the expected cell count is five or more in at least 80% of the cells was violated by others.

According to (Field, 2017), where expected counts are found to be less than 5, the chi-squared test is likely to be inaccurate. Therefore, the likelihood ratio should be calculated for smaller samples. (Pallant, 2011; Siegel and Wagner, 2022). The formula for the likelihood ratio is shown below.

$$G = 2\sum f . \ln\left(\frac{f}{f_i}\right)$$

Figure 14: Likelihood Ratio Chi-Square test

Where:

G is the likelihood ratio

f is the observed frequency

f1 is the expected frequency

ln is the natural logarithm

All tests were carried out using SPSS, a statistical analysis platform used for data analysis. A significance level (P) of 0.05 was adopted (Straková et al., 2021; Bateman et al., 2002; Mokhtari et al., 2021).

The following hypothesis was tested:

H0 – There is no relationship between the motivations of Agile and the Agile implementation approaches

H1 – There is a relationship between the motivations of Agile and the Agile implementation approaches.

The results of the Chi-squared test and (where required) the Likelihood ratio was compared to the P value of 0.05.

Results with $P < 0.05$ were considered statistically significant and the null hypothesis (H0) was rejected. Results with $P > 0.05$ were considered statistically insignificant, therefore the hypothesis (H0) was accepted.

Reliability and Validity

Reliability considers the degree to which the research design is consistent and repeatable (Amaratunga et al., 2002). Peterson, (1994) defines it as the "extent to which measurements are repeatable. "One of the primary objectives of reliability is that the research is repeatable; it ensures that the procedures can be replicated by another researcher and produce similar outcomes. (Amaratunga et al., 2002), this is important for avoiding bias and reducing errors. All the data relating to the motivations of Agile were collected based on the consolidation of previous literature. The patterns of adopting Agile were also classified by Cram and Newell (2016) based on five case studies of Agile implementation approach patterns.

Data Triangulation
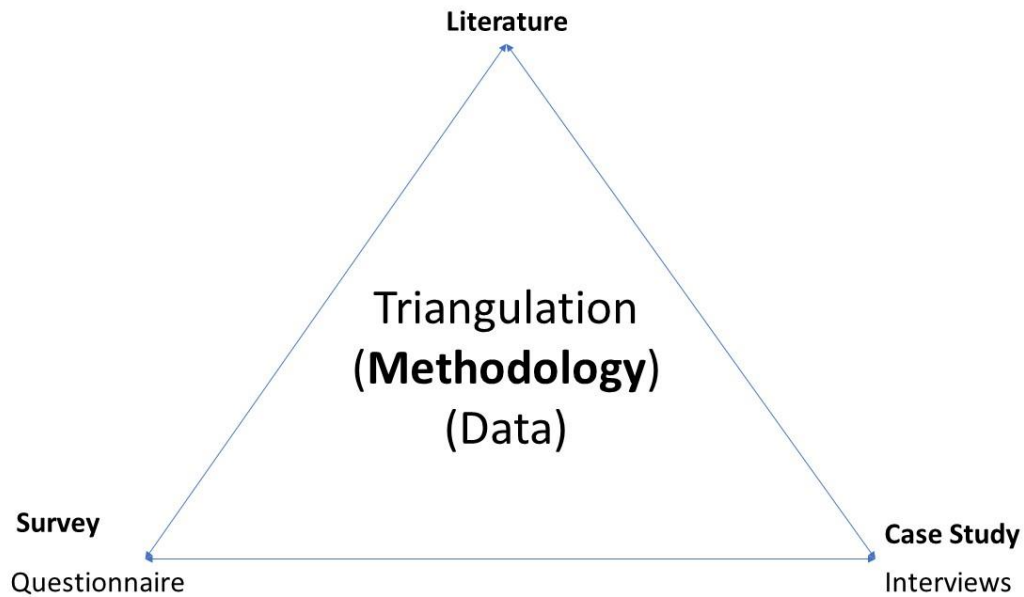
Figure 15: Data and Methodological Triangulation

According to (Heale & Twycross, 2015), validity refers to the degree of confidence in the findings obtained from research. The appropriateness of the model. This research used a triangulation method to establish the credibility, validity, and reliability of the data collected. This study used data triangulation to extract data from three key sources: extant Literature, Questionnaires, and Interviews. Methodological triangulation was also used within this study, as the study Carried out a Literature review. This research used a Case Study and Surveys as three different methods.

Triangulation Data Sources
Literature:
The review of the literature provided a foundation for understanding existing knowledge, theories, and empirical studies related to the agile adoption approaches and the motivations for adopting agile. By critically analyzing and synthesizing relevant literature, the researcher gained insights into the conceptual frameworks, key concepts, and gaps in existing knowledge. This process enhanced the theoretical underpinnings of this research and facilitated the development of research questions and hypotheses. A total of 10 motivations for adopting agile were established, and three adoption approaches were determined.

Questionnaires

The motivations for adopting agile found within the literature were validated with the quantitative data collected via questionnaires. This enabled the researcher to gather quantitative information to support or refute the findings established from the literature review. As part of the triangulation process, questionnaires were also used to identify the factors that affect an organization's Implementation decisions, such as organizational culture, internal resources, and competitive pressures.

Through carefully designed questionnaires, the researcher captured various perspectives, beliefs, and behaviors related to the motivations for adopting agile. The quantitative data from questionnaires were subjected to statistical analyses, providing valuable insights into patterns, correlations, and trends.

Interviews

Interviews were conducted to complement the data collected from the literature and the questionnaires as part of the triangulation process. (Rumeser and Emsley, 2019).

By conducting interviews, the researcher explored complex issues, uncovered personal narratives, and delved into nuances not captured by quantitative measures alone. Interviews also facilitated the development of rapport with participants, fostering trust and encouraging them to share candid insights.

Considering that this thesis was aimed at identifying the motivations behind agile and the different approaches to its Implementation within an organizational context. This third source of data triangulation was used to understand the rationale behind the organization's agile adoption approaches. The qualitative data gathered through open-ended interviews were analyzed using thematic analysis to provide a deeper understanding of Agile implementation approaches and the influential factors they are driven by.

Analysis of the data

Triangulation has been increasingly employed in industrial marketing research to understand further the motivations behind firms' Implementation of agile methods (K Sarangee et al., 2022). By gathering data from multiple sources, this research was able to triangulate the data and identify underlying patterns in the motivations behind firms' Agile Implementation. These various data sets were used to explain different aspects of a phenomenon. It also confirmed the hypothesis.

Triangulation has its criticisms, and the researcher acknowledged the limitations of this approach. Thurmond (2001) argues that triangulation is overestimated and unsuitable for all studies. However, this study found triangulation to be of great benefit and value.

3.5.2.2 Analyzing the Interview Results

The purpose of the interview was to elaborate on the findings from the survey; it also guided the understanding of the rationale for the selected Agile approaches adopted while also identifying any links with their motivations for adopting Agile (Clarke and John W. Creswell, 2018).

The interviews were carried out to further probe beneath the surface of the implementation approaches and the motivational factors driving them. (Denscombe, 2010)

Once the interviews were complete and the transcripts were collated, they were uploaded to Nvivo (a qualitative data analysis application), and the data was coded. A thematic analysis approach was adopted to aid the refinement of larger chunks of data (Saldana et al. 2014, p.73). Thematic analysis is considered appropriate for studies that intend to understand data based on interpretations by associating an analysis of the frequency of a theme with one the whole content. (Maguire and Delahunt, 2017). The data were coded using a deductive top-down coding approach because a structure already existed, and the collected data had already been categorized based on the motivations and the corresponding implementation approaches (crusader, tailor, and dabbler) selected by each of the interviewees. The explanations provided by the respondents were categorized into two, understanding why they perceived that the organization considered some motivations higher than others and understanding their rationale for adopting Agile using the approach they did.

S/N	Process	Action
1.	The Research Question	The semi-structured interviews were aimed at supplementing the answers for two of the three research questions. R1a. What are the motivations for adopting Agile methods in software delivery projects?

		And RQ2. Is there a relationship between the motivations for adopting Agile and the Agile implementation approaches within software development projects?
2.	Semi-Structured Interviews Conducted	11 Participants were chosen from the group of respondents who participated in the questionnaire. Respondents with experience in the delivery of agile within various industries were considered and software delivery projects delivered using the Crusader, Tailor and Dabbler approaches were also considered.
3.	Data Transcription	Audio recordings of the interviews were transcribed into written form to prepare the data for analysis.
4.	Theme Identification	The themes within this research were identified based on the recurring patterns and concepts relevant two of the research questions. R1a. What are the motivations for adopting Agile methods in software delivery projects? And RQ2. Is there a relationship between the motivations for adopting Agile and the Agile implementation approaches within software development projects?
5.	Data Coding	Codes were assigned to the relevant sections of the interview transcripts to categorize them based on the identified themes
6.	Developing the Matrix	The coded data was then organized into a matrix to visually analyze the organizational motivations for the Implementation of agile and the agile implementation approaches.

7.	Analyzing the themes and developing the findings	The data was interpreted and all commonalities and patterns in the organizational motivations of agile and the agile implementation approaches were analyzed. The results were summarized and presented as part of the results and analysis chapter (Chapter 4.5)

Table 10: Thematic Analysis Process

Trustworthiness

Trustworthiness is considered the "degree of confidence in data, interpretation, and methods used in the study which ensures the quality of the research" (Amankwaa, 2016) Protocols and procedures are required for a study to be worth considering. (Guba and Lincoln, 1982) highlighted five possible criteria that can be used to determine the trustworthiness of research: credibility, dependability, confirmability, and reliability. These criteria have guided the findings from the interview to ensure trustworthiness. Credibility refers to the level of confidence in the findings of the study. (Polit and Beck, 2010).

An audit trail of the process logs was maintained throughout the study to ensure the study was credible. This is an important technique to ensure the study's findings are credible. The qualitative data obtained from this study was not repeatable, as the response was based on individual experiences. However, the respondents selected for the interviews were representative of all three implementation approaches (crusaders, dabblers, and tailors) to ensure that transferability was established.

3.6 Ethical Considerations

The researcher undertook interviews and a survey, obtaining the necessary ethical approval from the Biomedical and Scientific Research Ethics Committee (BSREC) before proceeding. The researcher followed all guidelines and guidance as part of the BSREC process concerning data storage, methods for safeguarding and destroying data, and an approach to publishing the data. These measures were implemented to ensure the confidentiality and privacy of the participants and to safeguard against any potential risks of harm that may arise due to the research. Furthermore, the researcher took additional steps to protect the participants' anonymity by removing all names and job

titles from the documentation related to the study. This was done to ensure that no participant could be identified and protect their privacy.

As part of the study's ethical framework, no compensation was offered to any participant. Participation in the survey and interview was voluntary, and participants were free to withdraw any time before the survey and interview. This measure was put in place to safeguard the participants' rights and ensure they were fully aware of the implications of their participation.

In line with ethical requirements, all consent forms and participant information leaflets related to the study were compiled and included in Appendix A. This was done to ensure that all ethical standards and requirements were met and to provide transparency and accountability for the study.

3.7 Chapter Summary

This chapter summarizes the methodological approach used in this study and provides an overview of the research design, data collection, and analysis methods. This chapter will outline the research philosophy, approach, strategy, and ethical considerations that guided the study. The research philosophy adopted in this study was based on an exploratory and multi-phased approach. This approach was chosen because of the need to comprehensively understand the motivations for adopting Agile and the approaches used. A mixed-method approach was used to meet this goal, which included both a quantitative and a qualitative component. The first phase of the research involved a quantitative approach, which used a survey research strategy to gather data and evaluate the motivations for adopting Agile. This research phase was designed to provide a broad overview of the subject matter and identify critical trends and patterns in the data. The data collected in this phase was analyzed using statistical techniques, including descriptive statistics and inferential statistics, to provide insights into the motivations for adopting Agile and the implementation approaches used. The second phase of the research involved a qualitative approach, which used a case study research strategy to provide a more in-depth understanding of the motivations for adopting Agile and the approaches used. This research phase was designed to provide a more nuanced and detailed understanding of the subject matter and identify key data themes and patterns. The data collected in this phase was analyzed using qualitative data analysis techniques, including content analysis and thematic analysis, to provide insights into the

motivations for adopting Agile and the approaches used. The combined case study and survey research strategy used in this study allowed for a more comprehensive examination of the subject matter. It provided a more in-depth understanding of the motivations for adopting Agile, and the implementation approaches used. This research design was also chosen because it can balance the strengths and limitations of both qualitative and quantitative research methods.

The study was guided by informed consent, anonymity, and confidentiality regarding ethical considerations. Participants were informed of the study's purpose and allowed to opt out. All data collected was treated as confidential and was used solely for this research. In conclusion, this chapter provides an overview of the methodological approach used in this study. The research philosophy, approach, strategy, and ethical considerations are summarized, and the research design is outlined. The next chapter will focus on the data results found and their analysis.

CHAPTER 4 RESULTS

4.1 Introduction

This chapter provides the results of analyzing the data collected from the sample. This includes analyzing the level of importance of the ten identified motivations and the implementation approaches and identifying any difference in the level of importance of each motivation across the three implementation approaches. (Tailors, Dabblers, and Crusaders).

The objectives are.

a. Investigate the motivations for the Adoption of Agile to develop software by organizations.

b. Explore the Agile implementation approaches.

c. Evaluate the differences in the level of importance of each identified motivation.

d. Identify any relationships that exist between the motivations and the Agile implementation approaches.

e. Establish a theoretical framework that informs organizations' future Implementations of Agile methods in software delivery.

The first section covers the details of the sample on which the results are based. The second section covers the descriptive statistic results for the motivations of Agile and the implementation approaches. The third section covers the Relative Importance Index, which provides the results of the overall RII rankings for the motivations by the overall sample population and the rankings based on the three implementation approaches.

Responses

As described in the previous chapter (3.0 Research Methodology), one hundred and forty valid responses were received from the respondents, representing a 69% response rate. The high response rate was attributed to the adopted mixed sampling techniques. Based on the review of the collected data, theoretical saturation was reached, and as such, this number was considered satisfactory for the survey questionnaire and aligned with similar research (Hwang and Lim, 2013; Mkpojiogu et al., 2019). All respondents were drawn from project practitioners with experience in the delivery of software projects.

4.2 Motivations of Agile (Descriptive Statistics)

4.2.1 Levels of Importance of the Motivations of Agile

This section presents the statistical results of a survey that aimed to examine the level of importance of various motivations for adopting Agile methodologies in software development. The survey participants were asked to rate the significance of ten motivations, including enhancing software quality, accelerating to market, reducing cost, improving visibility, and managing changing priorities. The survey results provide a comprehensive understanding of the drivers behind adopting Agile methodologies and the prioritization of different motivations among organizations. The following section summarizes the survey results and highlights the importance level of each motivation.

The survey results summarized in Table 11 showed that enhancing software quality (M1), accelerating to market (M3), increasing team productivity (M4), managing changing priorities (M6), improving Business/IT alignment (M7), reducing risk (M9) was considered necessary by the majority of the respondents, with the highest being 70% for risk reduction. On the other hand, reducing cost (M5), improving culture and boost team morale (M8), and improving visibility (M10) were considered not important by a considerable portion of the respondents, with the highest being 58% for improving visibility. These results provide a general understanding of prioritizing different organizational motivations for adopting Agile methodologies. Each of the motivations has been discussed in sections 4.2.1.1 to 4.2.1.10
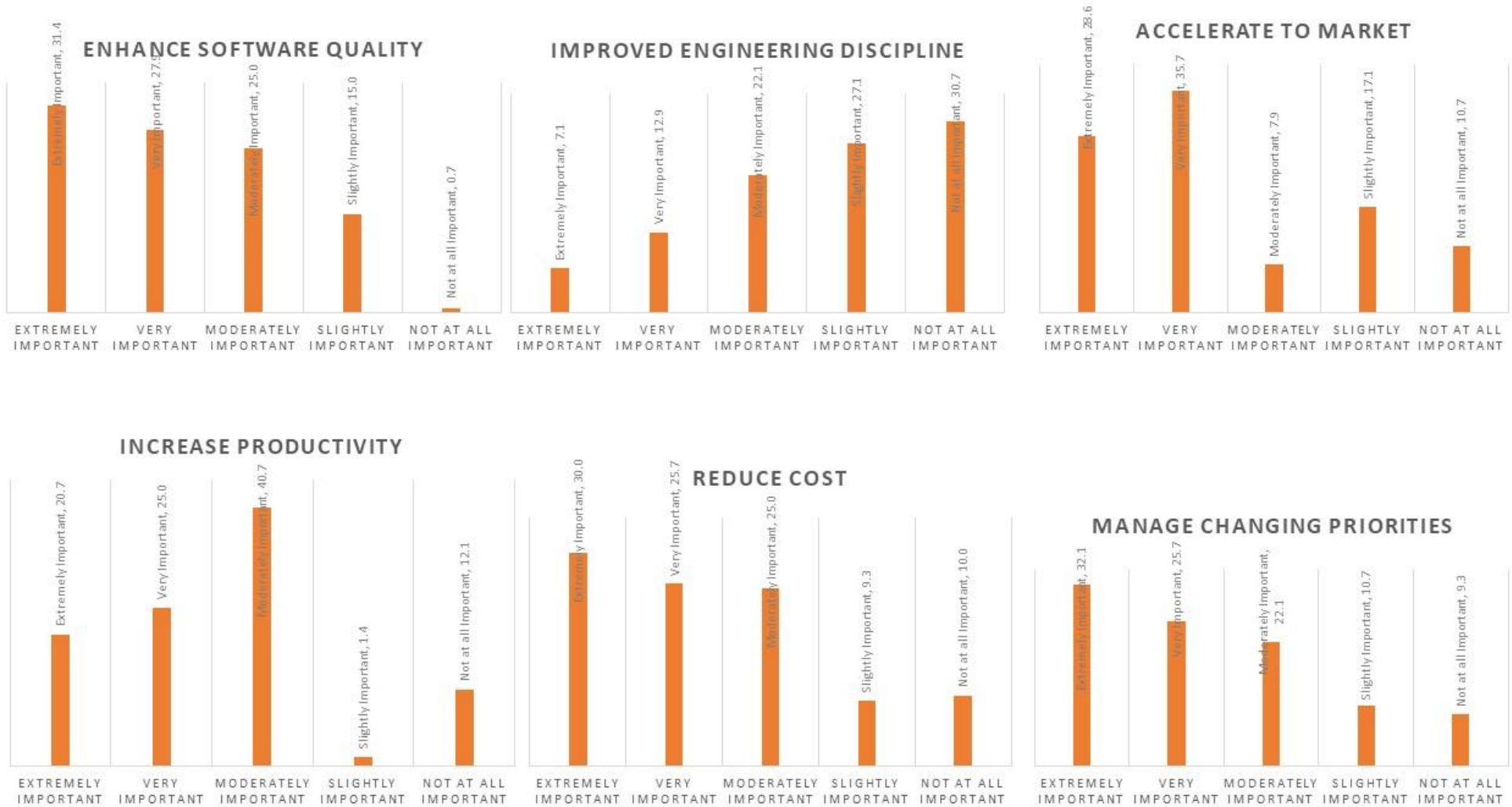
Figure 16: Descriptive Statistics - Motivations for adopting Agile (1)

IMPROVE BUSINESS /IT ALIGNMENT

Extremely Important, 22.9
Very Important, 29.3
Moderately Important, .1
Slightly Important, 15.0
Not at all Important, 10.7

EXTREMELY IMPORTANT | VERY IMPORTANT | MODERATELY IMPORTANT | SLIGHTLY IMPORTANT | NOT AT ALL IMPORTANT

IMPROVE CULTURE AND BOOST MORALE

Extremely Important, 17.1
Very Important, 12.9
Moderately Important, 2
Slightly Important, 5.7
Not at all Important, 44.3

EXTREMELY IMPORTANT | VERY IMPORTANT | MODERATELY IMPORTANT | SLIGHTLY IMPORTANT | NOT AT ALL IMPORTANT

REDUCE RISK

Extremely Important, 49
Very Important, 49
Moderately Important, 21
Slightly Important, 3
Not at all Important, 18

EXTREMELY IMPORTANT | VERY IMPORTANT | MODERATELY IMPORTANT | SLIGHTLY IMPORTANT | NOT AT ALL IMPORTANT

IMPROVE VISIBILITY

Extremely Important, 20
Very Important, 20
Moderately Important, 19
Slightly Important, 16
Not at all Important, 65

EXTREMELY IMPORTANT | VERY IMPORTANT | MODERATELY IMPORTANT | SLIGHTLY IMPORTANT | NOT AT ALL IMPORTANT

Figure 17: Descriptive Statistics: Motivations for adopting Agile (2)

100

4.2.1.1 *Enhance Software quality (M1)*

58.5% of the respondents mentioned that enhancing software quality was very important or extremely important, while 15.5% of the respondents considered enhancing software quality as either slightly important or not important at all. 25.4% Considered enhancing software quality as moderately important.

4.2.1.2 *Enhance Engineering discipline (M2)*

20% of the respondents considered the enhancement of engineering discipline as either very important or extremely important, while 58% considered the enhancement of engineering discipline as either not important or slightly important. 22% of the respondents considered it moderately important.

4.2.1.3 *Accelerate to Market (M3)*

64.1% of the respondents considered Acceleration to Market as either very important or extremely important, while 27.5% considered acceleration to market as slightly important or not an important motivator. 7.7% rated accelerating to market as moderately important.

4.2.1.4 *Increase Productivity (M4)*

45.8% of the responding population ranked the increase in team productivity as very important or extremely important. 40.1% of the respondents considered it moderately important and 13.4% of the respondents considered the increase in team productivity as not important or slightly important.

4.2.1.5 *Reduce Cost (M5)*

6% of the respondents considered cost reduction as an extremely important or very important motivation for adopting Agile, while 25.4% considered it as a moderate motivation, and 19.1% considered cost reduction as slightly important or not important at all.

4.2.1.6 *Manage Changing Priorities (M6)*

19.8% of the respondents considered Managing changing priorities as not important or slightly important. 57.8% considered it extremely important and very important while 21.8% considered managing changing priorities as moderately important.

4.2.1.7 Improve Business/IT Alignment (M7)

25.4% of the respondents considered Business/IT Alignment as slightly important or not important at all, while 52.1% considered Business and IT/Alignment as very important or extremely important. 21.8% considered it moderately important.

4.2.1.8 Improve Culture and Boost Morale (M8)

30% of the respondents considered the improvement of culture and boost team morale as extremely important or very important. 50% considered it not important or slightly important while 20% considered it moderately important.

4.2.1.9 Reduce Risk (M9)

70% of the respondents considered Risk reduction as very important or extremely important, 15% considered it moderately important and 15% considered risk reduction as not important or only slightly important.

4.2.1.10 Improve Visibility (M10)

28% of the respondents considered the improvement of visibility as extremely important or very important. 14% of the sample population considered it moderately important while 58% considered the improvement of visibility as not important or slightly important.

4.2.2 Relative level of importance Index

The results of the Relative Importance index (RII), revealed that Reduce Risk (M1) was considered the most important motivation for adopting Agile, managing changing priorities (M2), enhance software delivery(M3), and Reduce Cost(M4) was also ranked as an essential motivation.

Accelerate to Market, Increase Productivity, and Improve Business and IT alignment were ranked at the midpoint of all ten motivations. Improve visibility, Improved engineering discipline and Improve culture and boost team morale were ranked lower and considered less important than all other motivational factors. Figure 24 summarizes the relative importance of motivations based on rankings.

Relative Importance Index - Motivation Rankings						
Code	Motivation	Frequency	Total Number (N)	A*N	RII	Rank
M9	Reduce Risk	528	140	700	0.754	1
M6	Manage Changing Priorities	505	140	700	0.721	2
M1	Enhance Software delivery	504	140	700	0.72	3
M5	Reduce Cost	499	140	700	0.713	4
M3	Accelerate to Market	496	140	700	0.709	5
M4	Increase Productivity	477	140	700	0.681	6
M7	Improve Business and IT Alignment	474	140	700	0.677	7
M8	Improve Culture and boost morale	354	140	700	0.506	8
M2	Improved Engineering Discipline	334	140	700	0.477	9
M10	Improve Visibility	334	140	700	0.477	10

Figure 19: Relative Importance Index Rankings

4.2.3 Mean, Variance, and Standard Deviation

Code	Motivation	Minimum	Maximum	Mean	Std. Deviation	Variance
M1	Enhance Software	1	5	3.6	1.34	1.796
M2	Improved Engineering discipline	1	5	2.39	1.24	1.548
M3	Accelerate to Market	1	5	3.54	1.34	1.818
M4	Increase Productivity	1	5	3.41	1.19	1.423
M5	Reduce Cost	1	5	3.56	1.28	1.643
M6	Manage changing priorities	1	5	3.61	1.29	1.665
M7	Improve Business and IT alignment	1	5	3.39	1.28	1.649

M8	Culture and Morale	1	5	2.53	1.56	2.438
M9	Reduce Project Risk	1	5	3.77	1.30	1.703
M10	Improve Visibility	1	5	2.39	1.52	2.325
				3.22	**1.34**	**1.80**

Table 11: Mean, Standard deviation and Variance: Motivations for adopting Agile.

