

The Impact of Agile Processes on Organisational Behaviour Within Current Banking Practice

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Declaration

I hereby declare that this submission is the result of my own work and that, to the best of my knowledge, contains no material previously published or written by another person. Due acknowledgement is given where references have been made.

... Hisham Alasad

Acknowledgements



I dedicate this thesis to the angels who have departed us on March 15th in Christchurch, New Zealand.

I acknowledge and extend my utmost gratitude to my supervisor Prof. Brian Cusack for his unwavering commitment and support throughout this journey, and unleashing the researcher in me. In addition, I extend my wholehearted appreciation to my family and friends for their unconditional love and support. Last but not least, I thank the staff and academics of the Faculty of Design and Creative Technologies of the Auckland University of Technology.

Abstract

In recent years, the banking industry is confronted with multidimensional challenges including regulatory changes imposed by authorities, non-stop emergence of technological advancements, and most importantly is the unprecedented level of customer sophistication. The consequence is a demanding customer base that has high expectations. Nonetheless, it is crucial to the continuity of banking operations to have the ability and mechanisms in place for responding to such changes in a timely, appropriate, and a swift way. Hence, acquiring the qualities of flexibility and dynamism is a key factor in gaining core competitive advantages to enable digitization and personalisation within the banking industry.

In seeking responsiveness and speed, banks are adopting Agile processes to replace fully or partially the existing traditional heavyweight methodologies such as Waterfall. However, such an adoption across the banking industry introduces a multifaceted impact with positive and negative consequences. Subsequently, the manifestation of this impact is observed through the emerging changes in both practice and culture; including social and behavioural norms.

Accordingly, this study aims to analyse the impact of Agile adoption within the banking industry, and consequently serves two major purposes. Firstly, it sets out to discover the impact of Waterfall and Agile methodologies on the speed of delivery as a time-to-market rate. For this purpose, the key feature of responsiveness and its interlinked relationships with other influential elements are examined. Secondly, it investigates the impact of Agile adoption on the organisational behaviour. For this purpose, it analyses the change in social and behavioural norms in the segments of people, communication, management, and customers.

Fundamentally, this study is a theoretical research based on qualitative secondary data with the use of combined research methodology of Case study and Grounded theory. Accordingly, the relevant data is collected from appropriate previous studies, while the eligibility is determined by using a rigorous inclusion or exclusion criteria in order to ensure the credibility and integrity of the research. Moreover, the selected dataset is mapped using key identifiers based from the research targets, and subsequently the data analysis process is applied guided by the Grounded theory procedures.

Eleven hypotheses emerged covering the different aspects of this study and comprehensively answering the research questions. On the one hand, the inverse relationship between responsiveness and the time-to-market explains the positive impact of adopting Agile in comparison to Waterfall that shortens the time-to-market rate. On the other hand, multiple behavioural changes and emerging relationships are identified. These give the positive impact of adopting Agile on organisational behaviour in its segments including instating the sense of inclusivity, switching from individualism to collectivism mindsets, adhering to transformational leadership styles, and enabling multi transparent communication and knowledge sharing channels between different stakeholders within the banking industry. Moreover, the study reveals an emergent impact of Agility in enabling socialising as a contemporary form of communication with customers. Additionally, due to its qualitative nature, this study is limited to analytical generalisation, and not statistical evidence.

Ultimately, through this thesis the author contributes to the ongoing debate of the suitability of adopting Agile processes within various industries, most specifically the banking industry. A set of practical recommendations are proposed to the banking industry, and potential future work is suggested to the academic community.

Table of Contents

Declaration.....	i
Acknowledgements.....	ii
Abstract.....	iii
List of Tables	viii
List of Figures.....	x
List of Abbreviations	xi
Chapter 1: Introduction	1
1.1 Intorduction.....	1
1.2 The significance of the study	3
1.3 Aims of the research.....	4
1.4 Organisation of the research.....	5
Chapter 2: Literature Review	6
2.1 Introduction.....	6
2.2 Changes in banking	7
2.2.1 Regulatory changes	8
2.2.2 Competitional Change	10
2.2.3 Technology Changes	11
2.3 Delivery methodologies in banking	12
2.3.1 Waterfall methodology	14
2.3.1.1 Background.....	15
2.3.1.2 Waterfall advantages and disadvantages	16
2.3.2 Agile methodology	20
2.3.2.1 Background.....	21
2.3.2.2 Agile advantages and Disadvantages.....	24
2.3.3 Comparison of Agile Vs. Waterfall.....	27
2.4 Adoption of agile processes	31
2.5 Impact of adopting agile processes on organisational behaviour.....	31
2.5.1 Impact of Agile on people	32
2.5.2 Impact of Agile on communication.....	33
2.5.3 Impact of Agile on management	34
2.5.4 Impact of agile on relationship with customers.....	35
2.6 Review of issues and problems	36
2.7 Summary of issues and problems.....	37
2.8 Conclusion.....	38
Chapter 3: Research Methodology	40

3.1	Introduction	40
3.2	Similar study review	42
3.3	Theoretical framework	43
3.4	Case Study method.....	45
3.5	Grounded Theory	48
3.5.1	Glaserian and Straussian Approach.....	49
3.5.2	Grounded Theory procedures	51
3.6	Combined methodology	56
3.6.1	Case Study: Grounded theory Combability.....	56
3.6.2	Case Study: Grounded theory Methodology	58
3.7	Application of the methodology.....	61
3.7.1	Literature review	61
3.7.2	Case study and unit of analysis	62
3.7.3	Case study Protocol	63
3.7.4	Techniques of data collection.....	64
3.7.5	Findings and reporting.....	65
3.7.6	Suggested solutions	65
3.8	Limitation.....	65
3.9	Summary	66
	Chapter 4: Research Findings	67
4.1	Introduction	67
4.2	Data eligibility.....	68
4.2.1	Criteria for including or excluding studies.....	69
4.2.2	Summary of selected sources	71
4.2.3	Summary of sources vs. participants	72
4.2.4	Summary of participants vs. roles	73
4.2.5	Summary of participants vs. research question	75
4.3	Summary of data presentation.....	76
4.3.1	Methodology - data.....	78
4.3.2	Organisational behaviour (People) - Data	78
4.3.3	Organisational behaviour (Communication) - data	79
4.3.4	Organisational behaviour (Management) - data	80
4.3.5	Organisational behaviour (Customer) - data	81
4.4	Summary	82
	Chapter 5: Analysis.....	84
5.1	Introduction	84
5.2	Data analysis framework.....	85

5.2.1	Key area - methodology	88
5.2.1.1	Data analysis	88
5.2.1.2	Observation and hypothesis	94
5.2.2	Organisational behaviour – people	95
5.2.2.1	Data analysis	96
5.2.2.2	Observation and hypothesis	102
5.2.3	Organisational behaviour – communication.....	103
5.2.3.1	Data analysis	103
5.2.3.2	Observation and hypothesis	107
5.2.4	Organisational behaviour – management	108
5.2.4.1	Data analysis	109
5.2.4.2	Observation and hypothesis	113
5.2.5	Organisational behaviour – customer.....	114
5.2.5.1	Data analysis	114
5.2.5.2	Observation and hypothesis	118
5.3	Research evaluation	119
5.4	Conclusion	120
Chapter 6: Discussion	124
6.1	Introduction	124
6.2	Findings discussion	124
6.2.1	Research questions one.....	125
6.2.2	Research question two	127
6.2.2.1	People.....	127
6.2.2.2	Communication.....	128
6.2.2.3	Management.....	129
6.2.2.4	Customer	131
6.3	Solutions.....	132
6.4	Limitation of the study	133
6.5	Discussion summary	134
Chapter 7: Conclusion	136
7.1	Introduction	136
7.2	Summary of the study	136
7.3	Recommendation to the banking industry.....	138
7.4	Future research	140
References	141

List of Tables

Table 1. 1 Thesis Organisation.....	5
Table 2.1 Growth of the banking industry between 2008-2017.....	8
Table 2. 2 BS11 Policy Change Analysis	9
Table 2. 3 Key processes and methods timeline	12
Table 2. 4 Advantages of Waterfall model	17
Table 2. 5 Disadvantages of Waterfall model.....	18
Table 2. 6 Agility features.....	23
Table 2. 7 Advantages of Agile Methodology	24
Table 2. 8 Disadvantages of Agile Methodology.....	25
Table 2. 9 Comparison between Agile and Waterfall methods	27
Table 3. 1 Major Procedures of Grounded theory.....	52
Table 3. 2 Example of coding procedure in Grounded theory	55
Table 3. 3 Phases and steps of Case Study: Grounded Theory methodology.....	58
Table 3. 4 Main study guidelines	61
Table 3. 6 Design of Case Study protocol.....	63
Table 4.1 Secondary data inclusion/exclusion criteria.....	70
Table 4.2 Sources of approved secondary data.....	71
Table 4.3 Sources vs. participants entries	72
Table 4.4 Role vs. participants entries	74
Table 4.5 Key areas vs. participants entries.....	75
Table 4. 6 Key identifiers of data mapping.....	76
Table 4.7 Excerpts of data on methodology impact.....	78
Table 4.8 Excerpts of data on people behaviour impact	79
Table 4.9 Excerpts of data on communication behaviour impact.....	80
Table 4.10 Excerpts of data on management behaviour impact	80
Table 4.11 Excerpts of data on customer behaviour impact	81
Table 5.1 Data analysis systematic steps	86
Table 5. 2 Emerged codes of Q1-Methdology	89
Table 5.3 Emerged categories of Q1-Methdology.....	91
Table 5.4 Relationships between categories for Q1-Methdology.....	93
Table 5.5 Emerged codes of Q2-People.....	96
Table 5.6 Emerged categories of Q2-People.....	98
Table 5.7 Relationships between categories for Q2-People.....	101
Table 5.8 Emerged codes of Q2-Communication.....	103
Table 5.9 Emerged categories of Q2-Communication.....	105
Table 5.10 Relationships between categories for Q2-Communication.....	106
Table 5.11 Emerged codes of Q2-Management.....	109
Table 5.12 Emerged categories of Q2-Management.....	110
Table 5.13 Relationships between categories of Q2-Management.....	112
Table 5.14 Emerged codes of Q2-Customer	114
Table 5.15 Emerged categories of Q2-Customer	115

Table 5.16 Relationships between categories of Q2-Customer	117
Table 5. 17 Research evaluation	119
Table 5. 18 Research hypothesis.....	121

List of Figures

Figure 2. 1 Implementation phases for large programs (Royce, 1987, p. 329).....	15
Figure 2. 2 Waterfall lifecycle model (Ragunath et al. 2010, p. 113).....	16
Figure 3. 1 Straussian Approach Procedures (Strauss & Corbin, 1990).....	51
Figure 3. 2 Case study: Grounded theory combined methodology, adapted from (Adwan, 2017, p. 300; Halaweh, 2012, p. 40)	60
Figure 4.1 Participants source	73
Figure 4.2 Participants job	74
Figure 4.3 Key areas distribution	76
Figure 4.4 Example of data mapping process	77
Figure 4.5 Mapped sub-datasheets	77
Figure 5.1 Q1 - Methodology Codes Distribution	90
Figure 5.2 Chart of emerged categories of Q1-Methodology	92
Figure 5.3 Emerged hypothesis of research question one.....	95
Figure 5.4 Codes distribution of Q2-People	98
Figure 5.5 Chart of emerged categories of Q2-People.....	100
Figure 5.6 Emerged hypothesis of research question two (people)	102
Figure 5.7 Codes distribution of Q2-Communication.....	104
Figure 5.8 Chart of emerged categories of Q2-Communication.....	106
Figure 5.9 Emerged hypothesis of research question two (comms)	108
Figure 5.10 Codes distribution of Q2-Management	110
Figure 5.11 Chart of emerged categories of Q2-Management.....	111
Figure 5.12 Emerged hypothesis of research question two (management)	113
Figure 5.13 Codes distribution of Q2-Customer.....	115
Figure 5.14 Chart of emerged codes of Q2-Customer	116
Figure 5.15 Emerged hypothesis of research question two (customer)	118

List of Abbreviations

IT	Information Technology
IS	Information Systems
NWOW	New Ways of Working
C:D	Continuous Delivery
FMA	Financial Markets Authority
RBNZ	Reserve Bank of New Zealand
FinTech	Financial Technology
Pwc	Pricewaterhousecoopers
SOA	Service-Oriented Architecture
BPM	Business Process Management
MBM	Model-Based Management
SDLC	Software Development Life Cycles
BAU	Business As Usual
XP	Extreme Programming
FDD	Feature Driven Development
DSD	Dynamic System Development
AI	Artificial Intelligence
CeBASE	Empirically Based Software Engineering
GT	Grounded Theory
GTM	Grounded Theory Methodology
CCA	Constant Comparison Analysis
NWOW	New Ways of Working

Chapter 1: Introduction

1.1 INTRODUCTION

The banking industry is undergoing continuous transformations in response to rapid changes in the surrounding environment. The changes are categorised based on their nature including regulatory, Information Technology (IT) advancements, and customer sophistication (Callaway & Hamilton, 2008). However, the failure or delay in responding to these changes within an acceptable timeframe is a major risk to the banking industry. On the one hand, this risk potentially leads to disruption in banking operations. On the other hand, depending on the impact of the imposed change, it could threaten the core existence of the affected banks (Fiordelisi, Soana, & Schwizer, 2013).

Moreover, the potential implications of such threats is severe, and follows the snowball effect. Initially, it starts with some disassociation between banks and the customer's wants and needs leading to a gradual lack of interest in bank's products and services. Subsequently, banks are subjected to losing their customer base, falling out of competition, and ultimately being exposed and ousted from the market (Fiordelisi, Soana, & Schwizer, 2013).

Accordingly, in securing their survival and unique competitive advantages, banks have endeavored to adopt and embrace new initiatives, which could potentially impact their nature, code, and conduct (Mcintyre, 2018; RBNZ & FMA, 2018). Subsequently, banks are forced to improve and sometimes abandon some old practices, and replace them with more contemporary and flexible ones. Accordingly, this has led to the introduction of New Ways of Working (NWOW) approach, which includes embracing new tactics, and delivery methodologies seeking flexibility and speed in addressing changes (Crozier, 2019).

Furthermore, in seeking robust and swift delivery processes, banks have explored both heavy and lightweight methodologies including Waterfall and Agile respectively. Traditionally, the practices in the banking industry are widely associated with the

adoption of the Waterfall methodology, where the focus is on consolidating control and minimising cost; rather than addressing other merits such as speed and quality (Lvivity, 2018; Ragunath, Velmourougan, P. Davachelvan, & Ravimohan, 2010). However, the Waterfall disadvantages of inflexibility and unresponsiveness (Royce, 1987) have forced banks to consider and explore other options including adaptable processes such as Agile. Ultimately, Agile offers the sought after merits of flexibility and dynamism in order to respond to changes quickly and timely enough (Gill & Henderson-Sellers, 2006; Sharma, Sarkar, & Gupta, 2012).

However, the adoption of Agile in banking brings multifaceted impacts, and it is usually combined with a change across practices, social and behavioural norms. Accordingly, the change associated with Agile influences various aspects including the main aspects of this study, which are the time-to-market rate and organisational behaviour with its segments of people, communication, management, and customer. Therefore, this thesis analyses the impact of adopting Agile within the banking industry from two main positions. Firstly, it examines the impact of both Agile and Waterfall on the time-to-market rate with the objective of exploring which of the two methodologies of Agile or Waterfall is more suitable to the dynamic nature of the current banking industry. Secondly, it analyses the impact and the behavioural changes on organisational behaviour as a result of adopting Agile.

Fundamentally, this study is qualitative research based on secondary data collected from eligible sources. Furthermore, the study uses a combined methodology of Case study and Grounded theory, and gives justification for selecting the choice. Moreover, Chapter 2 reviews existing literature comprehensively; and by doing so the researcher gains appropriate knowledge concerning the researched topics, identifies gaps in existing research and publications, and detects related problems and issues to be addressed by study. Additionally, Chapter 4 explains in detail the search strategy for secondary data, and describes the mechanism behind the data cleansing and mapping processes. Subsequently, Chapter 5 offers a detailed analysis of the collected secondary data using the procedures from Grounded theory of theoretical sampling, constant

comparison analysis, and coding. Finally, chapter 6 discusses in-depth the hypotheses that emerged in the course of the research. These answer the study's two research questions. Secondly, it addresses the identified problems and issues. Thirdly, it suggests future research work to capitalise on the findings and knowledge acquired from this research. Finally, it proposes a set of practical recommendations to the banking industry.

1.2 THE SIGNIFICANCE OF THE STUDY

This study has academic and practical points of views. It contributes academically to the existing body of knowledge in terms of joining the debate of the suitability of adopting Agile within different industries, and evaluation of adopting Agile delivery processes within the banking industry. Also there is a lack of Agile publications related to the domain of the banking industry in general, and specifically evaluation of such impacts in terms of organisational behaviour within the industry. Secondly, this study offers an academic research framework of adopting a combined research methodology of Case study and the *Straussian approach* of Grounded theory within the banking industry. Accordingly, this thesis could be an academic reference point to future studies which adopt the use of this combined research methodology within technology in general, and the banking industry in specific.

More generally, it contributes valuable insights into current changes within the banking industry, and it offers solutions to critical challenges within it. The study reveals an inverse relationship between responsiveness and the time-to-market rate, and accordingly, it offers the banking industry with a solution of adopting Agility in order to shorten their time-to-market rate, which in return enhances their ability to respond swiftly to the surrounding changes. Subsequently, the study explains the positive impact of shortening the time-to-market rate in terms of increasing customer satisfaction as a consequence of having customer's wants and needs met as soon as possible. Secondly, the study reveals multiple emerged relationships across the banking industry as the result of a shift in organisational behaviour due to the Agile adoption. Furthermore, revealing these relationships is significant, because it provides banking practitioners with much

needed insights, which are keys in managing the process of transitioning into Agile and with its associated expectations.

Subsequently, the study offers practitioners with recommendations of how to leverage those interlinked behavioral relationships in order to establish effective interactional channels whether internally within banks, or externally between banks and customers. Ultimately, this is driven by key factors of customer centricity, digitization, and personalization. It results in higher staff inclusivity, and transforms the nature of communication with customers to become a conversational socialising experience.

1.3 AIMS OF THE RESEARCH

This is a theoretical research based on secondary dataset collected from eligible data sources. Accordingly, the aim of this thesis is to analyse two primary impacts of adopting Agile within the banking industry. Firstly, it examines the suitability of the selected methodology -whether Waterfall or Agile- in providing quick and swift responses to the rapid changes in surrounding environments. Moreover, this is achieved by inspecting and comparing the time-to-market rate between the Waterfall and Agile methodologies, and accordingly drawing an appropriate conclusion. Secondly, this thesis aims to explore the impact of Agility within the banking industry on organisational behaviour. This is achieved by firstly, analysing the impact of adopting Agile on the segments of people, communication, management, and customer. Secondly, examining emerged relationships and linkages between them. Thirdly, validating emerged hypotheses and connecting them to the literature and practice. Accordingly, the key questions to be investigated in this research are as follows:

Research questions one: What is/are the impact of Waterfall and Agile methodologies on the time-to-market within the banking industry?

Research question two: What is/are the impact of Agile processes on organisational behaviour within the banking industry?

1.4 ORGANISATION OF THE RESEARCH

This thesis comprises of seven chapters, and each chapter is set to achieve a specific objective. Table 1.1 displays the thesis organisation highlighting the contribution of each chapter.

Table 1. 1 Thesis Organisation

Chapter Number	Objective
One	It features the background, significance and purpose of the research.
Two	It features the review of relevant literature that outlines the theory behind adopting Agile processes, shifting from Waterfall methodology to Agile, and the impact of such an adoption.
Three	It features the adopted research methodology and the design of the implemented case study with Ground theory methodology.
Four	It presents the findings derived from the secondary data collection process.
Five	It features the Grounded theory analysis of findings, and outlines emerged patterns and hypotheses
Six	It features the in-depth discussion of emerged hypotheses and findings.
Seven	It presents the final conclusion and draws practical recommendations to the banking industry in addition to potential future research

Chapter 2: Literature Review

2.1 INTRODUCTION

In the literature there are materials addressing the change that the banking industry is undergoing in response to rapid changes within the surrounding environment. Traditionally, the banking industry is perceived as stationary and operates in a stable environment (Mcintyre, 2018). Furthermore, this characterization of banking is established due to the infamous slow-to-react responsive nature, and the lack of leanness and dynamic governing processes across the organisations. However, influential forces such as heavy regulations, sophisticated customers, and a digital revolution are leaving the banking industry with no choice but to change in order to survive (pwc, 2014). Furthermore, such fundamental challenges leads to a change in *conduct* in terms of methods, technology tools, maintaining customer information, and reporting to financial authorities. In parallel, it requires a change in *culture* in terms of procedures, practices, and behavior. Accordingly, such an adaption, inevitably, leads to a transformation in organizational behavior (RBNZ & FMA, 2018).

Furthermore, multiple financial organizations have attempted to explore new ways to enhance their services and responsiveness rate in terms of adopting both new technologies and processes. Moreover, the adoption of effective and efficient ICT strategies plays a vital role in achieving a bank long and short term goals, and it has a direct impact on both qualitative and quantitative measures such as productivity, customer satisfaction, and revenue growth (Luka, 2012). Additionally, banks have invested heavily in ICT not only in the classical sense of increasing the hardware expenditure budget such as servers, networking, etc., but also in the adoption of more friendly technological advancements as a way to enhance their customer perception leading to the emergence of service-oriented technology (Joseph & Stone, 2003).

In seeking dynamism banks have started shifting away from the traditional heavyweight methodologies which have been proven slow and lacking flexibility

(Hartlen, 2015). Ultimately, Agile methodology is perceived as the answer to challenges posed by the Waterfall in terms of offering better qualities such as speed, dynamism, and responsiveness, however, Agile introduces its own drawbacks (Livermore, 2007). Accordingly, after the noticeable success of Agile within software development cycle, firms are seeking Agile scalability across the whole enterprise (Flahiff, 2011).