4.2.2.1 Mean

Based on the results in Table 9, for the average mean value of 3.22, Enhance Software, Accelerate to Market, increase team productivity, managing changing priorities, Improve Business and IT alignment and Reduce Project Risk had a mean above 3.22, while Improved engineering discipline, Improve Culture, and Boost Morale and Improve visibility were all below the mean value.

4.2.2.3 Standard deviation

The standard deviation is considered the average distance from the mean. Based on an average standard deviation of 1.34 in Table 9. Reduce Risk, Improved engineering discipline, Reduce Cost, manage changing priorities, Improve Business, and IT alignment, increase team productivity, accelerate to market, and Enhance Software were lower and, as such, closer to the mean. While Improve visibility, improve Culture, and Boost team morale had a standard deviation higher than the average, as their values were further from the mean.

		Mean > 3.22	Mean < 3.22	σ > 1.34	σ< 1.34
		Higher level of importance	**Lower level of Importance**	**Value farther from mean**	**Value closer to mean**
M1	Enhance Software	✓			✓
M2	Improved Engineering discipline		✓		✓
M3	Accelerate to Market	✓			✓
M4	Increase Productivity	✓			✓
M5	Reduce Cost		✓		✓
M6	Manage changing priorities	✓			✓
M7	Improve Business and IT alignment	✓			✓
M8	Improve Culture and Boost Morale		✓	✓	
M9	Reduce Project Risk	✓			✓

| M10 | Improve Visibility | | | ✓ | ✓ | |

4.3 Agile Implementation approaches

According to the data presented in Figure 25, a significant proportion of the participants, namely 61.4%, considered their approach to adopting Agile as a tailored approach. This suggests that these participants approached Agile Implementation with a customized and personalized strategy, likely based on their specific organizational needs and requirements. On the other hand, 24.3% of the participants considered their approach to adopting Agile as a Dabbler approach. This suggests that these participants adopted Agile from an experimental and exploratory perspective. A smaller proportion of the participants, precisely 14.3%, considered their approach to adopting Agile as a Crusader approach. This suggests that these participants approached Agile Implementation with a firm conviction and a clear vision of its benefits, likely with a focus on driving change and transformation within their organizations. Interestingly, none of the participants selected the "None of the above" option, indicating that they all had a specific approach to adopting Agile and did not fall into any other category. Overall, the findings in Figure 25 provide a valuable snapshot of the participants' approach to adopting Agile, highlighting the various strategies and perspectives employed in the process. This information can be used to inform future research and practice in Agile Implementation and to develop tailored strategies and approaches that are best suited to different organizational contexts and requirements.

IMPLEMENTATION APPROACHES (%)

00

Figure 20: Results - Implementation Approaches

4.4 Test of Association between motivations and implementation approaches

A chi-squared test was performed against the implementation approaches and each motivation at a 5% significance level. P = 0.05

Where P< 0.05, H0 was rejected

Where P> 0.05 H0 was confirmed

The p-value is a measure of the significance of the results of a hypothesis test. The lower the p-value, the more substantial the evidence against the null hypothesis (H0). If the p-value is less than a significance level (0.05), the null hypothesis is rejected, and the alternative hypothesis is accepted.

Based on the results of the Chi-Squared test. The following results were established. The results of the Chi-squared tests show that there is no statistically significant relationship between the implementation approaches and M1 (Enhance software delivery), M2 (Improve Engineering Discipline), M3 (Accelerate to Market), M5 (Reduce Cost), and M6 (Manage Changing Priorities). However, there is a statistically significant relationship between the Implementation approach and M4 (Increase Productivity), M7 (Improve Business/IT Alignment), and M8 (Improve Culture/Morale). This means that the Implementation approach significantly affects the improvement of these three aspects. Figure 26 and Figure 27 summarize the overall results for the relationship between the ten motivations; M1 - Enhance Software delivery, M2 - Improved Engineering Discipline, M3 - Accelerate to Market, M4 - Increase Productivity, M5 - Reduce Cost, M6 - Manage Changing Priorities, M7- Improve Business and IT Alignment, M8 - Improve Team Culture and Boost Morale, M9 - Reduce Risk, M10 - Improve Visibility and three agile implementation approaches (Crusaders, Tailors, and Dabblers) Section 4.4.1 to 4.4.10 discusses each result for the relationship as met or not met in detail..

4.4.1 Enhance software delivery

A Chi-squared test was performed between the implementation approaches and M1 (Enhance software delivery). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was no statistically significant relationship between the implementation approaches and M1 (Enhance software). χ^2 (8) = 9.882, p = .273, Likelihood Ratio = 10.251, p= .248

This results in a p-value of .273 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

4.4.2 Improve Engineering discipline (M2)

A Chi-squared test was performed between the implementation approaches and M2 (Improve Engineering Discipline). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There

was no statistically significant relationship between the implementation approaches and M2 (Improve Engineering Discipline). χ^2 (8) = 8.518, p = .385, Likelihood Ratio = 8.589, p= .378

This results in a p-value of .378 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

Enhance software

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.882[a]	8	0.273
Likelihood Ratio	10.251	8	0.248
N of Valid Cases	140		

a. 4 cells (26.7%) have an expected count of less than 5. The minimum expected count is .14.

Improve Engineering discipline

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.518[a]	8	0.385
Likelihood Ratio	8.589	8	0.378
N of Valid Cases	140		

a. 5 cells (33.3%) have an expected count of less than 5. The minimum expected count is 1.43.

Accelerate to Market

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.139[a]	8	0.743
Likelihood Ratio	7.193	8	0.516
N of Valid Cases	140		

a. 5 cells (33.3%) have an expected count of less than 5. The minimum expected count is 1.57.

Increase Productivity

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.267[a]	8	0.054
Likelihood Ratio	16.115	8	0.041
N of Valid Cases	140		

a. 6 cells (40.0%) have an expected count of less than 5. The minimum expected count is .29.

Reduce Cost

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.294[a]	8	0.102
Likelihood Ratio	14.949	8	0.060
N of Valid Cases	140		

a. 4 cells (26.7%) have an expected count of less than 5. The minimum expected count is 1.86.

Manage Changing Priorities

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.277[a]	8	0.103
Likelihood Ratio	15.368	8	0.052
N of Valid Cases	140		

a. 5 cells (33.3%) have an expected count of less than 5. The minimum expected count is 1.86.

Improve Business/IT Alignment

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.628[a]	8	0.048
Likelihood Ratio	16.333	8	0.038
N of Valid Cases	140		

a. 5 cells (33.3%) have an expected count of less than 5. The minimum expected count is 2.14.

Improve Culture/Morale

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.651[a]	8	0.001
Likelihood Ratio	26.185	8	0.001
N of Valid Cases	140		

a. 7 cells (46.7%) have an expected count of less than 5. The minimum expected count is 1.14.

Figure 21: Chi Squared Results - Motivations of Agile (1)

Reduce Risk

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.111[a]	8	0.525
Likelihood Ratio	10.428	8	0.236
N of Valid Cases	140		

a. 6 cells (40.0%) have an expected count of less than 5. The minimum expected count is .43.

Improve Visibility

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.403[a]	8	0.602
Likelihood Ratio	6.286	8	0.615
N of Valid Cases	140		

a. 8 cells (53.3%) have an expected count of less than 5. The minimum expected count is 2.29.

Figure 22: Chi Squared Results - Motivations of Agile (2)

4.4.3 Accelerate to Market (M3)

A Chi-squared test was performed between the implementation approaches and M3 (Accelerate to Market). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was no statistically significant relationship between the implementation approaches and M3 (Accelerate to Market). χ^2 (8) = 5.139, p = .743, Likelihood Ratio = 7.193, p= .516

This results in a p-value of .516 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

4.4.4 Increase Productivity (M4)

A Chi-squared test was performed between the implementation approaches and M4 (Increase Productivity). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was a statistically significant relationship between Implementation and M4 (Increase Productivity). , $\chi^2(8)$ = 15.267, p = .054, Likelihood Ratio = 16.115, p= .041

This results in a p-value of .041 which is lower than the defined significance level of 5%. The Chi-squared test is therefore significant, and the null hypothesis is rejected.

4.4.5 Reduce Cost (M5)

A Chi-squared test was performed between the implementation approaches and M5 (Reduce Cost). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was no statistically significant relationship between the implementation approaches and M5 (Reduce Cost). . χ^2 (8) = 13.294, p = .102, Likelihood Ratio = 14.949, p= .060

This results in a p-value of .060 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

4.4.6 Manage Changing Priorities (M6)

A Chi-squared test was performed between the implementation approaches and M6 (Manage Changing Priorities). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was no statistically significant relationship between the implementation approaches and M6 (Manage Changing Priorities). χ^2 (8) = 13.277, p = .103, Likelihood Ratio = 15.368, p= .052

This results in a p-value of .052 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

4.4.7 Improve Business/IT Alignment (M7)

A Chi-squared test was performed between the implementation approaches and M7 (Improve Business/IT alignment). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was a statistically significant relationship between Implementation and M7 (Improve Business/IT alignment), $\chi^2(8) = 15.628$, p = .048, Likelihood Ratio = 16.333, p= .038

This results in a p-value of .038 which is lower than the defined significance level of 5%. The Chi-squared test is therefore significant, and the null hypothesis is rejected.

4.4.8 Improve Culture/Morale (M8)

A Chi-squared test was performed between the implementation approaches and M8 (Improve culture and Boost team morale). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was a statistically significant relationship between Implementation and M8 (Improve culture and Boost team morale), $\chi^2(8) = 27.651$, p = .001, Likelihood Ratio = 26.185, p= .001

This results in a p-value of .001 which is lower than the defined significance level of 5%. The Chi-squared test is therefore significant, and the null hypothesis is rejected.

4.4.9 Reduce Risk (M9)

A Chi-squared test was performed between the implementation approaches and M9 (Reduce Risk). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was no statistically significant relationship between the implementation approaches and M9 (Reduce Risk). $\chi^2 (8) = 7.111$, p = .525, Likelihood Ratio = 10.428, p= .236

This results in a p-value of .236 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

4.4.10 Improve Visibility (M10)

A Chi-squared test was performed between the implementation approaches and M10 (Improve Visibility). At least one of the expected cell frequencies was less than 5. Therefore, the assumptions for the Chi-squared test were not met. There was no statistically significant

relationship between the implementation approaches and M10 (Improve Visibility). χ^2 (8) = 6.403, p = .602, Likelihood Ratio = 6.286, p= .615

This results in a p-value of .615 which is above the defined significance level of 5%. The Chi-squared test is therefore not significant, and the null hypothesis is confirmed.

Based on the research hypotheses H0 and H1. The findings have been summarized below.

H0 – There is no relationship between the motivations of Agile and the Agile implementation approaches

H1 – There is a relationship between the motivations of Agile and the Agile implementation approaches

Table 14 summarizes the results of the relationship between the Agile motivations against the implementation approaches. In table 14, hypotheses M4, M7, and M8 are rejected because their p-values are less than 0.05. Hypotheses M1, M2, M3, M5, M6, M9, and M10 are confirmed because their p-values are greater than 0.05.

Code	Motivation	p-value	Null Hypothesis (H0)
M1	Enhance Software delivery	0.273	Confirmed
M2	Improved Engineering Discipline	0.378	Confirmed
M3	Accelerate to Market	0.516	Confirmed
M4	Increase Team Productivity	0.041	Rejected
M5	Reduce Cost	0.06	Confirmed
M6	Manage Changing Priorities	0.052	Confirmed
M7	Improve Business and IT Alignment	0.038	Rejected
M8	Improve Team Culture and Boost Morale	0.001	Rejected
M9	Reduce Risk	0.236	Confirmed
M10	Improve Visibility	0.615	Confirmed

4.5 Interview findings

Following the semi-structured interviews with 11 participants (6 Tailors, 3 Crusaders, and 2 Dabblers) as shown in Table 15 below. The table lists the 11 interviewees (R1-R11) and their respective industries, types of projects, roles, and implementation approaches. The industries represented were Manufacturing, Game Development, Broadcasting, Software Development, and Retail. The roles of the interviewees ranged from Project Manager to Scrum Master, with some also serving as Project Co-Ordinator, Project Lead, and Programme Manager. The implementation approach for each interviewee were either Tailor, Crusader, or Dabbler.

Participant ID	Industry	Type of Project	Role	Implementation approach
R1	Manufacturing	Software Implementation	Project Manager	Tailor
R2	Manufacturing	Software Implementation	Project Co-ordinator	Crusader
R3	Game development	Software Implementation	Scrum Master	Crusader
R4	Broadcasting	Software Implementation	Project Lead	Tailor
R5	Software development	Software Implementation	Project delivery Lead	Crusader
R6	Retail	Software Implementation	Scrum Master	Tailor
R7	Manufacturing	Software Implementation	Programme Manager	Tailor
R8	Software development	Software Implementation	Project Manager	Dabbler
R9	Software development	Software Implementation	Scum Master	Tailor
R10	Manufacturing	Software Implementation	Scrum Master	Tailor
R11	Software development	Software Implementation	Project Manager	Dabbler

Table 14:Semi structured Interview respondents

During these interviews, the participants were asked two questions to elicit their perceptions of the organization's motivations for adopting Agile and why a particular implementation approach was chosen. The first question, "What are your perceptions of the organization's motivations for adopting Agile?" was designed to elicit information on why the organization decided to adopt Agile. The responses provided by the interviewees were analyzed and used to identify ten critical motivations for adopting

Agile. The ten identified motivations included enhancing software delivery, improving engineering discipline, accelerating time-to-market, increasing team productivity, reducing cost, managing changing priorities, improving business and IT alignment, enhancing culture, and boosting team morale. These motivations reflect the various reasons organizations may adopt Agile, including Reducing risk, enhancing team productivity, and improving visibility. The second question, "Why did the organization use the selected implementation approach?" was designed to elicit information on the specific approach the organization chose to adopt, Agile. The responses provided by the interviewees were analyzed and used to identify the factors that influenced the organization's implementation approach. The study's findings, as summarized in Table 16, highlight the additional information gathered on the ten motivations for adopting Agile. By identifying these motivations, the study provides valuable insights into why organizations may adopt Agile and how the Implementation process can be tailored to meet their specific needs and requirements. Overall, the responses provided by the interviewees provide valuable information on the motivations and implementation approach used by the organization, highlighting the importance of understanding these factors when implementing Agile in an organizational context. These findings can inform future research and practice in Agile Implementation and develop tailored strategies and approaches that are best suited to different organizational contexts and requirements.

4.5.1 Responses for Interview question 1

This section summarizes the motivations for organizations to adopt Agile methodologies. The interview respondents were asked about their perception of the organization's motivations for adopting Agile to understand further why they perceived that the organization had decided to use Agile to deliver their software projects. Through the qualitative interviews with 11 participants, a range of reasons for considering and adopting Agile was identified and grouped into several themes: process improvement, delivering value faster, flexibility and change, improving the organizational Agile experience, improving communication, customer satisfaction and visibility, perception, type of project, reduce risk, and team productivity. The quotes provided offer insight into the participants' personal experiences and perspectives on why their organization adopted Agile and how it has benefited their processes and outcomes.

Question	Themes	Thematic quotes	Participant ID
What were the motivations for considering/adopting Agile?	Process Improvement	"Because, in my opinion, it is one of the best ways to manage certainty and introduce predictability while keeping innovation and responsiveness high"	R1
	Deliver value faster	"Agile allowed us to iterate and deliver in a timely manner"	R2
		"Projects were delivered in weeks/months rather than years"	R1
		"It was necessary for constant delivery of value to clients/customers, this was important to me and the organization	R3

		"It provided better transparency, quicker time to market, and increased value	R5
	Flexibility and change	"We liked Agile because it allowed us to make changes. and improvement for the client frequently"	R7
		"Because Agile is less rigid than waterfall"	R6
		" We were able to manage change without compromising quality"	R8
		"Nurturing a culture of agility and applying principles that promote flexibility is the best-known way to deliver software. This has been the case for some 20 years now from my experience. I wouldn't consider working in an organization that wanted to deliver software via other means.	R2
	Improve the organizational Agile experience	"We adopted Agile because we wanted to gain experience in Agile deliveries as an organization"	R3
	Improve communication, customer satisfaction and visibility	"We needed to work a little bit, test, and deliver to the client"	R7
		"We used Agile because it was perceived that it will	R11

		provide us with short feedback loops"	
		"It was adopted because there was a perception that it made our processes leaner and improved customer satisfaction"	R7
		"Because the focus was on providing value to clients"	R8
		"With Agile, the benefits were visible to our team and the customer"	R2
		"It provided a more efficient way of working / better collaboration"	R8
		"Improving the visibility of the project was considered highly important on specific types of projects and where project teams were working from different locations, several members of the project team were working across various parts of the world, with different time zones, therefore it was critical to establish an Agile (Kanban) approach which provided the visibility and alignment required across all project team members.	R1
		The client was the main driver for selecting Agile	R1

	Perception	"Agile was considered a new trend and the organization was keen to adopt it based on its reputation"	R5
	Type of Project	"Depending on the nature of the project, most change-driven projects were either run on Agile methodologies or Hybrid for better outcomes"	R6
		"It is useful in some circumstances, such as software development"	R7
		"The organization had a defined process for project method selection, and as part of this process, all software-related projects were highly likely to fall under the Agile approach. "	R4
		"The company selected Agile because we were developing software, there was a perception within the organization that Agile was more suited for software projects"	R10
	Reduce Risk	"I think Agile methods bring the best out of every individual and are timesaving (especially as colocation is one of its main features). There is also minimal risk of failure since the customer is involved in the process. Your ROI is almost stripped bare for you to see and	R11

		decide".	
		"Teams were able to quickly adapt to requirements changes without negatively impacting release dates. "	R6
		"Agile was adopted because it helps manage risks early, it was also adopted to build confidence with stakeholders and to rapidly iterate towards our users' goals	R5
		"There was a direct link between the decision to adopt Agile and the need to reduce risk on his project"	R10
		"Introducing some level of agility into the existing waterfall process was done to satisfy the concerns of the sponsors"	R7
		"The purpose of introducing Agile to their specific project was to increase the 'fluidity" of the governance process, this enabled the project team to quickly identify any misinterpretation of requirements with the customer at regular intervals and as a result, mitigated	R7

		the risk of cost over-runs"	
	Team productivity	"I think Agile methods bring the best out of every individual and are time-saving (especially as colocation is one of its main features). There is also minimal risk of failure since the customer is involved in the process. Your ROI is almost stripped bare for you to see and decide."	R2
		"Agile gave the team structure and allowed the ability to manage change"	R1
		"It was the preferred choice because it provided empowerment for the professional software developers to solve problems"	R3
		It was to provide teams the ability to quickly adapt to requirements changes without negatively impacting release dates.	R7
		The Agile (Scrum) method was used because it was perceived to be effective in increasing overall	R7

		productivity in comparison to other methodologies	

Table 15: Interview question 1 results

4.5.2 Response for Interview question 2

The section presents the interview respondents' responses on why organizations adopted specific Agile approaches. The interview respondents were asked why their organizations had adopted the approaches specified in the survey, i.e., Tailors, Dabblers, or Crusaders; this was to understand if there were other influencing factors apart from the motivations found in the literature that influenced the organizations to approach adopting Agile. The reasons for Implementation are grouped into themes, including senior management directives, resource availability and training, perception, existing processes, and adaptability. The quotes from participants (R1 to R11) provide insight into their experiences and perspectives on the implementation approach taken by their organization. The results summarized in Table 17 highlight that the reason for Implementation varies and can be influenced by multiple factors such as the organization's existing processes, resource availability, perception of Agile, and the backing of senior management.

Question	Implementation approach	Theme(s)	Thematic quote	Participant ID
Why did the organization use this implementation approach?	Crusader	Senior Management Backing / Directive	"The Portfolio director was a Scrum master, and recommended that we follow the scrum framework in its entirety, it's been working so far, at least to an extent when were all executed"	R3
		Senior Management Backing / Directive	"Agile is something that we as a business have adopted, so, previous, current and the selection for future projects will fall naturally to Agile. We also consider each of the things we build to be a product that is continually improved rather than a project with an end date. Agile works very well given these parameters"	R2
		Senior Management Directive	"This approach was recommended by the organization"	R2

		Resource availability and Training	"There was a newly set up Project management office (PMO) with funding and with its training budget, this likely influenced the Implementation of the crusader approach "	R3
		Perception	"There was a perception that Agile provided flexibility and reduced risk but it was not clear if this was the reason for taking a crusader approach, although I suspect that it was"	R5
		Senior Management Directive	"The crusader approach was more likely adopted because of the push and backing by senior management"	R5
	Tailor	Senior Management Directive	"Agile was adopted based on the recommendation by the organization"	R10
		Existing processes	"Another methodology already existed within the organization and senior management was looking to combine with Agile, hence the need for a tailored approach"	R6

		Perception	"Approach taken because it seemed to be trendy, Agile had become popular became within the top organizations and multinationals based in the country, and my organization wanted to be a part of this trend. This likely influenced the Tailor approach taken as it needed to blend into our unique processes "	R9
		Resource availability and Training	"We never followed Agile strictly to the book, because the knowledge was not there to follow it prescriptively"	R7
		Resource availability and Training	"Used due to lack of training costs. Elements of the (Agile) Scrum approach were combined with the "Waterfall approach. The organization had considered taking a Crusader approach by using the (Agile) Scrum Master methodology but training costs were a deterrent "	R1
		Adaptability	"Part of the reason for doing it this way was that we had to integrate with the	R10

			client's methodology"	
		Resource availability and Training	"There was a lack of understanding of Agile as a methodology, only a couple of people on the project understood how it works, this is likely why the tailored approach was adopted "	R4
	Dabbler	Existing processes	"No formal approach to project selection within the organization"	R11
		Existing processes	"Selected as there was no defined methodology recommended by the organization, but Senior Management was supportive of Introducing Agile "	R8
		Senior Management Backing / Directive	"There was no backing from Senior Management"	R11

Table 16: Interview question 2 results

4.6 Chapter Summary

In this research study chapter, the researcher utilized descriptive statistical analysis techniques to analyze the survey results and semi-structured interviews. The survey results were collected using a questionnaire and semi-structured interview tools. The data were analyzed to gain insight into the organization's motivations for adopting Agile and the implementation approaches used. The frequency of each element of the Likert scale was calculated to analyze the survey results. The mean and standard deviation were then determined to establish the motivations deemed of higher or lower importance. Additionally, a relative importance index (RII) was calculated to determine the relative importance of each motivation. The chi-squared association test was also carried out to explore the relationship between all the motivations and the implementation approaches.

In addition to the survey results, the responses from the semi-structured interviews were also analyzed. The responses from both Q1 and Q2 from all 11 interviewees were analyzed, and thematic quotes were provided to help contextualize and illustrate the findings.

The research findings were then compared and discussed with existing literature in Chapter 5. This comparative analysis helps contextualize the findings within the broader body of literature on Agile Implementation and provides insights into how the study results align with or differ from previous research. Using descriptive statistical analysis techniques to analyze the survey results and semi-structured interviews provides valuable insights into the motivations for adopting Agile and the approaches used. The comparison and discussion of the research findings with existing literature in Chapter 5 provide additional context and help elucidate the study's critical findings further. These findings can inform future research and practice in Agile Implementation and develop tailored strategies and approaches best suited to different organizational contexts and requirements.

CHAPTER 5 – ANALYSIS AND DISCUSSION

5.1 Introduction

In this chapter, the researcher presents and discusses the outcomes of the mixed-method research that was conducted. The findings are analyzed and linked to the existing literature that was discussed in Chapter 2 (Literature Review) of this study. The chapter focuses on three key areas: the motivations for adopting Agile and their rankings, the patterns of adoption based on the three implementation approaches (Crusaders, Dabblers, and Tailors), and the relationship between the motivations and the implementation approaches. Additionally, the chapter explores other relevant factors that were identified during the empirical research that influenced the selection of an implementation approach by organizations. The first area of focus is the motivations for adopting Agile and their rankings. The researcher discusses the identified motivations and their relative importance, as determined by the frequency, mean, standard deviation, and relative importance index (RII) analyses. This analysis answers research questions RQ1a and RQ1b and provides valuable insights into the key drivers behind the decision to adopt Agile in organizations. The second area of focus is the patterns of Implementation based on the three implementation approaches (Crusaders, Dabblers, and Tailors). The researcher provides an in-depth discussion of the patterns of Implementation observed in the study, and how they align with or differ from previous research. This analysis sheds light on the most common implementation approaches used by organizations and provides insights into the potential benefits and drawbacks of each approach. The third area of focus is the relationship between the motivations and the implementation approaches. The researcher utilizes a chi-squared test of association to explore the relationship between the identified motivations and the implementation approaches. This analysis answers research question RQ2 and provides valuable insights into the factors that influence the selection of an implementation approach by organizations. In addition to these three areas of focus, the chapter also discusses other relevant factors that were identified during the empirical research that influenced the selection of an implementation approach by organizations. This analysis provides a more nuanced understanding of the complex decision-making processes that organizations go through when selecting an Agile implementation approach.

Following the discussions, significant insights and conclusions are derived accordingly. These insights and conclusions provide valuable contributions to the field of Agile Implementation and can inform future research and practice in this area. Overall, this chapter provides a comprehensive analysis of the mixed-method research findings and contextualizes them within the broader body of literature on Agile Implementation.

5.2 Motivations of Agile

At the start of this research, sixteen motivations were identified within literature (see section 2.7). These were then streamlined to ten motivations for the Implementation of Agile as some of the motivations were grouped where they were understood to have similar meanings (See Section 2.7). The ten motivations were then presented to the questionnaire respondents who ranked these motivations based on their perceived importance to the organization in the delivery of software (See Section 4.2.2). Following the empirical results obtained from the questionnaire survey, it was found that six of the motivations were ranked considerably higher than four of the motivations. As such, two categories of motivations were established. Motivations of higher importance and motivations of lower importance. (See Figure 28).

Enhance software delivery, Accelerate to Market, Increase Productivity, Reduce Cost, Manage Changing Priorities, Improve Business and IT Alignment and Reduce Risk are all considered motivations of higher importance, while Improve visibility, Improved engineering discipline, and Improve culture and boost team morale were considered motivations of lower importance (See Figure 28). Furthermore, the results from the semi-structured interviews provided additional context to each motivation. It was found that for at least one of the motivations within each category, the rankings were reconsidered. Deductions from extant literature and comparisons with the empirical findings have been presented in section 5.2.1, Section 5.2.2 and Section 5.2.3

5.2 1 Motivations of Higher Importance

5.2.1.1 Reduce Project Risk

With over 70% (98) of the respondents ranking "Reduce Risk" as either extremely important or very important, it highlights that "Reduce risk" was considered a highly important motivation by organizations (See section 4.2.1.9). With an RII (Relative Importance Index) of

0.754, this also ranked Reduce risk as a motivation of higher importance (Section 5.2.1). As such, there appears to be a perception that the use of Agile methods reduces the risk probability to project delivery.

In comparison to the work carried out by Mkpojiogu et al., (2019) as highlighted in Section 2.7 (Page 49), Reduce project risk was ranked highly by respondents and was considered within the top 50% of the fourteen motivations which were assessed. 39% of the respondents in the 15th state of Agile report (Digital.ai Software, 2021), also ranked reduce project risk as an important motivation. Risk in the context of project management involves any uncertainty within the projects that can likely be a threat or an opportunity. (Sudarmilah et al. 2019). According to Smith and Merritt (2002) and Cule et al. (1998), a lack of proactive assessment and management of risks contributes to the failure rate of projects. Managing Risk and Uncertainty has remained a major unresolved challenge for organizations and project teams. (Souza, 2016). Cule, et al. (1998) and Smith and Merritt (2002) both mention that the rise in project failure rates is partly due to the lack of proper risk management measures in projects by managers. At the same time, several project management pieces of literature consider risk management to be a major factor that increases the success rates of projects (Shrivastava and Rathod, 2017;Pinto and Slevin, 1987). These factors might indicate why the reduction of risk in a project is considered an important motivation for organizations to adopt a methodology such as Agile. R7 mentioned that the purpose of introducing Agile to their specific project was to "increase the 'fluidity" of the governance process", (See section 4.5.1) this enabled the project team to quickly identify any misinterpretation of requirements with the customer at regular intervals and as a result, mitigated the risk of cost over-runs.

R10 also acknowledged that there was a direct link between the decision to adopt Agile and the need to reduce risk on their project. They mentioned that "introducing some level of agility into the existing waterfall process, was done to satisfy the concerns of the sponsors", this helped reduce the nervousness and concerns around uncertainty and long requirements gathering surrounding the project. This indicates that there was a perception from the customer that the use of Agile methods was likely to reduce the risk of overspends on the project. (Section 4.5.1)

Also quoting R6, they said, "Teams were able to quickly adapt to requirements changes without negatively impacting release dates. " While this response referred to Agile's adaptability characteristic, it highlighted that Agile indirectly impacted the risk of schedule overruns. Within Agile software deliveries, the approach of delivering a minimal viable product as well as techniques such as daily stand-ups are designed with the intent of getting early feedback from customers is considered less risky than traditional Agile methods, as this enables faster feedback loops and quality concerns are identified sooner rather than later. According to R5 "Agile was adopted because it helps manage risks early, it was also adopted to build confidence with stakeholders and to rapidly iterate towards our user's goals

Unlike traditional methods which only tend to gather the needs of the customer at the beginning of the project (Santos, 2020), Agile methods recommend customer involvement and collaboration at all stages, it also provides room for planning and re-planning regularly, as such new information discovered by the project delivery team can be adapted quickly for effectiveness. As suggested by R4 "There is also minimal risk of failure since the customer is involved in the process. Your ROI is almost stripped bare for you to see and decide". (Section 4.5.1). There is evidence to suggest that organizations have a strong perception that by adopting Agile methods they are Reducing risks to their projects, and this fuels their motivation to select Agile methods.

5.2.1.2 Accelerate to Market

Based on extant literature (Section 2.7 – Table 4), accelerate to market was defined as the need to reduce the time it takes to deliver the product and from the analysis of the empirical data, it was determined that the need to deliver the products faster was a motivation of higher importance (Section 4.2.3). This is consistent with previous literature on this topic. Mkpojiogu et al., (2019)'s research on Agile motivations found that accelerate product delivery was ranked as the most important motivation for adopting Agile. (Section 2.7)

According to R1 "Projects were delivered in weeks/months rather than years". Melton, (2002) describes a case study of a clinical trial carried out by a medium-sized biotech company which by taking an Agile approach to delivery, as a result, they removed organizational and operational boundaries, promoted parallel working, and eliminated a

"handover requirement" between the design and site teams enabled their progress at a rapid pace. R2 mentioned that "Agile allowed us to iterate and deliver in a timely manner". This also implies that organizations are keen to give their customers something to assess quickly, even if it is not the finished product, as they are likely to get feedback early enough to make the necessary adjustments and iterate. In comparison to Traditional methods where requirements are gathered up front and baselined, such changes are not likely to be identified until the product has been fully delivered. There is also an illusion that things are being done faster when the product is delivered in increments and clients can see frequent changes in the product. R5 said, "It provided better transparency, quicker time to market, and increased value". As such, while there might be no evidence found which indicates that Agile projects are delivered faster, it certainly accelerates the delivery of some value to the customer earlier than traditional methods. Organizations are therefore motivated to use Agile methods as they aid in accelerating the product to market. These support the previous findings that the need to Accelerate to Market is a strong motivation for adopting Agile to deliver software.

5.2.1.3 Increase Productivity

Agile methods are perceived to support the team's ability to become more productive. As suggested by R7 (Section 4.5.1). "Agile (Scrum) methods were used because they were perceived to be effective in increasing overall team productivity in comparison to other methodologies". Increasing team productivity refers to increasing the ability of the project to be effective and increasing the rate of productivity. This was considered a motivation of high importance as ranked by the respondents of the survey and the comments provided by the interviewees. Previous research has highlighted that Agile methods facilitate an increase in the team's productivity. A qualitative analysis of Agile methodologies found that the use of Agile methodologies led to improved quality and increased team productivity, the self-organizing teams are organized to handle complexities and adapt accordingly to changes in the environment, and are much better at utilizing talents more efficiently (Ahmed *et al.*, 2010). Previous work carried out by (De Melo *et al.*, 2013) who conducted a case study of three IT firms in Brazil found that Agile team design (structure and work allocation). This supports the perceptions of R4, who said that "I think Agile methods bring the best out of

every individual". They also implied that Agile gave the team structure and allowed the ability to manage change.

Another case study research conducted by Melo, et al. (2011) highlighted three perceived Agile-related factors that impacted positively the productivity of the team, these were appropriate team composition and allocation, external dependencies, and staff turnover. Some Agile practices such as pair programming and collocation were also found to have positively impacted productivity. This supports the comment made by R3 who said, "it (Agile) was the preferred choice because it provided empowerment for the professional software developers to solve problems".

According to interviews conducted by (F. Tripp and Armstrong, 2018), Agile provided 20-30% productivity enhancement. With the supporting evidence provided by previous case studies in literature and the empirical data of this research. The need to increase team productivity can be considered an important motivation that is driving the selection of Agile methods by organizations.

5.2.1.4 Reduce Cost

Although the need to reduce cost was ranked quite highly by the interview respondents, there was hardly any reference to cost reduction as an important motivator following the interviews carried out in this study. Cost reduction in this context refers to the reduction of the overall project expenditure. It appears that there were conflicting perspectives on the need to reduce risk being a motivation. The comments of some interviewees, such as R3 who mentioned that "There was a newly set up Project management office (PMO) with funding and with its training budget" As such, implying that the use of Agile was likely to increase costs, rather than reduce it. (See section 4.5.1)

Reduce cost was also ranked as among the lowest motivations in the work carried out previously by Mohamed (2014) and Mkpojiogu et al., (2019) (See Section 2.7), it was also considered by only 23% of the respondents from the 15th annual state of Agile as an important reason for adopting Agile. (Digital.ai Software, 2021).

Considering that Agile is currently viewed as a novel methodology, there is a need for organizations to invest in its knowledge and maturity via training or hiring specialist

resources like Scrum masters to implement projects, which appears to influence the perception among organizations that Agile methods are not likely to reduce costs.

The motivation to Reduce cost cannot be categorically considered as a motivation of higher importance for organizations delivering software.

5.2.1.5 Manage Changing Priorities

According to previous research, the concept of agility was initiated based on the need for flexibility and due to constantly evolving environments (Fernandez and Fernandez, 2008; Schilli et al. 2014). Modern project environments are fast-paced and as such are changing frequently, therefore, it is clear why organizations consider the need to manage changing priorities as a motivation of higher importance. Comments from respondents like R7 said "We liked Agile because it allowed us to make changes and improvements for the client frequently".

Priorities of the business and the customer are also likely to change frequently, especially for software. Therefore, rigid project delivery methods are unlikely to be selected as the preferred approach, this makes methods like Agile which are more flexible, the front runners when alternatives are being considered. According to R2 "Nurturing a culture of agility and applying principles that promote flexibility is the best-known way to deliver software, this has been the case for some 20 years now from my experience. I would not consider working in an organization that wanted to deliver software via other means". As indicated by this respondent, the perception that delivering software requires some element of flexibility means that they are unlikely to consider traditional project management methodologies which are considered more rigid and inflexible (Almeida, 2017; Niederman, Lechler, and Petit, 2018). When R8 was asked why they believe the organization had selected Agile methods as the preferred approach, they simply responded "Because Agile is less rigid than waterfall".

5.2.1.6 Improve Business and IT Alignment

Although improving business and IT alignment was considered a motivation of higher importance, responses from the semi-structured interviews indicated this was not the case. Whether there was a motivation to adopt Agile to improve the collaboration between the IT delivery team was unclear in some cases. This is because, following the semi-structured

interviews, it was determined that there were multiple interpretations of the term "business", as there was a conflict about whether this was referring to an external customer or the internal business teams. Findings suggest that there was a motivation to adopt Agile where it was perceived to improve collaboration between the IT delivery team and the customer. As mentioned by R7 who said, "it was adopted because there was a perception that it made our processes leaner and improved customer satisfaction" and R5 suggested that "it provided a more efficient way of working and better collaboration". It was therefore deduced that there was a motivation to adopt Agile to improve alignment between the IT delivery team and the customer, but no evidence was found that suggests that there was any motivation to improve alignment between the IT delivery team and the internal business teams. Considering that the report from the 15th state of Agile recorded that 47% of the respondents considered this a motivation of high importance. Despite the slight variation in interpretation, the findings within this study suggest that the alignment between the business and IT is a motivation of higher importance for the delivery of software by organizations.

5.2.1.7 Enhance Software delivery

Considering that this study was focused specifically on software delivery projects, it was unusual that the motivation to enhance software delivery was not ranked as highly as other motivations. Although enhancing the delivery of software was found to be a motivation of higher importance in this study, organizations appear to lean towards Agile due to a perception of its suitability for software development projects rather than the actual motivation to enhance the delivery of the software. R11 said, "the organization had a defined process for project method selection, and as part of this process, all software-related projects were highly likely to fall under the Agile approach. ". It could be argued that the motivation was not necessarily enhancing the software delivery, but because Agile methods were considered synonymous with software delivery. This is in line with the comments from R10 who said, "The company selected Agile because we were developing software, there was a perception within the organization that Agile was more suited for software projects". This perception might be linked to recommendations found in the manifesto of Agile which recommends "working software over comprehensive

documentation", as such organizations are more likely to link Agile to software development projects.

The Agile manifesto recommends, "Working software over comprehensive documentation" (Matalonga, Solari and Matturro, 2013). This recommendation puts more emphasis on the quality of the software being delivered and less emphasis on rigorous documentation. This emphasis is likely to persuade organizations focused on enhancing software delivery, that Agile will be a more suitable approach.

5.2.1.8 Simplified development process

The need to simplify the development process as a motivation for adopting Agile was previously mentioned by Mkpojiogu et al (2019) in Section 2.7; however, this was intentionally omitted from the scope of motivations that were ranked by survey respondents, as justified in section 2.8.1. However, several responses received from the interview respondents indicated that Agile was adopted for the need to simplify the development process. Agile projects recommend incremental delivery, which allows for the software development process to be simplified. (Larman and Basili, 2003). According to Albadarneh et al., (2015), "Delivering software in small chunks is relatively easier to plan and manage, this allows for defects to be found earlier in the process when it is cheaper and quicker to fix". R5 also mentioned that "it (Agile) provided a more efficient way of working / better collaboration". According to R7, "the purpose of introducing Agile to their specific project was to increase the 'fluidity" of the governance process, this enabled the project team to quickly identify any misinterpretation of requirements with the customer at regular intervals ". R11 mentioned that "We needed to work a little bit, test and deliver to the client" (See section 4.5.1). This ability to adapt processes to suit specific delivery objectives is not common within traditional approaches.

Software deliveries are less successful where the development processes are rigid and complex (Sarangee, Schmidt, Srinath, and Wallace, 2022). Governance processes within traditional Agile methods are considered inflexible and rigid. (Inayat, Salim, Marczak, Daneva, and Shamshirband, 2015). s such organizations are likely to be motivated to adopt Agile for software deliveries as it introduces more simplicity to the development process.

5.2.2 Motivations of Lower Importance

5.2.2.1 Improved Engineering discipline and Enhance Culture and Boost Morale

Improved Engineering discipline and Enhance Culture and Boost Morale were found to be motivations of lower importance within this study (See section 4.5.1). This is consistent with other findings within the literature on the motivations of Agile. Mkpojiogu et al., (2019)'s study ranked improved engineering discipline as the lowest-ranked motivation for software start-ups in Saudi Arabia, Improved team morale was also ranked very low in the same research (See Section 2.7). Improved team morale was also considered an unimportant motivation by programmers surveyed by Mohamed et al., (2014). However, there were some indications that Agile was boosting the morale of the teams. R2 said "I think Agile methods bring the best out of every individual and are time-saving (especially as colocation is one of its main features).

These findings suggest that characteristics of Agile which improve team dynamics are prioritized ahead of team satisfaction. Organizations appear to be more interested in adopting Agile based on its ability to improve the structure of the team, rather than its ability to boost the team's morale or overall satisfaction. As mentioned by R1 "Agile gave the team structure and allowed the ability to manage change" and, as mentioned by R3. "It (Agile) was the preferred choice because it provided empowerment for the professional software developers to solve problems" (See section 4.5.1). Therefore, improved engineering discipline and the need to improve culture and boost team morale is not considered important motivation for adopting Agile to deliver software. Several responses indicate that the need to improve the dynamics within the team and ultimately increase team productivity is considered a motivation as previously highlighted.

5.2.2.2 Improving Visibility

The first phase of this study considered Improving visibility as a motivation of lower importance. This was consistent with other similar findings in literature (Mkpojiogu *et al.,* 2019)

However, an exception was identified following the interview responses, it was mentioned by R1 that Improving visibility was considered highly important on specific types of projects and where project teams were working from different locations. According to R1, "Improving the visibility of the project was considered more important within specific

project scenarios, particularly where project teams were working from different locations or team members of the project team were working across different time zones.

While the need for improving visibility cannot be categorically considered as a motivation of higher importance strictly based on this account, it is deemed to be more important within specific scenarios, such as the one described by R1 (See section 4.5.1). Overall, the findings from the interviews were generally consistent with the findings from the survey data (See section 4.4.1.0) and the comments from participant R1 seem to explain why there was a higher coefficient of variation in all three motivators as while some respondents considered improve visibility as important, others did not.

5.2.3 Other factors influencing the Implementation Agile.

Following the completion of this study, four additional factors influencing the adoption of agile. While it is however unclear if these factors can be considered as motivations of higher or lower importance. They provide some level of influence on the organization's decision to adopt Agile. They include Improve team communication and customer satisfaction, Senior Management Directive, Type of Project and Improve organizational Agile experience.

5.2.3.1 Improve Team Communication and Customer Satisfaction

The importance of improving team communication and collaboration was evident in the responses provided by the interviewees in this study. For example, R6 mentioned that Agile was perceived to provide short feedback loops, which could help to improve communication within the project team. Similarly, R5 highlighted that Agile provided a more efficient way of working and better collaboration. These responses suggest that organizations were motivated to adopt Agile to improve communication and collaboration within their project teams.

Effective communication is a critical component for the success of any project, and it is no different when it comes to the Implementation of Agile methodology (Marnada *et al.*, 2021). One of the core principles of Agile is to promote communication and collaboration among team members, and this has been credited with improving team communication (Bennett et al., 2010). Agile methodology encourages self-managed teams, which can help to break down communication barriers, enabling team members to work together more effectively and efficiently.

In some cases, the Implementation of Agile was driven by the needs of the client. R1 stated that the client was the main driver for selecting Agile, and as such, the Implementation of Agile was aimed at satisfying the needs of the customer. This further underscores the importance of effective communication, not just within the project team, but also with external stakeholders such as customers.

Overall, improving team communication and customer satisfaction can be considered important motivators for the Implementation of Agile methodology. Agile methodology emphasizes the importance of effective communication and collaboration, which can help to break down barriers and enable team members to work together more effectively. Organizations that adopt Agile can improve their ability to communicate with both internal and external stakeholders, leading to better collaboration and customer satisfaction.

5.2.3.2 Senior Management Directive

This research found that Senior Management Directive was significantly influential in some of the decisions to adopt. As mentioned by R3 "The Portfolio director was a Scrum master and recommended that we follow the scrum framework in its entirety, it's been working so far, at least to an extent when were all executed". Agile methodology has seen a significant increase in Implementation in recent years (Cao et al., 2009; De Cesare et al., 2010; West *et al.*, 2012). Its effectiveness in enabling organizations to quickly respond to changing project requirements and improve team collaboration has contributed to its widespread popularity. However, the growing popularity of Agile has also led to concerns that some organizations may be adopting it without a clear understanding of its purpose or specific benefits. Cram and Newell (2016) suggest that some organizations may be adopting Agile "mindlessly", simply because it has developed a reputation within the project management industry. The findings of the study support this view, with some organizations adopting Agile because it has become a popular trend rather than because it offers specific benefits. For example, R8 stated that their organization was keen to adopt Agile based on its reputation as a new trend. This suggests that some organizations may be adopting Agile without a clear understanding of how it can benefit their projects. This highlights the importance of organizations carefully considering the decision to adopt Agile methodology. It is important to have a clear understanding of the benefits that Agile can offer and to ensure that the organization is ready to embrace the cultural changes that come with adopting Agile.

Without this understanding, organizations may not be able to fully realize the benefits of Agile and may even encounter challenges during the Implementation process.

While Agile methodology has gained widespread popularity in recent years, it is important for organizations to carefully consider the decision to adopt it. The benefits of Agile must be understood, and the organization must be prepared for the cultural changes that come with adopting Agile. Organizations that adopt Agile without a clear purpose or understanding of its benefits may not fully realize its potential and may even encounter challenges during the Implementation process. Overall, Senior management directive was found to be influential in the decisions to adopt agile, while in some cases this was based on experience, in others, it was based on perception.

5.2.3.3 Type of Project

As found within this study, in some cases, organizations have clearly defined processes for determining the most appropriate project management approach, whether it be Agile or other traditional methods. This process helps organizations to evaluate projects based on a predetermined set of criteria and identify the most suitable approach for delivery. R6 highlighted that "depending on the nature of the project, change-driven projects were either run on Agile methodologies or Hybrid for better outcomes". Similarly, R11 mentioned that "the organization had a defined process for project method selection, and software-related projects were highly likely to fall under the Agile approach." This approach highlights the importance of considering the specific characteristics of a project before determining the most appropriate project management approach. Such a method ensures that the approach taken is tailored to the specific needs of the project and increases the likelihood of project success. This process of project method selection is typically based on previous experiences and lessons learned from previous projects. Organizations can use their past experiences to identify which project management approach was most successful for a particular type of project, and then apply it to similar projects in the future. This approach can help organizations to maximize the benefits of Agile methodology, while also ensuring that traditional methods are used when appropriate. The process of determining the most appropriate project management approach is critical in ensuring project success. In some cases, organizations have well-defined processes for project method selection based on predetermined criteria. This approach allows organizations to evaluate projects based on

their specific characteristics, past experiences, and lessons learned. By doing so, organizations can tailor their project management approach to meet the specific needs of the project and maximize project success.

5.2.3.4 Improve organizational Agile experience:

One of the interesting findings from the interviews was the motivation for organizations to adopt Agile to improve their experience in Agile deliveries. This was highlighted by R3, who stated that the organization adopted Agile because they wanted to gain experience in Agile deliveries as an organization. This is a unique motivation that was not previously captured in the literature and may be considered an obscure motivation for adopting Agile.

It is worth noting that Agile can be a cost-intensive approach and it is unlikely that organizations will adopt it solely for the purpose of gaining experience. However, the desire to improve organizational experience in Agile deliveries could be seen as a strategic motivation for some organizations. This could be especially true for organizations that are seeking to build their capabilities in Agile delivery and looking to establish themselves as industry leaders in this area.

Figure 28 illustrates the motivations for Agile Implementation as categorized by the study. The motivational factors are grouped into three categories: higher importance, lower importance, and other factors.

This categorization helps to provide a clearer picture of the different factors that are driving organizations to adopt Agile. By understanding these motivations, organizations can make informed decisions about whether Agile is the right approach for their projects and how it can best be implemented to achieve their goals.