However, the migration from Waterfall to Agile is not simple, because Agile is a behavioural methodology (Flahiff, 2011) which requires not only adapting to new practices, but also it comes with a very complex behavioral transformation concerning people, communication, management, and customer (Almeida, 2017). For example, Hoda and Murugesan (2016) emphasize that with adhering to Agile there is an expected change in the practice of management, which influences directly the traditional strong top-down management style, allowing for unexpected representatives to join the decision making table (Hoda & Murugesan, 2016).

Ultimately, this chapter aims to review existing literature in relation to the topic of study, and the identified research questions in section 1.3. Firstly, it discusses the changes surrounding the banking industry explaining their different nature, and inspects how the banks are responding accordingly. Moreover, it addresses the concept of methodologies and delivery processes within banking. Furthermore, it explains in detail the foundation and mechanism of Waterfall and Agile methodologies, highlighting their advantages and disadvantages and offers a comprehensive comparison between them, and their impact on the banking industry. Additionally, it examines the adoption of Agile processes in the banking industry, and investigates the impact of Agile adoption on the organisational behaviour in the segments of people, communication, management, and customers. Subsequently, upon completion the literature review the chapter concludes and highlights the emerged issues and problems with relevance to the research topic.

2.2 CHANGES IN BANKING

In the recent years, the banking industry is exhibiting resilience with strong signs of recovery since the financial crisis in 2009, and at the same time is experiencing an

unprecedented level of growth and expansion in terms of assets, profitability and capital (Deloitte, 2019). Table 2.1 demonstrates the change and growth between 2008 and 2017 as published in The Banker global financial institute journal (Myles, 2018). It indicates that the banking industry is becoming bigger, more profitable, and better capitalized (Deloitte, 2019, p. 1).

Table 2.1 Growth of the banking industry between 2008-2017

	2008	2017	Change
Assets (\$T)	\$96.4	\$123.7	+\$27.3
Return on assets (%)	0.1%	0.9%	+0.8%
Capital/assets (%)	4.4%	6.7%	+2.3%

The growth in banking industry does not come unchallenged, and these changes whether internal or external are always associated with risk. However, such a risk impacts banks and the impact could also affects individuals, communities, and in some cases impacts the country's financial system (Jeucken, 2001). Accordingly, banks which are failing to respond in a timely way to surrounding challenges are putting their business at the risk of falling out of competition, and losing both their customer base and market share (Fiordelisi, Soana, & Schwizer, 2013).

Fundamentally, the influential changes are sorted into three main categories: *regulatory changes* which are imposed by authorities in order to secure and regulate markets; *competitional changes* which are the direct response to fulfill sophisticated customer's wants and needs; and, *technology changes* which are the disruptive consequences of a digital revolution (Callaway & Hamilton, 2008).

2.2.1 REGULATORY CHANGES

The regulator demands that banks have to respond and implement in order to adhere to key guidelines and policies set out by designated authorities; is described as *regulatory recalibration*. For example, in New Zealand the banking industry -which has twenty-six

registered banks- is regulated by the Reserve Bank of New Zealand (RBNZ) (RBNZ, 2018). With the help of Financial Markets Authority (FMA), the RBNZ monitors the banks adherence to policies and regulations, and inspects misconduct within the sector under the Reserve Bank of New Zealand 1989 ACT (RBNZ, 2018). Subsequently, the failure to respond to regulatory changes exposes banks to serious ramifications from the regulator.

Furthermore, the implementation of regulatory policies demands a change in both conduct and culture in order to achieve their purpose (RBNZ & FMA, 2018). For example, Table 2.2 demonstrates an analysis of expected changes by banks in order to adhere to BS11 policy, which has been set out by RBNZ (RBNZ & BS11, 2017). The content of the Table 2.2 is adopted from the BS11 outsourcing policy charter (RBNZ & BS11, 2017).

Table 2. 2 BS11 Policy Change Analysis

Country	New Zealand
Regulator	Reserve Bank of New Zealand
Policy	Outsourcing Policy BS11 – September 2017
Policy Type	Mandatory
Date	September 2017
Purpose of the policy	Large banks (ANZ, ASB, BNZ, Kiwibank, Westpac) must have the legal and adequate ability to perform internally any current outsourced function (RBNZ & BS11, 2017).
Logic behind the policy	In the case of overseas service-provider failure, the banks should be able to perform and conduct their daily operations autonomously with no disruption. For examples, if the mother bank ANZ-AU in Australia fails for unforeseen reasons, then the bank ANZ-NZ in New Zealand should be able to carry on with its operations and services.

The expected change	<ul style="list-style-type: none"> • Financial change: Banks have to allocate budgets and absorb financial costs to cater and implement changes forced by BS11 policy • Process change: Banks have to review and determine all business operations and processes to identify outsourced tools, service, and applications • Resource and technology change: Banks have to run multiple technology projects in order to have in-house functions and services which are currently outsourced.
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2.2.2 COMPETITIONAL CHANGE

In the modern banking industry, the customer satisfaction concept is becoming more challenging especially with more restive customers who are responding by the click on their social networking likes and dislikes. Accordingly, sophisticated customers expect the availability of more reliable, fast, dynamic, and interactive banking services (Akinci, Aksoy, & Atilgan, 2004). Furthermore, banks which are not able to meet and respond in a timely manner to their customer's wants and needs, are at risk of gradually falling behind in terms of attractiveness, which eventually leads to dropping out of the competition race, and potentially losing market share (Levesque & McDougall, 1996).

Consequently, banks are left with no choice but to transform and think strategically in order to be able to listen, change, and respond to their customer base. As Srinivas, Fromhart, and Wadhwani (2018) put it, "*not only with running the bank, but also transforming the bank to grow in a sustainable manner*" (Srinivas, Fromhart, Goradia, & Wadhwani, 2018, p. 2). Additionally, such a transformational journey is only achieved when banks are able to shift their mentality from just offering traditional products and services, to establish interactive and trust-driven relationships with customers leading to *Customer Centricity* thinking, which is the core and heart of modern

banking (Srinivas, Fromhart, Goradia, & Wadhwani, 2018). Furthermore, achieving customer centricity requires a non-stop feed of innovation which is achieved by embracing the wave of emerging Financial Technologies (FinTech), and adopting new practices and processes in order to accomplish the sought after robust organisational agility (Nicoletti, 2017).

Furthermore, Shuttleworth (2016) highlights that there is a trend of customers are becoming more sophisticated and confident with technology, which consequently equips them with knowledge in seeking new deals and services. Furthermore, he further urges the banks in New Zealand to leverage the FinTech in order to get more closer to their customer base. Ultimately, utilising new technology allows customers to enjoy a personalised and warmhearted experience which leads to enhance their interaction experience (Shuttleworth, 2016).

2.2.3 TECHNOLOGY CHANGES

Technology in general and Financial Technologies specifically are disruptive to the banking industry, and the unprecedented pace of changes. Subsequently, banks are on a mission to leverage new technologies to opportunities, and further capitalize on them in enhancing customer experience, which ultimately re-invents the relationship with their customer base (Shuttleworth, 2016).

Furthermore, in their illusive chase after technology to gain competitive advantages, banks have increased their investment in technology (Deloitte, 2018). Similarly, banks in New Zealand are spending more than ever on technology in terms of hardware, software, and processes. For example, ANZ reported – in the 2018 annual report- an increase in technology expenses from 1,602M (18% of ANZ operating cost) in 2017 to 1,899M (21% of ANZ operating cost) in 2018 (ANZ, 2018). Likewise, ASB reported -in 2018 annual report- an increase in information technology expenses from 106M in 2017 to 119M in 2018 (ASB, 2018). Also, Westpac reported -in 2018 report- an increase in information technology expenses from 1,738M in 2017 to 1,824M in 2018 (Westpac, 2018).

Furthermore, the effective adoption of new technologies allows banks to be faster, leaner, and more responsive to customer's wants and needs. Accordingly, it is critical for banks to adopt the *personalisation* concept, which is to customise and personalise their products and services to the likes of their customers (Lapavitsas & Santos, 2008).

Moreover, migrating from traditional "Bank Branch" model to "Digital Bank" shifts the focus of products and services from being driven by human face-to-face interactions to be centralised around digital experiences (Deloitte, 2018). For example, in 2018 the ANZ bank in New Zealand has launched the voice activated digital assistant, as an alternative channel to interact with customers instead of them calling or visiting physical ANZ branches (Tibshraeny, 2018). Moreover, the avatar of this voice-service is activated by calling the name "Jamie", and users with a microphone and camera are able to interact with Jamie in a video-calling experience (ANZ, 2018).

2.3 DELIVERY METHODOLOGIES IN BANKING

In information technology, the history of methodologies and process is tracked back to the 1960s period with the use of basic flowcharting (Rico, 2010). Furthermore, the need for structured methodologies has become a necessity with the emergence of standardisation and governance structures (Rico, 2010; Knuth, 1963). Table 2.3 highlights key emergent delivery processes corresponding to their respective eras (Rico, 2010).

Table 2.3 Key processes and methods timeline

ERA	Key emerged process
Mainframe (1960s)	<u>Flowcharting</u> : The graphical display of this method facilitated common understanding to both coders and users (Knuth, 1963).
Midrange (1970s)	<u>Structured Analysis</u> : Analysing requirements thoroughly and produce heavy documentations before commencing the implementation (Hardy, Thompson, & Edwards, 1994)

Microcomputers (1980s)	<u><i>Project Management</i></u> : Project management processes have emerged trying to optimise and standardise delivery practice of life cycles activities and phases (SDLC) (Mills, 1980).
Internet (1990s)	<u><i>Quality Management</i></u> : Embedding the concept of quality into product development in order to enhance customer experience, meeting international standardisation and auditing requirements such as ISO 9001, and compliance with regulations (Rigby, Stoddart, & Norris, 1990).
Personalized (2000s)	<u><i>Agile Method</i></u> : Organisations are able to respond to the non-stop changes in the market. Agile offers market an early customer validation and the feedback is recycled straight back to the development team (MacCormack, Verganti, & Iansiti, 2001).

Furthermore, banks have joined the quest of experimenting with different processes and methodologies with the aim of optimising productivity and responding appropriately to internal and external challenges. However, those banks which have, blindly, followed the suit of adopting glamorous trendy processes had learned the hard way that “*one size fits all*” is just a myth and far from being practical (Clarke & O’Connor, 2012).

Ultimately, the selection of delivery processes and methodologies is characteristically situational, that is based on organisations’ needs and conditions. Furthermore, the selection process of suitable methodology is expected to take into considerations factors such as size of the projects, cost, budget, and the behavioral traits of both the organisation and its individuals (Clarke & O’Connor, 2012). Furthermore, Fuggetta (2000) elaborates that the impact of selected processes on areas such as social and behavioral norms of staff and customers must be taken into account while selecting amongst methodologies (Fuggetta, 2000).

Nonetheless, Fitzgerald (1998) weighs the advantage and disadvantage of adhering to a methodology. On one hand, he acknowledges the potential advantages

including “*reduction in complexity, offering more transparency, and enhancing in quality*” (Fitzgerald, 1998). On the other hand, he criticizes and labels methodologies as a “*source for confusion*”. These lead to unwise depletion of resources, because – according to his criticisms- there is an abundance of “*more than a thousand brand-named methodologies*” with hardly any or minimal differences between them, and most of them lack the satisfactory theoretical and empirical research to back up their processes and methods (Fitzgerald, 1998).

Considering above arguments, the question in relation to this study is whether banks should adopt/switch methodologies or not?. The answer is in the dynamic nature of the current banking environment driven by personalisation while seeking flexibility and adaptability that is forcing the banking industry to take into consideration the adoption of appropriate processes and practices (Mangalaraj, Nerur, & Mahapatra, 2005). However, if banks decide to adopt/switch methodologies, then they need to carefully analyse the impact of such adoption on all levels of banking, including organisation, project, team, and individuals. It is in terms of both practice and behaviour (Vijayasarathy & Butler, 2015; Nerur & Balijepally, 2007).

Nevertheless, this study examines only the most adopted delivery methods within the banking industry, which are the Waterfall methodology (representing the heavyweight traditional methodologies), and Agile methodology (representing the lightweight contemporary methodologies). Furthermore, the following sections offer a comprehensive review of these selected methodologies in terms of their backgrounds, advantages, disadvantages and their ultimate direct and indirect impacts on different aspects within the banking industry. Moreover, these aspects are examined based on the relevance to the research topics and the two research questions identified in section 1.3.

2.3.1 WATERFALL METHODOLOGY

The Waterfall model has been the dominant methodology in software development since the publication of its description by Winston Royce in 1970. Furthermore, the introduction of this approach was arguably the beginning of new epoch in information

technology (Clarke & O'Connor, 2012). Similarly, the Waterfall was widely adopted within the banking industry, in fact it was the predominant methodology in practice during the era of 1980s until early 2000s (Nichols, 2018). Fundamentally, the Waterfall in its multi-phases sequential nature offers both strengths and weaknesses, and accordingly, it manifests its positive and negative impacts when implemented as a delivery process within the banking industry.

The choice of adhering to or discarding the practice of Waterfall within the banking industry is situational and completely dependent on the banks underlying strategies. For example, the Waterfall offers a rigid and structured governance mechanism, which makes it an ideal choice for banks that are driven by tight control and cost reduction mindsets (Ragunath et al., 2010). However, the Waterfall characteristics of being inflexible and insensitive to change makes it an inappropriate choice for banks that are driven by customer centricity and personalisation (Stoica, Mircea, & Ghilic-Micu, 2013). Therefore, this section aims to provide an overview of Waterfall methodology, and examines its strengths and weaknesses, then accordingly, argues and links their impact for the banking industry.

2.3.1.1 BACKGROUND

Originally, in his publication Royce (1970) recommends the adherence to structured methodical practices in delivering information technology projects. One of his illustrations was what is called the Waterfall model (Royce, 1987). Figure 2.1 illustrates Royce's implementation phases for large programs including seven linear phases using the "single-pass sequential" approach; has the exit criteria for one phase as the entry criteria of the next one in line (Royce, 1987).

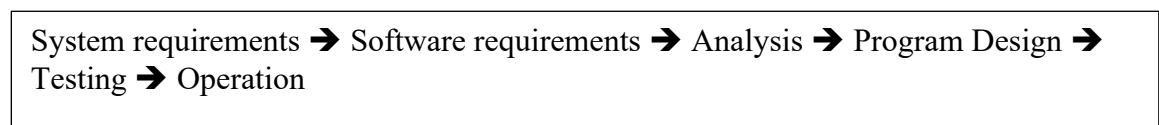


Figure 2. 1 Implementation phases for large programs (Royce, 1987, p. 329)

However, the most practiced Waterfall life cycle model is the product of incorporating the phases of SDLC (*requirements, design, implementation, and testing*) into Royce's original model in Figure 2.1 (Ragunath et al., 2010). Accordingly, Figure 2.2 illustrates the stages of Waterfall life cycle model.

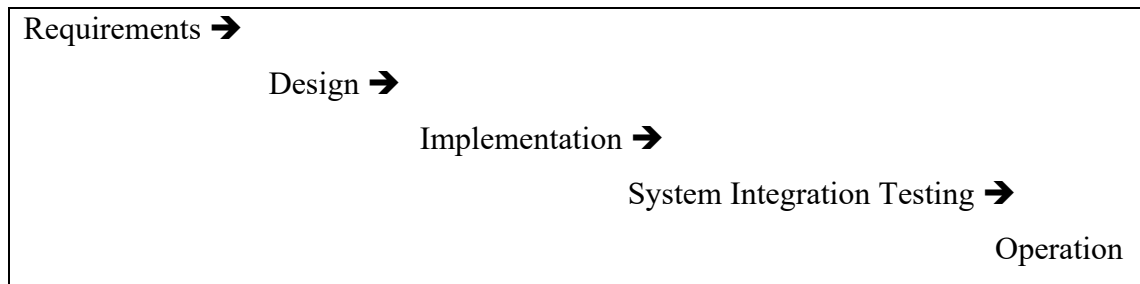


Figure 2. 2 Waterfall lifecycle model (Ragunath et al. 2010, p. 113)

Moreover, the model's downward one-directional linear processes have resemblance with the mechanics of actual waterfalls where water travels downward only and never upward, hence the naming convention of *Waterfall* (Hoog, Jong, & Vries, 1994). Furthermore, Royce himself has not named it as the "Waterfall" model. However, the emergence of actual Waterfall naming convention is tracked to a publication of Bell & Thayer in 1976 (Bell & Thayer, 1976).

"In an excellent paper by Royce; he introduced the concept of the "waterfall" of development activities. In this approach software is developed in the disciplined sequence of activities" (Bell & Thayer, 1976, p. 62).

2.3.1.2 WATERFALL ADVANTAGES AND DISADVANTAGES

In his introduction, Royce (1970) criticizes the Waterfall model and refers to it as "*risky and invites for failure*". Furthermore, the issue for Royce is the distinct one-dimensional-separation between phases; this leaves the testing phase to the end which leads to magnifying associated risks. Accordingly, such risks could lead to setbacks in delivery,

timeline, and budget as Royce puts it “*100% overrun in schedule and/or cost*” (Royce, 1970). Nevertheless, the Waterfall model is adopted widely in all sorts of industries due to its structured mechanisms, and Overmyer (1990) suggests that the rationale behind the widespread wave of Waterfall adoption is a reaction to the unstructured practice of “*footloose and fancy free*” style back in the days (Overmyer, 1990).

Fundamentally, the Waterfall model is hugely debated whether it brings advantages or disadvantages within the banking industry. The variation in perception is related to the nature of resulting impacts, which is influenced by the culture, and the size of projects and organisations (Laplante & Neill, 2004). Furthermore, Felix (2015) suggests that the Waterfall performs effectively in product development, especially when surrounding conditions are stable (Felix, 2015). Table 2.4 lists the advantages of a Waterfall methodology.

Table 2. 4 Advantages of Waterfall model

ID	Item
AW01	Simplicity – Waterfall is easy method in terms of implementation, adoption (Ragunath et al., 2010) and easy to be communicated and taught to users and enablers (Felix, 2015).
AW02	Control – Waterfall gives management a strict control of expectations in terms deliverables, processes, and the entry/exit criteria of each phase (Ragunath et al., 2010).
AW03	Planning – Waterfall model does not allow overlapping between phases, this enables the start/end date, budget, tasks, and processes to be independently and tightly managed (Lvivity, 2018).
AW04	Documentation & Reporting – artefacts in terms of processes, requirements, and reports are thoroughly and heavily documented, which leaves not much room for interpretation or going off scenario (Lvivity, 2018).

AW05	Predictivity - Waterfall is purely based on a predictive approach (Stoica, Mircea, & Ghilic-Micu, 2013). Furthermore, predictivity is driven by detailed requirements and tasks, which are executed according to strict timelines (Stoica, Mircea, & Ghilic-Micu, 2013).
AW06	Size – Waterfall is most effective with large sized projects (Felix, 2015)

On the other hand, Table 2.5 highlights the disadvantages of Waterfall methodology.

Table 2. 5 Disadvantages of Waterfall model

ID	Item
DW01	Inflexibility – Waterfall model does not cater for unforeseen changes in terms of scope, design, or requirements (Royce, 1987). Accordingly, this makes it rigid and unsuitable to operate in a dynamic environment with trends of continuous changes (Stoica, Mircea, & Ghilic-Micu, 2013).
DW02	Requirements – In Waterfall, requirements are expected to be finalised and signed off before commencing the design and development phases (Felix, 2015). However, these requirements focus merely on functionality rather quality and with no clear definition of acceptance criteria (Petersen, Wohlin, & Baca, 2009). Furthermore, this model fails to accommodate and respond to changes to requirements (Felix, 2015).
D03	No Customer Validation – Users or customers are excluded from providing validation or feedback in the earlier stages of this model; this imposes the risk of disassociation with customers leading to delivering a product or service that does not meet expectations (Petersen, Wohlin, & Baca, 2009). Moreover, this is critical because such an end product might not be usable, sellable, or even able to support banking operations.
D04	Late testing – Leaving testing to very late stage is “ <i>very risky and invites to failure</i> ”, as Royce (1970) puts it.

D05	Time-to-market – In the Waterfall, products are not released to market until all sequential phases are completely done. Ultimately, this increases the time-to-market significantly, which prevents organisations from gaining the competitive advantage of being early entrant, or in some cases the impact causes severe customer dissatisfaction (Hartlen, 2015).
D06	Unsuitability – The Waterfall model is not appropriate for the following types of projects (<i>complex, on-going, changeable requirements, projects with substantial integrations with other applications and interfaces</i>) (Felix, 2015):
D07	Risk – The Waterfall is a risk accumulative model, where identified risks in each phase are carried and passed over to the next one; which leaves the risk mitigation process to a very late stage (Petersen, Wohlin, & Baca, 2009).
D08	Operational failure – The actual deployment of a full product on existing infrastructure is left to the last phase. This imposes a potential risk of incompatibility between the new product and existing infrastructure (Ragunath et al., 2010).
D09	Failure rate – The Waterfall exhibits high vulnerability to any major changes in scope, design, or requirements leading budget and timeline issues (Royce, 1987). Furthermore, according to the Standish Group’s Chaos report in 2015,- on the status of projects using a Waterfall model- they reported failure rate of 29%, challenged of 60%, and success only of 11%. The study used 1000 software projects from FY2011-2015 (Wojewoda & Hastie, 2015). Consistently, in another study, including 1,027 projects in the year 2000 with the objective of analysing failure factors in IT projects, only 12.7% were reported as successful (Taylor, 2000, p. 24). Furthermore, Jonson (2002) quotes the Standish Group that a “ <i>staggering 45% of documented original requirements during specification phase are not actually used</i> ” (Johnson, 2002).

D10	Documentations – The Waterfall is costly in terms of allocating a vast degree of resources for each phase, and time needed to produce heavy documentations (Petersen, Wohlin, & Baca, 2009). Additionally, there is the ongoing cost of maintaining these documentations in the future (Ambler, 2002).
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Correspondingly, by evaluating Table 2.4 and Table 2.5, a legitimate question is posed in terms of inquiring about the underlying reasons behind the wide adoption of the Waterfall within the banking industry in previous eras. In answering this question, Nichols (2018) explains that Waterfall model was indeed the mainstream methodology adopted by banks of all sizes whether small, medium, or big enterprises. Moreover, the adoption of this model has flourished during the 1980s to early 2000s, because the nature of the banking industry, products, and market conditions were fundamentally different in comparison to the current era. He further explains that back then the focus of product development was on the WHAT rather HOW in terms of “*What you do*” vs. “*How well you do*” (Nichols, 2018).

Furthermore, the culture of banking industry during that era was not about socialising or interacting with customers, it was rather about fortifying behind high walls; and with full reliance on physical branches as the major method of offering traditional banking services. Accordingly, within such a culture of the banking industry the Waterfall model has thrived by offering what traditional and transactional management is expecting in terms of over value-added analysis of requirements, sequential tasks, and rigid governance structure. Including top down centralised control (Nichols, 2018); and hence the wide adoption within the banking industry.

2.3.2 AGILE METHODOLOGY

From the mid 90s, the wave of Agile methodology use has become more widespread following an upward trend of adoption, which is driven by its revolutionary incremental and iterative approaches (Jiang & Eberlein, 2009; Gill & Henderson-Sellers, 2006).

Furthermore, by the early 2000s -the era of personalisation (Rico, 2010)- Agile became a phenomena and its scope has overarched to cover organisations vertically and horizontally triggering series of changes in practice, behaviour, and the nature of interactions with customers (Abbas, Gravell, & Wills, 2008).

Similarly, the tidal wave of Agile adoption is also observed within the banking industry which is seeking the Agile core competences of flexibility and sensitivity to change that leads to dynamism (Gill & Henderson-Sellers, 2006). However, Agile adoption within the banking industry is a behavioural not mechanical process, and due to its nature it spans endlessly, rather than being a one-off installation. Furthermore, the adoption comes with server impact which needs to be managed, and such an impact is derived from the essence of Agile strengths and weaknesses. Therefore, this section aims to provide a comprehensive overview of Agile methodology, and examines closely its advantages and disadvantages, then accordingly, discusses and links their impact into the banking industry.

2.3.2.1 BACKGROUND

The fundamental aspects of Agile of being iterative and incremental have a long history (Jiang & Eberlein, 2009). Furthermore, the practice of *iterative* cycles is traced back to 1930 at Bell Labs; and the practice of *incremental* development is actually applied back in 1957 by IBM (Larman & Basili, 2003). Subsequently, one could inquire for the reasons of why such processes did not make a similar impact in the past within the banking industry?. In answering, Boehm and Turner (2003) suggest that Agile processes are not new, however, there is a new *attitude* by organisations and practitioners towards facing and embracing the change rather avoiding it (Boehm & Turner, 2003).

Moreover, the naming convention of Agile originated from Agility which has been derived from the manufacturing industry (Jiang & Eberlein, 2009). In the early 2000, a group of software practitioners and Agile advocates -known as Agile Alliance- have developed what is called “Manifesto for Agile Software Development” and highlighting the four main values and further twelve principles of the Agile methodology framework

(Bibik, 2018). Furthermore, the four foundational values of Agile as stated in the manifesto revolve around the four main concepts: *people, knowledge, relationships, and flexibility* (AgileManifesto, 2001).

Initially, Agile processes are seen as reactional alternatives to traditional methods; this is apparent in the manifesto that stated “*the need for an alternative to documentation driven, heavyweight software development processes convened*” (Cohen, Lindvall, & Costa, 2004). Nevertheless, practitioners and academics have debated the actual definition of Agile. Highsmith and Cockburn (2001) define Agile as the ability to respond to changes. In their opinion, Agile is driven by three main principles and values, which are *people, effectiveness, and maneuverability* (Highsmith & Cockburn, 2001). On the other hand, Boehm and Turner (2003) describe Agile as a philosophy of change that changes the underlying notion of delivery from being a mere mechanical industrial process to becoming a craft of humanizing applications (Boehm & Turner, 2003).

Additionally, in several publications “Agility” is put with “flexibility” which is quite positive and gives Agile the thought of responding to changes swiftly (Conboy & Fitzgerald, 2004). However, Sharifi and Zhang (1999) argue that the formula of successful agility is not primarily relying on flexibility. Merely, because Agile is in need for another critical factor which is “*speed*”. That is to respond to changes “flexibly” in addition to “speedily” (Sharifi & Zhang, 1999). Likewise, Agile methodology exhibits the ability of being almost on “*standby mode*” in anticipation for change and responding appropriately. This constitutes the definition of Agile as “*the continual readiness to change*” (Goldman, Nagel, & Preiss, 1995). Accordingly, Conboy and Fitzgerald (2004) consolidate the multiple descriptions of Agile in one comprehensive definition as follows:

“the continual readiness of an entity to rapidly or inherently, proactively or reactively, embrace change, through its collective components or its relationships with its environment” (Conboy & Fitzgerald, 2004, p. 39).

Therefore, Gill and Henderson-Sellers (2006), in their publication for measuring Agility, identify the five main characteristics which are used to constitute which method could be deemed as Agile. The five features are Flexibility, Speed, Leanness, Learning, and Responsiveness. Table 2.6 lists the definitions of agility main features as adopted from (Gill & Henderson-Sellers, 2006).

Table 2. 6 Agility features

Item	Characteristic	Description
1	Flexibility	The ability to cater for expected and unexpected internal and external changes.
2	Speed	The ability to act/react swiftly and timely.
3	Leanness	The ability to use processes to shorten delivery time and enhance quality.
4	Learning	The ability to apply mistakes and feedback as different sources of knowledge.
5	Responsiveness	The ability to sense, detect, and respond surrounding changes.

Furthermore, the Agile eWorkshop -held by (CeBASE) in April 2002 - mandates that for any method to be constituted as Agile, it should embrace processes that are “*iterative, incremental, self-organising, and empower emergence of all sorts*” (Lindvall, et al., 2002). Similarly, Boehm and Turner (2003) suggest that the practice of committed Agile teams must be an *iterative, incremental development, self-organising* team, relaying on *tacit knowledge* within team members, and permitting *emergence* of requirements (Boehm & Turner, 2003).

Ultimately, Agile methodology is not restricted to a certain code of practice nor to fixed guidelines when it is applied into action. Accordingly, the elastic nature has enabled the emergence of different methods, which vary in terms of guidelines, however,

they share the same objectives, hence they are categorised under the overarching umbrella of Agile methodology (Livermore, 2007). For example, Agile methods such as Scrum, Extreme Programming (XP), Feature Driven Development (FDD), Dynamic System Development (DSD) and more, share the core values of Agile processes while varying in techniques (Abbas, Gravell, & Wills, 2008).

2.3.2.2 AGILE ADVANTAGES AND DISADVANTAGES

Agile exhibits dichotomous features; meaning that the same attribute could be advantage or disadvantage, that is depending on the circumstances and conditions of the environment in which Agile is applied. Accordingly, by listing Agile attributes, it is possible for the same feature to be listed as an advantage and a disadvantage. Table 2.7 displays the main advantages of Agile.

Table 2. 7 Advantages of Agile Methodology

ID	Item
AA01	Flexibility and Adaptivity – Agility is purely based on adaptive approach which allows lots of dynamism within the team to accommodate changes (Stoica, Mircea, & Ghilic-Micu, 2013). Furthermore, Agile enables iterative approach, which in its nature is not restricted to a certain sequential phases. Accordingly, this allows the sprint to accommodate changes as they emerge, whether by customer feedback or responding to a certain change in the surrounding (Sharma, Sarkar, & Gupta, 2012), and whether these changes are internal, external, expected, or unexpected (Gill & Henderson-Sellers, 2006).
AA02	Documentations – In Agile the documentations are light, minimal, and designed almost effortless to manage. The main source of knowledge is the accumulative tacit knowledge acquired collectively by team members (Boehm & Turner, 2003).

AA03	Quality – Agile - by following the iterative approach- decreases the risk of inheriting or passing critical issues and defects to further stages, and enhances the quality of products. Furthermore, testing and effective customer validation do increase the probability of catching critical defects at an early stage following the logic of “ <i>test fast fail fast</i> ” (Shore, 2004).
AA04	Time-to-market – Agile allows and enables Continuous Delivery (C:D) which shortens the time-to-market rate allowing banks to release their products (fully or partially) as soon as possible to the market (Livermore, 2007).

On the other hand, Table 2.8 displays the potential disadvantages of Agile.

Table 2. 8 Disadvantages of Agile Methodology

AD01	Lack of Documentation – This becomes a disadvantage when there is no code versioning control in place, and this opens the possibility of losing track of changes (Sarkan, Ahmad, & Bakar, 2011; Boehm & Port, 2001). Furthermore, Agile relies majorly on team member’s tacit knowledge, however, there is no guarantee that same team members are retained until the end of delivery. Moreover, Boehm (2002) argues that documentation is needed for external support because it helps an external consultant (Boehm, 2002). Likewise, it is challenging to support, operate, and troubleshoot new products without related documentation.
AD02	Cost of Change – With responsivity to change there is a definite cost associated. Furthermore, with Agile continuous accommodation to changes, there is the risk of exhausting the team budget earlier than expected exposing projects to consequences (McCormick, 2012).
AD03	Team and Project Size – Agile is most effective with small and medium project size, however, it becomes more challenging when there are multiple

	teams involved posing challenges such as cross communication and interlocked tasks (Highsmith & Cockburn, 2001). Additionally, Constantine (2001) suggests that having more than 20 developers in single Agile team might add more complexity “ <i>The tightly coordinated teamwork needed for these methods to succeed becomes increasingly difficult beyond 15 or 20 developers.</i> ” (Boehm B. , 2002, p. 67).
AD04	Simplicity – The second value of the Agile manifesto urges for simplicity (Boehm, 2002). Furthermore, Agile methods of (XP) adheres to the YAGNI term, which stands for “ <i>You Aint Going To Need It</i> ” (Drysedale, 2007, p. 25). Fundamentally, this terms encourages practitioners to postpone future architectural features, which are not needed for the current iterative. The action is perceived as pragmatic. However, this might cause fundamental issues for future features especially if requirements are predictable (Boehm, 2002).
AD05	Scalability - Scalability comes with expectations that all Agile teams should be working and interacting in synchronization (Dikert, Paasivaara, & Lassenius, 2016). Furthermore, Dyba and Dingsoyr (2009) suggest that organisations are attracted by the glamour of Agile hence they tried to implement across enterprises. However, applying Agile across organisations brings unforeseen challenges such as extra cross-communication, stakeholders, dependencies, and interdependency between multiple teams (Dyba & Dingsoyr, 2009).

Ultimately, by comparing and analysing Table 2.7 and Table 2.8, the researcher is able to conclude that the output of adopting Agile within the banking industry is not easily predictable; because the manifestation of the Agile impact takes into account other surrounding conditions in addition to other factors such as the organisation culture, size, and mindset. Accordingly, additional organisational factors must be taken into consideration before making the decision of adopting or switching to Agile; including the

behavioural context which is evident in influencing the impact of agility (Nerur & Balijepally, 2007).

2.3.3 COMPARISON OF AGILE VS. WATERFALL

This section offers a comparison between the attributes of the two methodologies, and accordingly, leverages the output to understand their suitability to the banking industry. Furthermore, this comparison produces a factual summary, which allows practitioners within banking industry to make informed decisions in determining a suitable methodology to adhere with.

Fundamentally, in comparing multiple processes or methods, mutual attributes are identified, sorted, and classified into main categories, to be used in conducting the comparison (Syamsiyah, et al., 2017). Accordingly, the key categories of the two compared methods of Waterfall and Agile are identified by the use of the literature addressed in sections 2.4.1 and 2.4.2. Also in the findings of Table 2.4, Table 2.5, Table 2.8, and Table 2.9. Therefore, the key categories and sub-categories are listed in Table 2.9, and accordingly used in the comparison.

Subsequently, Table 2.9 demonstrates the comparison between lightweight and heavyweight methodologies represented by Waterfall and Agile respectively. This table is adapted from (Stoica, Mircea, & Ghilic-Micu, 2013, pp. 71-72; Awad, 2005, pp. 35-38; Nerur & Balijepally, 2007, p. 82; Mangalaraj, Nerur, & Mahapatra, 2005, p. 75; Mahalakshmi & Sundararajan, 2013, p. 195).

Table 2. 9 Comparison between Agile and Waterfall methods

Key Category	Sub-Category	Waterfall (Heavyweight)	Agile (Lightweight)
Nature	<i>Approach</i>	Predictive	Adaptive
	Orientation	Process oriented	People oriented
	<i>Goal</i>	Optimization	Adaption, flexibility, responsiveness

	<i>Innovation</i>	Formalize innovation	Encourage exploration and creativity
	<i>Objective</i>	Safety	Quick delivery
	<i>Measurement</i>	Achieving the plan	Adding business value
Organisation	<i>Structure</i>	Mechanistic (bureaucratic with high formalisation)	Organic – (flexible, flat and encourage cooperative actions)
	<i>Culture</i>	Command control	Leadership and collaboration
	<i>Process</i>	Formal, linear sequential steps, governed by rules	Emergent, iterative, informal
	<i>Scalability</i>	Large	Small
Management	<i>Management</i>	Autocratic Manager is controller	Decentralized manager is facilitator
	<i>Project Cycle</i>	Driven by tasks and activities	Driven by product features
	<i>Planning</i>	Comprehensive	Minimal
	<i>Communication</i>	Formal and structured	Informal, open, and continuous
	<i>Task allocation</i>	Individual allocation and favours specialisation	Self-organised teams- encourages role interchangeability
	<i>Accountability</i>	Avoid conflict	Embrace conflict
	<i>Effective Project Size</i>	Large	Small

Information	<i>Knowledge</i>	Explicit	Tacit
	<i>Requirements</i>	Fixed, pre-defined, and signed off prior to commence coding	Largely emergent, rapid change, unknown
	<i>Documentations</i>	Heavy	Light
Customers	<i>Customer Interaction</i>	Minimal	Critical
	<i>Customers</i>	As needed customer interactions, focused on contract provisions	Dedicated, knowledgeable, collaborated, collocated onsite customers
Team	<i>Team Size</i>	Large - requirements driven	Small - delivery driven
	<i>Team members</i>	Plan driven, mixed skill levels, fixed roles and responsibilities	Creative, advanced skills, co-located, cooperative
	<i>Testing</i>	Late testing only after coding is completed	Continuous iterative testing
	<i>Developers</i>	Plan-oriented; adequate skills access to external knowledge	Agile, knowledgeable, collocated, and collaborative
Technology	<i>Architecture</i>	Designed for current and future requirements	Designed for current requirements

	<i>Design</i>	Design is completed prior to implementation	Design and implementation evolve iteratively together
	<i>Technology</i>	No restriction	Favours object-oriented technology
	<i>Refactoring</i>	Expensive	Inexpensive
Cost	<i>Return on Investment</i>	End of the project	Early in the project
	<i>Cost of Restart</i>	High	Low
	<i>Risk</i>	Well understood risks, manageable impact	Unknown risks, Major Impact

Furthermore, the analysis of Table 2.9 demonstrates that both methodologies have their own strengths and weaknesses. Ultimately, their impact within the banking industry is greatly reliant on the configurations of the environment in which they are applied. Furthermore, the manifestation of their impact within the banking industry is greatly influenced by other factors such as banking culture, project size, and human capital. Such influential factors have a critical role in the decision-making process of which methodology is to be selected as an appropriate choice (Awad, 2005).

Additionally, the selection process for choosing the optimum methodology to be adopted by banks is a complex and risky one, and accordingly, the decision-makers have to weigh their options carefully either way. However, sometimes the surrounding factors dictate and drive the choice of what methodology to adhere to. For example: if a bank is operating within continuously changing surroundings, then Agility becomes a condition rather an option. This is in order to ensure its survival and relevance within competition in the market (Stoica, Mircea, & Ghilic-Micu, 2013). On the contrary, when a bank is operating within a fully stable environment with fixed requirements and clear products,

then the Waterfall choice is effective and could be efficient in terms of cost and time (Yau & Murphy, 2013).

2.4 ADOPTION OF AGILE PROCESSES

The Agile adoption has momentum within the banking industry. Hoda, Salleh, and Grundy (2018) suggest that the implementation of Agile practice is still on the rise (Hoda, Salleh, & Grundy, 2018). Additionally, according to the “State-of-Agile” annual surveys of 2007 and 2018, the overall Agile trend is in the rise, however, the adoption rate of different Agile method vary by time, therefore methods which have been considered as popular in previous years might not have the same attractiveness today. For example, the adoption rate of Agile-Scrum has increased from 42% in 2007 to 52% in 2018, while Agile-XP dropped from 23% in 2007 to 1% in 2018 (Hoda, Salleh, & Grundy, 2018, pp. 58-59; VersionOne, Inc, 2007, p. 4; VersionOne, Inc, 2018, p. 9).

Nonetheless, the banks which have adopted Agile methods might not be able to observe the impact in its entirety immediately. Additionally, it has difficulties to accurately detect and measure the nature of such an impact whether being positive, negative or variable depending on the environment (Scarpino & Chicone, 2014). For example, a practical demonstration of a positive impact of Agile adoption within banking industry is the ING bank, which embraced Agile in 2014. Furthermore, according to Barton, Carey, and Charan (2018) the adoption of Agile methodology by ING bank is with direct and positive impact, and accordingly, the bank has become more flexible and responsive in meeting customer’s wants and needs. Correspondingly, this has resulted in diverting 60% of customer interactions through mobile applications and digital interfaces, while the traditional physical visits to branches dropped to less than 1% (Barton, Carey, & Charan, 2016).

2.5 IMPACT OF ADOPTING AGILE PROCESSES ON ORGANISATIONAL BEHAVIOUR

Agile is a behavioural methodology (Flahiff, 2011) driven by a philosophy of change (Boehm & Turner, 2003) which leads to an impact on the banking industry concerning

its organisational behaviour, including social and behavioural norms. Furthermore, the mature adoption of Agile processes results in a radical change in organisational behaviour within banks. It is manifested by the behavioural transformation from being mechanistic, bureaucratic with high formalisation, to become organic, flexible, and driven by cooperative actions (Stoica, Mircea, & Ghilic-Micu, 2013).

Furthermore, Almeida (2017) identifies the primary segments, which embrace and manifest the associated Agile organisational behaviour change. These segments are “*people, organisation and management, process, and tools*” (Almeida, 2017). Moreover, the behavioural impact overarches to include *culture, communication, and customers* across organisations (Lindvall, et al., 2002; Dikert, Paasivaara, & Lassenius, 2016). Accordingly, this thesis examines and analyses the impact of Agile on organisational behaviour within the banking industry on its main segments of people, communication, management, and customers.

2.5.1 IMPACT OF AGILE ON PEOPLE

Agile processes are people-oriented, and driven by the ongoing investment in human capital. By putting *Good-People* in the centre as the ultimate core competency of banks, the targeted goals and objectives can be better achieved. Additionally, adhering to Agile triggers associated behavioural change which transforms people’s mindset from being Fixed, Transactional, and Task limited, to become Growth, Transformational, and Creative (Cockburn, 2002).

Furthermore, Agile adoption leads to an increase in the people’s proficiency rate, because embracing Agile by people comes with the most notable characteristic of “*mentality of sufficiency and change*” (Boehm & Turner, 2003). Firstly, the *mentality of sufficiency* is to preserve efforts and optimise resources by undertaking only tasks, which are necessary. Secondly, the *mentality of change* is to expect, welcome, and accept all sorts of changes (Boehm & Turner, 2003).

Moreover, another observed behavioural change is the shift in attitude from individualism to collectivism. This is manifested by showing the dedication to the team,

exhibiting self-professional adequacy, and the adherence to de-centralised collective leadership (Mahalakshmi & Sundararajan, 2013; Highsmith & Cockburn, 2001). Furthermore, Agile facilitates a constructive feedback mechanism in the form of retrospective processes, which encourages team members to become active in expressing themselves (Highsmith & Cockburn, 2001).

On the other hand, Agile adoption poses challenges to people which could result in making them resistant to the associated behavioural changes. Furthermore, the main challenges are the unknowingness of Agile, letting go of a traditional mindset, and maintaining an ongoing commitment to Agile practice. However, such challenges are mitigated by investing more in people in terms of educating and training (Akif & Majeed, 2012; Almeida, 2017).

2.5.2 IMPACT OF AGILE ON COMMUNICATION

Agile advocates for a transformation in communication from being Formal, Structured, and OnDemand, to become Informal, Open, and Continuous (Boehm, 2002). Furthermore, this is facilitated by a change in communication method from being a one-directional solo channel to become multi-directional channels. Moreover, having these effective channels in place enables timely, direct, and uninterrupted lines of communication between management, practitioners, and customers which results in replacing the ambiguity by clarity (Mangalaraj, Nerur, & Mahapatra, 2005).

Furthermore, effective communication in Agile guarantees that all stakeholders do share the same understanding in terms of assumptions, impediments, and expectations (Boehm, 2002). Likewise, Turk, Robert, and Rumpe (2005) warn that within Agile it is critical to communicate clearly and comprehensively especially when it comes to the work assumptions, which is to avoid potential risk and possible conflicts. Consequently, if these assumptions were not communicated, clearly then there is a potential risk amongst stakeholders of being in contradiction (Turk, Robert, & Rumpe, 2005).