In conclusion, the study highlighted additional factors influencing the Implementation Agile which were not previously identified within literature. It found that, while some organizations are motivated by the ten motivational factors identified in section 2.7 c, the Implementation of agile is also influenced by other factors such as improving team communication and customer satisfaction, or responding to senior management directives, while others may be seeking to gain experience in Agile deliveries. By understanding these

motivations, organizations can make informed decisions about the most appropriate project management approach and increase their chances of project success.
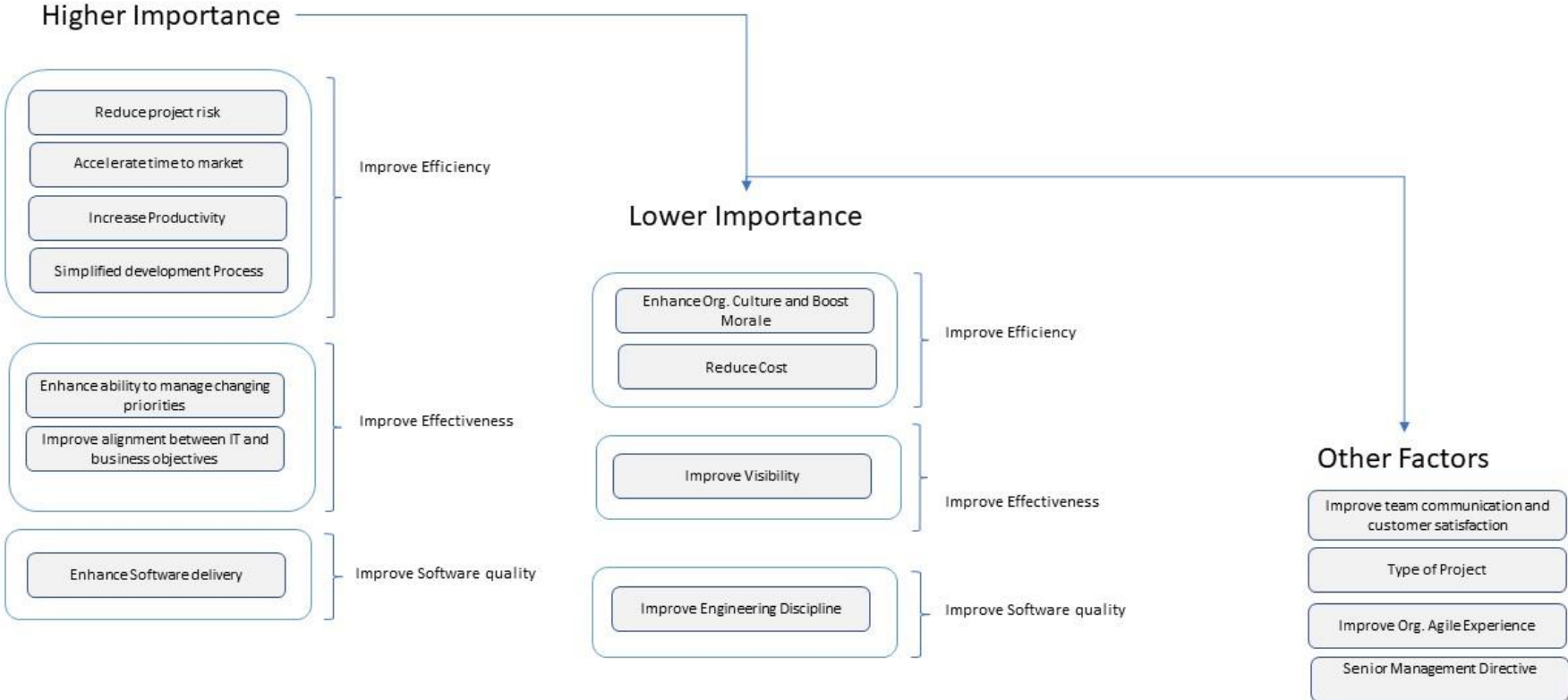
Figure 23: Organizational Motivations of Agile for the delivery of Software

5.2.4 Emerging Patterns:

It was found that organizations are driven to adopt Agile not only by specific motivations but also by other influential factors that may not be considered motivations themselves. In line with the findings of this research, a study conducted by Hiryani and Mishra (2022) also identified various drivers of Agile adoption, which align with the motivations identified in this thesis. The drivers of Agile adoption identified in Hiryani and Mishra's study include non-motivating factors such as public and peer pressure, top management commitment, government regulations, legislation, availability of organizational resources, and corporate image. These findings resonate with the factors discovered in this research, such as senior management directives and the type of project.

Furthermore, it was established that in addition to the categorizations proposed by Tripp and Armstrong (2014), the motivations uncovered in this study and the other factors can also be classified into three categories which can be grouped as follows: Organization - Motivations focused on delivering organizational objectives and meeting business needs, Process - Motivations aimed at improving the organization's project process, and People - Motivations aimed at enhancing individuals and their interactions.

Organization:

Under the category of "Organization," Agile drivers were found to be related to factors such as management buy-in, organizational setup, and the prevailing climate within the organization. Some of the specific drivers in this category found within this study and previous studies (Abrar et al., 2019; F. Tripp & Armstrong, 2018; Mkpojiogu et al., 2019) included accelerating time to market, improving alignment between IT and the business senior management commitment, organizational image, government regulations, legislation, and the availability of organizational resources.

People:

Within the "People" category, the Agile drivers were focused on improving individuals and team dynamics. These drivers included enhancing organizational culture, boosting morale, improving team communication, and enhancing customer satisfaction. (Noteboom & Ofori, 2021) Also found Agile drivers within this category, such as team size, leadership, communication, collaboration, and team expertise.

Process:

In the "Process" category, the Agile drivers were centered around improving the project delivery process. These drivers included reducing project risk, simplifying the development process,

increasing productivity, enhancing the ability to manage changing priorities, improving software delivery, reducing costs, improving visibility, and enhancing engineering discipline.

These patterns highlight a notable trend: Agile adoption is more influenced by the need to improve the project delivery process than enhance individuals and team dynamics or meet organizational objectives. This is evident from the rankings of the motivations within each of these categories, where there are more process-driven motivations considered of higher importance than organization and people-driven motivations.
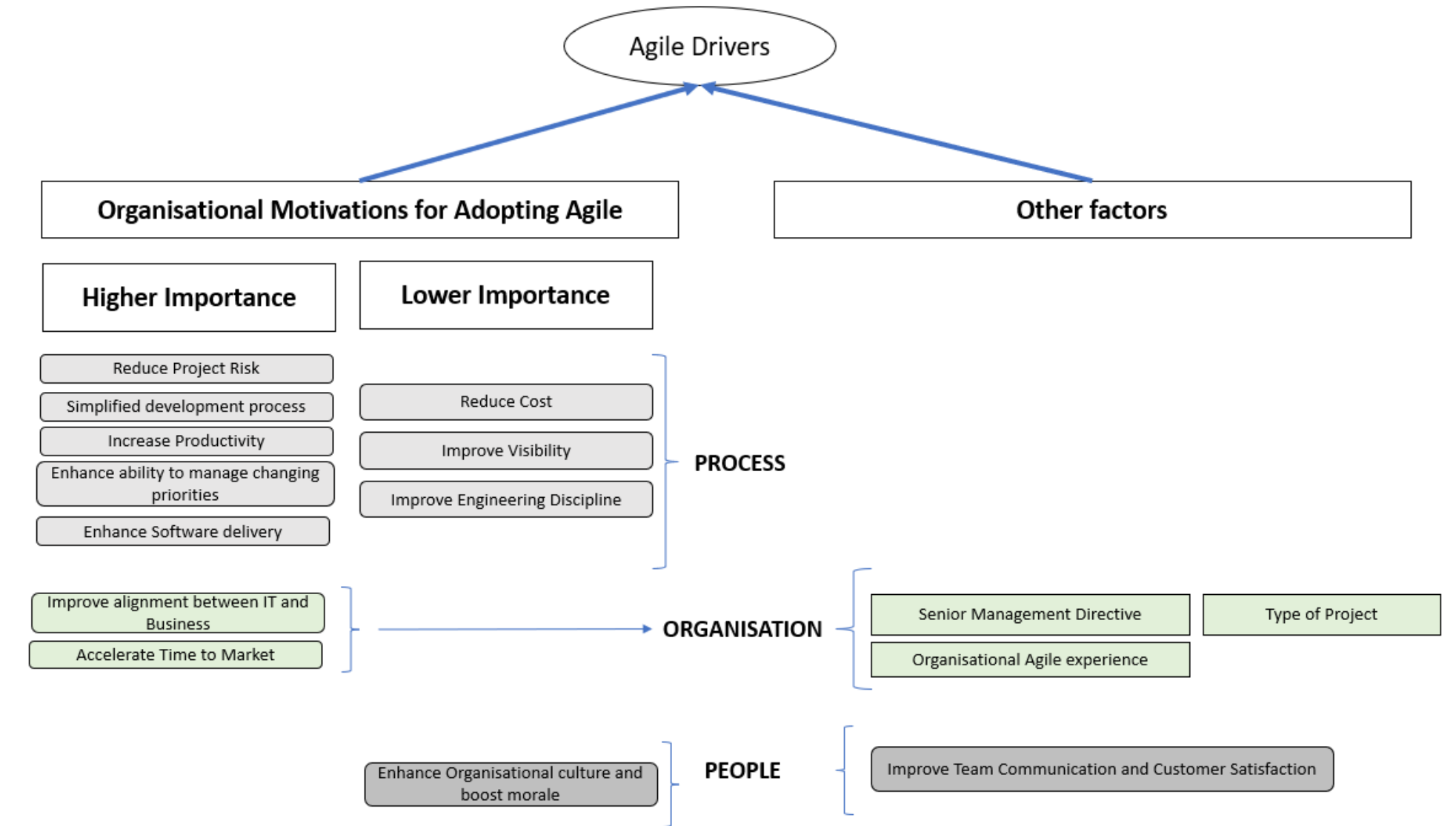
Figure 23:Emerging Categories of Agile Drivers

5.3 Implementation approaches of Agile

At the start of this research, three implementation approaches were found within literature. Cram and Newell (2016) posited that Agile was being adopted "mindfully" or "mindlessly". Either from a Crusader, Tailor, or Dabbler approach. To establish if Agile Implementation was consistent with these approaches and determine whether motivations were influencing the implementation approaches. The three implementation approaches mentioned by Cram and Newell (2016) were tested.

This study found that all Agile adopters indicated that their approaches fall into one of the three categories identified within literature. Crusaders, Tailor, and Dabbler.

There appears to be a strong leaning toward the "Tailor" approach to Agile Implementation in comparison to the "Dabbler" and "Crusader" approaches. The findings are discussed below.

5.2.1 Tailors and Dabblers

Most of the respondents within this study were found to be tailoring their projects or dabbling. This represented 85.7% of the entire sample population (See section 4.5.2). As found within literature. Tailoring refers to the "blending" of an Agile methodology with other existing methodologies within an organization while Dabbling involves selecting various techniques (such as Daily stand-ups or Retrospectives) from   one or multiple Agile methodologies (Cram and Newell, 2016). Some of the findings within literature (See section 2.5.2) and this empirical research provide some insight into some of the reasons why Tailoring and dabbling appear to be the more popular implementation approach.

It is worth mentioning that the process of adopting Agile is complex and demanding, adopting an approach of this nature requires senior management support, and cultural adaptation will require team commitment and is likely to face resistance to change. (Campanelli and Parreiras, 2015; Binder et al., 2014; Javdani Javdani Gandomani and Ziaei Nafchi, 2016)

Considering that organizations have been historically delivering projects before the evolution of Agile methods, adopting Agile will require strategic considerations (Campanelli and Parreiras, 2015). Kurapati, Manyam, and Petersen (2012) mention that cases exist

where the Implementation of standard Agile practices (the Crusader approach) is not suitable for some organizations. Unpacking the organizations' previously existing methods to onboard a new methodology might be daunting for these organizations as there is a need to spend effort and resources when adopting Agile. As such, finding ways to integrate their existing methods with the novel methods such as Agile provides some level of consistency that aligns closely with the organization's culture, values and needs has become more common. This way they only spend just enough effort and resources in adopting the aspects of the Agile frameworks which provide the required value. (Abbas, Gravell, and Wills, 2010; Sidky, 2007; Qumer and Henderson-Sellers, 2008). This was consistent with the comments of R6, who said "Another methodology already existed within the organization and senior management was looking to combine with Agile, hence the need for a tailored approach" (See section 4.5.2). This also suggests that organizations are averse to risk and as such, are threading with caution by not fully committing to Agile, hence the preference for a more tailored approach.

In addition, implementing Agile is not cheap. From training costs to the costs of recruitment and accreditation which any organization looking to adopt Agile in its raw form must consider, is impacting their likelihood of them being crusaders and more of tailors and dabblers. This was in line with the comments from R1 who said "Agile was used due to lack of training costs. Elements of the (Agile) Scrum approach were combined with the "Waterfall approach. The organization had considered taking a Crusader-type approach by using the (Agile) Scrum Master methodology but training costs were a deterrent "(Section 4.5.2). Scrum is the most popular Agile approach used by organizations (Yusnorizam Ma, 2018), at the minimum organizations will need to invest in the training of an accredited scrum master who then provides the team with the required Agile knowledge. Scrum practices such as daily stand-ups might also require investments into tools that facilitate the implementation of these techniques. These could include office spaces for teams within the same location or subscriptions to applications such as Jira, Microsoft Teams, etc. Organizations might not be able or willing to commit considerable investments into Agile. As such, will aim for alternatives such as Tailoring.

Agile is also not perceived as a silver bullet. Several drawbacks to its implementation have been found within literature and discussed in section 2.4.5. Include organizational, people

drawbacks and technology-related drawbacks are a hindrance to the full Implementation of Agile in its authentic form. Moe, Aurum, and Dybå, (2012) lists a few challenges experienced using pair programming and lean development Agile methods specifically.

The concept of organizational agility has become popular in recent years and some researchers suggest that Agile methods are more effective when the entire organization is Agile (Organizational Agility). (Žitkienė and Deksnys, 2018; Renzl, Mahringer, Rost, and Scheible, 2021; Govuzela and Mafini, 2019) but several people drawbacks mentioned by (Javdani Javdani Gandomani and Ziaei Nafchi, 2016) such as non-collaborative behaviors, wrong mindsets, a lack of Senior leadership team buy-in, and unwillingness to change are also likely to be deterrents that prevent the wholesome Implementation of Agile methods.

5.2.2 Crusaders
This study found that only 14% of the entire sample population uses the crusader approach, Crusaders are adopters who are taking a holistic implementation approach by diligently adhering to the principles, artifacts, phases, and practices of one of the Agile methodologies. (See section 4.3)

While some organizations are taking a more laid-back and risk-averse approach to adopt Agile, other organizations are seeking the full Agile experience, "we adopted Agile because we wanted to gain experience in Agile deliveries as an organization" – R3. (See Section 4.5.2) Although this appears to be a relatively lower number in comparison to organizations looking to implement a Tailor and Dabbler approach. This study found some deductions which might explain why this is the case.

The issue of cost and expenditure is not a challenge for some organizations, as they are willing to commit the resources required to implement Agile by the book. Where required, they are also willing to invest in the necessary knowledge gaps to ensure they maximize the benefits of adopting Agile in its purest form. According to comments summarized in section 4.5.2 by R3 "There was a newly set up Project management office (PMO) with funding and with its training budget, this likely influenced the Implementation of the crusader approach ". This indicates that organizations with available funding are likely to consider implementing Agile comprehensively in a method-centric approach.

Some of the crusaders within this study indicated that this was possible due to senior management backing and directives. According to R5, "The crusader approach was more likely adopted because of the push and backing by senior management" and R2, said, "This approach was recommended by the organization". (Section 4.5.2)

In addition to the backing from senior management, the availability of the knowledge required to deliver Agile also influenced its crusader-style Implementation. R3 mentioned that "The Portfolio director was a Scrum master and recommended that we follow the scrum framework in its entirety, it's been working so far, at least to an extent when were all executed".   Where there is Senior management buy-in, these organizations are more open to embracing a comprehensive approach to adopting Agile.

It was also found that the organization's perception of Agile might have also influenced the use of a method-centric approach to delivering Agile. R2 said, "Agile is something that we as a business have adopted, so, previous, current, and the selection for future projects will fall naturally to Agile. We also consider each of the things we build to be a product that is continually improved rather than a project with an end date. Agile works very well given these parameters". (Section 4.5.2) Such organizations are fully committed to Agile and might tailor and dabble but will also be crusaders as required.

Considering several Agile methodologies are frameworks, it is unlikely that all organizations who are adopting Agile comprehensively as crusaders, are doing it the same way. Therefore, a crusader implementing Agile, 100% in its purest form is unlikely to exist

More recent frameworks such as PRINCE2-AGILE and SAFe are highly prescriptive and organizations adopting Agile using these methodologies will be more crusader inclined.

Considering that all respondents within this research selected "None of above" and all their approaches were considered either Crusader, Tailor or Dabbler approaches. This clarifies that these three approaches provide a broad enough categorization which encompasses majority of agile implementation approaches. As identified in section 2.6 Big Bang Implementation, Incremental Implementation, Agile pilots, Lean startup approach, and Agile coaches can all be considered agile Implementation strategies with their implementations more likely to fall within any of these three categories (Crusader, Dabbler or Tailor).

Overall, the research found enough evidence to suggest that organizations are implementing Agile using the three implementation approaches mentioned (Cram and Newell, 2016) (Crusaders, Dabblers, and Tailors).

5.3 Relationships between the Motivations and the implementation approaches

The research question RQ2b within this study is aimed at understanding whether a relationship exists between the motivations and the implementation approaches.

Previous researchers hinted that a relationship exists between the motivations for adopting Agile and the use of Agile practices (Tripp and Armstrong, 2014; Digital.ai Software, 2021; F. Tripp and Armstrong, 2018). (See section 2.5.2)

This study expanded further on previous studies by investigating if a relationship exists between the motivations for adopting Agile and the Agile implementation approaches. This included Crusaders (An implementation approach that involves the holistic Implementation of Agile in its purest form), Tailors (The tailoring of Agile to suit existing approaches), and Dabblers (The Implementation of Agile practices). (See Section 2.5.2)

The findings from this study established that there were consistencies with previous research within this area.

5.3.1 Motivations influencing the selection of the Tailor and Dabbler approach.

The three categories of the motivations of Agile established as part of this research were motivations that improve efficiency, motivations that improve effectiveness, and motivations that improve software quality. All three categories of motivations were found to influence the type of implementation approaches that were selected by organizations. (See Section 4.4 and 4.5.2)

Improve Efficiency

Findings from this study established that the need to reduce risk was the most popular reason why organizations are adopting Agile. Some of the respondents made it clear that Agile provided several benefits which mitigated risks to their projects. As hinted by R10 "Part of the reason for doing it this way was because we had to integrate with the client's methodology" Agile was tailored to suit the methodology of the client. As such, the

motivation to reduce project risk influenced the implementation approach taken. (See section 2.5.2)

It was also found that within organizations where legacy methodologies already existed, they were inclined to use the tailor or dabbler approaches to avoid the risk of adopting a new methodology. According to R6 "Another methodology already existed within the organization and senior management was looking to combine with Agile, hence the need for a tailored approach". The lack of training costs also dictated the Implementation of approaches. As suggested by R1, elements of the (Agile) Scrum approach were combined with the Waterfall approach. The organization had considered taking a Crusader approach by using the (Agile) Scrum methodology but training costs was a major limitation. In other cases, there was also a lack of understanding of Agile as a methodology, "only a couple of people on the project understood how it works, this is likely why the tailored approach was adopted" (R4). Another respondent's statement which indicated that the lack of knowledge of Agile limited their implementation approaches was R7 who said, "We never followed Agile strictly to the book, because the knowledge was not there to follow it prescriptively" (See section 2.5.2)

Improve Effectiveness

One of the primary reasons for the emergence of Agile methodologies was to address the challenge of managing complex and ever-changing environments. Researchers like Moran (2013) and Berkani, Causse, and Thomas (2019) have highlighted this fact. The flexibility and adaptability offered by Agile methods have been identified as key drivers behind its Implementation. As stated by one of the participants in this study, R7, "It was to provide teams the ability to quickly adapt to requirement changes without negatively impacting release dates" (See Section 2.5.7). This comment suggests that organizations adopt Agile methodologies because of their ability to handle change in a flexible and efficient way.

Furthermore, this flexibility allows organizations to fluctuate between implementation approaches as per the changing requirements. In other words, if an organization needs to adopt a more comprehensive approach to Agile, such as the Crusader approach, to address a specific need or to implement a particular project, they can do so without negatively impacting their Agile Implementation as a whole. Conversely, if the

organization needs to adopt a more relaxed approach, such as the Dabbler approach, for a different project, they can do so without worrying about being locked into a specific approach. Therefore, the adaptability and flexibility offered by Agile methodologies have become significant motivators for organizations to adopt Agile. Organizations can easily change their approach to Agile based on their current needs, and Agile methodologies allow them to quickly adapt to the changes in requirements without negatively impacting their release dates. Thus, the Implementation of Agile methodologies enables organizations to navigate the complexity and uncertainty of their environments while being agile and adaptive in their approach.

Improve Software Quality

The perception that Agile methodologies are only applicable to software development has a significant impact on the selection of implementation approaches. Organizations often choose an implementation approach based on their initial goals for implementing Agile. For instance, if an organization's primary objective is to enhance the quality of their software by creating a minimum viable product (MVP), this goal is likely to influence the approach they take to adopt Agile. In such cases, the organization may adopt Agile in a way that enables them to work alongside the client to deliver and test smaller chunks of functionality, as mentioned by R7, "We needed to work a little bit, test, and deliver to the client" (See Section 2.5.7). It is more likely that such organizations will be successful when the methodologies used by both teams are synchronized. Moreover, when an organization's focus is on providing value to clients, they may have to tailor or dabble in their Agile delivery approach to meet the needs of the client, as pointed out by R8, "Because the focus was on providing value to clients" (See Section 4.5.2). Thus, the need to enhance the quality of the software can significantly influence the organization's implementation approach. In summary, the perception that Agile is primarily used for software development, combined with an organization's initial goals for adopting Agile, can play a crucial role in selecting the most suitable implementation approach.

Other Factors

In addition to the motivations, other factors were also found to influence the selection of the tailor and dabbler approaches. In some other cases, it was found that the decision to tailor existing methodologies or implement Agile practices was influenced by senior

management directives. As hinted by R6 "management was looking to combine with Agile, hence the need for a tailored approach". (See section 4.5.2). This study also found that within organizations where no formal approaches existed, organizations were found to implement Agile practices as required (dabbler approach).

The lack of backing from senior management was also determined as an influential factor in the implementation approach selected. Some organizations took the dabbler approach because senior management did not back the more resource and cost-intensive approaches such as the Tailor or the crusader approach.

5.3.2 Motivations influencing the Implementation of the Crusader approach

The Implementation of the Crusader approach in Agile was found to be influenced by various factors, according to this study. One of the most significant factors was the directive of senior management. It was observed that in some organizations, the decision to use Agile was made by senior management and that they played a crucial role in determining the implementation approach. This was evident in the comments made by R3, who mentioned that the Portfolio director recommended the use of the Scrum framework in its entirety. In such cases, the delivery team was unlikely to consider any other implementation approaches other than the Crusader approach. Availability of funding was also found to be a significant factor in the Implementation of the Crusader approach. As mentioned by R3, the presence of a newly set up Project Management Office (PMO) with funding and training budgets influenced the Implementation of the Crusader approach. This finding suggests that organizations with sufficient resources are more likely to adopt Agile as Crusaders.

The Perception of Agile was another factor that influenced organizations to adopt Agile as Crusaders. Some organizations were adopting Agile "mindlessly" without any justifiable reasons, according to Cram and Newell (2016). This approach was influenced by their perceived knowledge of Agile. For instance, R5 mentioned that there was a perception that Agile provided flexibility and reduced risk, but it was not clear if this was the reason for taking a Crusader approach, although they suspected that it was.

Finally, the lack of existing methodologies was another influential factor that led some organizations to adopt Agile as Crusaders. In such cases, Agile provided a framework for managing projects where no methodology existed previously. Overall, the study shows that

there are several factors that influence the selection of the Crusader approach in Agile, including senior management directives, availability of funding, perception, and the lack of existing methodologies.

5.3.3 Emerging Patterns

Following a thorough examination of the interview data, several unique patterns have emerged, shedding light on a novel relationship between Agile knowledge/experience, Senior Management buy-in, and the adoption approaches employed by organizations. The findings reveal a correlation between the level of Agile knowledge and awareness and the degree of Senior Management support.

One striking observation is Senior Management buy-in's significant influence on the adoption approach. In several instances, the use of Agile methodologies was driven by directives from Senior Management, resulting in a strong leaning towards the Crusader approach. However, it is essential to note that although benefiting from high Senior Management support, the Crusaders exhibited a relatively low Agile knowledge and experience.

On the other hand, the data also revealed a group of participants known as dabblers who displayed a high level of Agile awareness and knowledge but needed more Senior Management support. This finding aligns with the report by Tripp and Armstrong (2018), emphasizing that organizations employed specific Agile practices to meet their motivational objectives for adopting Agile. Consequently, successfully implementing specific Agile practices requires a reasonable understanding of Agile principles. Dabblers, possessing a strong Agile awareness, were considered Agile experts. However, notable limitations were their lack of Senior Management backing and the absence of a defined approach to project selection.

Another group that emerged from the analysis was the Tailors. The data indicated that most Tailors had low Agile awareness, suggesting an average understanding of Agile principles. However, they also reported low Senior Management support for their projects. Some participants cited the cost of training as the reason for adopting Agile using a Tailored approach, which further indicated the limited support from Senior Management. Therefore,

among the Tailors, a low level of Senior Management support and a relatively low level of Agile knowledge and awareness were identified.

Interestingly, there were no specific patterns or variations where high Senior Management support and Agile awareness were present. Instead, participants who experienced high Senior Management support along with high Agile awareness often employed a mix of adoption approaches, including Tailor, Dabbler, and, in some cases, Crusader.

A new framework referred to as the Tyough Quadrant Agile Adoption was developed based on these emerging patterns. This framework visually represents the different adoption approaches, considering the level of Senior Management support and Agile knowledge and awareness. It helps categorize organizations based on these factors, leading to a better understanding of their Agile adoption dynamics.