2.5.3 IMPACT OF AGILE ON MANAGEMENT

In terms of the impact on management behaviour, it is manifested in the change from being an autocratic management style driven by centralised command, and monopoly of decision-making; to become a leadership driven style guided by collaboration, empowerment, and collective decision making (Nerur & Balijepally, 2007) (Stoica, Mircea, & Ghilic-Micu, 2013).

Furthermore, the behavioural transformation process is almost sequential in its patterns. Firstly, it starts with enabling an organic flat structure. Subsequently, it shifts the decision-making process and power centrality from being Dictated, Top Down, and Manager to Staff, in a traditional style. It becomes Collective, Flat, Manager to Staff two ways in a collaborative style. Decisions are taken collectively by team members (Highsmith & Cockburn, 2001). Secondly, it alters the depth of a project managers role from Micro to Macro level. This allows them to re-focus their attention on new duties of a different nature (Highsmith & Cockburn, 2001). Thirdly, the managers are becoming agents of change by facilitating a productive workspace, and building cooperative relationships with customers (Highsmith & Cockburn, 2001). Finally, there is a change in attitude towards conflict and accountability. In terms of *conflict*, management welcomes conflict in the form of constructive feedback (Nerur & Balijepally, 2007). In terms of *accountability*, the responsibility formula shifts the focus from being Manager Task and Blame focused, to become Team Value and Embrace (Highsmith & Cockburn, 2001).

Expectedly, multiple impediments could possibly delay or prevent the sought after behavioural change in management. According to Almeida (2017) the main impediments are the change resistance, the engraved traditional management culture, and the fear of losing hierarchal control (Almeida, 2017). Moreover, such challenges might take a while to remedy; however, qualities such as open communication and the mentality of leading by example do expedite the adaption process (Hajjdiab & Taleb, 2011; Almeida, 2017).

2.5.4 IMPACT OF AGILE ON RELATIONSHIP WITH CUSTOMERS

One of the Agile foundational pillars is active customers engagement (Boehm, 2002), which is considered a critical path in leading to customer satisfaction. Furthermore, the iterative model of Agile caters for active customer involvement and grants customers early access to validate and experience banks' products and services (Gladden, 1982). Additionally, in terms of the behavioural change related to customers, the adopting of Agile transforms the nature of relationship between banks and customers from being Formal and Minimal, to becoming Informal and Continuous (Awad, 2005). Subsequently, this alters the customer behaviour from being high-level, occasional interactions, focused on contract provisions to become dedicated, knowledgeable, and interactive (Awad, 2005). As a result, customers are becoming more engaged with banks, and actively involved throughout the process in terms dictating requirements, refining features, validating products, and providing feedback (Boehm, 1996).

However, inactive customer engagement or shielding customers behind high walls does not add any value. In fact, it only increases the level of anxiety and uncertainty by customers, which leads to customer dissatisfaction (Gladden, 1982). Furthermore, the risk arises in the absence of a committed customer, leaving the team with no guidance, direction, or validation agents (Boehm, 2002). Ultimately, "*Agile methods work best when such customers operate in dedicated mode with the development team*" (Boehm, 2002, p. 66).

Additionally, socialising is a fundamental concept when it comes to customer interaction. Accordingly, Dutta (2013) suggests that processes and methods in digitization have their impact on enabling socialising; this comes from the concept of providing customers with adequate digital channels and tools, which are used as direct methods of interaction with service providers (Dutta, 2013). Furthermore, O'hEocha and Conboy (2010) suggest that the concept of innovation is derived from the tacit or explicit knowledge, and accordingly, the socialisation serves as a conversational channel to pass knowledge from customers to banks and vice versa. Moreover, this channel allows

customers to pass their experience, feedback, and tacit knowledge back to the team to respond accordingly (O'hEocha & Conboy). Furthermore, Martins and Zacarias (2017) iterate the critical role of socialising as a source of knowledge in Agile methodology by highlighting that Agility comprises of three main phases "*Socialising, Embedment* , and *Adoption*" (Martins & Zacarias, 2017).

For example, the artificial intelligence help agent "Jamie" at ANZ bank is a manifestation of technology that enables socialisation. Furthermore, this social conversational channel between "Jamie" and customers ensures that feedback and validation channels are active and serve the purpose of delivering the knowledge back to the designated Agile team within the ANZ bank to adopt and respond accordingly (ANZ, 2018).

2.6 REVIEW OF ISSUES AND PROBLEMS

The literature review in this chapter addresses the different nature of ongoing challenges imposed on the banking industry, whether triggered by regulators, technological advancements, or customer sophistication. Furthermore, the review sheds light upon the heavyweight and lightweight processes represented by Waterfall and Agile methods respectively; and reviews their advantages and disadvantages; and then compares their strengths and weaknesses. Subsequently, it highlights their impact within the banking industry.

Furthermore, the review underlines the change in strategies within the banking industry in terms of adopting new processes, to become more dynamic and flexible; which is driven by the ultimate goal of achieving higher customer satisfaction. In their quest to attain flexibility and adaptability, banks have explored and attempted different delivery methodologies some were traditional heavyweight such as Waterfall, while others were lightweight such as Agile. Furthermore, the selection process of appropriate methods is subject to the conditions of bank nature, deliverables, targeted segments, and the surrounding environment. Additionally, the impact of adhering to a methodology is major issue within the banking industry, because each method enjoys strengths and weaknesses

which directly leads to consequences whether gaining competitive advantages, or falling out of competition, and ultimately losing market shares.

Additionally, the review touches upon the impact of adopting Agile methods on organisational behaviour, which is in some cases disruptive to business operation. Furthermore, such an impact is predominantly manifested by the change in social and behavioural norms of people, communication, management, and the customer. Likewise, the enablement of concepts such as collaborative teams, open communication, interactive customers, and distributed leadership are examples of the behavioural changes which come from the adoption of Agile methods.

However, Agile behavioural impact does come with challenging risks such as the resistance to change, and the desire to fall back to the old-style of practice. Moreover, the decision of scaling Agile across organisations is proven challenging and comes with a lengthy and risky journey. Ultimately, banks have to manage such risks closely and methodically, in order to reap the positive impact of Agile.

2.7 SUMMARY OF ISSUES AND PROBLEMS

Upon completion the relevant literature review, this study addresses the issues and problems at hand, which are summarised as follows:

- The risk within banking industry of not being able to respond and adopt in a timely and effective manner to changes within the surrounding environments. These changes are categorised as regulations, technological advancements, and customer sophistication.
- In the current dynamic environment, the risk within banking industry of adhering only to traditional heavyweight methodologies such as Waterfall. Such methodologies lack flexibility and potentially lead to longer time-to-market rate in responding to changes.
- The impact of adopting agile processes on organisational behaviour including people, communication, management, and the nature of relationship with

customers. Subsequently, an effective adoption of Agile could lead to activate the socialising channel with customers driven by personalisation with the aim to enhance customer satisfaction.

2.8 CONCLUSION

Rationally, banks have to be responsive to the continuous challenges in the surrounding environment in terms of regulations, and technological advancements. Such a change should be driven by personalisation in order to ensure both customer satisfaction and customer retention. However, the traditional monolithic legacy systems combined with heavyweight traditional delivery methods such as Waterfall did not allow banks to respond to changes either timely nor swiftly. Subsequently, in seeking higher responsiveness and customer interactivity, the banks are adopting the digitization path along with Agile methods (Christou, Ponis, & Palaiologou, 2009).

Furthermore, banks which have a wide spectrum of applications -which are categorially different in terms of underlying technology and targeted segments- are adopting a multi-methodologies approach. On the one hand, they are adopting Agile to facilitate customer interaction and personalisation for digital apps and customer facing applications; and, seeking higher responsiveness and reduction in the time-to-market rates. On the other hand, banks have maintained the use of Waterfall and other hybrid methods for internal facing and core platforms; that is because such platforms usually operate under no pressure of time or customer expectations (Almeida, 2017).

The adoption of Agile methods does not come unchallenged and brings about an impact, and this impact could be positive, negative or vary (Scarpino & Chicone, 2014). Concurrently, embracing Agile methods on a wide scale triggers a series of changes across organisations, where some of these changes enforce transformation in organisational behaviour. Ultimately, the change in organisational behaviour is the concatenation of sub-behavioural impacts associated with the segments of people, communication, management, customer. Furthermore, the change in customer behaviour

is a key to enhancing customer stratification, by enabling critical socialising and direct channels between customers and banks (Martins & Zacarias, 2017).

Chapter 3: Research Methodology

3.1 INTRODUCTION

It is critical to select the appropriate research methodology for this study. The selection process is not random; but is methodical and takes into consideration multiple factors including the nature of the banking industry, the characteristics of this research, and the accessibility and nature of research data.

Furthermore, the adoption of various research methods, in the field of Information Systems (IS), is primarily driven by the prospect of enhancing the quality of both the research techniques and associated findings (Simula, Dyba, & Jorgensen, 2007). Moreover, the selection process of research methods should be meticulous, thorough and rigorous in order to choose the appropriate one; which is be deemed the most relevant to the study (Fernández & Lehmann, 2005).

However, with the emergence of socio-technical research phenomena in IS field, there has been a significant increase in qualitative studies looking into people in technology and their associated social and behavioural aspects (Hoda, 2011; Adwan, 2017). Furthermore, Adwan (2017) suggests that a suitable qualitative research method must be able to address the multifaceted relationships in a socio-technical environment; that is between the system “*in the form of banks*”, the technical queues “*in the form of Agile processes*”, and the social queues “*in the form of attitude and behavioural relationships*” (Adwan, 2017). Furthermore, Rodon and Pastor (2017) elaborate on highlighting the complexity of interlinked relationships between social and technical aspects in socio-technical studies “*dichotomy between social context and technical artefacts dissolves in complex intertwining of socio-technical actors*” (Rodon & Pastor2, 2007, p. 72).

Accordingly, the current study is in the socio-technical system area within banking industry; with the aim to address and theorise the qualitative aspect of Agile impact on time-to-market and organisational behaviour including the changes in social

and behavioural norms, hence the choice of qualitative research. Additionally, this research is based on secondary data from eligible sources.

Furthermore, the methodology of choice for this research comprises of combining and integrating two research methods Grounded Theory (GT) (Glaser & Strauss, 1967) – most specifically the *Straussian approach* (Strauss & Corbin, 1994)- and Case study research method (Yin, 1994). Additionally, each of the two methods have strengths and weaknesses, and the objective of combining them is to remedy and overcome the weaknesses of the other (Halaweh, 2012). Furthermore, the Grounded theory plays as a “*method*” in terms of offering comprehensive guidelines of data collection and data analysis including coding, categorising, and theoretical sampling; and as a “*theory generator*” in terms of offering a detailed framework for developing resultant findings to conclude the end theory product (Strauss & Corbin, 1994).

Furthermore, such an integration -between the two methods- is done by applying the mechanism of Grounded theory procedures into the use of interpretive case study strategy (Fidler, Halaweh, & McRobb, 2008). Furthermore, in terms of data collection, secondary sources of data such as previous studies, publications, organisations websites, project reports, and contemporary literature are used for the current research. Subsequently, the procedure of data analysis mechanism is applied against the collected data; and in parallel, the results are validated and analyzed rigorously using the Constant Comparative Analysis (CCA) method (Hoda, Noble, & Marshall, 2011).

Furthermore, this chapter highlights the background, thought process, and rationale behind the choice of selected methodology. Additionally, it casts more light on the construct and design aspects of the combined methodology of choice, and provides a complete mandate of the sequential steps of this methodology. Furthermore, it offers a comprehensive account of how the methodology is, practically, applied in study field taking into consideration that this is a theoretical study which uses secondary data sources. Finally, it highlights the major limitations of adopted methodology; and moreover it clarifies the standard aspects of documenting, reporting, and the validation criteria of the findings for this research.

3.2 SIMILAR STUDY REVIEW

The method of case study research has been widely adopted in the IS research field in the last two decades (O'Connor, 2012). At the same time, Grounded theory is picking up the momentum and becoming slowly more popular since it has been first used in the IS field in 1990s (Fidler, Halaweh, & McRobb, 2008). Moreover, Goulielmos (2004) suggests that Grounded theory is quite “*attractive*” to be used in the IS studies, especially when it is implemented to examine new emergent phenomena within organisational context (Goulielmos, 2004). Likewise, Hoda, Nobel and Marshall (2011) advocate for Grounded theory suitability in research related to Agile. This is based on the application in investigating social aspects of Agile within technology (Hoda, Noble, & Marshall, 2011; Martin, 2009).

However, Birks and et al. (2013) argues that Grounded theory is still lacking maturity and invites errors. Which according to Adwan (2017) is not quite accurate, because most of associated issues reported are related to mis-use or not following properly the Grounded theory procedures by users. In most cases Grounded theory is not implemented to its full extent yet researchers claim the use of it; which results in such misconception (Adwan, 2017). Furthermore, the infamous confusion in applying Grounded theory is related to the inconsistency of its application; whether it is a *methodology* (Glaser, 2008), or a *method* (Strauss & Corbin, 1990), or even sometimes - inaccurately described- as *process* (O'Connor, 2012; Lazenbatt & Elliott, 2005).

Moreover, Fidler, Halaweh, and McRobb (2008) draw a line between the use of Grounded theory as a method or a methodology; where it is (*method*) when it merely covers “*procedure or technique used to collect and/or analyze data*”; and it is (*methodology*) when it holistically covers the end-to-end process including Identifying, Selecting, Collecting, and Formulation (Fidler, Halaweh, & McRobb, 2008).

“methodology is the entire research process from the identification of one or more research questions and the selection of a research strategy, through to the formulation of the findings and results, in which the entire

process is based on philosophical assumptions (ontology and epistemology).

(Fidler, Halaweh, & McRobb, 2008, p. 2)

Multiple (IS) studies have deployed Grounded theory as a complete stand-alone methodology in studying social aspects of Agile related research. That is because Grounded theory methodology does offer comprehensive procedures of conducting research, and a framework of developing emerged theory out of knowledge grounded in the data (Adolph, Hall, & Kruchten, 2011; Coleman & O'Connor, 2007; Crabtree, Seaman, & Norcio, 2009; Adolph, Hall, & Kruchten, 2011). On the other hand, according to Fidler, Halaweh, and McRobb (2008) and Adwan (2017), the integrative use of case study strategy, which deploys the Grounded Theory mechanism of data analysis while driven by interpretive assumptions, is considered a compatible complete methodology (Fidler, Halaweh, & McRobb, 2008). Furthermore, adopting a combined methodology enables researchers to hypothesize and generate theory from the tacit knowledge embedded and grounded within the data, which is extracted from participants upon the completion of coding and categorising processes (Adwan, 2017; Fidler, Halaweh, & McRobb, 2008).

Subsequently, this combined methodology (GT + Case study) has been adopted in multiple research projects in the (IS) field within different industries. For example, in technology (Halaweh, 2012; Nielsen, 2014), in education (Taber, 2000), and in health (Adwan, 2017).

3.3 THEORETICAL FRAMEWORK

Theoretically, the research paradigms are categorised into three main groups that is based on the underlying philosophical reasoning of ontology and epistemology. These paradigms are positivist, critical and interpretive (Myers, 1997; Myers & Avison, 2002; Chua, 1986; Halaweh, 2012). In terms of *Positivist*, the fundamental underlying notion behind it is the segregation and independence between the knowledge and the human-conduct; and researchers are driven by scientific evidence based on quantitative methods.

Predominantly, such an approach is used in testing and verifying existing theories using procedures such as surveys (Hoda, 2011; Orlikowski & Baroudi, 1991).

In terms of *Interpretive*, it preaches that the knowledge is weaved with human. Accordingly, in order to extract the ultimate knowledge, then the human-conduct and interaction should be observed and taken into account. That is to understand both the reactions by humans and the meaning behind such reactions. Consequently, this leads to achieve in depth comprehension of the studied phenomena in the context of the research (Myers & Avison, 2002; Kara, 2018; Hoda, 2011). Finally in terms of *Critical*, this approach is also called the “*transformative paradigm*” in seeking a change and reform while advocating for realism; this is mostly used in action studies (Kivunja & Kuyini, 2017).

Accordingly, it is critical for the success of the combined methodology -adopted in this research- to have its sub-methods (GT + Case study) using the same paradigm (Halaweh, 2012). On the one hand, the Grounded Theory is fundamentally founded on theory generation from the data, and does not partake in testing or validating existing theory, hence has association with interpretive assumptions only (Strauss & Corbin, 1990). On the other hand, according to Myers and Avison (2002) the case study as a qualitative research is interpretive or positivist driven by the conditions of its application whether validating or generating theory (Myers & Avison, 2002). For example, if static questions are designed to extract answers which might fit (or not) into predefined answer templates in order to validating existing theories, then such a case study is driven by positivist assumptions. However, if the case study was designed to extract all sorts of answers with the objective of discovering new patterns, paradigms and eventually evolving theories -which is the drive of this research-, then it is deemed to be driven by interpretive assumptions (Yin, 1994; Halaweh, 2012). Therefore, in this research both GT and case study methods are adhering to interpretive assumptions.

Furthermore, research methods are also classified into qualitative and quantitative categories. On one hand, quantitative methods are fully reliant on numerical data -or what could be translated into numerical units- and then contextualising results in the form of

figures and statistical findings. On the other hand, qualitative methods take into account the human-conduct and social behavioural aspects, in terms of “*understanding the experience, thoughts, and opinions*”. This in return generates textual-data (non-numerical) which is used in concluding theoretical results (Jick, 1979; Bernard, 2017; Farnsworth, 2019).

Generally, case studies are viewed as qualitative research methods only. However, this is not accurate as case studies could be referenced as quantitative, qualitative, or even both qualitative-quantitative depending on the nature of derived data from study whether numerical or categorical (Stake, 1995; Zainal, 2007). Additionally, Yin (1984) reminds case study researchers that it is quite possible to have quantitative case studies “*case studies can be based ... entirely on quantitative evidence*” (Yin, 1984, p. 25; Zainal, 2007). Similarly, the Grounded theory uses its procedures to inductively generate theory from analysed qualitative data where “*qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon*” (Strauss & Corbin, 1990, p. 42; Halaweh, 2012). Therefore, with the nature of the subject in question and data collected in this research, the two methods of Grounded Theory and case study are categorised under qualitative research (Strauss & Corbin, 1990; Yin, 1994).

3.4 CASE STUDY METHOD

In the context of technology and IS, case studies are considered the “*preferred search strategy to answer ‘How?’ and ‘why?’*” (Walsham, 1995, p. 74). Moreover, according to Yin (2009) the adoption of case study research is both rewarding and challenging at the same time. It is subject to conditions to the research environment, type, subject, and the nature of data (Yin, 2009). In practice, conducting case study research is similar to acquiring a slice-of-life in the context from the researched unit. Yin (1994) puts it in a context in his definition of case studies as follows:

“an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.” (Yin, 1994, p. 13)

Furthermore, case studies are used to either verify existing theory or generate new theory propositions (Yin, 1994; Fidler, Halaweh, & McRobb, 2008). Therefore, case studies could fall into the sphere of being either interpretive or positivist paradigms. Furthermore, case studies are categorised within the positivist context when they are applied repetitively to test and verify theories in pre-contextualised hypotheses; with the ability of generalisation to broader theory. However to be noted, in this perspective researchers take a neutral stance –as if they are external observers- to avoid influencing the course of research *“the researcher remains detached, neutral and objective”* (Myers & Avison, 2002; Darke, Shanks, & Broadbent, 1988, p. 276).

On the other hand, case studies are used within an interpretive context; when the objective is creating a theoretical framework and using the acquired in-depth knowledge whether it being explicit or tacit. However, the theorising is only done after comprehending the phenomena in question, with all its surrounding factors including social queues and human interactions (Darke, Shanks, & Broadbent, 1988; Walsham, 1995). Furthermore, in interpretive case studies researchers are viewed as participants in the course of research, and are actively involved in rationalising informants’ contribution (Walsham, 1995; Halaweh, 2012).

Additionally, case studies adhere to deductive or inductive principles, that are based on the ultimate goal of their findings (Yin, 1994; Saunders, Lewis, & Thornhill, 2009). One on hand it is *deductive* when the theory is established, hypothesis is articulated, or the objective of the research is to test existing knowledge. On the other hand, it is *inductive* when researchers are at liberty to interpret data and draw conclusions in order to generate theory (Yin, 1994; Saunders, Lewis, & Thornhill, 2009).

Moreover, identifying case study research propositions offers guidance and road-mapping to researchers in conducting their studies. Furthermore, research propositions

are developed from reviewing literature and existing theoretical concepts in relation to the studied unit (Yin, 1994; Darke, Shanks, & Broadbent, 1988). Additionally, this allows the researcher to contextualise the objective of the their case study research and to outline guidelines. Moreover, case study objectives include determining whether the study is theory validation or generation, identifying target participants or data sets, developing compatible research questions, and identifying potential variables (Eisenhardt, 1989; Zainal, 2007). Similarly, Yin (1994) urges for producing a case study protocol before commencing data collection in the form of document, which outlines the key features of the case study. It serves as a “*mental framework*” for researchers by listing objectives, procedures, issues, and questions investigated in the case study (Yin, 2011, p. 14).

Additionally, according to Yin (2003) cases studies are “*single case study, holistic case study, or multiple case studies*”. Moreover, in designing case studies specifications such as “*Boundary*”, “*Scope*” and “*Unit of Analysis*” should be identified before commencing the research (Yin, 1994). Furthermore, the unit of analysis is not restricted and could cover a wide spectrum of samples such as “*individuals, organisations, groups, applications, or projects*” (Adwan, 2017; Halaweh, 2012).

Essentially, single case studies -which use a single unit with restricted boundaries- have the limitation of representing a single voice and a single perspective. However, multi-case studies enrich the research with multiple voices and multiple perspectives; which allows the catering for a spectrum of prospect emerging issues because they are not being limited to a specific boundary/case (Feagin, Orum, & Sjoberg, 1991), and at the same time offers highly accurate, representative, and consistent data (O’Connor, 2012).

Arguably, single case studies might lack the ability of generalising conclusions (Shaw & Holland, 2014). However, Adwan (2017) clarifies what could and could not be generalised in “*single case studies are theoretically but not statistically generable*” (2017, p. 299). On the other hand, multi-case studies allows for continuous “*cross-case analysis*” and constant comparison of emerging results; allowing for a wider spectrum of theorising and confidence in findings generalisation (Lawrence, 2010; Adwan, 2017).

Expectedly, case study research method has been subject to criticism due to the following disadvantages. First of all, the analysing of colossal volumes of qualitative data without having a proper analytical approach in place (Darke, Shanks, & Broadbent, 1988; Halaweh, 2012). Typically, this is remedied by combining case study method with another method, which has a rigorous and effective qualitative data analysis procedures, such as Grounded theory. Secondly, the lack of ability to generalise from a single case study. Accordingly, Yin (1994) acknowledges that it is scientifically challenging to generalise from case studies using only one subject “*How can you generalise from a single case?*” (Yin, 1984, p. 21; Zainal, 2007). However, he further explains that case studies do not generalise statistically to population, yet they do offer generalisation in terms of theory propositions; and the goal conducting case studies research is to achieve the “*Analytical generalisation*” not “*Statistical generalisation*” (Yin, 2009, pp. 38-39; Yin, 2011). Thirdly, Yin (1984) questions the scope of artefacts and documentations required to conduct a research using case study (Zainal, 2007). Finally, Halaweh (2012) note the hesitancy or sometime lack of enthusiasm of organisations to partake in case study research.

3.5 GROUNDED THEORY

The Grounded Theory (GT) is developed by Barney Glaser and Anselm Strauss in 1967; while they were cooperatively researching patients in the health sector. Subsequently they have published their book “*The Discovery of Grounded Theory*” which tends to set the foundation for all future Grounded Theory related literature (Glaser & Strauss, 1967; Hoda, 2011). Ultimately, the main purpose of Grounded theory is “*the discovery of theory from data systematically obtained and analysed in social research*” (Glaser & Strauss, 1967, p. 2). It is done by analysing collected data in order to discover behavioral patterns in relation to the examined concerns “*to generate a theory that accounts for a pattern of behaviour which is relevant and problematic for those involved*” (Glaser, 1978, p. 93).

Consequently, researchers would be able to, inductively, generate theory using knowledge (tacit and explicit) grounded in the data. It is about facilitating the emergence

of theory (Glaser, 1978; Glaser, 1992). Collectively, Glaser defines the Grounded theory as a complete methodology, which equips researchers with techniques and procedures to conduct research and generate relevant theory. He puts it as follows:

“a general methodology of analysis linked with data collection that uses a systematically applied set of methods to generate an inductive theory about a substantive area” (Glaser, 1992, p. 16)

3.5.1 GLASERIAN AND STRAUSSIAN APPROACH

Further to their joint work in bringing the Grounded theory to light, the founders Glaser and Strauss have taken a different stand in viewing the best mechanism of implementing Grounded Theory into a field of study; resulting in the emergence of “*Glaserian Approach*” and “*Straussian Approach*” (Charmaz, 2006; Hekkala, 2007; Halaweh, 2012; Glaser & Holton, 2004). Additionally, Cooney (2010) suggests that actually it is Strauss’ understating of (GT) that has changed and arguably evolved; while Glaser is stayed adamant to the original 1967 design of (GT) in terms of essence and procedures (Cooney, 2010).

Fundamentally, the core differences between the two approaches are the forever debated questions. Firstly, whether researchers have to review and use existing literature before commencing the work. Or if they have to start from a complete clean state of no pre-assumptions, no research questions, or sought after pre-determined paradigms (Hoda, Noble, & Marshall, 2011; Stern, 1994; Suddaby, 2006). Secondly, whether the generated theory is used in the verification of existing literature or not? (Cooney, 2010).

On the one hand, from paradigmatic view of the “*Glaserian Approach*”, Glaser (2002) believes in “*true reality*” in the essence of that the reality is out there and collecting exact data enables the reality to reveal itself irrespective from the relevance to subjectivity of the surrounding in terms of people, place, time, and interactions (Devadas, Silong, & Ismail, 2011). Furthermore, According to Glaser (1978), the objective of GT is about

“discover what is going on, rather than assuming what should go on” (Glaser, 1978, p. 2). Accordingly, Glaser (1992) asserts that in applying (GT) researchers should not review or leverage any exiting literature in relation to the study; that is to avoid having pre-assumptions whatsoever.

Furthermore, Glaser (2004) and Hekkala (2007) argue that there are two aspects in which having pre-assumptions in researcher’s mind distorts the study, and jeopardizes the theory generation process. Firstly, it might skew the neutrality of researchers while conceptualising emerged qualitative data. Secondly, it derails the study from its natural path of inductively generating theory. Then, in the classic Grounded theory, contrary to most research methods, there are no pre-defined problems or questions of research; and the questions only emerge during the study (Glaser, 1992; Hekkala, 2007; Halaweh, 2012). Moreover, Glaser (2004) argues that the consideration of exiting literature in relation to *“qualitative data analysis”* is invalid, and does not comply with the essence of the original Grounded theory (Glaser & Holton, 2004; Halaweh, 2012). Furthermore, Glaser (2002) fears that literature review, directly or indirectly, leads to *“forcing theory into data”* (Glaser, 2002). Likewise, Glaser (1992) adamantly insists that Grounded theory purely adheres to inductive principle in theory generation, and should not be used for theory verification (Cooney, 2010).

On the other hand, from paradigmatic view of the *“Straussian Approach”*, Strauss and Corbin (2008) believe in *“constructive reality”* allowing researchers to construct reality with participants by accepting assumptions (Devadas, Silong, & Ismail, 2011). Strauss and Corbin (1990) advocate for some degree of literature review prior to commencing fieldwork. In their opinion, such literature review helps in focusing the research on areas of interest, categorising research dimensions, identifying the sought after main research questions, guiding the process of theoretical sampling, and allowing for comparison between the literature and emergent new theory (Strauss & Corbin, 1990; Adwan, 2017).

Furthermore, Hoda, Noble and Marshall (2011) draw attention to the non-practicality of commencing a research with no prior knowledge of the topic of study, and

the importance for researchers to familiarize themselves with concepts and terminologies related to the research. Otherwise, researchers might face some ambiguity, and interview time might be wasted in asking simple questions and seeking clarifications of basics (Hoda, Noble, & Marshall, 2011). Additionally, Strauss (1987) allows for the use of Grounded theory in theory deduction and verification and remarks it as “*absolutely essential*” (Strauss, 1987, p. 13; Cooney, 2010).

Therefore, according to Hekkala (2007) the “Straussian approach” is with inductive-deductive principle. Deductive when it is applied to verify existing knowledge using pre-determined concepts and paradigms; and inductive when it facilitates the emerging of new concepts and theory (Strauss & Corbin, 1998; Hekkala, 2007; Halaweh, 2012). Ultimately, the “*Straussian Approach*” aims to generate theory “*that fits to the situation*” using guided procedures and practice (Strauss & Corbin, 2008; Strauss & Corbin, 1990; Strauss & Corbin, 1998; Cooney, 2010).

3.5.2 GROUNDED THEORY PROCEDURES

The Grounded theory is used as a methodology or as a method. When adopting the “*Glaserian Approach*” approach then it is used as a methodology (Glaser, 1992; Glaser & Strauss, 1967); while using the “*Straussian Approach*” means it is been adopted as a method which provides systematic procedures and techniques for rigorous qualitative data analysis (Strauss & Corbin, 1990; Hekkala, 2007; Halaweh, 2012). Accordingly, this research adopts the use of the “*Straussian Approach*”, and therefore this section focuses on associated procedures of the selected approach. Figure 3.1 demonstrates the procedures of Grounded theory “*Straussian Approach*”.

Literature Review → Theoretical Sampling → Data Collection → Data Analysis
(Coding, constant comparison analysis, categorising) → Theory Generation.

Figure 3. 1 Straussian Approach Procedures (Strauss & Corbin, 1990)

Conceptually, this approach of Grounded theory process starts with conducting literature review, and as a result, researchers should be able to construct navigating guidelines in terms of concepts, directions and main questions. Then with such guidelines, researchers are able to proceed to the theoretical sampling step and select their samples of participants. Next, the data collection process starts by conducting interviews with participants to extract the tacit and explicit knowledge. After that comes the data analysis phase, which comprises of the coding, constant comparison analysis, and identifying core categories.

Finally, after knowledge is acquired and processed, the theoretical propositions start emerging and researchers collate their findings in the final write up (Strauss & Corbin, 1990; Strauss & Corbin, 2008; Adolph, Hall, & Kruchten, 2011; Hoda, Noble, & Marshal, 2012). Furthermore, the data collection and analysis phases keep occurring in iterative interplay cycles, and at the same time combined with the constant comparison analysis. Subsequently, the process keeps in play until data collected from new participants stop revealing new information (codes, concepts, categories), and their contribution becomes merely a confirmation or validation to what has emerged already. Accordingly, this indicates reaching to the “*Theoretical Saturation*” stage, declaring the end of data collection (Glaser & Strauss, 1967; Strauss & Corbin, 2008; Hoda & Noble, 2017). Table 3.1 describes the main procedures for Grounded theory (Straussian approach).

Table 3. 1 Major Procedures of Grounded theory

Procedure	Detail
Sampling	Sampling is driven by the GT “ <i>Theoretical Sampling</i> ” concept (Glaser & Strauss, 1967); which is deriving the sampling of new data using already emerged concepts -from data collected and analysed in previous rounds - , which have theoretical significance to the evolving theory (Strauss & Corbin, 1990; Glaser, 1978). For example, as a starting point, the first

	<p>round of sampling uses the derivative concepts from the literature review which, have significance to the research question, otherwise “<i>the researcher might be tempted to collect everything</i>” (Adwan, 2017, p. 298). Subsequently, after the completion of data analysis of the first round, new emerged concepts are manifested and become the basis of the second round of sampling. The exact same process keeps occurring until the completion of data collection (Halaweh, 2012).</p>
Data Collection	<p>According to Strauss and Corbin (1990) the ultimate goal of data collection is to record the actions, interaction, reactions, and relationships between participants and the studied incidents (Strauss & Corbin, 1990). Furthermore, interviews with participants should be semi-structured with open ending questions, allowing participants to elaborate their behavioural aspect which researchers trying to capture (Hoda, Noble, & Marshall, 2011; Adwan, 2017). Furthermore, the researcher keeps conducting iterations of data collection and data analysis derived by theoretical sapling until reaching “<i>theoretical saturation</i>” point (Hoda & Noble, 2017).</p>
Coding	<p>Coding is the key of data analysis process in Grounded theory, which starts straight after the first round of data acquired, and continues throughout the research with iterative and retrospective effect (Strauss & Corbin, 1990). Furthermore, coding procedures are not rigid but rather flexible and acknowledge the different nature of each research “<i>we do not at all wish to imply rigid adherence to them</i>” (Strauss & Corbin, 1990, p. 59). In terms of coding types, there are substantive code (including open and selective) and theoretical codes (Glaser, 2005). However, studies, which adopted the Straussian approach, are guided by “<i>Open, Axial and Selective</i>” codes, with the parallel application of the constant comparison</p>

	<p>analysis procedures (O'Connor, 2012; Shiau & George, 2014; Halaweh, 2012; Adwan, 2017).</p> <p><u>Open Coding</u>: is the process of “<i>breaking down, examining, comparing, conceptualizing and categorizing data</i>” (Strauss & Corbin, 1990, p. 61). Next highlighting “<i>key Points</i>”, and after collating and grouping similar key points they get assigned to a unique code. A <i>code</i>: is a sentence that summarises the key points in two or three words maximum (Strauss & Corbin, 1990; Hoda, Noble, & Marshal, 2012, p. 619; Georgieva & Allan, 2008). Ultimately, two “<i>What</i>” questions need to be answered in coding in the form of <i>What does that mean?</i> and <i>What does that represent</i> (Halaweh, 2012).</p> <p><u>Constant Comparison Analysis (CCA)</u>: According to Glaser and Strauss (1967) the “<i>CCA is an iterative process of reducing data through constant recoding</i>” (Adwan, 2017, p. 306). The emerged codes are subject to constant comparison in which they get compared against new and existing codes found in the same or other participants. The objective is to group the emerged codes and generate a higher level to data abstractions which called “<i>Concepts</i>” (Glaser & Strauss, 1967).</p> <p><u>Axial Coding</u>: is the process of applying CCA on emerged concepts to generate a higher level of data called “<i>Categories</i>” (Hoda, Noble, & Marshal, 2012; Adwan, 2017). Furthermore, this is done by assembling and establishing links between concepts to create a broader theme (category); and consequently identifying the reoccurring, steady, major, and minor themes/categories (Strauss & Corbin, 1990; Halaweh, 2012; Adwan, 2017).</p> <p><u>Selective Coding</u>: is the process applied to “<i>integrate and refine theory</i>” out of the emerged themes and categories (Lawrence & Tar, 2013, p. 33). However, this is only done after identifying the “<i>Core Category</i>” which</p>
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	<p>represents the main theme, concern or problem of the study. Furthermore, according to Glaser (1978) that the core category reveals itself when it “<i>accounts for a large portion of the variation in a pattern of behaviour</i>”; and according to Hoda (2011) it is “<i>central, reoccurs frequently, is related to the other main categories, and accounts for most variations in data</i>” (Hoda, 2011, p. 52). Subsequently, upon discovering the core category researchers must cease open coding (including all emerged concepts and categories), and delimit coding and CCA to only categories and concepts which relate to the core category (Glaser & Holton, 2004).</p>
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Ultimately, Grounded theory generates theory by applying coding procedures combined with constant comparison analysis, resulting in data abstraction process to a higher level and so on (*Row Data → Key point → Code → Concept → Category → Theory*) (Hoda, 2011, p. 51). For example, by applying these procedures on a -fictious- sample of data where a team member is reflecting on his participation in an Agile retrospective session. Accordingly, Table 3.2 shows the application of Grounded theory procedures and data abstraction process.

Table 3. 2 Example of coding procedure in Grounded theory

Collected Data	Key points	Code	Concept	Category
Team member saying: In Agile retrospective session, I was able to talk to my workmates and express my	Retrospective allows direct talk between team members	Approach team directly	Open comms	Communication
	Retrospective allows collective participation	No fear in participation	Safe comms	
	Retrospective helps in understating each other	Team talks clearly	Effective comms	

frustration without feeling shy or scared, they actually understood where I am coming from.	Retrospective facilitates accepting concerns	Team accepts feedback	Receptive comms	
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3.6 COMBINED METHDOLOGY

The combined methodology of this research is the product of combining and integrating case study research method and Grounded Theory as a method, using the *Straussian approach*. According to Hekkala (2007) most of the Grounded theory related research in ICT are leveraging the Straussian approach. Therefore, the proposed combined methodology of case study method and Straussian approach have been adopted in multiple (IS) related studies such as (O'Connor, 2012; Shiau & George, 2014; Halaweh, 2012; Adwan, 2017; Nielsen, 2014; Fernández, Lehmann, & Underwood, 2002; Taber, 2000).

3.6.1 CASE STUDY: GROUNDED THEORY COMBABILITY

According to Fernandez, Lehman, and Underwood (2002) the Grounded theory and case study methods do work together. Furthermore, Hughes and Jones (2003) argue that the theory generation mechanism of Grounded theory is in alignment with case study research of interpretive nature, especially when it is applied in organisational and behavioural research (Hughes & Jones, 2003). Moreover, Fidler, Halaweh, and McRobb (2008) stress the compatibility between the Straussian approach and case study, and highlight the aspects of conformity and consonance between the two methods as follows.

Firstly, both methods seek literature review before commencing the research and leveraging this acquired knowledge in developing research questions (case study) and

directing theoretical sampling (GT). Furthermore, this in return facilitates the focusing and narrowing down of the scope of data collection process to be relevant with the scope of research (Fidler, Halaweh, & McRobb, 2008; Strauss & Corbin, 1990; Yin, 1994).

Secondly, both methods consider conducting interviews with participants as the core source of capturing data (Fidler, Halaweh, & McRobb, 2008; Allan, 2003; Yin, 1994; Strauss & Corbin, 1990).

Thirdly, both methods share the objective of generalisation of findings; which is to accept that originated results are applicable to other different situations, which share comparable conditions and features (Fidler, Halaweh, & McRobb, 2008). On one hand, Strauss and Corbin (1990) explain that the generalisation in (GT) is driven by data abstraction, and there is a relationship between abstraction and generated theory in terms of “*the more abstract the concepts, the more theory applicability*” (Fidler, Halaweh, & McRobb, 2008, p. 7). Similarly, Yin (1994) confirms the ability of generalisation using case study findings; however, it is “*Analytical generalisation*” not “*Statistical generalisation*”.

Finally, the combined methodology is the answer to multiple criticism related to research conducted by case study method only. For example, case study is critiqued by its inability to process colossal volumes of qualitative data without using a formal analytical approach (Darke, Shanks, & Broadbent, 1988). Therefore, the integration with Grounded Theory procedures are utilised to counterbalance such disadvantages; most specifically by applying the coding and CCA procedures against the data collected via case study (O'Connor, 2012; Fidler, Halaweh, & McRobb, 2008). Furthermore, another criticism is the limitation of case study to its boundaries. However, the theoretical sampling of Grounded theory allows researchers to cross these boundaries in peruse for emerging concepts (Halaweh, 2012). Ultimately, according to Eisenhardt (1989) the combining of these two methods leads to three core competencies as it produces “*novel theories*” and this “*theories are likely to be testable*” and the “*emergent theories are empirically valid*” (Eisenhardt, 1989, p. 532; Adwan, 2017, p. 299).

3.6.2 CASE STUDY: GROUNDED THEORY METHODOLOGY

The integration between case study and Grounded theory involves all phases including design, data collection, data analysis, findings, and theorising. Moreover, the assumed model for this study is adopted from previous studies (Pandit, 1996, pp. 8-10; Rowlands, 2005, p. 88; Fidler, Halaweh, & McRobb, 2008, p. 10; Halaweh, 2012, p. 40; Adwan, 2017, p. 300). Table 3.3 explains the expected phases and associated steps when applying the proposed methodology of Case study and Grounded theory (Adwan, 2017; Fidler, Halaweh, & McRobb, 2008).

Table 3. 3 Phases and steps of Case Study: Grounded Theory methodology

Phase	Steps	Actions
Define and Design	1: Exploring Research area	<ul style="list-style-type: none"> Identify general research area
	2: Literature Review	<ul style="list-style-type: none"> Identify gaps Discover new areas of research Extend existing body of knowledge
	3: Select Study Topic	<ul style="list-style-type: none"> Select research topic Identify research questions Propose initial conceptual model
	4: Use Case Study Strategy	<ul style="list-style-type: none"> Develop case study protocol Identify case study unit of analysis
	5: Pre Data Collection	<ul style="list-style-type: none"> Apply for ethics approval (<i>not required for this research</i>) Identify participants Design data collection protocol (method, location, artefacts) Design data collection tools (recorder, transcribing tool)
Data Collection	6: Enter Study Field	<ul style="list-style-type: none"> Collect data (Primary → interviews), OR (Secondary → previous studies, journals, and available artifacts) <i>Note: Secondary data is the choice of this research</i> Transcribe cases
Data Analysis	7: Data Coding	<ul style="list-style-type: none"> Open coding Axial coding

		<ul style="list-style-type: none"> ▪ Core category ▪ Selective coding
Interplay loop (between data collection and data analysis)		<ul style="list-style-type: none"> ▪ Theoretical sampling ▪ Constant comparison analysis (CCA) ▪ Identify case study unit of analysis
Findings	8: Research Model	<ul style="list-style-type: none"> ▪ Findings (Codes, Concepts, Categories) ▪ Core category ▪ Relationship between them
Conclusion	9: Theory Generation	<ul style="list-style-type: none"> ▪ Showing contribution to literature ▪ Comparing against existing literature

Similarly, Figure 3.2 demonstrates the associated flowchart of adopted methodology of case study and Grounded methodology for this research.