The analysis of the interview data revealed compelling patterns in Agile adoption approaches. The correlation between the level of Agile knowledge and awareness, Senior Management buy-in, and the adoption approaches employed by organizations highlights the complex interplay between these factors. The findings underscore the importance of aligning Senior Management support with a solid understanding of Agile principles for successful adoption. The Tyough Quadrant Agile adoption is valuable for visualizing and categorizing organizations' Agile adoption strategies, providing insights for future research and practical implementation. Practical applications of this framework are discussed in Section   6.1

Implementation Approach	Senior Management Directive	Level	Level of Agile Knowledge/Experience	Level
Crusader	"The Portfolio director was a Scrum master, and recommended that we follow the scrum framework in its entirety, it's been working so far, at least to an extent when were all executed" R3 "This approach was recommended by the organization" R2 "The crusader approach was more likely adopted because of the push and backing by senior management"R5	HIGH	"There was a newly set up Project management office (PMO) with funding and with its training budget, this likely influenced the Implementation of the crusader approach " - R3	LOW
Tailor	"Agile was adopted based on the recommendation by the organization" R10 "Another methodology already existed within the organization and senior management was looking to combine with Agile, hence the need for a tailored approach" – R6 "Used due to lack of training costs. Elements of the (Agile) Scrum approach were combined with the "Waterfall approach R1	LOW	"Approach taken because it seemed to be trendy, Agile had become popular became within the top organizations and multinationals based in the country, and my organization wanted to be a part of this trend. This likely influenced the Tailor approach taken as it needed to blend into our unique processes " – R9 "We never followed Agile strictly to the book, because the knowledge was not there to follow it prescriptively"- R7 "There was a lack of understanding of Agile as a methodology, only a couple of people on the project understood how it works, this is likely why the tailored approach was adopted " - R4	LOW
Dabbler	"No formal approach to project selection within the organization"- R8 "There was no backing from Senior Management" – R11	LOW	""Selected as there was no defined methodology recommended by the organization, but Senior Management was supportive of Introducing Agile " - R8 "Agile was considered a new trend and the organization was keen to adopt it based on its reputation"- R11	HIGH

Figure 25: Relationship between Senior Management Directives and the Level of Agile Knowledge/Expereience.

160

5.4 Summary

This chapter presents the key findings from the mixed method approach that was conducted as part of the study and draws connections with previous literature. The discussion begins by outlining the motivations that organizations have for adopting Agile and categorizes them into two tiers: higher and lower importance. It goes on to examine the factors that influence the Implementation of Agile, including the role of senior management directives, the availability of funding, and the lack of existing methodologies.

The chapter also presents the three implementation approaches identified in the study: the crusader, dabbler, and tailor approaches. It highlights the reasons why organizations adopt Agile and why they choose to implement it through a particular implementation approach. It also establishes that other factors, such as the lack of backing from senior management, can determine which approach is selected.

Considering the findings, the next chapter (6.0 Conclusion) proposes a theoretical framework that can guide organizations in their Implementation of Agile. The insights presented in this chapter are significant and contribute to the understanding of Agile Implementation, software development, and project management. The chapter underscores the importance of considering various factors when selecting an Agile implementation approach and highlights the need for organizations to tailor Agile to suit their specific needs.

CHAPTER 6 CONCLUSION

6.0 Introduction (Overall Summary)

This thesis presents a comprehensive analysis of Agile Implementation in organizations. The research is structured into six chapters, with each chapter contributing to the overall research objectives.

Chapter 1 provides an overview of the study, stating the research questions and aims. The research approach adopted is also explained, and the structure of the study is outlined.

Chapter 2 critically reviews the literature on Agile Implementation, organizational motivations for adopting Agile, and the Agile implementation approaches. The chapter also presents the conceptual framework for the study.

Chapter 3 illustrates the research methodology used in the study, including the research philosophy and mixed-method approach employed. The chapter details the sampling strategy and the data analysis techniques used to identify the motivations and implementation approaches used by organizations.

Chapter 4 presents the results of the empirical research based on the survey questionnaire and the semi-structured survey. The extensive analysis of the data collected from the survey respondents and interviewees is also presented in this chapter.

Chapter 5 discusses the research findings and compares them with the existing literature. The chapter highlights the motivations of Agile and validates the common implementation approaches used by organizations, including Crusader, Dabbler, and Tailor. The chapter also provides significant insights into the relationships that exist between Agile implementation approaches and organizational motivations.

The concluding chapter (Chapter 6) summarizes the practical and theoretical contributions of this research. It also discusses the limitations of the study and makes recommendations for future research. In conclusion, this study provides valuable insights into Agile Implementation in organizations. The research highlights the importance of considering the motivations of Agile and the implementation approaches used by organizations. The findings of this study contribute to the development of a theoretical framework for Agile Implementation and provide guidance for project management and software development practitioners.

6.1 Research Contributions

To the best of the author's knowledge, a comprehensive review of the motivations for adopting Agile and the corresponding Agile implementation approaches has not been conducted previously. The subject area of why organizations choose to implement Agile methodologies for software delivery projects is relatively under-researched, and this study provides more clarity in this domain. The research makes significant contributions, including practical, methodological, and knowledge contributions.

In terms of practical contributions, this study provides valuable insights into the motivations of Agile and how they influence the selection of implementation approaches. These findings can help organizations make informed decisions on which approach to choose, depending on their specific requirements and circumstances. For example, the study highlights the role of senior management directives in the choice of approach, which can be a crucial factor in the implementation of Agile.

Methodologically, this study uses a mixed-method approach to collect and analyze data, providing a more comprehensive view of the topic. By combining survey questionnaires and semi-structured interviews, the research collects both quantitative and qualitative data, increasing the depth of analysis and reducing the potential for bias.

The knowledge contributions of this study lie in its rigorous review of the motivations for Agile Implementation and the identification of the three main implementation approaches: Crusader, Dabbler, and Tailor. The research identifies the motivations of higher and lower importance, providing a more nuanced understanding of why organizations choose Agile. Additionally, the study highlights the influence of factors such as the lack of existing methodologies and the availability of funding, providing insights into the context of Agile Implementation. Overall, this research makes significant contributions to the understanding of Agile Implementation and can help organizations make informed decisions on which approach to choose based on their specific circumstances. The practical, methodological, and knowledge contributions of this study make it a valuable addition to the literature on Agile Implementation.

6.1.1 Knowledge Contributions
6.1.1.1 Tyough Quadrant for Agile Adoption.

At the start of this research, a conceptual framework was created based on findings within literature. Motivations of Agile were found to influence the Agile practices that were adopted; (See section 2.8.2) however, this finding was only based on the dabbler implementation approach. It was unclear if these motivations were influencing how Agile was being adopted either holistically (Crusaders) or in a tailored manner (Tailors). Following the evidence from the mixed method approach adopted within this study. Seven Motivational factors were found to be the most important reasons why Agile was adopted to deliver software. **Motivations that improve Efficiency** (Reduce project risk, accelerate time to market, Increase Productivity, Simplify the development process) (See Section 2.7). **Motivations to improve effectiveness** (Enhance ability to manage changing priorities, improve alignment between IT and business objectives) and **Motivations to Improve software quality** (Enhance software delivery). All three categories of motivations were found to be influential to the Tailor and Dabbler implementation approaches. Other factors which include Improved team communication and customer satisfaction, Perception of Agile, and Senior Management Directives were also found to influence the organization's decision to take a Tailor and Dabbler approach. The perception of Agile and Senior Management directives was found to influence the organization's decision to take a Crusader approach.

Furthermore, an emergent category of agile motivations and other influencing factors which drive the adoption of agile was established. The motivations were grouped as follows: motivations focused on delivering organizational objectives and meeting business needs (Organization), motivations aimed at improving the organization's project process (Process), and motivations aimed at enhancing individuals and their interactions. (People)

In addition to these, some emergent findings were uncovered as there was a correlation found between the level of Agile knowledge and awareness against the Senior Management Buy-in within the organization. The influence of Senior Management buy-in was found to be a strong factor in determining the adoption approach. In cases where Agile was adopted due to Senior Management directives, the Crusader approach was often favored. However, it was observed that Crusaders had a low level of Agile knowledge and experience, but a

high level of Senior Management support. Tailors on the other hand appeared to have a low level of Agile knowledge and experience and low senior management support.

As a result of these findings, a theoretical framework (Tyough Quadrant for Agile Adoption) has been created. Figure 27 provides a summary of the Tyough Quadrant.

This framework provides, Knowledge, methodological and Practical contributions to the area   of   project   management.
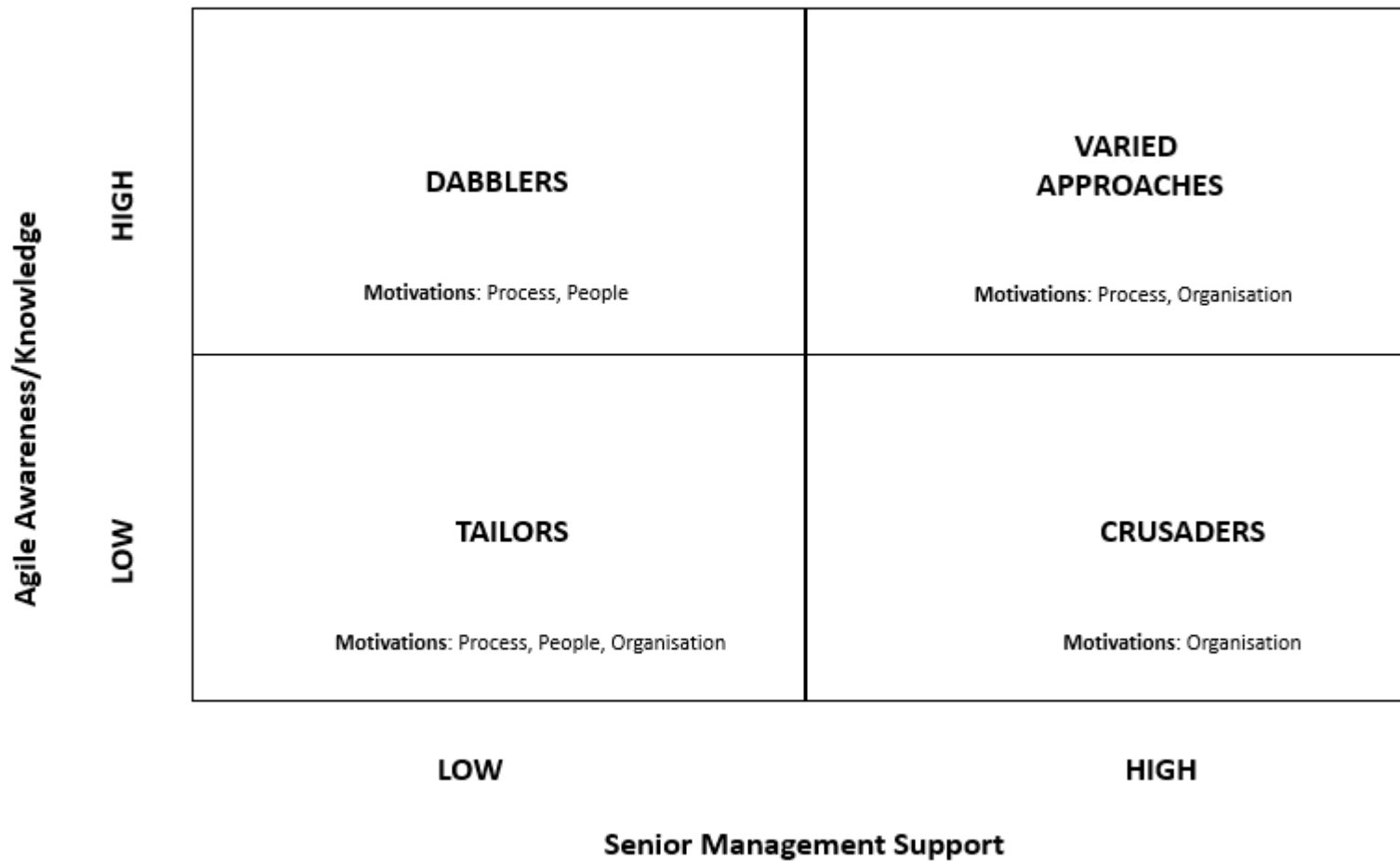
Figure 27: Tyough Quadrant for Agile Adoption

Uses of the Framework

Aligning Agile Motivations and Implementation approaches: Organizations and project practitioners can use the Tyough Quadrant to align their motivations for adopting agile with an implementation approach based on the knowledge of similar practices used by other organizations.

Understanding the motivations for adopting agile: The framework can be used to understand the motivations behind an organization's decision to adopt Agile, and how these motivations influence the implementation approach (Tailors, Dabblers, Crusaders).

Decision-making: The framework can be used as a tool to help organizations decide which approach to Agile Implementation (Tailors, Dabblers, Crusaders) is most appropriate for their specific context, based on their motivations and other influential factors.

Evaluating success: The framework can be used to evaluate the success of an Agile Implementation effort. By understanding the motivations and factors that influenced the implementation approach, organizations can assess whether the goals and objectives behind the Implementation have been achieved.

Improving Implementation: The framework can be used to identify areas for improvement in the Agile Implementation process. For example, if an organization's motivation to adopt Agile is to improve software quality, but they are not seeing the desired results, the framework can be used to identify what needs to change to achieve that goal.

Overall, the framework can be used as a guide for organizations looking to adopt Agile, and for those who want to understand and improve their Agile Implementation efforts.

Reliability and Validity of the Framework

This framework can be considered reliable for a variety of reasons. Although The framework is based on a single study, the mixed methods approach used in the study and the quality of data collected can be considered a major influencing factor in the validity of the results. The sample data used can be considered representative of the larger population of organizations that adopt Agile, as such, the results can be generalizable, and the framework is considered reliable. This research is also replicable in different contexts and organizations. Future

researchers can replicate this study which further establishes its validity and generalizability. As a result, the findings from the study can be considered robust and reliable.

Limitations of this framework and future opportunities

Context specificity: This framework may not be applicable in all contexts and organizations, as the motivations and influential factors behind Agile Implementation can vary greatly between organizations and industries. Also, the projects reviewed within this thesis and the data used framework were limited to software implementation projects, therefore the generalization of this framework is arguable. However, this research found that the motivations of agile and the implementation approaches used across other non-software related sectors were not dis-similar, when the findings of this thesis were compared to the findings from previous literature which did not focus on software related projects. Therefore, on this basis, there is a strong likelihood that this framework can be applied across other non-software related industries.

Limited scope: The framework is based on a single study and may not have captured the full breadth of motivations and other influential factors that exist. Further research and exploration may uncover additional motivations and factors that impact Agile Implementation.

Time sensitivity: The motivations and influential factors behind Agile Implementation can change over time, so the framework may become outdated as the Agile landscape evolves.

Reliance on self-reported data: The findings of the study and the framework are based on self-reported data, which can be subject to bias and error. Further validation of the findings through additional studies is necessary to establish their reliability.

Lack of control over external factors: The framework does not account for external factors that can influence Agile Implementation, such as market conditions, economic trends, and changes in technology.

While the framework provides valuable insights into motivations and influential factors behind Agile Implementation, it is important to consider its limitations and use it in conjunction with other resources to make informed decisions.

Future researchers can build on this model by measuring the rate of success and rate of failures for each project sample, to determine which implementation approaches are likely to fail or succeed when aligned with specific motivations.

Generalization the Framework

While the data used to determine the findings from this research are limited to software implementation projects. A case for generalizing these findings is appropriate for the following reasons.

The principles and values of Agile, such as flexibility, collaboration, and continuous improvement, can be applied in many different types of projects and organizations, regardless of the specific industry or domain. Thus, the findings from data collected on software implementation projects using Agile may provide valuable insights and lessons for the wider application of Agile methodologies in other areas.

Additionally, the increasing popularity and success of Agile in software development may demonstrate its potential for wider application and make a case for its generalization to other areas. However, it is important to note that the specifics of how Agile is implemented and the factors contributing to its success may differ between domains and should be carefully considered before generalizing the findings.

Overall, findings from this research provided clarity on the critical factors which trigger the use of methodological approaches such as Agile in the delivery of Software implementation projects. By identifying Agile motivations and their relative importance, organizations can self-assess and determine if their motivations are leading to the expected outcomes.

This study also established that Agile is being delivered in three distinct categories which were found in literature. Crusaders, Tailors, and Dabblers. These three implementation approaches were validated by empirical data. With this knowledge, organizations can assess their current approaches and determine if they align with their organizational strategy and expectations. For example, some organizations which are currently applying Agile in its pure form (Crusaders) might decide to take a more Tailored approach to reduce cost.

There has been no clarity provided in previous literature on why organizations are tailoring projects. Although several studies have mentioned that organizations are tailoring

methodologies to deliver projects, no previous study has provided insight into why these organizations have taken this approach. This study highlighted some of the reasons why organizations Tailor their projects, but also why they apply other implementation approaches as well.

6.1.1.2 Contributions to Project management research

Over the past decade, project management research has undergone significant development, with numerous researchers contributing to this field. However, there is a need to identify additional knowledge that has the potential to improve project delivery. This study provides a detailed insight into important aspects of project management, including project management methodology, it also contributes to new knowledge about organizational behavior. One of the key contributions of this research is its examination of how Agile is applied and considered by organizations. It sheds light on the primary motivations for organizations in selecting Agile as a delivery approach, which is to reduce risk. Additionally, unlike previous research that has focused on specific Agile types such as Scrum and XP, this study includes a wider range of Agile frameworks and categories, including modern frameworks such as SAFe and DSDM. The new knowledge gained from this study offers valuable insights for organizations looking to adopt Agile methodologies and improve their project delivery processes.

6.1.1.3 Contributions to Agile Motivations and Implementation approaches

In summary, the findings of this research revealed that the motivations for adopting Agile in software development were found to be influenced by several factors, including:

- Motivations to improve efficiency (reduce project risk, accelerate time to market, increase team productivity, simplify the development process)

- Motivations to improve effectiveness (enhance ability to manage changing priorities, improve alignment between IT and business objectives)

- Motivations to improve software quality (enhance software delivery)

- Improved team communication and customer satisfaction

- Perception of Agile

- Senior management directives

These motivations were found to influence the organization's decision to adopt Agile in either a tailored manner (Tailors) or holistically (Crusaders). The perception of Agile and senior management directives was found to be particularly influential in the Crusader approach.

These insights found in this research contribute to the growing body of work on Agile implementation. By using empirical data to identify motivations of Agile and whether this is influenced by the implementation approaches. No previous research has identified the implementation approaches within Agile implementation. Although organizations have been delivering Agile either as crusaders, dabblers, or tailors. There has been no clarity on why this was being done and whether they understood the implications. The revelations found within this thesis will provide organizations with the necessary knowledge to identify which approaches they are currently using and assess their suitability.

Agile also has a reputation for being the "silver bullet." However, this study demonstrates that careful consideration needs to be made before adopting Agile, while some project environments might accommodate Agile being applied in its pure form, this might be intolerable for other environments.

Based on the study carried out by (Cram and Newell, 2016)'s, they found that crusaders and Tailors were mindful while dabblers were mindless. However, this study reveals that scenarios exist where all three categories can be mindful and mindless.

6.1.2 Methodological Contributions and Limitations Addressed.

This study applied two methods of triangulation (Methodological triangulation and Data Triangulation). A comprehensive literature review was carried out, followed by a survey and supplemented by a case study methodology. The data was also collated from the literature review, followed by the questionnaires (Quantitative) and then the Semi-structured interviews (Qualitative). No previous studies have sought to identify the Agile implementation approaches and the influencing factors driving the selection of those approaches using any of these triangulation methods. This research also addressed limitations found in previous studies.

Software Startups: Motivations for Agile Adoption - Mkpojiogu et al. (2019) - This study on agile adoption among software startups in KSA relied solely on descriptive statistics, which limited the depth of analysis. Additionally, the sample size needed to be bigger, consisting of only 76 software startups, raising concerns about its representativeness. The study also did not assess the impact of agile adoption. In addition, the study did not explore the challenges software startups face in adopting agile methodologies, which could have provided valuable

insights into the barriers to adoption in the region. To address these limitations, this research incorporated both descriptive and inferential statistics, enhancing the depth of analysis and providing a more comprehensive understanding of the motivations for agile adoption. The research also expanded its scope beyond software startups to include a wide range of software development projects across different industries, thereby increasing the representation of the entire population of software startups. Moreover, the research identified and examined the challenges faced by software projects, offering additional insights into the barriers to agile adoption.

Agile Methodologies: Organizational Adoption Motives, Tailoring, and Performance - (F. Tripp & Armstrong, 2018a) - The study relied on data from the 2011 State of Agile Survey, which may reflect a different state of agile adoption and practice. Additionally, the study uses a factor analysis to identify adoption motives, which may not capture organizations' full range of motives for adopting agile methodologies. To address this limitation, this study was carried out empirically using a mixed (quantitative and qualitative) research method. In addition, the most recent State of Agile reports (2020 State of Agile reports) were also considered when identifying the motivations for Agile adoption. Thus, enhancing the validity of the findings within this research. This research also used a data triangulation approach to improve the credibility of the findings.

Practices of motivators in adopting agile software development at large scale development team from a management perspective. Abrar et al. (2019) - The study only focused on large-scale agile adoption from a management perspective. Therefore, it may not apply to small-scale agile adoption or from a developer's perspective. To address this limitation, this research covered a wide range of software development project sizes and was not limited to large-scale projects. As such, findings from this research provide a more robust understanding of the motivations of Agile and the Agile adoption approaches.

Mindful revolution or mindless trend? – Cram And Newell (2016). Examining agile development as a management fashion The limitation found within this study was that it focused solely on five management fashion indicators may limit the understanding of how other indicators or unique patterns could further enhance the understanding of the mindful adoption and use of innovations. To address this limitation, this research confirmed that

agile adoption patterns could be categorized into these three approaches. Crusaders,

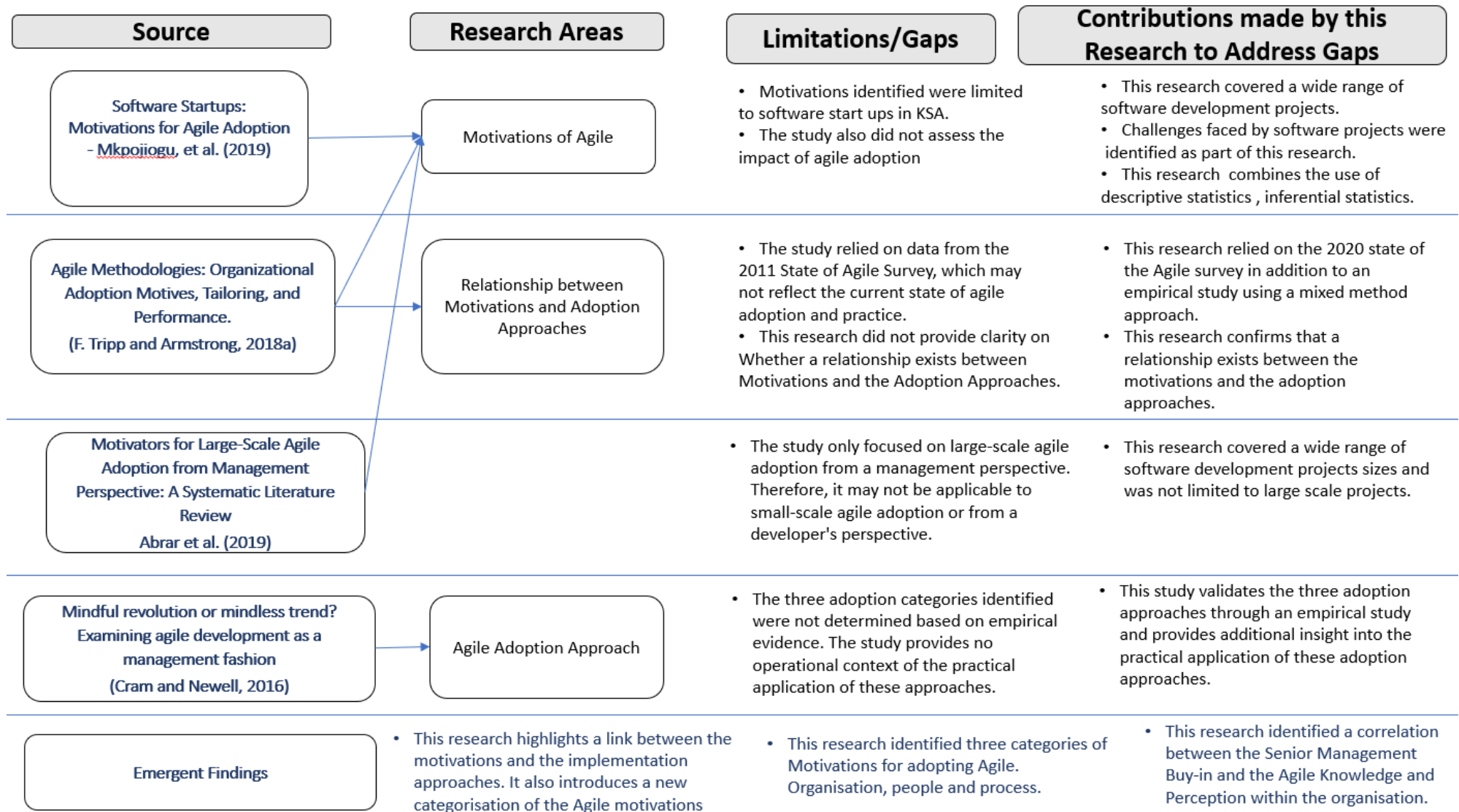Tailors,   and   Dabblers

Source	Research Areas	Limitations/Gaps	Contributions made by this Research to Address Gaps
Software Startups: Motivations for Agile Adoption - Mkpojiogu, et al. (2019)	Motivations of Agile	• Motivations identified were limited to software start ups in KSA. • The study also did not assess the impact of agile adoption	• This research covered a wide range of software development projects. • Challenges faced by software projects were identified as part of this research. • This research combines the use of descriptive statistics , inferential statistics.
Agile Methodologies: Organizational Adoption Motives, Tailoring, and Performance. (F. Tripp and Armstrong, 2018a)	Relationship between Motivations and Adoption Approaches	• The study relied on data from the 2011 State of Agile Survey, which may not reflect the current state of agile adoption and practice. • This research did not provide clarity on Whether a relationship exists between Motivations and the Adoption Approaches.	• This research relied on the 2020 state of the Agile survey in addition to an empirical study using a mixed method approach. • This research confirms that a relationship exists between the motivations and the adoption approaches.
Motivators for Large-Scale Agile Adoption from Management Perspective: A Systematic Literature Review Abrar et al. (2019)		• The study only focused on large-scale agile adoption from a management perspective. Therefore, it may not be applicable to small-scale agile adoption or from a developer's perspective.	• This research covered a wide range of software development projects sizes and was not limited to large scale projects.
Mindful revolution or mindless trend? Examining agile development as a management fashion (Cram and Newell, 2016)	Agile Adoption Approach	• The three adoption categories identified were not determined based on empirical evidence. The study provides no operational context of the practical application of these approaches.	• This study validates the three adoption approaches through an empirical study and provides additional insight into the practical application of these adoption approaches.
Emergent Findings		• This research highlights a link between the motivations and the implementation approaches. It also introduces a new categorisation of the Agile motivations	• This research identified three categories of Motivations for adopting Agile. Organisation, people and process. • This research identified a correlation between the Senior Management Buy-in and the Agile Knowledge and Perception within the organisation.

Figure 26: Summary of Research contributions

175

6.1.3 Practical Contributions

The research conducted in this study has led to the development of a valuable framework for organizations seeking to deliver projects using Agile methodologies. The insights gained from the research will also be useful to organizations that have been applying Agile "mindlessly" as noted by Cram and Newell in 2016. With the knowledge gained from this study, organizations can re-evaluate their motives for selecting a particular delivery methodology and assess its suitability for their needs.

The Tyough Quadrant for Agile Adoption , which was established as part of this research, provides a comprehensive guide for organizations and practitioners who wish to implement Agile. It serves as a valuable tool in aligning motivations and implementation approaches, as described in section 6.1.1 of the study. By following this framework, organizations can ensure that their Agile implementation is aligned with their objectives and tailored to their specific needs.

This research provides a valuable contribution to the field of project management and Agile methodologies. The insights gained from this study and the Tyough Quadrant for Agile Adoption can aid organizations in achieving their project delivery goals efficiently and effectively.

6.2 The Research Questions

By adopting a questionnaire survey and semi-structured interviews, this research based on software project management case study extensively investigated the motivations of Agile, the implementation approaches, and the relationships that exist between them. Based on the data and results found in the previous chapters, the main findings of this study and how they answered the three research questions presented at the start of this research are presented in this section. This section focuses on highlighting the answers to the research questions within this study.

6.2.1 Findings referring to RQ1.

a. What are the motivations for adopting Agile methods?

b. What is the relative importance of the motivations for adopting Agile methods?

Based on previous literature (See section 2.57) , ten motivations for Agile were found. These are Enhance software, improve engineering discipline, accelerate to market, increase team productivity, reduce cost, managing changing priorities, improve business/IT alignment, improve culture and boost team morale, reduce risk, and improve visibility. These motivations were presented to 140 respondents who ranked them based on a 5-point Likert scale ranging from Not important at all to Extremely important. The analysis of these findings found two categories of motivations. Motivations of higher importance and motivations of lower importance. Table 25 summarizes the two categories of motivations. Reduce Project risk, accelerate to market, increase team productivity, reduce cost, manage changing priorities, improve business and IT alignment, and Enhance software delivery were considered motivations of higher importance. While improve visibility, improve engineering discipline, improve culture, and boost team morale were found to be motivations of lower importance.

There was a strong indication that the motive to Reduce risk was ranked very highly by the respondents as the most important motivational factor, the supplementary findings from the survey validated this discovery. However, the findings from the semi-structure interviews also found that the motive to improve visibility was also ranked as a motivation of higher importance in several scenarios, while the need to improve business and IT alignment was not considered a motivation of higher importance but rather the need to improve the alignment between the customer and the delivery. In summary, seven of the motivations found within literature were adopted. While reduce risk was considered the most important motivation, all other motivations were ranked quite closely, and this did not provide the researcher with sufficient evidence to rank them above each other. The relative importance of the motivation's rankings based on the mixed method approach is summarized as part of section 5.2.

In addition to the ten motivations found within literature. This study also found three additional motivations for adopting Agile to deliver software. These include the Senior Management Directive, Improve team communication and customer satisfaction, and the perception of Agile. All three motivational factors were found to be important motivations and reasons why organizations are adopting Agile. While the need to improve team communication and customer satisfaction and the Senior Management Directive can be

considered proactive motivations, the Perception of Agile will be considered a reactive motivation.

6.2.2 Findings referring to RQ2

RQ2: Is there a relationship between the motivations for adopting Agile and the Agile implementation approaches?

The Agile implementation approaches found within literature were Crusaders, Tailors, and Dabblers. From the findings within literature, all the respondents were delivering Agile using one of these three implementation approaches. It was found that most of the respondents were delivering Agile using a tailored approach, followed by a dabbler approach and then a crusader approach. Several revelations were also found to explain these discoveries. Factors such as Senior management buy-ins and Costs were determinant factors that influenced the implementation approach selected by the organizations.

This study sought to establish if there was a relationship between the motivations and the implementation approaches. Whether the implementation approaches taken were based on the motivations of Agile. This was found to be the case for some motivations and not for others. Reduce risk was found to be a motivation that influenced the implementation approach taken by organizations. It was established that organizations were likely to take a tailored approach to reduce the risk of project failure. Reduce cost or cost avoidance was also a motivation that influenced the implementation approach taken by organizations. It was established that some organizations were likely to avoid taking a crusader approach to delivery, to avoid additional costs to the project, such as costs of training and hiring consultants.

6.2.4 Other significant findings

In addition to the findings relating directly to the research question, it was also found that organizations are adopting Agile using these implementation approaches due to other factors which might not be part of the motivations. The lack of funding was found to limit the organization's options on which implementation approach they will prefer to take. Other internal factors such as Agile capabilities also influence the implementation approach taken. Organizations with limited knowledge of Agile are more likely to adopt Agile based on

their limited knowledge. This study also found that the perception of Agile plays an important role in both the selection of Agile methods and how it is adopted.

6.3 Research Objectives Addressed

The objectives of the study have been successfully met and addressed. The following objectives have been achieved:

I. **Identification of motivations for Agile Implementation:** In Chapter 2.7, the motivations behind organizations' decisions to adopt Agile to develop software were identified. Seven motivations were found to be the most important, including improving efficiency, effectiveness, and software quality.

I. **Exploration of Agile implementation approaches:** In Chapter 2.5, the different approaches to Agile Implementation (Tailors, Dabblers, Crusaders) were explored. This provided a comprehensive understanding of the different ways in which organizations adopt Agile methods.

II. **Evaluation of motivation level importance:** In Chapter 4.3, the level of importance of each motivation was evaluated, providing a deeper understanding of the relative importance of each motivation in organizations' decisions to adopt Agile.

III. **Identification of relationships between motivations and implementation approaches:** In Chapter 5.3, relationships between motivations and the Agile implementation approaches were identified. This provided insights into how motivations influence organizations' decisions to adopt Agile in different ways.

IV. **Development of a theoretical framework:** In Chapter 5.4, a theoretical framework was established to inform future Implementations of Agile methods by organizations in the delivery of software. This framework provides valuable insights into motivations, influential factors, and the different ways in which organizations adopt Agile.

In conclusion, all the objectives of the study have been successfully met and addressed. The findings provide valuable insights into motivations, influential factors, and implementation approaches in the context of Agile software development, and the framework established provides a valuable tool for organizations looking to adopt Agile.

6.4 Limitations and suggestions for future research

As with all studies, this study was not without its limitations. The first limitation will be linked to the generalizability of the findings in this study. The population and sample size in this research were limited. It is plausible to argue that additional motivations could have been discovered using a higher sample size and a wider population. Most of the respondents were from www.linkedin.com; Although this social media platform provides access to many project practitioners, these are a small fraction of the total number of project practitioners that exist within the population.

This research was limited to software development. Although it provides some important findings which can be generalized across other non-software-related project deliveries, there will be differences. For example, the motivations and ranking for the delivery of construction projects using Agile are likely to defer from software projects as the objectives are different.

Several directions of future research exist. This research did not verify whether there are additional implementation approaches, apart from the crusaders, dabblers, and tailors. Future researchers can explore further Agile implementation approaches. Also, the implementation approaches highlighted by (Zhang and Sharifi, 2007) (Responsive Players, Quick Players, and Proactive Players) were not explored. Future research investigating these implementation approaches and their links to the motivations of Agile will provide valuable insight into this area of study.

More research is needed in understanding the success rates of the implementation approaches and the motivations. While this research identified the motivations and linked them with the implementation approaches, it did not provide clarity on how successful these organizations were in meeting their objectives. For example, if an organization adopts Agile to reduce cost, which of the implementation approaches (crusader, tailor, dabbler) is more likely to enable them to meet their motivation objectives

Several papers have identified critical success factors of Agile (Abrar *et al.*, 2019). Future researchers can investigate the alignment between the implementation approaches, the motivations, and how this aligns with the critical success factors, this will provide important insight for future Agile implementations.

REFERENCES

1.   Abbas, N., Gravell, A. M., and Wills, G. B. (2010). Using factor analysis to generate clusters of agile practices (a guide for agile process improvement). Proceedings - 2010 Agile Conference, AGILE 2010, 11–20. https://doi.org/10.1109/AGILE.2010.15

2.   Abbott, K. M., Hulshult, A., Eshraghi, K., Heppner, A., Crumbie, V., Heid, A. R., … Van Haitsma, K. (2022). Applying Agile Methodology to Reengineer the Delivery of Person-Centered Care in a Nursing Home: A Case Study. Journal of the American Medical Directors Association, 23(9), 1442–1447. https://doi.org/10.1016/J.JAMDA.2022.05.012

3.   Abrahamsson, P., Salo, O., Ronkainen, J., and Warsta, J. (2017). Agile Software Development Methods: Review and Analysis. VTT Publications, (478), 3–107. https://doi.org/10.48550/arxiv.1709.08439

4.   Abrar, M. F., Khan, M. S., Ali, S., Ali, U., Majeed, M. F., Ali, A., … Rasheed, N. (2019). Motivators for Large-Scale Agile Adoption from Management Perspective: A Systematic Literature Review. IEEE Access, 7, 22660–22674. https://doi.org/10.1109/ACCESS.2019.2896212

5.   Ahmed, A., Ahmad, S., Ehsan, N., Mirza, E., and Sarwar, S. Z. (2010). Agile software development: Impact on productivity and quality. 5th IEEE International Conference on Management of Innovation and Technology, ICMIT2010, 287–291. https://doi.org/10.1109/ICMIT.2010.5492703

6.   Almeida, F. (2017). Challenges in Migration from Waterfall to Agile Environments. World Journal of Computer Application and Technology, 5(3), 39–49. https://doi.org/10.13189/wjcat.2017.050302

7.   Amankwaa, L. (2016). CREATING PROTOCOLS FOR TRUSTWORTHINESS IN QUALITATIVE RESEARCH. Journal of Cultural Diversity, 23(3), 121–127.

8.   Amran Hossain, A. H. (2013). Enhancing Software Quality Using Agile Techniques. IOSR Journal of Computer Engineering, 10(2), 87–93. https://doi.org/10.9790/0661-01028793

9.   Anes, V., Abreu, A., and Santos, R. (2020). A new risk assessment approach for agile projects. Proceedings - 2020 International Young Engineers Forum, YEF-ECE 2020, 67–72. https://doi.org/10.1109/YEF-ECE49388.2020.9171808

10.   Ayarkwa, J., Joe Opoku, D. G., Antwi-Afari, P., and Man Li, R. Y. (2022). Sustainable building processes' challenges and strategies: The relative important index approach. Cleaner Engineering and Technology, 7. https://doi.org/10.1016/j.clet.2022.100455

11.   Andy Jordan (1999) 'The Technology-Driven Future of Project Management: Capitalizing on the Potential Changes and Opportunities', 34(3), pp. 524–525.

12.   Bateman, T. S., O'Neill, H., and Kenworthy-U'Ren, A. (2002). A hierarchical taxonomy of top managers' goals. Journal of Applied Psychology, 87(6), 1134–1148. https://doi.org/10.1037/0021-9010.87.6.1134

13.   Beck, K. (2004) Extreme Programming Explained: Embrace Change, 2nd Edition (The XP Series).

14.   Biesialska, K., Franch, X., and Muntés-Mulero, V. (2021). Big Data analytics in Agile software development: A systematic mapping study. Information and Software Technology, 132(October 2020), 106448. https://doi.org/10.1016/j.infsof.2020.106448

15.   Binder, J., Aillaud, L. I., and Schilli, L. (2014). The Project Management Cocktail Model: An Approach for Balancing Agile and ISO 21500. Procedia - Social and Behavioral Sciences, 119, 182–191. https://doi.org/10.1016/j.sbspro.2014.03.022

16.   Budzier, A. and Flyvbjerg, B. (2013) 'Making Sense of the Impact and Importance of Outliers in Project Management Through the Use of Power Laws', IRNOP Conference, (June), pp. 1–28. Available at: http://papers.ssrn.com/abstract=2289549.

17.   Bishop, D., and Deokar, A. (2014). Toward an understanding of preference for agile software development methods from a personality theory perspective. Proceedings of the

Annual Hawaii International Conference on System Sciences, 4749–4758. https://doi.org/10.1109/HICSS.2014.583

18.   Boehm, B. W. (1988). A Spiral Model of Software Development and Enhancement. Computer. https://doi.org/10.1109/2.59

19.   Boehm, B. W. (2007a). Software engineering-as it is. Software Engineering: Barry W. Boehm'S Lifetime Contributions to Software Development, Management, and Research, 663–685. https://doi.org/10.1109/9780470187562.ch8

20.   Boehm, B. W. (2007b). Software engineering economics. Software Engineering: Barry W. Boehm'S Lifetime Contributions to Software Development, Management, and Research, (1), 117–149. https://doi.org/10.1109/9780470187562.ch2

21.   Booch, G. (2018). The History of Software Engineering. IEEE Software, 35(5), 108–114. https://doi.org/10.1109/MS.2018.3571234

22.   Brenner, R., and Wunder, S. (2015). Presentation and Real World Example. 2015 IEEE Eighth International Conference on Software Testing, Verification and Validation Workshops (ICSTW), 1–2.

23.   Burga, R., Spraakman, C., Balestreri, C., and Rezania, D. (2022). Examining the transition to agile practices with information technology projects: Agile teams and their experience of accountability. International Journal of Project Management, 40(1), 76–87. https://doi.org/10.1016/j.ijproman.2021.10.004

24.   Campanelli, A. S., and Parreiras, F. S. (2015a). Agile methods tailoring - A systematic literature review. Journal of Systems and Software, 110, 85–100. https://doi.org/10.1016/j.jss.2015.08.035

25.   Campanelli, A. S., and Parreiras, F. S. (2015b). Agile methods tailoring - A systematic literature review. Journal of Systems and Software, 110, 85–100. https://doi.org/10.1016/j.jss.2015.08.035

26.   Carmel, E., and Agarwal, R. (2001). Tactical approaches for alleviating distance in global software development. IEEE Software, 18(2), 22–29. https://doi.org/10.1109/52.914734

27.   Clarke, V. and John W. Creswell (2018) 'Designing and conducting mixed methods research'.

28.   Cohen, D., Lindvall, M. and Costa, P. (2004) 'An Introduction to Agile Methods', Advances in Computers, 62(C), pp. 1–66. doi: 10.1016/S0065-2458(03)62001-2.

29.   CollabNet VersionOne. (2019). The 13th annual STATE OF AGILE Report - 2018. CollabNet | VersionOne, 13, 16.

30.   Collyer, S. et al. (2010) 'Aim, fire, aim - Project planning styles in dynamic environments', Project Management Journal, 41(4), pp. 108–121. doi: 10.1002/pmj.20199.

31.   Chatwani, N. (2019). Agility Revisited BT - Organisational Agility: Exploring the Impact of Identity on Knowledge Management. Retrieved from https://doi.org/10.1007/978-3-030-17249-7_1

32.   CollabNet VersionOne. (2019). The 13th annual STATE OF AGILE Report - 2018. CollabNet | VersionOne, 13, 16.

33.   Control, P. P., Performance, P. M., and Contexts, D. (2008). Project Portfolio Control and Portfolio. Project Management Journal, 39(1), 28–42. https://doi.org/10.1002/pmj

34.   Coyle, S., and Conboy, K. (2009). A case study of risk management in agile systems development. 17th European Conference on Information Systems, ECIS 2009, 2567–2578.

35.   Cram, W. A., and Newell, S. (2016). Mindful revolution or mindless trend? Examining agile development as a management fashion. European Journal of Information Systems, 25(2), 154–169. https://doi.org/10.1057/ejis.2015.13

36.   Da Silva, T. S., Silveira, M. S., Maurer, F., and Silveira, F. F. (2018). The evolution of agile UXD. Information and Software Technology, 102(March), 1–5. https://doi.org/10.1016/j.infsof.2018.04.008

37.   Dalcher, D., and Raffo, D. (2009). Software Process : The End of an Era. Practice, (November), 303–304. https://doi.org/10.1002/spip

38.   Damian, D., Lassenius, C., Paasivaara, M., Borici, A., and Schröter, A. (2012). Teaching a globally distributed project course using Scrum practices. 2012 2nd International

Workshop on Collaborative Teaching of Globally Distributed Software Development, CTGDSD 2012 - Proceedings, 30–34. https://doi.org/10.1109/CTGDSD.2012.6226947

39. De Melo, C. O., S. Cruzes, D., Kon, F., and Conradi, R. (2013). Interpretative case studies on agile team productivity and management. Information and Software Technology, 55(2), 412–427. https://doi.org/10.1016/j.infsof.2012.09.004

40. Denis, D. J. (2018). SPSS Data Analysis for Univariate, Bivariate, and Multivariate Statistics. SPSS Data Analysis for Univariate, Bivariate, and Multivariate Statistics. https://doi.org/10.1002/9781119465775

41. Digital.ai. (2020). 14th annual STATE OF AGILE REPORT. Annual Report for the STATE OF AGILE, 14(14), 2–19. Retrieved from https://explore.digital.ai/state-of-agile/14th-annual-state-of-agile-report

42. Digital.ai. (2022). State of Agile Report. Annual Report for the State of Agile, 13, 1–22. Retrieved from https://info.digital.ai/rs/981-LQX-968/images/AR-SA-2022-16th-Annual-State-Of-Agile-Report.pdf

43. Digital.ai Software, I. (2021). 15th State of Agile Report. Digital.Ai, 1–23. Retrieved from https://stateofagile.com/

44. Dingsøyr, T. et al. (2012) 'A decade of agile methodologies: Towards explaining agile software development', Journal of Systems and Software, 85(6), pp. 1213–1221. doi: 10.1016/j.jss.2012.02.033.

45. Dorairaj, S., Noble, J. and Malik, P. (2010) 'Understanding the importance of trust in distributed Agile projects: A practical perspective', Lecture Notes in Business Information Processing, 48 LNBIP, pp. 172–177. doi: 10.1007/978-3-642-13054-0_14.

46. Dove, R., Schindel, W. B. and Garlington, K. (2018) 'Case Study: Agile Systems Engineering at Lockheed Martin Aeronautics Integrated Fighter Group', INCOSE International Symposium, 28(1), pp. 303–320. doi: 10.1002/j.2334-5837.2018.00483.x.

47. Drummond, B. and Unson, J. F. (2008) 'Yahoo! Distributed Agile: Notes from the world over', Proceedings - Agile 2008 Conference, pp. 315–321. doi: 10.1109/Agile.2008.21

48. Earl Babbie (2002) The Basics of social research .

49. Edin Grimheden, M. (2013) 'Can agile methods enhance mechatronics design education?', Mechatronics. Elsevier Ltd, 23(8), pp. 967–973. doi: 10.1016/j.mechatronics.2013.01.003

50. Eilers, K., Peters, C., and Leimeister, J. M. (2022). Why the agile mindset matters. Technological Forecasting and Social Change, 179(March), 121650. https://doi.org/10.1016/j.techfore.2022.121650

51. Eisenhardt, K. M. (1989). Building Theories from Case Study Research Published by : Academy of Management Stable. The Academy of Management Review, 14(4), 532–550.

52. Elkins, D. A., Huang, N., and Alden, J. M. (2004). Agile manufacturing systems in the automotive industry. International Journal of Production Economics, 91(3), 201–214. https://doi.org/10.1016/j.ijpe.2003.07.006

53. F. Tripp, J., and Armstrong, D. J. (2018a). Agile Methodologies: Organizational Adoption Motives, Tailoring, and Performance. Journal of Computer Information Systems, 58(2), 170–179. https://doi.org/10.1080/08874417.2016.1220240

54. Faniran, V. T., Badru, A. and Ajayi, N. (2017) 'Adopting Scrum as an Agile approach in distributed software development: A review of literature', 2017 1st International Conference on Next Generation Computing Applications, NextComp 2017, pp. 36–40. doi: 10.1109/NEXTCOMP.2017.8016173

55. Fernandez, D. J., and Fernandez, J. D. (2008). Agile project management - Agilism versus traditional approaches. Journal of Computer Information Systems, 49(2), 10–17. https://doi.org/10.1080/08874417.2009.11646044

56. Gold, B. and Vassell, C. (2016) 'Using risk management to balance agile methods: A study of the Scrum process', Conference Proceedings of 2015 2nd International Conference on Knowledge-Based Engineering and Innovation, KBEI 2015, pp. 49–54. doi: 10.1109/KBEI.2015.7436020.

57. Field, A. P. (2017). Discovering Statistics using SPSS, (April), 8–9.

58. Floyd J. Fowler, J. (2014). Survey Research Methods. In J. Floyd J. Fowler. Sage.

59. FP Jr, B. (1987). No Silver Bullet Essence and Accidents of Software Engineering. Computer, (4), 10–19.

60. Fusch, P., Fusch, G. E., and Ness, L. R. (2018). Denzin's Paradigm Shift: Revisiting Triangulation in Qualitative Research. Journal of Social Change, 10(1). https://doi.org/10.5590/josc.2018.10.1.02

61. Ge, Y., Yang, G., Wang, X., Dou, W., Lu, X., and Mao, J. (2021). Understanding risk perception from floods: a case study from China. Natural Hazards, 105(3), 3119–3140. https://doi.org/10.1007/s11069-020-04458-y

62. Gechman, M. (2019). Software Development Methodologies. Project Management of Large Software-Intensive Systems, (June), 49–66. https://doi.org/10.1201/9780429027932-4

63. George, J. F., Scheibe, K., Townsend, A. M., and Mennecke, B. (2018). The amorphous nature of agile: no one size fits all. Journal of Systems and Information Technology, 20(2), 241–260. https://doi.org/10.1108/JSIT-11-2017-0118

64. Gersick, C. J. G. (1988). Time an Transition in Work Teams: Toward a New Model of Group Development. Academy of Management Journal, 31(1), 9–41. https://doi.org/10.2307/256496

65. González, C., Pufahl, L., Weber, I., and Mendling, J. (2022). Uses of business process modeling in agile software development projects. Information and Software Technology, 152(March), 107028. https://doi.org/10.1016/j.infsof.2022.107028

66. Goranson, H. T. (1999). The Agile Virtual Enterprise.

67. Govuzela, S., and Mafini, C. (2019). Organisational agility, business best practices and the performance of small to medium enterprises in South Africa. South African Journal of Business Management, 50(1), 1–13. https://doi.org/10.4102/sajbm.v50i1.1417

68. Gunasekaran, A., Yusuf, Y. Y., Adeleye, E. O., Papadopoulos, T., et al. (2018) 'Agile manufacturing: an evolutionary review of practices', https://doi.org/10.1080/00207543.2018.1530478. Taylor & Francis, 57(15–16), pp. 5154–5174. doi: 10.1080/00207543.2018.1530478

69.   GSAM. (2003). "Condensed GSAM Handbook, chapter 2: Software Life Cycle,".

70.   Grangel, R., and Campos, C. (2019). Agile Model-Driven Methodology to Implement Corporate Social Responsibility. Computers and Industrial Engineering, 127(April 2018), 116–128. https://doi.org/10.1016/j.cie.2018.11.052

71.   Gregory, P., Barroca, L., Sharp, H., Deshpande, A., and Taylor, K. (2016). The challenges that challenge: Engaging with agile practitioners' concerns. Information and Software Technology, 77, 92–104. https://doi.org/10.1016/j.infsof.2016.04.006

72.   Grier, D. A. (2021). There is still no silver bullet. Computer, 54(2), 60–62. https://doi.org/10.1109/MC.2020.3042682

73.   Gunasekaran, A. (1999). Design and implementation of agile manufacturing systems. International Journal of Production Economics, 62(1–2), 1–6. https://doi.org/10.1016/s0925-5273(98)00216-3

74.   Gunasekaran, Angappa, Yusuf, Y. Y., Adeleye, E. O., and Papadopoulos, T. (2018). Agile manufacturing practices: the role of big data and business analytics with multiple case studies. International Journal of Production Research, 56(1–2), 385–397. https://doi.org/10.1080/00207543.2017.1395488

75.   Guo, X., El-Hadedy, M., Mosanu, S., Wei, X., Skadron, K., and Stan, M. R. (2022). Agile-AES: Implementation of configurable AES primitive with agile design approach. Integration, 85(November 2021), 87–96. https://doi.org/10.1016/j.vlsi.2022.04.005

76.   Gustavsson, T. (2016). Benefits of agile project management in a non-software development context - A literature review. Project Management Development – Practice and Perspectives: Fifth International Scientific Conference on Project Management in the Baltic Contries April 14-15, Riga, University of Latvia, (April), 67–82.