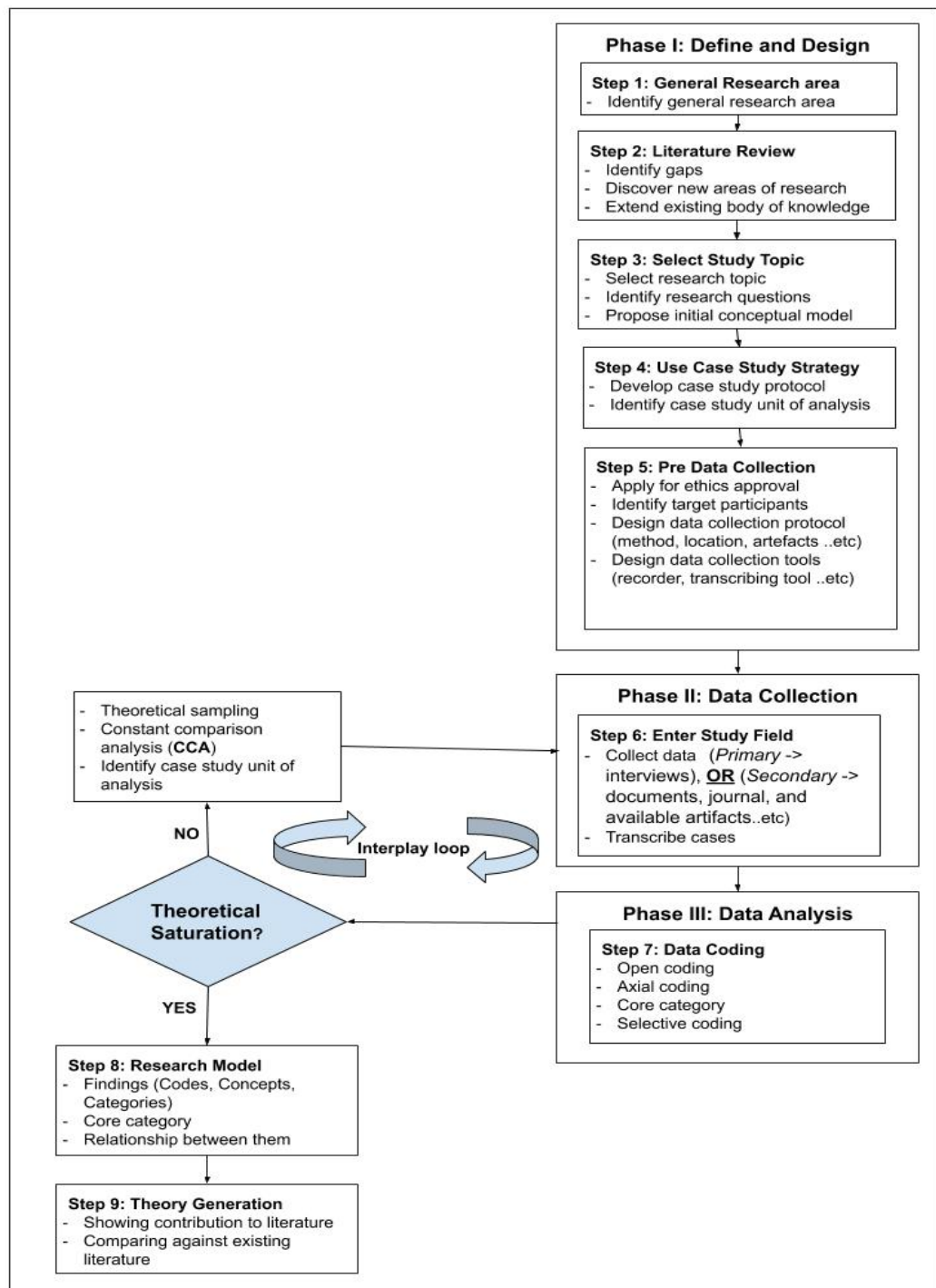


Figure 3. 2 Case study: Grounded theory combined methodology, adapted from (Adwan, 2017, p. 300; Halaweh, 2012, p. 40)

3.7 APPLICATION OF THE METHDOLOGY

This section presents a practical deployment of how the proposed combined methodology is applied into study field for the use of the current research. This is achieved by implementing the sequential phases and steps demonstrated in above Table 3.3 and Figure 3.2, while taken into consideration that this is a theoretical study based on secondary data. Accordingly, the general research area has been identified as the impact of Agile in the banking industry.

3.7.1 LITERATURE REVIEW

An exhaustive literature review has been conducted in Chapter 2 of this thesis. Upon the completion the relevant literature review, issues and problems at hand have been identified in sections 2.6 and 2.7. In summary, banks are facing a rapid pace of change in the surrounding environment; and by not responding to these changes swiftly and in a timely way banks are exposed to the risk of being ousted, or losing market share to competitors. Subsequently, banks have explored adopting new delivery methods such as Agile seeking swiftness and flexibility in responding to changes. Such an adoption has an impact; firstly, on the time-to-market rate in comparison to the Waterfall approach (Hartlen, 2015; Livermore, 2007). Secondly, on organisational behaviour in terms of people, communication, management, and customers (Stoica, Mircea, & Ghilic-Micu, 2013; Almeida, 2017; Lindvall, et al., 2002). Accordingly, Table 3.4 shows the main guidelines for research after completing the literature review.

Table 3. 4 Main study guidelines

Item	Details
Study area	Agile processes in banking industry
General research question	What is the impact of adopting Agile in the banking industry?

Sub research questions (detailed)	<ul style="list-style-type: none"> - What is/are the impact of adopting (Agile Vs. Waterfall) methodology on the time-to-market rate? - What is/are the impact of Agile processes on organisational behaviour?
Literature Review Output	<ul style="list-style-type: none"> - There is an opportunity of extending the body of knowledge of existing literature. - There is a gap in the literature addressing new topics such as the socialisation aspect of Agile.

3.7.2 CASE STUDY AND UNIT OF ANALYSIS

Yin (2003) advises that a research is achieved by a single case study or multi-case studies; he further explains that the use of multi-case study allows for cross-reference findings between different cases (Yin, 2003). However, for this theoretical study, the decision is to implement a single case study approach. To be noted, this research could be expanded to include multi-case studies based on criteria such as multiple banks, Agile maturity level, multiple geographical locations ..etc..

Accordingly, the participants of this study are extracted from collected materials in terms of previous studies, publications, websites, project reports, and contemporary literature. Furthermore, accepted data is deemed eligible and related to the topic of Agile implementation in the banking industry, and enjoys both reliability and authenticity. Moreover, the unit of analysis for this research is the *participant's opinion* on how Agile impacts the ways of doing work in banking from the behavioural and functional point of views.

Furthermore, this selection of first round of initial participants is driven by the concept of “*purposive sampling*”; which is choosing participants based on their relevance and association to the studied topic (Patton, 1990). Such a relevance is established on the back of the literature review, industry knowledge, and after understanding the major participants and factors which impact the studied phenomena (Patton, 1990; Halaweh,

2012). However, this research uses the “*theoretical sampling*” concept driven by Grounded theory (Glaser & Strauss, 1967); then the participants pool is possible to be updated in the subsequent rounds of data collection to be in aligned with emerging concepts. The researcher has to follow the emerging concepts, categories, concerns, and associated relationships; and by doing so both targeted data and participants are changing accordingly (Strauss & Corbin, 1990).

3.7.3 CASE STUDY PROTOCOL

As highlighted earlier in section 3.4, Yin (1994) urges for producing a case study protocol before commencing data collection. Furthermore, the case study protocol for this research is adopted from Adwan (2017) and Halaweh’s (2012) studies, in addition to taking into consideration other recommended guidelines. For example, the nature of sought questions should be “*explorative, relevant and appropriate for the objectives of this study*” (Adwan, 2017, p. 304; Ajzen, 2002; Holden, 2010). Accordingly, Table 3.6 shows the suggested case study protocol for the current research.

Table 3. 5 Design of Case Study protocol

Case Study protocol - Agile in Banking
Objective: This research aims to investigate the impact of Agile adoption in banking industry in order to facilitate swift and timely responses to changes in the surrounding environment.
Key issues: <ul style="list-style-type: none"> - What is/are the impact of adopting an Agile Vs. Waterfall methodology on the time-to-market? - What is/are the impact of adopting Agile processes on organisational behaviour?
Participants’ Questions: <i>This research uses secondary data, hence the researcher seeks to extract relevant secondary data from collected materials, which answers the below hypothetical questions:</i>

- In the material, what is the general opinion about adopting Agile in banking (advantages/disadvantages)?
- What is the material feedback on using Agile vs. Waterfall? (in terms of time-to-market rate)
- How does the material address the social and behavioural impact of Agile?

3.7.4 TECHNIQUES OF DATA COLLECTION

This research is a theoretical study based on the copious available secondary data sources. Practically, the use of a secondary dataset is time and cost efficient in terms of saving time needed to collect primary data and associated costs (Windle, 2010). Furthermore, Hox and Boeije (2005) recommend the use of secondary datasets whether quantitative or qualitative, however the challenge is whether researchers are able to locate, retrieve, and evaluate the desired data (Hox & Boeije., 2005).

Likewise, the authenticity of secondary data is essential to the success of studies, hence the criticality of only using reliable datasets whether they have been acquired physically or electronically. Moreover, authentic datasets are acquired from reliable sources such as previous studies, publications, government records, organisations official reports, and academic knowledge (Hox & Boeije., 2005). Therefore, the collected materials for this research are mostly from previous studies, publications, organisation websites, and reports as the main sources of data.

Furthermore, the data evaluation process involves examining data collection techniques of original studies, the limitation of original primary data, and the quality of collected data itself. Moreover, the data quality is determined in the context of understanding its history and background in terms of applying the questions set *Who, When, Where, How, What, Whether* (Hox & Boeije., 2005; Tashakkori & Teddlie, 2003). For example: *Who* collected the data?, *When* the data was collected?, *Where* the data was collected? *What* type of data ?, *Whether* data is consistent? Accordingly, the relevancy

and accuracy of this research's secondary data is determined by applying the verification criteria above.

Subsequently, the collected data for this research is validated and analyzed rigorously using the Grounded Theory procedures and techniques, and upon reaching the theoretical saturation point, then a data collection process ceases (Hoda, Noble, & Marshall, 2011).

3.7.5 FINDINGS AND REPORTING

Conceivably, resultant findings are documented properly according to the adhered university standards. Afterwards, findings are assessed in terms of its ability in explaining results, answering the research questions, highlighting weaknesses, and pointing towards areas for future research. Furthermore, findings credibility are subject to evaluation criteria in terms of its conformity and compatibility to the existing literature, and available professional sources in the banking industry.

3.7.6 SUGGESTED SOLUTIONS

Upon completion the research and findings, the researcher -equipped with adequate evidence and knowledge- then answers the research questions and draws up a set of suggestions. Furthermore, this set of suggestions appropriately addresses the problems and issues highlighted in section 2.7. Additionally, practical recommendations based on the findings are proposed to the banking industry.

3.8 LIMITATION

The generalisation of this research's findings is based on concepts and theories coming from qualitative data only, which could be open for criticism. However, Yin (2003) states "*case studies are generalisable to theoretical propositions and not to populations or universes*" (Yin, 2003, p. 10), and he further elaborates that the generalisation is actually "*Analytical Generalisation*" not "*Statistical Generalisation*" (Yin, 1994). However, Walsham (1995) argues that in qualitative research the generalisation is done by generating concepts and theories. Furthermore, Strauss and Corbin (1990) explain that

the generalisation in GT is driven by data abstraction, and there is a relationship between abstraction and generated theory in terms of “*the more abstract the concepts, the more theory applicability*” (Fidler, Halaweh, & McRobb, 2008, p. 7). Moreover, Halaweh (2012) argues that, “*Interpretive case studies and grounded theory research are similar in terms of the generalisability of the results*” (Halaweh, 2012, p. 37). Hence, findings are analytically generalised to other situations which share the context and conditions of this study.

3.9 SUMMARY

This chapter aims to explain the methodology, methods, and guidelines used for the current research. First, the choice of adoption is a combined methodology which involves integrating Case study research method and Grounded Theory method. Furthermore, the chapter describes the two approaches of Grounded Theory (Glaserian approach, and Straussian approach), and highlights the major differences between them. Moreover, it draws a strong justification for the choice of selecting the “*Straussian Approach*” of Grounded Theory to be matched up with case study highlighting the compatibility between them. Additionally, it explains in detail the rigorous procedure of Grounded Theory, and the foundational aspects in designing case study search.

Subsequently, it offers a comprehensive description of the adopted methodology framework (Case study : Grounded Theory), and highlights its sequential phases and associated steps. Furthermore, it provides a hypothetical example of an actual application to this methodology in the study field, that is in the context for this study.

Finally, it explains the adhered to guidelines in terms of reporting, assessing, and generalising the findings from this research. In the next Chapter 4 of this research, the data collection process is recorded, and findings are summarised with a conclusion.

Chapter 4: Research Findings

4.1 INTRODUCTION

This study is qualitative research based on secondary data. In essence, secondary data analyses are considered effective, efficient, and practical in the sense of offering reduction in both time and cost associated with securing research data (Heaton, 2004; Andrews, Higgins, Andrews, & Lalor, 2012). Moreover, Corti and Bishop (2005) draw attention to the merits of transparency and pragmatism in re-using available data in further analysis and research that adds credibility to the original dataset (Corti & Bishop, 2005). Fundamentally, Heaton (2004) defines the process of secondary data analysis as follows:

“a research strategy which makes use of pre-existing quantitative data or pre-existing qualitative data for the purposes of investigating new questions or verifying previous studies” (Heaton, 2004, p. 15).

However, the adoption of a secondary data approach equally attracts criticism, most specifically in terms of the credibility of data sources, and the dissociation between researchers and data selection/collection processes (Andrews et al., 2012). Consequently, failing to address such concerns possibly leads to two major challenges; on the one hand, it might lead to have the research findings disputed. On the other hand, it might lead to a loss of control over the nature of the data. Furthermore, the latter issue is derived from, firstly, the lack of familiarity with the surroundings/conditions in which the original dataset is collected. Secondly, the inability of perusing data leads with further questioning because secondary data researchers do not have access to the original participants (Szabo & Strang, 1997; Corti & Bishop, 2005).

Nonetheless, such risks have been mitigated for the current study by adhering to a meticulous and thorough regime in examining potential datasets before accepting them appropriate for this study. Accordingly, this has been achieved by implementing two

strategies. Firstly, locating eligible existing studies with similarity to the current study in terms of conditions, targeted participants, and research methods. Secondly, by identifying clear inclusion or exclusion criteria in determining data relevancy.

This chapter offers a holistic overview of collected secondary data in relevance to this study. It casts light on the search strategy based on the criteria of data eligibility, and presents the resulting dataset, which is relevant to address the two questions for this study.

Furthermore, this chapter explains the step of data sanitizing, which is completed by applying the inclusion or exclusion pre-defined criteria. As a result, the total entries of 137 accounts (interview snippets extracted from secondary data sources) are collected from different verified and reliable sources, including exiting studies, publications, reports, and banks' formal journals.

Subsequently, the chapter describes the process of data mapping based on the research key areas and questions. Furthermore, such mapping and categorisation is done by using key identifiers as mapping keys. Moreover, it represents multiple summaries of the complete dataset from different point of views, with the objective of highlighting the sufficiency and adequacy of the collected data in covering all aspects of the studied topic, and answering this study's questions.

Additionally, the chapter lists excerpts of the interview snippets in order to demonstrate both the credibility and conformity of selected secondary data to the topic of the study. Finally, the selected dataset is categorised based on mapping keys in preparation for the next Chapter 5 of data analysis, which is guided by the Grounded theory procedures.

4.2 DATA ELIGIBILITY

Identifying appropriate data is a key step in qualitative research. Furthermore, according to Mack et al. (2005) there are three main techniques in collecting such data. Firstly, researchers are able to immerse themselves in participants' routines in order to observe closely and experience firsthand their actions, norms, perspectives and behaviour. Secondly, researchers are able to deal with focus groups -comprised of targeted

participants- as reflective subsets of their insights, norms, and dynamics. Thirdly, researchers are able to conduct in-depth interviews with participants allowing them to express their behavioural perspectives and social queues (Mack, Woodsong, Macqueen, Guest, & Namey, 2005; Malena, 2016). Furthermore, these in-depth interviews are usually conducted in a semi-structured setup and associated with open ending questions allowing participants to express themselves freely with less restrictions (Vejseli et al., 2018; Hoda, Noble, & Marshall, 2011). Subsequently, the choice of qualitative secondary data for this study is based on the third technique, which is *interviews*, however, for this research the interviews are based on secondary data sources.

Accordingly, the secondary data for this qualitative study comprises of eligible snippets of already transcribed and published interviews; which are extracted from eligible existing studies, publications, organisations' formal reports, and interviews. Furthermore, the search strategy seeking secondary data sources is neither random nor subjective. To the contrary, it is quite objective and adheres to clear and rigid guidelines of inclusion or exclusion criteria and is driven by the suitability to this study's questions and goals.

4.2.1 CRITERIA FOR INCLUDING OR EXCLUDING STUDIES

The search strategy in identifying suitable secondary data sources must be systematic, comprehensive, unbiased, and taking into consideration only completed studies (Grady, Cummings, & Hulley, 2013). Additionally, Doolan, Winters, and Nouredini (2017) urge that researchers should equip themselves with an adequate theoretical review of the targeted topic prior to commencing the data search process. Such in-depth understanding helps researchers in focusing efforts in terms of narrowing down, targeting, and locating relevant secondary data (Doolan, Winters, & Nouredini, 2017).

Furthermore, the decision of qualifying existing studies as *relevant* to this study is based on a detailed inclusion or exclusion criteria, which is determined by applying the key secondary data validation questions of *Who, When, Where, How, What, Whether* (Hox & Boeije., 2005). Table 4.1 shows the applied criteria questions for determining the

eligibility of existing data sources as a suitable source of secondary data for the current study.

Table 4.1 Secondary data inclusion/exclusion criteria

Category	Question	Objective	Inclusion/Exclusion
Who (Q1)	Who is the author?	To validate the credibility and reliability of existing data	Only credible authors are accepted for this study.
Who (Q2)	Who is the interviewee?	To validate the pertinency of the participants to the research questions.	Interviewees belong to categories of (functional, customer, managers, executives) are considered.
When (Q3)	When was the study conducted?	To validate whether the study is outdated or still valid as a source.	Studies from 2010 onwards are accepted.
Where (Q4)	Where was the data collected from “geographically”?	To check if there is any geographical restriction to data.	No geographical restriction on collected data.
How (Q5)	How primary data was collected?	To check the conditions and methods of data collection.	Grounded theory interviews, case study questions, reports, official interviews.
What (Q6)	What kind of research (qualitative or quantitative)?	To check the suitability of data to this study.	In exiting studies, only qualitative data is considered.

What (Q7)	What research method is used in the study?	To check whether Grounded theory or case study is used in the data analysis.	In existing studies grounded theory or/and case study is considered.
What (Q8)	Does this study (partially/fully) address Agile/Waterfall in banking?	To check the relevancy to this study's first research question.	In relevance to question ONE of the current study
What (Q9)	Does this study address agile impact of organisational behaviour?	To check the relevancy to this study's second research questions.	In relevance to question TWO of the current study

4.2.2 SUMMARY OF SELECTED SOURCES

Subsequently by applying (Q1 → Q7) of the inclusion or exclusion eligibility criteria described in Table 4.1, the following 20 sources of secondary data are deemed relevant and suitable to the current study. Table 4.2 shows the sources of approved secondary data for this study.

Table 4.2 Sources of approved secondary data

Type	Source
Previous Study	(Hoda, 2011; Öhlén & Leahy, 2016; Malena, 2016; Vejseli, Proba, Rossmann, & Jung, 2018)
Publications	(Hoda, Noble, & Marshal, 2012; Hoda & Noble, 2017; Lee & Xia, 2010)

Interviews	(Warhaft, 2018; Keen, 2017; Whelan, 2019, Bray, 2018; Cornell, 2017; Rogers, 2015; Carnegie & Cornell, 2017; Ginovsky, 2017; Mahadevan, 2016)
Reports	(Standishgroup, 2015; Standishgroup, 2010; VersionOne, Inc, 2016)

4.2.3 SUMMARY OF SOURCES VS. PARTICIPANTS

In addition to identifying eligible studies in section 4.2.2, a further abstraction process is conducted by applying Q8 and Q9 of Table 4.1. The objective is to extract qualified qualitative data, which is embedded within the selected exiting studies in the form of interview snippets.

Subsequently, a total of 137 entries of interviews with participants have been collected from above verified and reliable sources. Furthermore, to ensure diversity and avoiding the possibility of skewing findings, the researcher verifies that these interview snippets are not derived from a single source type. To the contrary, the resultant 137 entries have been extracted -in different capacities- from all source types listed in Table 4.2. Accordingly, Table 4.3 shows the breakdown of 137 entries of participants against the type of sources.

Table 4.3 Sources vs. participants entries

Type	Source	Entries#
Previous Study	(Hoda, 2011; Öhlén & Leahy, 2016; Malena, 2016; Vejseli, Proba, Rossmann, & Jung, 2018)	60
Publications	(Hoda, Noble, & Marshal, 2012; Hoda & Noble, 2017; Lee & Xia, 2010)	35
Interviews	(Warhaft, 2018; Keen, 2017; Whelan, 2019; Bray, 2018; Cornell, 2017; Rogers, 2015; Carnegie & Cornell, 2017; Ginovsky, 2017; Mahadevan, 2016)	37

Reports	(Standishgroup, 2015; Standishgroup, 2010; VersionOne, Inc, 2016)	5
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Correspondingly, Figure 4.1 displays the pie chart of percentage distribution of data sources vs. participants. Accordingly, this figure shows that 44% of the entries of the participants are derived from existing studies, while 27%, 25%, 4% are resultant from publications, interviews and reports respectively.

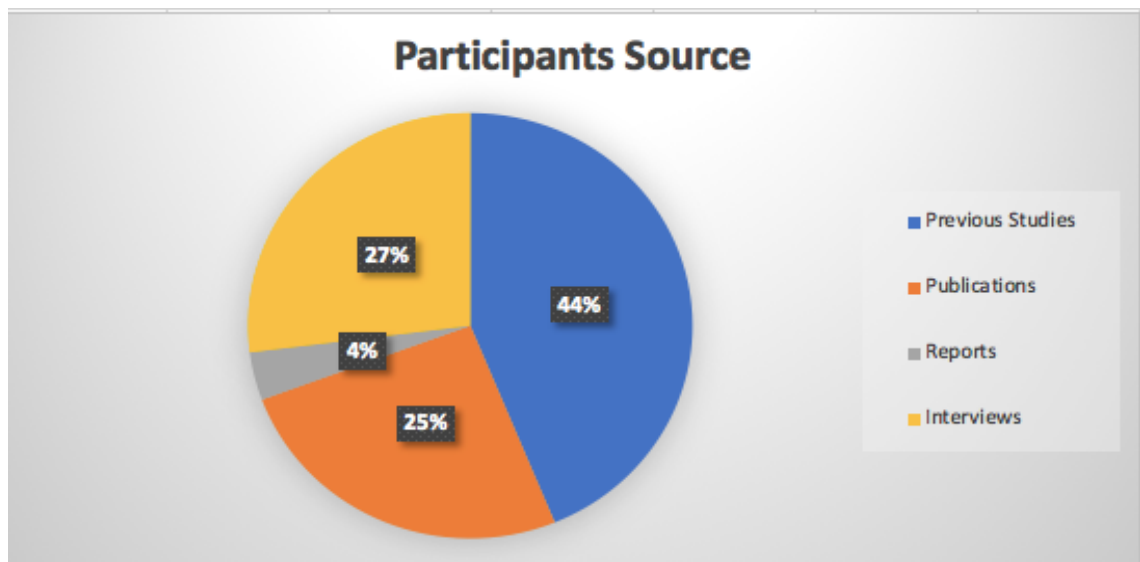


Figure 4.1 Participants source

4.2.4 SUMMARY OF PARTICIPANTS VS. ROLES

In order to answer this study's research questions, it is fundamental to capture the data derived from all hierarchical levels within banks, and their interactions with customers. Furthermore, the data reflects the sought after diversity of participants in terms of roles and responsibilities which includes functional, customer, manager and executive roles. Furthermore, Table 4.4 displays the breakdown of role categories against entries of the participants.