77.   Haines, T., and Raisinghani, M. S. (2017). The Conceptual Model for Agile Tools and Techniques. American Journal of Management, 17(3), 77.

78.   Hammad, M. and Inayat, I. (2019) 'Integrating risk management in scrum framework', Proceedings - 2018 International Conference on Frontiers of Information Technology, FIT 2018. IEEE, pp. 158–163. doi: 10.1109/FIT.2018.00035

79.   Hassan, A. E., and Holt, R. C. (2003). The chaos of software development. International Workshop on Principles of Software Evolution (IWPSE), 2003-Janua, 84–94. https://doi.org/10.1109/IWPSE.2003.1231214

80.   Heimicke, J., Niever, M., Zimmermann, V., Klippert, M., Marthaler, F., and Albers, A. (2019). Comparison of existing agile approaches in the context of mechatronic system development: Potentials and limits in implementation. Proceedings of the International Conference on Engineering Design, ICED, 2019-Augus(August), 2199–2208. https://doi.org/10.1017/dsi.2019.226

81.   Hijazi, H., Khdour, T., and Alarabeyyat, A. (2012). A Review of risk management in different software development methodologies. International Journal of Computer Applications in Technology, 45(7), 8–12.

82.   Highsmith, J. (2002). Agile Software Development Ecosystems. Addison-Wesley Professional, Boston.

83.   Hoda, R., Noble, J., and Marshall, S. (2012). Developing a grounded theory to explain the practices of self-organizing Agile teams. Empirical Software Engineering, 17(6), 609–639. https://doi.org/10.1007/s10664-011-9161-0

84.   Hollweck, T. (2016). Robert K. Yin. (2014). Case Study Research Design and Methods (5th ed.). Thousand Oaks, CA: Sage. 282 pages. The Canadian Journal of Program Evaluation, (October). https://doi.org/10.3138/cjpe.30.1.108

85.   Iqbal, J., Omar, M., and Yasin, A. (2019). The impact of agile methodologies and cost management success factors: An empirical study. Baghdad Science Journal, 16(2), 496–504. https://doi.org/10.21123/bsj.2019.16.2(SI)0496

86.   Intland. (2020). Intland Software. Retrieved from https://intland.com/case-studies/

87.   Islam, G., and Storer, T. (2020). A case study of agile software development for safety-Critical systems projects. Reliability Engineering and System Safety, 200(July 2018), 106954. https://doi.org/10.1016/j.ress.2020.106954

88.   Jalali, S. and Wohlin, C. (2010) 'Agile practices in global software engineering - A systematic map', Proceedings - 5th International Conference on Global Software Engineering, ICGSE 2010, (June), pp. 45–54. doi: 10.1109/ICGSE.2010.14.

89.   Javdani Gandomani, T. et al. (2014) 'Exploring Facilitators of Transition and Adoption to Agile Methods: A Grounded Theory Study', Journal of Software, 9(7), pp. 1666–1678. doi: 10.4304/jsw.9.7.1666-1678.

90.   Javdani Gandomani, T., and Ziaei Nafchi, M. (2016). Agile transition and adoption human-related challenges and issues: A Grounded Theory approach. Computers in Human Behavior, 62, 257–266. https://doi.org/10.1016/j.chb.2016.04.009

91.   Kannan, V., Fish, J. S., Mutz, J. M., Carrington, A. R., Lai, K., Davis, L. S., … Willett, D. L. (2017). Rapid Development of Specialty Population Registries and Quality Measures from Electronic Health Record Data. An Agile Framework . Methods of Information in Medicine . Germany . Retrieved from https://go.exlibris.link/WbgYQHQ8

92.   Kassem, M. A., Azry Khoiry, M., and Hamzah, N. (2020). Using Relative Importance Index Method for Developing Risk Map in Oil and Gas Construction Projects Transformation Toward Sustainable Rest and Service Area View project Identify Risk Factors in Construction Projects in Oil and Gas Sector in Yemen View pro, 32(3), 85–97. Retrieved from https://doi.org/10.17576/jkukm-2020-32

93.   Kermanshachi, S. et al. (2016) 'Project Complexity Indicators and Management Strategies - A Delphi Study', Procedia Engineering. Elsevier B.V., 145, pp. 587–594. doi: 10.1016/j.proeng.2016.04.048.

94.   Khatri, S. K., Bahri, K. and Johri, P. (2014) 'Best Practices for Managing Risk in Adaptive Agile Process', Proceedings of 3rd International Conference on Reliability, Infocom Technologies and Optimization. IEEE, pp. 1–5. doi: 10.1109/ICRITO.2014.7014759

95.   Kohl, P., Schmidts, O., Klöser, L., Werth, H., Kraft, B., and Zündorf, A. (2021). STAMP 4 NLP -- An Agile Framework for Rapid Quality-Driven NLP Applications Development . ArXiv.Org . Ithaca : Cornell University Library, arXiv.org . https://doi.org/10.1007/978-3-030-85347-1_12

96.   Könnölä, K., Suomi, S., Mäkilä, T., Jokela, T., Rantala, V., and Lehtonen, T. (2016). Agile methods in embedded system development: Multiple-case study of three industrial cases. Journal of Systems and Software, 118, 134–150. https://doi.org/10.1016/j.jss.2016.05.001

97.   Kowalczyk, M., Marcinkowski, B., and Przybyłek, A. (2022). Scaled agile framework. Dealing with software process-related challenges of a financial group with the action research approach . Journal of Software : Evolution and Process . Chichester : Wiley Subscription Services, Inc . https://doi.org/10.1002/smr.2455

98.   Kurapati, N., Manyam, V. S. C., and Petersen, K. (2012). Agile software development practice adoption survey. Lecture Notes in Business Information Processing, 111 LNBIP, 16–30. https://doi.org/10.1007/978-3-642-30350-0_2

99.   Kuusinen, K. et al. (2016) 'Strategies for doing Agile in a non-Agile Environment', International Symposium on Empirical Software Engineering and Measurement, 08-09-Sept. doi: 10.1145/2961111.2962623.

100.   Laanti, M., Salo, O. and Abrahamsson, P. (2011) 'Agile methods rapidly replacing traditional methods at Nokia: A survey of opinions on agile transformation', Information and Software Technology. Elsevier B.V., 53(3), pp. 276–290. doi: 10.1016/j.infsof.2010.11.010.

101.   Madhavji., K. E. (2017). Elements of software process assessment and improvement. Los Alamitos: IEEE Computer Society.

102.   Larman, C. and Basili, V. R. (2003) 'Iterative and incremental development: A brief history', Computer, 36(6), pp. 47–56. doi: 10.1109/MC.2003.1204375.

103.   Ley, T. et al. (2013) 'Open and social technologies for networked learning: IFIPWG3.4 international conference,OST2012 Tallinn, Estonia, july 30 - august 3, 2012 revised selected papers', IFIP Advances in Information and Communication Technology. Edited by T. Ley et al. Berlin, Heidelberg: Springer Berlin Heidelberg (IFIP Advances in Information and Communication Technology). doi: 10.1007/978-3-642-37285-8.

104.   Lopez-Martinez, J. et al. (2016) 'Problems in the adoption of agile-scrum methodologies: A systematic literature review', Proceedings - 2016 4th International

Conference in Software Engineering Research and Innovation, CONISOFT 2016, pp. 141–148. doi: 10.1109/CONISOFT.2016.30

105.   Leffingwell, D. (2021). Scaled Agile . Retrieved from Scaled Agile Framework: https://v3.scaledagileframework.com/safe-for-lean-enterprises/

106.   Madhavji., K. E. (2017). Elements of software process assessment and improvement. Los Alamitos: IEEE Computer Society.

107.   Manthou, V., and Vlachopoulou, M. (2001). Agile Manufacturing Strategic Options. Agile Manufacturing: The 21st Century Competitive Strategy. Elsevier Science Ltd. https://doi.org/10.1016/b978-008043567-1/50035-8

108.   Marnada, P., Raharjo, T., Hardian, B., and Prasetyo, A. (2021). Agile project management challenge in handling scope and change: A systematic literature review. Procedia Computer Science, 197(2021), 290–300. https://doi.org/10.1016/j.procs.2021.12.143

109.   Matalonga, S., Solari, M., and Matturro, G. (2013). Factors affecting distributed agile projects: A systematic review. International Journal of Software Engineering and Knowledge Engineering, 23(9), 1289–1301. https://doi.org/10.1142/S021819401350040X

110.   Maxwell, J. A. (no date) The history and breadth of mixed methods research View project Qualitative research design View project. Available at: https://www.researchgate.net/publication/313552075

111.   McHugh, M. L. (2012). The Chi-square test of independence. Biochemia Medica, 23(2), 143–149. https://doi.org/10.11613/BM.2013.018

112.   Melo, C., Cruzes, D. S., Kon, F., and Conradi, R. (2011). Agile team perceptions of productivity factors. Proceedings - 2011 Agile Conference, Agile 2011, 57–66. https://doi.org/10.1109/AGILE.2011.35

113.   Melton, T. (2002). Get agile - Deliver faster. Chemical Engineer, (736), 42–43.

114.   Merisalo-Rantanen, H., Tuunanen, T., and Rossi, M. (2011). Is Extreme Programming Just Old Wine in New Bottles. Journal of Database Management, 16(4), 41–61. https://doi.org/10.4018/jdm.2005100103

115.   Mero, J., Leinonen, M., Makkonen, H., and Karjaluoto, H. (2022). Agile logic for SaaS implementation: Capitalizing on marketing automation software in a start-up. Journal of Business Research, 145(March), 583–594. https://doi.org/10.1016/j.jbusres.2022.03.026

116.   Miller, M. (2022). Sprintegration® - An agile framework for M and A integration . Wiesbaden : Springer Gabler . Retrieved from https://go.exlibris.link/bxGZYKfK

117.   Misra, S. C., Kumar, V., and Kumar, U. (2009). Identifying some important success factors in adopting agile software development practices. Journal of Systems and Software, 82(11), 1869–1890. https://doi.org/10.1016/j.jss.2009.05.052

118.   Mkpojiogu, E. O. C., Lailyhashim, N., Al-Sakkaf, A., and Hussain, A. (2019). Software startups: Motivations for agile adoption. International Journal of Innovative Technology and Exploring Engineering, 8(8 S), 454–459.

119.   Moe, M. M., and Sanchez, J. C. (2019). International Journal of Trend in Scientific Research and Development (IJTSRD) Comparative Study of Test-Driven Development (TDD), Behavior-Driven Development (BDD) and Acceptance Test-Driven Development (ATDD) the Creative Commons Attribution License (CC. International Journal of Trend Scientific Research and Development (IJTSRD), 3(4), 231–234. Retrieved from http://creativecommons.org/licenses/by/4.0

120.   Moe, N. B., Aurum, A., and Dybå, T. (2012). Challenges of shared decision-making: A multiple case study of agile software development. Information and Software Technology, 54(8), 853–865. https://doi.org/10.1016/j.infsof.2011.11.006

121.   Mohamed, S. F. P., Baharom, F., and Deraman, A. (2014). An exploratory study on agile based software development practices. International Journal of Software Engineering and Its Applications, 8(5), 85–114. https://doi.org/10.14257/ijseia.2014.8.5.09

122.   Moi, L., and Cabiddu, F. (2021). An agile marketing capability maturity framework. Tourism Management, 86(February 2020), 104347. https://doi.org/10.1016/j.tourman.2021.104347

123.   Mokhtari, S., Mokhtari, S., and Salehi Shahrabi, M. (2021). Fingerprints as an index for investigating cooperation by children in dentistry: a pilot study. European Archives of Paediatric Dentistry, 22(2), 203–207. https://doi.org/10.1007/s40368-020-00570-6

124.   Molina-Ríos, J., and Pedreira-Souto, N. (2020). Comparison of development methodologies in web applications. Information and Software Technology, 119(February 2019). https://doi.org/10.1016/j.infsof.2019.106238

125.   Mora, M., Marx Gomez, J., Reyes-Delgado, P. Y., and Adelakun, O. (2022). AN INTEGRATIVE AGILE ITSM FRAMEWORK OF TENETS AND PRACTICES - ITS DESIGN AND EXPLORATORY UTILIZATION . Journal of Organizational Computing and Electronic Commerce . Mahwah : Taylor and Francis . https://doi.org/10.1080/10919392.2022.2068905

126.   Moran, A. (2014) 'Agile risk management', in Springer Briefs in Computer Science, pp. 1–101. doi: 10.1201/b18052-11.

127.   Neumann, P. G. (2022). Toward total-system trustworthiness. Communications of the ACM, 65(6), 32–35. https://doi.org/10.1145/3532631

128.   Nicholls, D., Dong, H., Dacre, N., Baxter, D., and Ceylan, S. (2022). Understanding agile in project management, (April). Retrieved from https://www.apm.org.uk/resources/find-a-resource/agile-project-management/understanding-agile-in-project-management/

129.   Niederman, F., Lechler, T., and Petit, Y. (2018). A Research Agenda for Extending Agile Practices In Software Development and Additional Task Domains. Project Management Journal, 49(6), 3–17. https://doi.org/10.1177/8756972818802713

130.   Noura Abbas, Andrew M. Gravell, and G. B. W. (2008) Historical Roots of Agile Methods: Where did 'Agile Thinking' come from _Page 94, Lecture Notes in Business Information Processing. doi: 10.1007/978-3-540-68255-4_17.

131.   Ochoa, O. et al. (2021) 'Adopting Agility in Academia through Pilot Projects', Proceedings - Frontiers in Education Conference, FIE, 2021-Octob. doi: 10.1109/FIE49875.2021.9637458.

132.   Ozkan, N. and Tarhan, A. K. (2019) 'Investigating Causes of Scalability Challenges in Agile Software Development from a Design Perspective', 1st International Informatics and Software Engineering Conference: Innovative Technologies for Digital Transformation, IISEC 2019 - Proceedings, (March 2020). doi: 10.1109/UBMYK48245.2019.8965633.

133.   Nurdiani, I., Börstler, J., Fricker, S., Petersen, K., and Chatzipetrou, P. (2019). Understanding the order of agile practice introduction: Comparing agile maturity models and practitioners' experience. Journal of Systems and Software, 156, 1–20. https://doi.org/10.1016/j.jss.2019.05.035

134.   Page, S., Hazen, D., Kelley, K., Singh, R., Rodgers, R. B., Brewer, B., … Dbeibo, L. (2020). Changing the culture of urine culturing: Utilizing Agile Implementation to improve diagnostic stewardship in the ICU. American Journal of Infection Control, 48(11), 1375–1380. https://doi.org/10.1016/j.ajic.2020.01.022

135.   Pedersen, S. A. R. and Henriksen, A. (2017) 'A qualitative case study on agile practices and project success in agile software projects', Journal of modern project management.

136.   Pallant, J. (2011). For the SPSS Survival Manual, (2020), 359.

137.   Patel, D. (2020). Comments on "An Agile-Based Integrated Framework for Mobile Application Development Considering Ilities" . IEEE Access . IEEE . https://doi.org/10.1109/ACCESS.2020.3005376

138.   Pernille Bjørn (2017) 'Dark Agile: Perceiving People As Assets, Not Humans', 8491, pp. 103–107.

139.   Persson, J. S., Bruun, A., Lárusdóttir, M. K., and Nielsen, P. A. (2022). Agile software development and UX design: A case study of integration by mutual adjustment. Information and Software Technology, 152(December 2021), 107059. https://doi.org/10.1016/j.infsof.2022.107059

140.   (PMI), P. M. (2020). http://www.pmi.org/pulse/agile. Retrieved from Driving Business Agility Through Adaptive Project Management.

141.   Pinto, J. K., and Slevin, D. P. (1987). Critical Factors in Successful Project Implementation. IEEE Transactions on Engineering Management, EM-34(1), 22–27. https://doi.org/10.1109/TEM.1987.6498856

142.   (PMI), P. M. (2020). http://www.pmi.org/pulse/agile. Retrieved from Driving Business Agility Through Adaptive Project Management.

143.   Przybilla, L., Wiesche, M., and Krcmar, H. (2018). The influence of agile practices on performance in software engineering teams: A subgroup perspective. SIGMIS-CPR 2018 - Proceedings of the 2018 ACM SIGMIS Conference on Computers and People Research, (June), 33–40. https://doi.org/10.1145/3209626.3209703

144.   Putta, A., Paasivaara, M., and Lassenius, C. (2018). Adopting scaled agile framework (SAFe): a multivocal literature review . Proceedings of the 19th International Conference on Agile Software Development . ACM . https://doi.org/10.1145/3234152.3234164

145.   Putta, A., Uludağ, Ö., Paasivaara, M., and Hong, S. L. (2021). Benefits and Challenges of Adopting SAFe - An Empirical Survey. Lecture Notes in Business Information Processing (Vol. 419 LNBIP). https://doi.org/10.1007/978-3-030-78098-2_11

146.   Qumer, A., and Henderson-Sellers, B. (2008). A framework to support the evaluation, adoption and improvement of agile methods in practice. Journal of Systems and Software, 81(11), 1899–1919. https://doi.org/10.1016/j.jss.2007.12.806

147.   Remta, D., and Buchalcevova, A. (2021). Product Owner's Journey to SAFe®—Role Changes in Scaled Agile Framework . Information (Basel) . Basel : MDPI AG . https://doi.org/10.3390/info12030107

148.   Renzl, B., Mahringer, C. A., Rost, M., and Scheible, L. (2021). Organizational Agility: Current Challenges and Future Opportunities. Journal of Competences, Strategy and Management, 11(December), 1–10. https://doi.org/10.25437/jcsm-vol11-51

149.   Repenning, J., Kieffer, D. and Repenning, N. P. (2017) 'Agile for Everyone Else: Using Triggers and Checks to Create Agility Outside of Software Development', MIT Sloan School of Management MIT Sloan School Working Paper, (June), pp. 5198–5215

150.   Rezaei, J., van Roekel, W. S., and Tavasszy, L. (2018). Measuring the relative importance of the logistics performance index indicators using Best Worst Method. Transport Policy, 68(December 2017), 158–169. https://doi.org/10.1016/j.tranpol.2018.05.007

151.   Riemann, T., Kreß, A., Roth, L., Klipfel, S., Metternich, J., and Grell, P. (2020). Agile implementation of virtual reality in learning factories. Procedia Manufacturing, 45(2019), 1–6. https://doi.org/10.1016/j.promfg.2020.04.029

152.   Rooshdi, R. R. R. M., Majid, M. Z. A., Sahamir, S. R., and Ismail, N. A. A. (2018). Relative importance index of sustainable design and construction activities criteria for green highway. Chemical Engineering Transactions, 63(2007), 151–156. https://doi.org/10.3303/CET1863026

153.   Rumeser, D., and Emsley, M. (2019). Lessons learned from implementing project management games. International Journal of Serious Games, 6(1), 71–92. https://doi.org/10.17083/ijsg.v6i1.130

154.   Ruparelia, N. B. (2010). Software development lifecycle models. ACM SIGSOFT Software Engineering Notes, 35(3), 8–13. https://doi.org/10.1145/1764810.1764814

155.   Saragih, L. R., Dachyar, M., and Zagloel, T. Y. M. (2021). Implementation of telecommunications cross-industry collaboration through agile project management. Heliyon, 7(5), e07013. https://doi.org/10.1016/j.heliyon.2021.e07013

156.   Serrador, P. and Pinto, J. K. (2015) 'Does Agile work? - A quantitative analysis of agile project success', International Journal of Project Management. Elsevier Ltd. APM and IPMA., 33(5), pp. 1040–1051. doi: 10.1016/j.ijproman.2015.01.006.

157.   Saunders, B. M., and Tosey, P. (2013). Research_Onion_Layers_58-libre (1) Saunders 2013.

158.   Scholz, J. A., Sieckmann, F., and Kohl, H. (2020). Implementation with agile project management approaches: Case study of an industrie 4.0 learning factory in China. Procedia Manufacturing, 45, 234–239. https://doi.org/10.1016/j.promfg.2020.04.100

159.   Schwaber, K., and Sutherland, J. (2015). The Scrum Guide. Software in 30 Days, 133–152. https://doi.org/10.1002/9781119203278.app2

160.   Shankarmani, R., Pawar, R., S. Mantha, S., and Babu, V. (2012). Agile Methodology Adoption: Benefits and Constraints. International Journal of Computer Applications, 58(15), 31–37. https://doi.org/10.5120/9361-3698

161.   Sharifi, H., and Zhang, Z. (1999). Methodology for achieving agility in manufacturing organisations: an introduction. International Journal of Production Economics, 62(1), 7–22. https://doi.org/10.1016/S0925-5273(98)00217-5

162. Shrivastava, S. V., and Rathod, U. (2017). A risk management framework for distributed agile projects. Information and Software Technology, 85, 1–15. https://doi.org/10.1016/j.infsof.2016.12.005

163. Sidky, A., and Arthur, J. D. (2007). A Structured Approach to Adopting Agile Practices : The Agile Adoption Framework A Structured Approach to Adopting Agile Practices : The Agile Adoption Framework. Innovations in Systems and Software Engineering, (1), 1–170.

164. Siegel, A. F., and Wagner, M. R. (2022). Chi-Squared Analysis. Practical Business Statistics, 531–547. https://doi.org/10.1016/b978-0-12-820025-4.00017-8

165. Sindhwani, R., and Malhotra, V. (2017). A framework to enhance agile manufacturing system: A total interpretive structural modelling (TISM) approach . Benchmarking : An International Journal . https://doi.org/10.1108/BIJ-09-2015-0092

166. Soe, R. M., and Drechsler, W. (2018). Agile local governments: Experimentation before implementation. Government Information Quarterly, 35(2), 323–335. https://doi.org/10.1016/j.giq.2017.11.010

167. Sorri, K., Mustafee, N., and Seppänen, M. (2022). Revisiting IoT definitions: A framework towards comprehensive use. Technological Forecasting and Social Change, 179(January). https://doi.org/10.1016/j.techfore.2022.121623

168. Špundak, M. (2014). Mixed Agile/Traditional Project Management Methodology – Reality or Illusion? Procedia - Social and Behavioral Sciences, 119, 939–948. https://doi.org/10.1016/j.sbspro.2014.03.105

169. Stavru, S. (2014) 'A critical examination of recent industrial surveys on agile method usage', Journal of Systems and Software. Elsevier Inc., 94, pp. 87–97. doi: 10.1016/j.jss.2014.03.041.

170. Steinmetz, S. (2016). Non-probability sampling, (January).

171. Straková, J., Váchal, J., Kollmann, J., and Talír, M. (2021). Development trends in organizational and management structures. Problems and Perspectives in Management, 19(2), 495–506. https://doi.org/10.21511/ppm.19(2).2021.39

172.   Sutherland, J., Darrell K, R. and Noble, A. (2018) 'AGILE AT SCALE', (June), pp. 88–97.

173.   Sunner, D. (2016). Agile : Adapting to need of the hour. 2016 2nd International Conference on Applied and Theoretical Computing and Communication Technology (ICATccT), 130–135.