Table 4.4 Role vs. participants entries

Group	Job Title	Entries
Functional	Tester (12), Developer (31), Business Analyst (4), Support (3), Agile Coach (24)	74
Customer	Customer Representative, Customer engagement lead	12
Manager	Senior Manager, Project manager, HR manager, IT manager	21
Executive	Founders, CEO, COO, CIO, Executives, Directors, Head of department, Partner	27
Undisclosed	-	3

Correspondingly, Figure 4.2 displays the pie chart of percentage distribution of roles and responsibilities Vs. participants. It shows that 54% of the entries of the participants are derived from functional roles, while 20%, 15%, and 9% are derived from executive, manger and customer roles respectively.

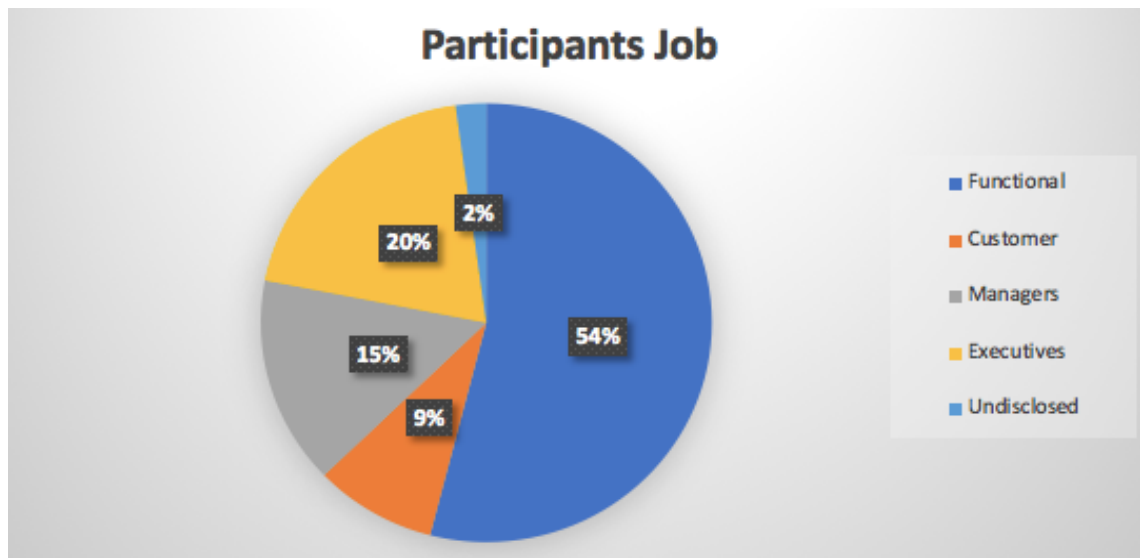


Figure 4.2 Participants job

4.2.5 SUMMARY OF PARTICIPANTS VS. RESEARCH QUESTION

Ensuring sufficient representation of targeted key areas is crucial in answering the research questions adequately. For this study, the key area for the first question is *methodology*: that is in assessing the time-to-market rate between the Waterfall and Agile. On the other hand, the key areas for the second question are *people*, *communication*, *management*, and *customer*; that is in addressing the impact of Agile processes on organisational behaviour.

Furthermore, cataloguing the data from key areas offers the sought after data spectrum, which highlights an adequate data allocation in order to answer the research questions. Table 4.5 shows the breakdown of entries of the participants against the research questions and key areas.

Table 4.5 Key areas vs. participants entries

Research question	Key Area	Entries
Q1- (Agile Vs. Waterfall)	Methodology	41
Q2- (Org. Behaviour)	Management	26
Q2- (Org. Behaviour)	People	36
Q2- (Org. Behaviour)	Communication	13
Q2- (Org. Behaviour)	Customer	21

Correspondingly, Figure 4.3 displays the pie chart of percentage distribution of research key areas Vs. participants'. It shows that 30% of entries of the participants' do cover methodology, while 26%, 19%, 15%, 10% are covering the people, management, customer, and communication, key areas respectively.

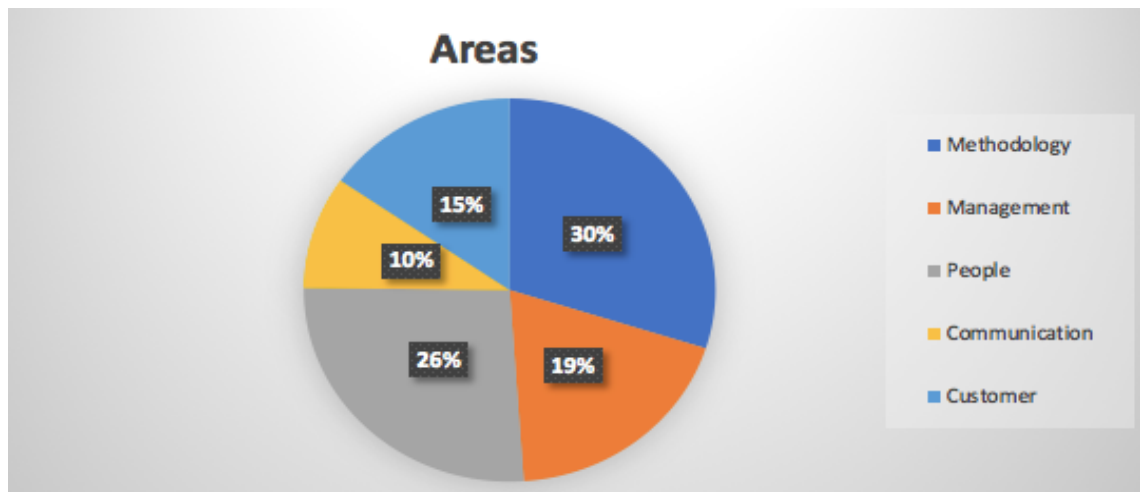


Figure 4.3 Key areas distribution

4.3 SUMMARY OF DATA PRESENTATION

Following the completion of the secondary data collection process, the next step is to commence the process of data mapping. Furthermore, this process -with the use of Excel- involves tagging interview snippets with key identifiers; that is to map them based on the criteria of key areas and research questions. Subsequently, the data is concatenated in a central data sheet labeled as “raw data sheet”, with three high-level headers including material source, participant details, and data mapping. Accordingly, Table 4.6 shows the domains and key identifiers used in the data mapping process.

Table 4. 6 Key identifiers of data mapping

Domain	Key Identifiers
Material Source	Source: Author and page Date: Year of published material Type: existing study, publications, reports, formal interviews
Participant details	Organisation: name of organisations (if disclosed) Location: location of the participant Role: job description and responsibilities

	Name: not disclosed
Data mapping	Research question: Research Question 1 or 2 key research area: Methodology, people, customer, management, communication Interview quote: copy of interview snippet extracted from materials

Accordingly, Figure 4.4 displays a screenshot of an example of the data mapping process.

Material Source		Data Source					Data Relevancy		
Source	Date	Type	Organisation	Location	Role	Name	Question#	Area	Interview Quote
(Hoda, 2011, p. 76)	2011	Previous Study	undisclosed	NZ	Agile Coach	undisclosed	2	Customer	"I have sort of a secret conversation with the customer, 'right okay, this team is new here for learning, expect them to blow the first sprint, it is very likely to happen'...and if anything good comes out of it, they [customers] are positively surprised."

Figure 4.4 Example of data mapping process

Upon the completion of the data mapping process, the raw data sheet is divided into five sub-sheets. Additionally, these sub-sheets are derived from research key areas, and the naming convention is a derivative from combining the two key identifiers (Research Question + Key Area). Accordingly, the resultant sub-mapped datasheets are: Q1-Methdology, Q2-People, Q2-Cumunication, Q2-Management, and Q2-Customer. Figure 4.5 displays the labels of key areas mapped sub-datasheets.

Data Overview	Raw Data Extract	Q1-Methodology	Q2-Management	Q2-People	Q2-Communication	Q2-Customer	Relationships
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Figure 4.5 Mapped sub-datasheets

4.3.1 METHODOLOGY - DATA

Upon the completion of the data mapping process, in correlation with key area ‘*methodology* concerning the first research question’, resulted in 41 interview snippets, as highlighted in Table 4.5. Illustratively, Table 4.7 highlights samples of the data.

Table 4.7 Excerpts of data on methodology impact

Source	Participant	Quote
(Keen, 2017)	[Interview, undisclosed, CEO, bank, NZ].	<i>"Agile is speed with stability, It's a fundamental and values-based way of working that allows the business to change its mind and adapt, change direction, with speed and stability and with low risk and low cost. Agile is a capability that organisations possess. If they don't recognise it, all it is doing is blocking them from competing in the market"</i>
(Hoda, 2011, p. 106)	[Interview, undisclosed, Developer, NZ].	<i>"[In traditional projects] it was more demotivating to be given ridiculous deadlines or just feel that the people [managers]...who are deciding the deadlines don't actually have any clue about the technical challenges"</i>
(Ginovsky, 2017)	[Interview, undisclosed, CEO, bank, Cali].	<i>"I would define agile as being prepared and being able to take advantage of opportunities in the market. It also is being open-minded and willing and courageous enough to do it,"</i>

4.3.2 ORGANISATIONAL BEHAVIOUR (PEOPLE) - DATA

Upon the completion the data mapping process, in correlation to key area ‘*people behaviour* concerning the second research question’, the findings resulted in 36 interview

snippets, as highlighted in Table 4.5. Illustratively, Table 4.8 highlights samples of the data.

Table 4.8 Excerpts of data on people behaviour impact

Source	Participant	Quote
(Hoda, 2011, p. 121)	[Interview, undisclosed, Developer, NZ].	<i>“We just didn’t do things based on technical skills...people would just grab whatever and if they couldn’t do it themselves, they get help. And that worked well.”</i>
(Öhlén & Leahy, 2016, pp. 32-33)	[Interview, undisclosed, Team member]	<i>“I think we still have a culture of fear. People are afraid of saying the wrong things and need top management approval. We need to be allowed to make mistakes. Big mistakes and we need to learn from these mistakes and keep improving. We can’t be scared of failing when we are thinking of new ideas. No idea is a bad idea.”</i>
(Bray, 2018)	[Interview, undisclosed, Customer Lead, bank].	<i>“What excites me with agile at ANZ is liberating ourselves and our people from the constraints of bureaucracy, empowering people to crack on and deliver”</i>

4.3.3 ORGANISATIONAL BEHAVIOUR (COMMUNICATION) - DATA

Upon the completion the data mapping process, in correlation to key area ‘communication concerning the second research question’, the findings resulted in 13 interview snippets as highlighted in Table 4.5. Illustratively, Table 4.9 highlights a sample of excerpts from the data.

Table 4.9 Excerpts of data on communication behaviour impact

Source	Participant	Quote
(Mahadevan, 2016)	[Interview, undisclosed COO, bank].	<i>“A lot is also down to the new way we communicate and to the new office configuration: we invested in tearing down walls in buildings to create more open spaces and to allow more informal interaction between employees”</i>
(Hoda, 2011, p. 177)	[Interview, Undisclosed, Senior manager]	<i>“you are communicating more generally with the client by virtue of the fact that if nothing else you are releasing software more frequently in iterations to the client”</i>
(Hoda & Noble, 2017, P7)	[Interview, Undisclosed, Project manager]	<i>“Also there is no defined communications hierarchy or process defined.”</i>

4.3.4 ORGANISATIONAL BEHAVIOUR (MANAGEMENT) - DATA

Upon the completion the data mapping process, in correlation to the key area ‘*management* concerning the second research question’, the findings resulted in 26 interview snippets as highlighted in Table 4.5. Illustratively, Table 4.10 highlights a sample of excerpts from the data.

Table 4.10 Excerpts of data on management behaviour impact

Source	Participant	Quote
(Carnegie & Cornell, 2017)	[Interview, Executive Digital Banking, bank].	<i>“Ensuring a workforce is comfortable with distributing leadership is a cultural issue - not a process or methodology one. This means leaders must expand their skills to adapt. In this world yes there are moments</i>

		<i>where [leaders] need to demonstrate command and control”</i>
(Rogers, 2015)	[Interview, Former Head of Digital Strategy & Business Performance, bank]	<i>“If you accept agile is critical to your organisation's digital future - and I do - the crucial question becomes what kind of leader do I need to be to enable the transformation and to get the best out of agile teams? Fundamentally, agile is a culture not a process. A few simple actions from leaders can encourage or discourage agility.”</i>
(Hoda, 2011, p. 96)	[Interview, Undisclosed, Developer]	<i>“A PM’s [Project Manager’s] job is to make himself or herself redundant. So then the team is self-organized, everybody is accountable... PM doesn’t have to do much, everything is in place and now I can go and do something else...I want to do some enabling, some team building...making sure all the processes are in place.”</i>

4.3.5 ORGANISATIONAL BEHAVIOUR (CUSTOMER) - DATA

Upon the completion the data mapping process, in correlation to the key area ‘customer concerning the second research question’, the findings resulted in 21 interview snippets as highlighted in Table 4.5. Illustratively, Table 4.11 highlights a sample of excerpts from the data.

Table 4.11 Excerpts of data on customer behaviour impact

Source	Participant	Quote
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(Bray, 2018)	[Interview, Customer Engagement Lead, bank].	<i>“To drive speed to market for customers Agile is not just about pace in isolation but deeply understanding what the customer values. Asking ‘what will they reward us for with their advocacy?’ before getting those capabilities to market with pace and quality”</i>
(Hoda, 2011, p. 88)	[Interview, Undisclosed, Senior manager]	<i>“To get the client involved in the process I think is the most difficult part of Agile...[customer involvement is a] benefit for us [team], because we don’t have to redo things. So from my perspective as a developer, yes, the more the client is involved, the better for us.”</i>
(Mahadevan, 2016)	[Interview, COO, bank].	<i>"in our case, when we introduced an agile way of working in June 2015. Customer behavior, however, was rapidly changing in response to new digital distribution channels, and customer expectations were being shaped by digital leaders in other industries, not just banking. We needed to stop thinking traditionally about product marketing and start understanding customer journeys in this new omnichannel environment.”</i>

4.4 SUMMARY

This chapter presents the collected qualitative secondary data for this study. It highlights the methodical process, which has been adopted in the search strategy, in order to identify a comprehensive spectrum of relevant source materials. Furthermore, it sheds light on the mechanism of applying the inclusion or exclusion criteria, in order to guarantee the credibility and authenticity of the sourced data, and to filter out non related data to this study’s goals and objectives.

Furthermore, the chapter displays multiple views of collected raw data from different points of view, such as sources, key research areas, roles and responsibilities, and the relationship to the research questions. Moreover, such a display of various data views is significant for two reasons. Firstly, it ensures an adequate representation of data in addressing and answering research questions. Secondly, it instates confidence and transparency in the quality of the work.

Additionally, this chapter explains the mapping and sorting process of raw data. The objective is to slice and dice the data based on key research areas and map them to the research questions. Subsequently, sub-datasets have been presented in this chapter in Figure 4.5.

Ultimately, with sufficient, well-organized, and mapped secondary data the researcher is satisfied and can proceed to the next chapter 5. In the following chapter the collected data undergoes a rigorous analysis process. Furthermore, this analysis is guided by the Grounded theory procedures of open coding, axial coding, CCA, and selective coding. Subsequently, the researcher applies the analysis of emerged hypothesis in answering the two research questions for this study.

Chapter 5: Analysis

5.1 INTRODUCTION

Qualitative data analysis is the art of transforming a mass of random data into meaningful findings. This process is achieved by applying logic and structure to the data while preserving its integrity and the truth embedded within it (Patton, 2002; de Vos, Strydom, Delport, & Fouché, 2005). Furthermore, such analysis processes must be methodical, systematic and adhering to predefined steps and mechanism across all units of data, and to maintain consistency throughout the findings (Denzin & Lincoln, 2008; John, 2012).

However, the analysis process sometimes gets challenging and does not track a straight forward path, actually in some cases it gets intermixed, as de Vos et al. (2005) puts it “*The analytical process does not proceed tidily or in a linear fashion but is more of a spiral process*” (de Vos, Strydom, Delport, & Fouché, 2005, p. 333). Therefore, researchers must enjoy a degree of patience, flexibility, and creativity combined with open mindset while conducting the analysis (Denzin & Lincoln, 2008; John, 2012).

Furthermore, qualitative research exhibits an “*inseparable relationship*” between the data collection and analysis processes (de Vos, Strydom, Delport, & Fouché, 2005, p. 335). Therefore, John (2012) suggests that researchers are able to distinguish and pinpoint patterns and paradigms at an early stage, even while they are still in the data collection phase. Accordingly, this is in alignment with the theoretical sampling interplay loop of Grounded theory (Glaser & Strauss, 1967); which is explained in Figure 3.2 of the adopted methodology for this study. Furthermore, in theoretical sampling the coding and CCA processes guide the on-going data collection until reaching to the theoretical saturation point (Strauss & Corbin, 1990).

Nevertheless, the data analysis process itself does not provide a resolution or answer to research questions. “*The answer to research questions is subject to the interpretation of the analysed data*”, this requires an ongoing involvement and interaction

with the data in order to generate a logical interpretation as the result (Kruger, de Vos, Fouché, & Venter, 2005, p. 218; John, 2012).

Accordingly, this chapter highlights the mechanism of data analysis which is guided by the Grounded theory procedures. Firstly, it presents a detailed account of how the process is conducted across all data units, which are the identified key areas in section 4.3, and the two research questions in section 1.3. Furthermore, the researcher presents the output of Grounded theory procedures of open coding, axial coding, constant comparison analysis, and selective coding of each of these key areas. Subsequently, the researcher identifies the core category (categories) for each key area.

Additionally, after identifying the core categories and based on the associated relationships with other emerged categories, the researcher is in a position to interpret the analysed data in order to find patterns and conclude associated hypothesis, which is grounded in the findings. Moreover, the above process is applied against each key area, and as a result, a list of hypotheses is generated at the end of this chapter.

Finally, the findings are verified against the research evaluation criteria in order to maintain the credibility of the research. Consequently, the approved findings of data analysis are the core material for the following Chapter 6 which aims to discuss the concluded hypotheses, relate them to existing literature, and answer the research questions.

5.2 DATA ANALYSIS FRAMEWORK

During data analysis, consistency in applying steps and procedures is a key in maintaining uniformity across the researched key areas. Hence, the researcher is applying a systematic framework with pre-defined steps against all research key areas. Furthermore, these steps are applied in a sequential manner against the mapped data sub-datasheets shown in Figure 4.5. Furthermore, the NVIVO software application is used in this study. It offers a substantial advantage in terms of using it as a central depository for analysed data instead of using multiple excel sheets; and it helps in the manual coding process as well. Furthermore, it offers supportive visual illustrations, which have helped the researcher in

analysing the emerged patterns and interpreting the density and distribution of the analysed qualitative data. Accordingly, Table 5.1 shows the sequential analytical steps of the data analysis framework adopted for this study that is guided by Grounded theory procedures.

Table 5.1 Data analysis systematic steps

ID	Step	Summary
S01	Reading interviews	This step involves scanning through the mapped data allowing the mind to be part of these interviews. According to Creswell and Poth (2018) it is critical to make sense of the data before commencing the coding process (Creswell & Poth, 2018) . Furthermore, Agar (1980) urges researchers to “ <i>read the transcripts in their entirety several times. Immerse yourself in the details, trying to get a sense of the interview as a whole before breaking it into parts</i> ” (Agar, 1980 in Creswell & Poth, 2018, p.103). Likewise, Bazeley (2013) describes the preliminary reading of interviews as “ <i>initial foray as into new data</i> ” (Bazeley, 2013, p. 101).
S02	Loading data into NVIVO	This step involves uploading each mapped sub-datasheet into NVIVO software.
S03	Open coding	This step involves “ <i>breaking down, examining, comparing, conceptualizing and categorizing data</i> ” (Strauss & Corbin, 1990, p. 61). Detailed account of how to conduct open coding is explained in Table 3.1.
S04	Constant Comparison Analysis (CCA)	This step involves comparing the emerged codes against new and existing codes found in the same or other participants, with the objective of data reduction and achieving higher abstraction of data called concepts.

		Detailed account of how to conduct CCA is explained in Table 3.1.
S05	Axial coding	This step involves assembling and establishing links between concepts to create a broader theme (higher abstraction: category); and consequently identifying the reoccurring, steady, major, and minor themes/categories (Strauss & Corbin, 1990; Halaweh, 2012; Adwan, 2017). Detailed account of how to conduct open coding is explained in Table 3.1.
S06	Selective coding + core category	This step involves “ <i>integrate and refine theory</i> ” out of emerged themes and categories (Lawrence & Tar, 2013). However, this is only be done after identifying the “ <i>Core Category</i> ” which represents the main theme, concern or problem of the study. According to Glaser (1978) that the core category reveals itself when it “ <i>accounts for a large portion of the variation in a pattern of behaviour</i> ”; and according to Hoda (2011) it is “ <i>central, reoccurs frequently, is related to the other main categories, and accounts for most variations in data</i> ” (Hoda, 2011, p. 52).
S07	Refining	Upon discovering the core category (categories) the researcher stops open coding, and delimits coding and CCA to only categories and concepts which relate to the core category (Glaser & Holton, 2004). This process carries on until the researcher reaches theoretical saturation point.
S08	Theoretical Saturation	The researcher ceases the interplay of data collection and data analysis when reaching the theoretical saturation point. This is determined by assessing the nature of the

		emerged findings, in exhibiting the criteria of being “ <i>repetitive and no new insights gained</i> ” (Halaweh, 2012, p. 45).
S09	Hypothesizing	This step involves interpreting the analysed data and conclude findings.