174.   Sutherland, J., Schoonheim, G., Kumar, N., Pandey, V., and Vishal, S. (2009). Fully distributed scrum: Linear scalability of production between San Francisco and India. Proceedings - 2009 Agile Conference, AGILE 2009, (August 2009), 277–282. https://doi.org/10.1109/AGILE.2009.27

175.   Tonelli, A. O., Bermejo, P. H. S., Santos, M. A., Zambalde, A. L., Silva De Oliveira, M., and Antonialli, L. M. (2013). Agile practices to accelerate the delivery of software: A quantitative study with software professionals. Proceedings of the Annual Hawaii International Conference on System Sciences, 4771–4779. https://doi.org/10.1109/HICSS.2013.75

176.   Tripp, J. F., and Armstrong, D. J. (2014). Exploring the relationship between organizational adoption motives and the tailoring of agile methods. Proceedings of the Annual Hawaii International Conference on System Sciences, 4799–4806. https://doi.org/10.1109/HICSS.2014.589

177.   Turetken, O., Stojanov, I., and Trienekens, J. J. M. (2017). Assessing the adoption level of scaled agile development: a maturity model for Scaled Agile Framework . Journal of Software : Evolution and Process . Chichester : Wiley Subscription Services, Inc . https://doi.org/10.1002/smr.1796

178.   Turner, R., Ledwith, A., and Kelly, J. (2010). Project management in small to medium-sized enterprises: Matching processes to the nature of the firm. International Journal of Project Management, 28(8), 744–755. https://doi.org/10.1016/j.ijproman.2010.06.005

179.   Ugoni, A., and Walker, B. F. (1995). The Chi square test: an introduction. COMSIG Review, 4(3), 61–64. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17989754%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC2050386

180.   Unhelkar, B. (2018). Big data strategies for agile business: framework, practices, and transformation roadmap . Boca Raton, Florida : CRC Press . Retrieved from https://go.exlibris.link/N6Gh2LCF

181.   Uwadi, M., Gregory, P., Allison, I., and Sharp, H. (2022). Roles of Middle Managers in Agile Project Governance. Lecture Notes in Business Information Processing (Vol. 445 LNBIP). https://doi.org/10.1007/978-3-031-08169-9_5

182.   Vallon, R., Strobl, S., Bernhart, M., Prikladnicki, R., and Grechenig, T. (2016). ADAPT: A Framework for Agile Distributed Software Development . IEEE Software . Los Alamitos : IEEE . https://doi.org/10.1109/MS.2016.130

183.   Vasudeva, S., and Rathod, U. (2017). A risk management framework for distributed agile projects. Information and Software Technology, 85, 1–15. https://doi.org/10.1016/j.infsof.2016.12.005.

184.   Vax, M. and Michaud, S. (2008) 'Distributed Agile: Growing a practice together', Proceedings - Agile 2008 Conference. IEEE, pp. 310–314. doi: 10.1109/Agile.2008.44

185.   VersionOne Inc. (2019). 13th Annual State of Agile Development Survey. Journal of Chemical Information and Modeling, 53(9), 1689–1699.

186.   Vijayasarathy, L. and Turk, D. (2012) 'Drivers of agile software development use: Dialectic interplay between benefits and hindrances', Information and Software Technology. Elsevier B.V., 54(2), pp. 137–148. doi: 10.1016/j.infsof.2011.08.003.

187.   Vinodh, S., Sundararaj, G., and Devadasan, S. R. (2010). Measuring organisational agility before and after implementation of TADS. International Journal of Advanced Manufacturing Technology, 47(5–8), 809–818. https://doi.org/10.1007/s00170-009-2212-7

188.   Wells, H. (2012). How effective are project management methodologies? An explorative evaluation of their benefits in practice. Project Management Journal, 43(6), 43–58. https://doi.org/10.1002/pmj.21302

189.   Wells, H., Dalcher, D. and Smyth, H. (2015) 'The adoption of agile management practices in a traditional project environment: An IT/IS case study', Proceedings of the

Annual Hawaii International Conference on System Sciences. IEEE, 2015-March, pp. 4446–4453. doi: 10.1109/HICSS.2015.532.

190. West, D., Grant, T., Gerush, M., and D'Silva, D. (2012). Forrester Research: Agile Development: Mainstream Adoption Has Changed Agility. Retrieved from http://www.forrester.com/Agile+Development+Mainstream+Adoption+Has+Changed+Agility/fulltext/-/E-RES56100

191. Willeke, M. H. H. (2011). Agile in academics: Applying agile to instructional design. Proceedings - 2011 Agile Conference, Agile 2011, 246–251. https://doi.org/10.1109/AGILE.2011.17

192. Wirth, N. (2008). A Brief History of Software Engineering. IEEE Annals of the History of Computing, 30(3), 32–39. https://doi.org/10.1109/MAHC.2008.33

193. Yin., R. K. (1996). Case study research design and methods (5th ed.). Thousand Oaks, CA: Sage. 282 pages. Metodología de La Investigación, 28(March 2016), 61–103. https://doi.org/10.3138/CJPE.BR-240

194. Yin, R. K. (2018). Case study research and applications. Sage Publications, 352.

195. Yusnorizam Ma, M. (2018). The Challenges of Implementing Agile Scrum in Information System's Project. Jour of Adv Research in Dynamical and Control Systems, 10(September), 9. Retrieved from https://ssrn.com/abstract=3786550

196. Yusuf, Y. Y., and Adeleye, E. O. (2002). A comparative study of lean and agile manufacturing with a related survey of current practices in the UK. International Journal of Production Research, 40(17), 4545–4562. https://doi.org/10.1080/00207540210157141

197. Zhang, Z. D., and Sharifi, H. (2007). Towards theory building in agile manufacturing strategy - A taxonomical approach. IEEE Transactions on Engineering Management, 54(2), 351–370. https://doi.org/10.1109/TEM.2007.893989

198. Zide, J., Elman, B., and Shahani-Denning, C. (2014). Linkedin and recruitment: How profiles differ across occupations. Employee Relations, 36(5), 583–604. https://doi.org/10.1108/ER-07-2013-0086

199. Žitkienė, R., and Deksnys, M. (2018). Organizational agility conceptual model. Montenegrin Journal of Economics, 14(2), 115–129. https://doi.org/10.14254/1800-5845/2018.14-2.7

APPENDIX A

SURVEY QUESTIONS

Participant Information Leaflet

Study Title: **Understanding Agile Project Management**

Investigator: Tyough Beetseh**.**

Introduction

You are invited to take part in a research study. Before you decide, you need to understand why the research is being done and what it would involve for you. Please take the time to read the following information carefully. Talk to others about the study if you wish.

 Please ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

 Who is organising and funding the study?

 This study is organised and self-funded by Tyough Beetseh as part of a doctoral research programme with the University of Warwick which seeks to understand how projects are adopting agile and if their approaches are producing the results expected

 What is the study about?

This major study is aimed at providing invaluable insights and case studies on how agile is being implemented, its impact on the projects and if this impact aligns with the expectations of its adopters.

 What would taking part involve?

 You will be invited to take part in a survey or survey and can choose which of the two you would prefer.

 Taking part in this survey will include;

 Providing access to personal information (Name, contact email), questionnaires, surveys.
 All surveys will be accessed via an Online tool (Qualtrics), a link to the survey tool will be sent via email.

Do I have to take part?

No. Participation in this study is completely voluntary and choosing not to take part will not affect you in any way. You can also choose to withdraw your participation at any time, without giving a reason by contacting one of the research team. Further details about withdrawing from the study are provided later on in this document.

Q67 **What are the possible benefits of taking part in this study?**

As part of the benefits of taking part in this survey, the participant will be contributing to major research which has the potential to improve the implementation of Agile within organizations.

What are the possible disadvantages, side effects or risks, of taking part in this study?

No disadvantages of participating in this survey have been identified.

Expenses and payments

There are no provisions for a reimbursement of the participant for their participation in this research.

Will my taking part be kept confidential?

All data collected will be via email, Microsoft Teams/Skype for Business or via qualtrics.

The collected data will be strictly for the purpose of this research, and for re-identification is required (i.e. participants will be given a study number to protect their identity and the code linking this will be stored separately to the research data); During the research, all data will be securely stored on the University of Warwick's secured one drive in accordance with the University's approved storage policy.

Any data collected will only be accessible by the Researcher

No personal data will be transferred or shared to other organisations outside of the University for this Project. No personal data will be transferred outside of the UK If a participant were to disclose that they, and/or others, may be at risk of harm, there is a duty of care to report this to the relevant authorities; No direct quotes will be used in the

research report/publication where individuals could be identified directly or indirectly. Note. The data will be pseudonymised and there will be no way of linking data back to an individual.

What will happen to the data collected about me?

As a publicly funded organization, the University of Warwick have to ensure that it is in the public interest when we use personally identifiable information from people who have agreed to take part in research. This means that when you agree to take part in a research study, such as this, we will use your data in the ways needed to conduct and analyse the research study.

We will be using information from you in order to undertake this study and will act as the data controller for this study. We are committed to protecting the rights of individuals in line with data protection legislation The University of Warwick will delete information about you once the research has been completed.   Research data will be **anonymised** as quickly as possible after data collection and it will not be possible to withdraw your data after this point. This data will be collected as part of the process of arranging survey and sending links to the survey questions. This data will be deleted once the research has been published.   Where applicable, research data will be **pseudonymised** as quickly as possible after data collection. This means all direct and indirect identifiers will be removed from the research data and will be replaced with a participant number. The key to identification will be stored separately and securely to the research data to safeguard your identity. Participants will be able to withdraw their information up to 12 months after it has been collected.   There will be no form of data sharing with other organisations as part of this research.   Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. The University of Warwick has in place policies and procedures to keep your data safe.

This data may also be used for future research, including impact activities following review and approval by an independent Research Ethics Committee and subject to your consent at the outset of this research project.

For further information, please refer to the University of Warwick Research Privacy Notice which is available here:
https://warwick.ac.uk/services/idc/dataprotection/privacynotices/researchprivacynotice or by contacting the Legal and Compliance Team at GDPR@warwick.ac.uk.

What will happen if I don't want to carry on being part of the study?

Participation is entirely voluntary, and as a participant you are entitled to withdraw your participation from the study without giving a reason, this would not affect you in any way.
Please send email to tyough.beetseh@warwick.ac.uk
Please note withdrawing participation is separate to withdrawing data that has already been collected during the study. Note that it will often not be possible to withdraw your data which has already been collected, after it has been anonymised. To safeguard your rights, we will use the minimum personally-identifiable information possible and keep the data secure in line with the University's Information and Data Compliance policies.

What will happen to the results of the study?

The results of this survey will be published as part of a thesis in partial fulfilment of a Doctor of Philosophy in Engineering. It will also be submitted to the Journal of Project Management.

Who has reviewed the study?
This study has been reviewed and given favourable opinion by the University of Warwick's Biomedical and Scientific Research Ethics Committee (BSREC):U0950853

Who should I contact if I want further information?
Lead researcher: Tyough Beetseh (tyough.beetseh@warwick.ac.uk)
Supervisor: kogila.balakrishnan@warwick.ac.uk

Who should I contact if I wish to make a complaint?

Any complaint about the way you have been dealt with during the study or any possible harm you might have suffered will be addressed. Please address your complaint to the person below, who is a senior University of Warwick official entirely independent of this study:

Head of Research Governance

Research and Impact Services

University House

University of Warwick

Coventry

CV4 8UW

Email: researchgovernance@warwick.ac.uk

Tel: 02476 575733

If you wish to raise a complaint on how we have handled your personal data, you can contact our Data Protection Officer who will investigate the matter: DPO@warwick.ac.uk.

If you are not satisfied with our response or believe we are processing your personal data in a way that is not lawful you can complain to the Information Commissioner's Office (ICO).

Thank you for taking the time to read this Participant Information Leaflet

CONSENT **STATEMENT**

Participant Identification Number for this study: 0950853

Title of Project: Understanding Agile Project Management

Name of Researcher(s): Name of Researcher: Tyough Beetseh. Supervisor: Dr. Kogila Balakrishnan and Prof. Naomi Brookes. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

I understand that my participation is voluntary. I understand that data collected during the study, may be looked at by individuals from The University of Warwick, I give permission for these individuals to have access to my data. I confirm that I understand the procedure for withdrawing their data after participating.6. I agree to take part in the above study.

Q47 By agreeing to participate, you are indicating that you are atleast 18 years of age and you have read and comprehend the informed consent.

○ I voluntarily agree to participate in this study, and I know of no reason I cannot participate. I have read and understand the informed consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project. (1)

End of Block: Consent Statement

Start of Block: MOTIVATIONS FOR AGILE IMPLEMENTATION

Q55 What were the motivations for considering/adopting agile? (e.g to reduce risk)

_____

Q15 How important were the following in you (or your organization's) decision to initially adopt agile development methodologies in your project?

	Not at all Important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Enhance software delivery (1)	○	○	○	○	○
Improved/increased engineering discipline (2)	○	○	○	○	○
Accelerate time-to-market (3)	○	○	○	○	○
Increase team productivity (4)	○	○	○	○	○
Reduce cost (5)	○	○	○	○	○
Enhance ability to manage changing priorities (6)	○	○	○	○	○
Improve alignment between IT and business objectives (7)	○	○	○	○	○
Improve Culture and Boost Moral (8)	○	○	○	○	○
Reduce Project risk (9)	○	○	○	○	○

Improve project visibility (10)	○	○	○	○	○

_____

Q16 Describe any other motivations for adopting agile development methodologies on your project? (If none, please type - N/A)

_____

Q63 How would you describe your approach to adopting agile methods?

○ Crusader: Agile was applied in its raw, unblended form. (1)

○ Tailor: Agile was blended with traditional and agile approaches to fit their conditions (2)

○ Dabbler : A traditional approach was followed with the addition of some agile activities and practices. (3)

○ None of the Above

End of Block: AGILE IMPLEMENTATION APPROACH

Start of Block: PERSONAL INFORMATION

Q39 First Name

_____

Q40 Surname

_____

Q41 Contact email

_____

End of Block: PERSONAL INFORMATION

Start of Block: PROJECT INFORMATION

Q1 Project Title (The title of any IT or Non IT related project you are willing to share information on)

_____

Q43 What was your Role on the referenced project? (e.g Scrum Master, Project Manager, Business Analyst etc)

_____

_____

Q3 Type of Delivery (If Non-IT please select "other")

○ Software (1)

○ Hardware (2)

○ Other (3) _____

End of Block: PROJECT INFORMATION

APPENDIX B

ETHICS APPROVAL

Biomedical and Scientific Research Ethics Committee

Kirby Corner Road

Coventry

CV4 8UW Thursday, 10 June 2021

Mr Tyough Beetseh

WMG

University of Warwick

Coventry

CV4 7AL

Dear Mr Beetseh,

Application Reference: BSREC 88/20-21

Title: Investigating the relationship between agile practices and agile Implementation goals

Thank you for submitting your revisions to the Biomedical and Scientific Research Ethics Committee (BSREC) for consideration. We are pleased to advise you that, under the authority delegated to us by the University of Warwick Research Governance and Ethics Committee, **full ethical approval for your project is hereby granted, subject to the conditions outlined in Appendix 1.**

Any substantial changes to any aspect of the project will require further review by BSREC and the PI is required to notify the BSREC as early as possible should they wish

to make any such changes. The BSREC Secretary should be notified of any minor amendments to the study.

Should issues arise during the course of the project that present risks to the safety and wellbeing of participants, these must be reported to BSREC. In such an event, recruitment and research activity must be halted until the appropriate actions have been taken, as agreed in consultation with BSREC.

I would like to take this opportunity to wish you all the best with your study.

Yours sincerely,

Dr David Ellard

Chair, Biomedical and Scientific Research Ethics Committee

---

www.warwick.ac.uk

- ✞ Please also be aware that BSREC grants **ethical approval** for studies. The seeking and obtaining of all other necessary approvals are the responsibility of the Principal/ Chief Investigator. For advice on what additional approvals may be required, please visit the following BSREC Other Approvals page.
- ✞ Please ensure that evidence of all necessary local permissions is provided to BSREC prior to commencing your study.
- ✞ Before conducting your research it is strongly recommended that you complete the on-line Research Integrity training.

- You must ensure that you are compliant with all necessary data protection legislation. Legal and Compliance guidance can be accessed on their GDPR information pages.

- In undertaking your study, you are required to comply with the University of Warwick's Research Code of Practice.

- You are also required to familiarise yourself with the University of Warwick's Code of Practice for the Investigation of Research Misconduct.

- Further advice and support is available from the BSREC Secretary via BSREC@warwick.ac.uk.

---

www.warwick.ac.uk

APPENDIX C

PARTICIPATION INFORMATION LEAFLET

Participant Information Leaflet for Project organizations, including Project Managers and Practitioners.

Study Title: **Understanding the motivations for adopting agile and Agile implementation approaches.**

Investigator(s): Tyough Beetseh**.**

Introduction

You are invited to take part in a research study. Before you decide, you need to understand why the research is being done and what it would involve for you. Please take the time to read the following information carefully. Talk to others about the study if you wish.

Please ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Who is organising and funding the study?

This study is organised and self-funded by Tyough Beetseh as part of a doctoral research programme with the University of Warwick which seeks to understand how projects are adopting agile and if their approaches are producing the results expected

What is the study about?

This major study is aimed at providing invaluable insights and case studies on how agile is being implemented, its impact on the projects and if this impact aligns with the expectations of its adopters.

What would taking part involve?

You will be invited to take part in a survey and interview and can choose to do just one or both

Taking part in this survey will include;

- Providing access to personal information (Name, contact email), questionnaires, interviews,

- The Interviews are expected to last for a maximum of 60 minutes, Access to Survey questions will be provided to the participant for a period of 30 days.
- All interviews will be conducted via Microsoft Team/Skype for Business and will be audio recorded.
- All surveys will be accessed via an Online tool (Qualtrics), a link to the survey tool will be sent via email.

Do I have to take part?

No. Participation in this study is completely voluntary and choosing not to take part will not affect you in any way. You can also choose to withdraw your participation at any time, without giving a reason by contacting one of the research team. Further details about withdrawing from the study are provided later on in this document.

What are the possible benefits of taking part in this study?

As part of the benefits of taking part in this interview, the participant will be contributing to a major research which has the potential to improve the implementation of Agile within organisations.

What are the possible disadvantages, side effects or risks, of taking part in this study?

No disadvantages of participating in this interview have been identified.

Expenses and payments

There are no provisions for a reimbursement of the participant for their participation in this research.

Will my taking part be kept confidential?

- All data collected will be via email, Microsoft Teams/Skype for Business or via qualtrics.
- The collected data will be strictly for the purpose of this research, and for re-identification is required (i.e. participants will be given a study number to protect their identity and the code linking this will be stored separately to the research data);
- During the research, all data will be securely stored on the University of Warwick's secured one drive in accordance with the University's approved storage policy.
- Any data collected will only be accessible by the Researcher
- No personal data will be transferred or shared to other organisations outside of the University for this Project.
- No personal data will be transferred outside of the UK
- If a participant were to disclose that they, and/or others, may be at risk of harm, there is a duty of care to report this to the relevant authorities;

- No direct quotes will be used in the research report/publication where individuals could be identified directly or indirectly.

Note. The data will be pseudonymised and there will be no way of linking data back to an individual.

What will happen to the data collected about me?

As a publicly funded organisation, the University of Warwick have to ensure that it is in the public interest when we use personally-identifiable information from people who have agreed to take part in research. This means that when you agree to take part in a research study, such as this, we will use your data in the ways needed to conduct and analyse the research study.

We will be using information from you in order to undertake this study and will act as the data controller for this study. We are committed to protecting the rights of individuals in line with data protection legislation The University of Warwick will delete information about you once the research has been completed.

1) Research data will be **anonymised** as quickly as possible after data collection and it will not be possible to withdraw your data after this point. This data will be collected as part of the process of arranging interview and sending links to the survey questions. This data will be deleted once the research has been published.

2) Where applicable, research data will be **pseudonymised** as quickly as possible after data collection. This means all direct and indirect identifiers will be removed from the research data and will be replaced with a participant number. The key to identification will be stored separately and securely to the research data to safeguard your identity. Participants will be able to withdraw their information up to 12 months after it has been collected.

3) There will be no form of data sharing with other organisations as part of this research.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. The University of Warwick has in place policies and procedures to keep your data safe.

This data may also be used for future research, including impact activities following review and approval by an independent Research Ethics Committee and subject to your consent at the outset of this research project.

For further information, please refer to the University of Warwick Research Privacy Notice which is available here: https://warwick.ac.uk/services/idc/dataprotection/privacynotices/researchprivacynotice or by contacting the Legal and Compliance Team at GDPR@warwick.ac.uk.

What will happen if I don't want to carry on being part of the study?
Participation is entirely voluntary, and as a participant you are entitled to withdraw your participation from the study without giving a reason, this would not affect you in any way.

Please send email to tyough.beetseh@warwick.ac.uk

Please note withdrawing participation is separate to withdrawing data that has already been collected during the study. Note that it will often not be possible to withdraw your data which has already been collected, after it has been anonymised. To safeguard your rights, we will use the minimum personally-identifiable information possible and keep the data secure in line with the University's Information and Data Compliance policies.

What will happen to the results of the study?

The results of this survey will be published as part of a thesis in partial fulfilment of a Doctor of Philosophy in Engineering. It will also be submitted to the Journal of Project Management.

Who has reviewed the study?
This study has been reviewed and given favourable opinion by the University of Warwick's Biomedical and Scientific Research Ethics Committee (BSREC):U0950853

Who should I contact if I want further information?

Lead researcher: Tyough Beetseh (tyough.beetseh@warwick.ac.uk)

Supervisor: kogila.balakrishnan@warwick.ac.uk

Who should I contact if I wish to make a complaint?

Any complaint about the way you have been dealt with during the study or any possible harm you might have suffered will be addressed. Please address your complaint to the person below, who is a senior University of Warwick official entirely independent of this study:

Head of Research Governance

Research and Impact Services

University House

University of Warwick

Coventry

CV4 8UW

Email: researchgovernance@warwick.ac.uk

Tel: 02476 575733

If you wish to raise a complaint on how we have handled your personal data, you can contact our Data Protection Officer who will investigate the matter: DPO@warwick.ac.uk.

If you are not satisfied with our response or believe we are processing your personal data in a way that is not lawful you can complain to the Information Commissioner's Office (ICO).

Thank you for taking the time to read this Participant Information Leaflet

APPENDIX D

CONSENT FORM

CONSENT FORM

Participant Identification Number for this study: *TBC*

Title of Project: Understanding Agile Project Management

Name of Researcher(s): Name of Researcher: Tyough Beetseh. Supervisor: Dr. Kogila Balakrishnan and Prof. Naomi Brookes.

Please   initial

all boxes

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. □

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my legal rights being affected. □

3. I understand that data collected during the study, may be looked at by individuals from The University of Warwick, from regulatory authoritieswhere it is relevant to my taking part in this study. I give permission for these individuals to have access to my data. □

4. I consent to audio/video recording of this interview, consent to use of (anonymised) verbatim quotations. □

5. I am happy for my data to be used in future research. □

6. I agree to take part in the above study. □

_____   _____   _____

Name of Participant   Date   Signature

Tyough Beetseh

Name of Person Date Signature

Taking consent

APPENDIX E

INVITATION EMAIL

Dear (Respondents name),

Project Topic: Understanding the motivations for adopting agile and Agile implementation approaches

I am undertaking research which seeks to understand the motivations of agile and the agile adopting approaches used within organizations. I am also seeking to understand if the approaches used are influenced by the motivations.

This major study will provide invaluable insights and case studies on how agile is being implemented, its impact on the projects and if this impact aligns with the expectations.

We are seeking case studies from major project based organisations like yours, including successful and unsuccessful projects where you have applied agile project management methods.

Research objectives:
  I.   Identify the motivations for the Adoption of Agile to develop software by organizations.
 II.   Explore the Agile implementation approaches
III.   Evaluate any differences in the level of importance of each identified motivation.
 IV.   Identify any relationships that exist between the motivations and the Agile implementation approaches.
  V.   Establish a theoretical framework that informs future Implementations of Agile methods by organizations in the delivery of software.

Research method: A survey questionnaire and 60-minute virtual interviews via Microsoft Teams with members of the project management team working on the selected project(s).

Interview schedule: We are seeking interviews between 15 March 2021 and 21 October 2021

I will be extremely grateful if you or someone from your organisation will be able to allocate some of your valuable time to speak to me in reference to the attached questionnaire. Due to the global pandemic, I am unable to meet you face to face and would like to request for an MS Teams meeting.

I would also like to mention that, data collection, analysis and storage will be in accordance and in line with the University of Warwick's research ethics and governance processes.

I intend to seek the consent of the respondent's and also request permission before recording. I am also happy to show you the transcript after it has been written if you wish to see it.

Please be informed that you have the right to retract anything you have mentioned if you are not comfortable within six months of the data being collected and before the thesis is published.

I am extremely grateful for your kind consideration and in supporting me with my research.

Please contact me Tyough Beetseh (University of Warwick) if you would like to take part or require further information, via email to: tyough.beetseh@warwick.ac.uk

Thank You

Tyough