Furthermore, the mechanism in this chapter proceeds by applying steps (S01 → S09) of Table 5.1 against each of the research key areas (methodology, people, communication, management, customer). Furthermore, steps (S01 → S08) are conducted in a strict sequential order, and then step (S09) is conducted successively in order to achieve an interpretation of the analysed data.

5.2.1 KEY AREA - METHDOLOGY

The analysis of this section involves the mapped data in Q1-Methodology sub-datasheet of Figure 4.5. This is related to Key area *Methodology*, and in association with Research question *One*.

5.2.1.1 DATA ANALYSIS

The researcher commences the work by, firstly, applying (S01) step of Table 5.1, which involves reading, and scanning the correlated mapped data with impartiality. This is to build a connection and establish some sense out of the data.

Secondly, the researcher applies (S02 → S03) steps of Table 5.1, which involve starting the manual open coding process. Subsequently, as the process carries on, the associated codes and concepts of Q1-Methdology have started emerging, and each with a different reoccurrence frequency. For example, the “Adaptability and Responsiveness” code has appeared 12 times, while the “Flexibility & Speed” has appeared 19 times. Table 5.2 displays the emerging codes and concepts of Q1-Methodology areas upon completion the open coding process. This table lists the emerged codes and the frequency of their reoccurrence during the open coding process.

Table 5. 2 Emerged codes of Q1-Methdology

Folder	Name	References
Nodes\\Methodology	Agile - Adaptability and Responsiveness	12
Nodes\\Methodology	Agile - Collaboration	9
Nodes\\Methodology	Agile - Communication	4
Nodes\\Methodology	Agile - Continuous delivery	2
Nodes\\Methodology	Agile - Culture change	5
Nodes\\Methodology	Agile - Customer (centricity) interactions	16
Nodes\\Methodology	Agile - Flexibility & Speed	19
Nodes\\Methodology	Agile - Leadership & Empowerment	2
Nodes\\Methodology	Agile - Management obstacles	7
Nodes\\Methodology	Agile - Management changes	13
Nodes\\Methodology	Agile - Mindset change & Openness	12
Nodes\\Methodology	Agile - Ownership & Values	5
Nodes\\Methodology	Agile - Rapid pace Time-to-market	8
Nodes\\Methodology	Agile - Risk and Resources	2
Nodes\\Methodology	Agile - Simplicity	1
Nodes\\Methodology	Agile - Success rate	2
Nodes\\Methodology	Agile - Swift task change	1
Nodes\\Methodology	FinTech change	5
Nodes\\Methodology	Sophisticated customer change	5
Nodes\\Methodology	Surroundings change	2
Nodes\\Methodology	Waterfall - Failure rate	2
Nodes\\Methodology	Waterfall - Unrealistic deadlines	1
Nodes\\Methodology	Waterfall - Delegation model	1
Nodes\\Methodology	Waterfall - Demotivation Theme	1
Nodes\\Methodology	Waterfall - Heavy documentations	1
Nodes\\Methodology	Waterfall - Lack of competition	5
Nodes\\Methodology	Waterfall - Lack of customer interaction	3
Nodes\\Methodology	Waterfall - Lack of technical knowledge	1
Nodes\\Methodology	Waterfall - Lack of trust	1
Nodes\\Methodology	Waterfall - Management control	1
Nodes\\Methodology	Waterfall - People behaviour	1
Nodes\\Methodology	Waterfall - Slow pace Time-to-market	1

This figure illustrates the codes distribution of the methodology key area based on the aggregated numbers of their reoccurrence during the open coding process. Accordingly, codes which are closer to the centre represent a higher density and frequency than those which are farther from the centre. Subsequently, emerged codes, which are closer to the center such as “Adaptability and Responsiveness”, “Customer centricity”, and “Rapid pace Time-to-market”, present higher importance to the next step of the coding process.

Thirdly, the researcher applies steps (S04 → S05) of Table 5.1 which involve conducting axial coding and CCA processes jointly and repetitively. Subsequently, the reoccurring, steady, and major concepts are identified. Furthermore, by employing a higher level of data abstraction, the main themes/categories emerged. Table 5.3 displays the emerged categories after applying the axial coding and CCA processes.

Table 5.3 Emerged categories of Q1-Methdology

Name	Aggregated References
Responsiveness	12
Collaboration	9
Communication	4
Continuous delivery	2
Culture change	5
Customer centricity	16
Flexibility	19
Management obstacles	7
Management changes	13
Mindset change & Openness	12
Ownership & Values	5
Success rate	2
Rapid pace Time-to-market	8
FinTech change	5
Sophisticated customer change	5
Surroundings change	2

Additionally, by applying an ascending sorting process against the emerged codes the researcher is able to visually display the categories with higher impact to the Q1-Methdology key area. Therefore, Figure 5.2 depicts the chart for ascending sorted emerged categories for the Q1-Methdology key area.

Subsequently, by examining Figure 5.2 the key categories with higher impact to this area are identified, and accordingly shaded in Table 5.3. These categories are responsiveness, collaboration, customer centricity, flexibility, management changes, and mindset change and openness.

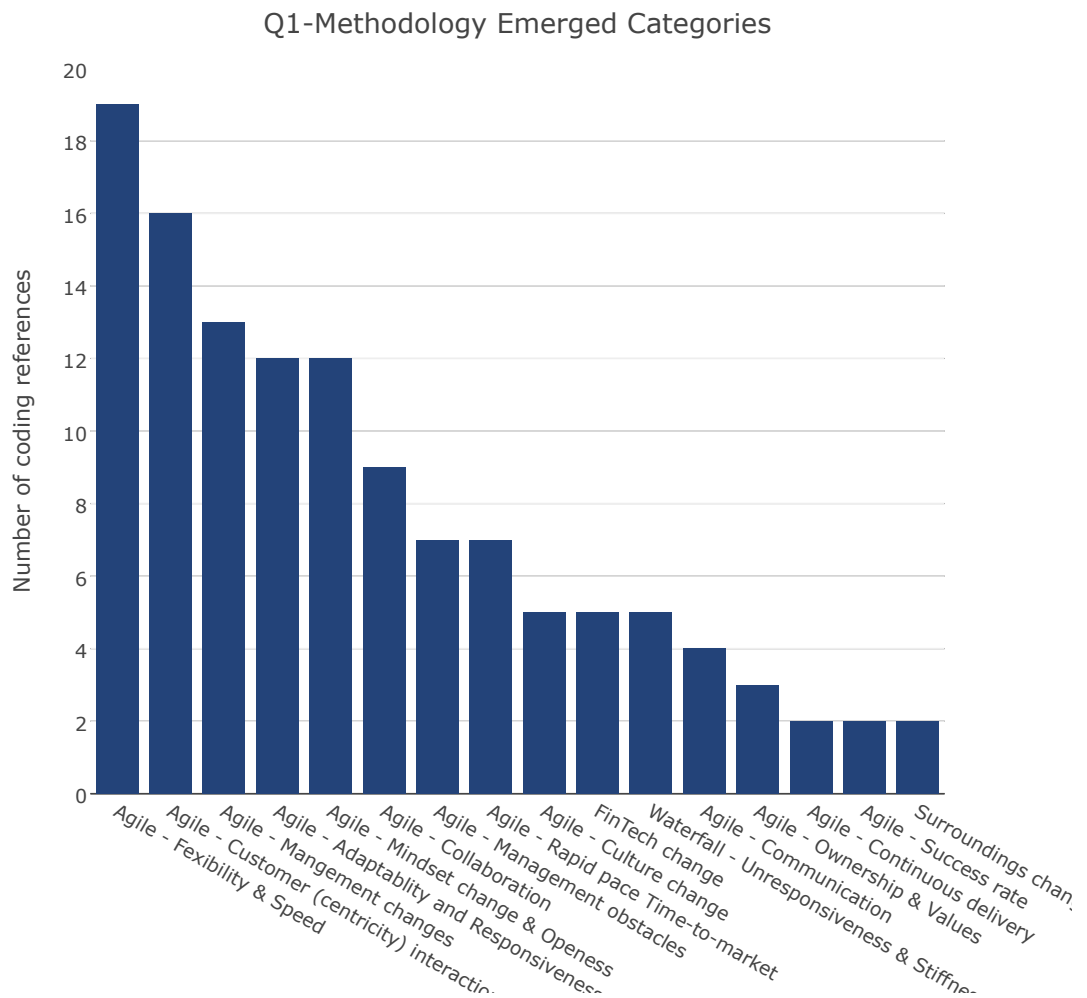


Figure 5.2 Chart of emerged categories of Q1-Methodology

Fourthly, the researcher applies step (S06) of Table 5.1 with the objective of identifying the core category and applying further selective coding. Furthermore, according to Halaweh (2012) the core category reveals itself when it meets a specific criteria exhibiting three main features. Firstly, it is been mentioned frequently by participants “*explicitly or implicitly*”. Secondly, it has relationships with other emerged categories. Thirdly, it accounts for the main area of the research question (Halaweh, 2012, p. 44). Therefore, the researcher identifies and analyses the relationships between emerged categories, which are listed in Table 5.3 against key categories (potential core categories) which are identified in Figure 5.2.

Accordingly, the researcher conducts a relationship analysis using a matrix table in investigating the relationships between categories. The emerged categories are represented vertically, and potential core categories are represented horizontally. Correspondingly, Table 5.4 displays the relationships between categories for Q1-Methodology key areas.

Table 5.4 Relationships between categories for Q1-Methodology

Relationships	Responsiveness	Collaboration	Customer centricity	Flexibility & Speed	Management changes	Mindset change
Responsiveness	X			X		X
Collaboration	X		X		X	X
Communication	X	X			X	
Continuous delivery	X			X		
Culture change	X		X	X	X	X
Customer centricity	X	X		X		
Flexibility & Speed	X	X	X	X		
Leadership & Empowerment	X			X	X	X
Management changes	X				X	
Mindset change & Openness	X			X	X	

Ownership & Values	X		X		X	X
Risk and Resources	X		X	X		
Simplicity	X		X	X		
Success rate	X	X	X	X		
Swift task change	X	X	X	X		X
Rapid pace Time-to-market	X	X	X	X	X	X
FinTech change	X					X
Sophisticated customer change	X					X
Surroundings change	X					X

Subsequently, by applying the core category criteria based on the identified relationships of Table 5.4, the category “*Responsiveness*” reveals itself as the *core category* for the Q1-Methdology. This *Responsiveness* core category has links to other categories, frequently mentioned by participants, and represents the main area of the first research question. Upon further examination, the category “*Time-To-Market*” emerges as a key player in terms of relationships to other main categories.

Fifthly, at this stage -after identifying the core category- the researcher applies step (S07) of Table 5.1 which aims to achieve further refining. This is done by stopping the open coding process and restricting coding and CCA to only categories and concepts which the core category has links to seeking a higher data abstraction (Glaser & Holton, 2004).

Finally, the researcher applies the step (S08) of Table 5.1 to declare reaching the theoretical saturation point and ceasing the analysis activities. This has been determined when emerging data is being “*repetitive and no new insights gained*”.

5.2.1.2 OBSERVATION AND HYPOTHESIS

Further to collating and meticulously examining the findings of data analysis in section 5.2.1.1, the researcher is able to conclude and construct an illustrative summary of emerged hypotheses guided by the identified core category “*Responsiveness*”, in addressing the impact of adopting Waterfall or Agile methodologies on the *time-to-*

market delivery rate within the banking industry. Figure 5.3 displays the emerged hypothesis for research question one.

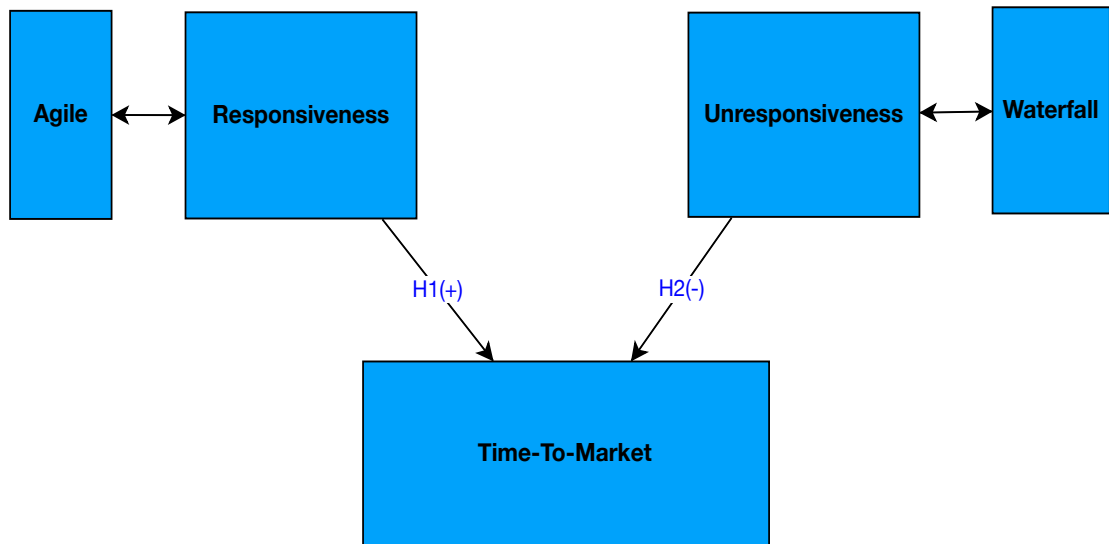


Figure 5.3 Emerged hypothesis of research question one

Correspondingly, in reflection on Figure 5.3 the researcher proposes two competing hypotheses for the effect of adopting methodology for on time-to-market.

Hypothesis 1: H1(+): Responsiveness feature of Agile positively influences Time-to-market in banking industry.

Hypothesis 2: H2(-): Unresponsiveness feature of Waterfall negatively influences Time-to-market rate in banking industry.

5.2.2 ORGANISATIONAL BEHAVIOUR – PEOPLE

The analysis of this section involves the mapped data in Q2-People sub-datasheet of Figure 4.5. This is related to Key area *Organisation behaviour – People*, and in association with Research question *Two*.

5.2.2.1 DATA ANALYSIS

Similarly, the researcher follows the same sequential steps highlighted in Table 5.1 of section 5.2; and adheres to same thought process which has been explained in detail within section 5.2.1. Therefore, the researcher only lists down the findings corresponding to the analysis of key area *people*.

Accordingly, after applying steps (S01→S03), Table 5.5 displays emerged codes and concepts of the open coding of the key area Q2-People.

Table 5.5 Emerged codes of Q2-People

Folder	Name	Files	References
Nodes\\Org. Behaviour	Collaborative approach	5	25
Nodes\\Org. Behaviour	Collective decision making	2	12
Nodes\\Org. Behaviour	Competitive advantage	1	1
Nodes\\Org. Behaviour	Confidence	2	3
Nodes\\Org. Behaviour	Considering team perspective	2	7
Nodes\\Org. Behaviour	Culture change & open mindset	5	13
Nodes\\Org. Behaviour	Customer collaboration	3	28
Nodes\\Org. Behaviour	Effective & short Communication	2	11
Nodes\\Org. Behaviour	Facilitation & enabling	3	8
Nodes\\Org. Behaviour	Feedback Welcome	4	10
Nodes\\Org. Behaviour	Flat structure	4	11
Nodes\\Org. Behaviour	Flexibility and speed	2	7
Nodes\\Org. Behaviour	Incremental approach	1	1
Nodes\\Org. Behaviour	Interactive Timely Requirements	1	6
Nodes\\Org. Behaviour	Interchangeability & multitasking	2	8
Nodes\\Org. Behaviour	Knowledge sharing	3	14
Nodes\\Org. Behaviour	Lead by example	0	0
Nodes\\Org. Behaviour	Leadership & empowerment	3	11
Nodes\\Org. Behaviour	Learning & Passion	5	17
Nodes\\Org. Behaviour	Liberation change	1	1
Nodes\\Org. Behaviour	Macro not Micro mgmt	2	4
Nodes\\Org. Behaviour	Mentorship & Support	2	12
Nodes\\Org. Behaviour	Mistakes accepted	4	7
Nodes\\Org. Behaviour	Open informal communication	4	17

Nodes\\Org. Behaviour	Productivity	3	10
Nodes\\Org. Behaviour	Resistance to change	1	5
Nodes\\Org. Behaviour	Retrospective adoption	1	3
Nodes\\Org. Behaviour	Safe, trust & respect environment	3	8
Nodes\\Org. Behaviour	Self-management, accountability	3	8
Nodes\\Org. Behaviour	Self-Organising team	2	6
Nodes\\Org. Behaviour	Tasks distributed not allocated	1	3
Nodes\\Org. Behaviour	Team inclusivity	2	3
Nodes\\Org. Behaviour	Team Ownership	1	1
Nodes\\Org. Behaviour	Transformational not transactional	2	3
Nodes\\Org. Behaviour	Transparency and openness	1	4

Correspondingly, Figure 5.4 illustrates the codes distribution of the key area Q2-People

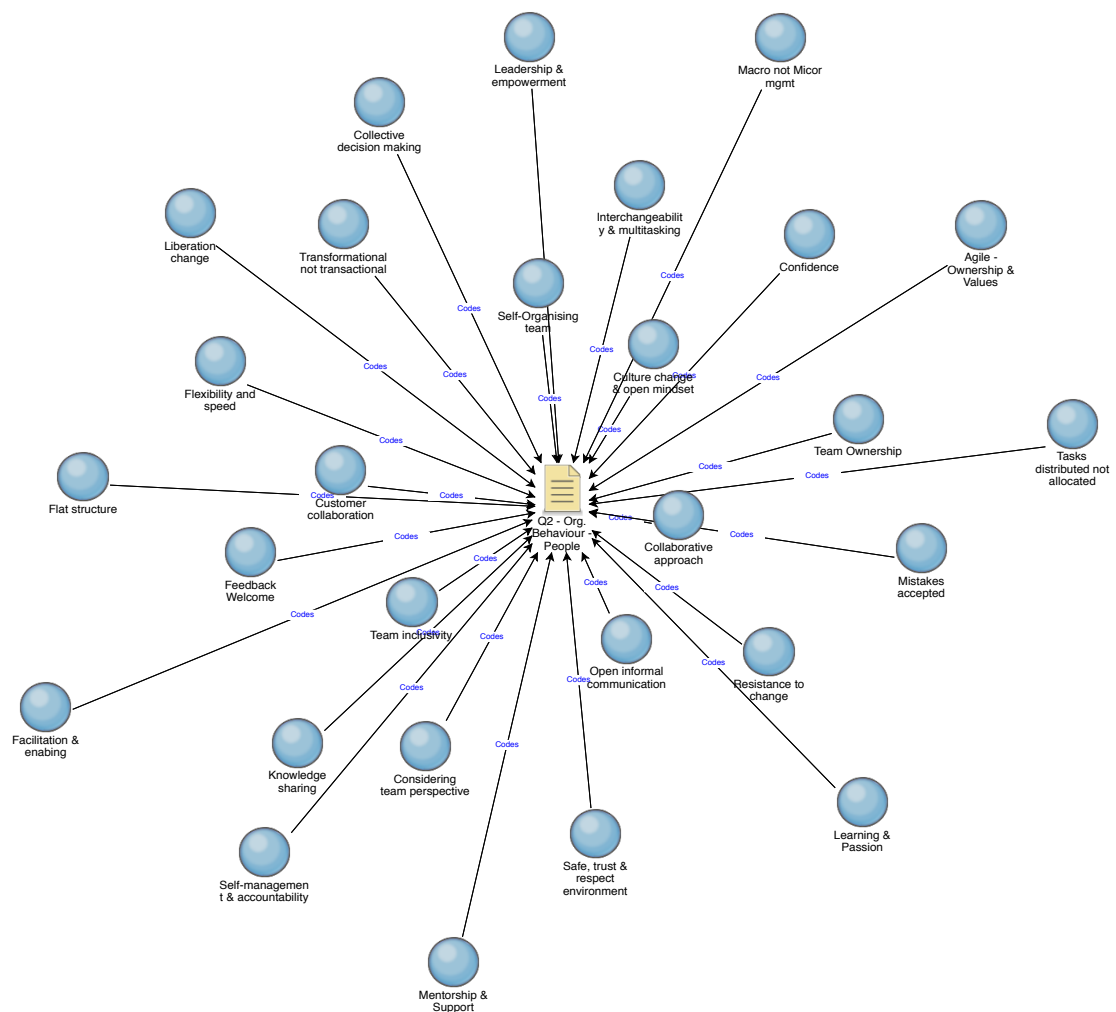


Figure 5.4 Codes distribution of Q2-People

After applying steps (S04→S05), Table 5.6 shows the emerged categories after applying axial coding and CCA against Q2-People key area.

Table 5.6 Emerged categories of Q2-People

Name	Aggregated References
Collaborative approach	9
Mentorship & Support	8
Interchangeability & multitasking	6
Collective decision making	5
Learning & Passion	5
Resistance to change	5

Safe, trust & respect environment	5
Self-management & accountability	5
Culture change & open mindset	4
Customer collaboration	4
Knowledge sharing	4
Leadership & empowerment	4
Feedback Welcome	3
Mistakes accepted	3
Tasks distributed not allocated	3
Agile - Ownership & Values	2
Confidence	2
Considering team perspective	2
Flat structure	2
Flexibility and speed	2
Transformational not transactional	2

Correspondingly, Figure 5.5 depicts the chart for ascending sorted emerged categories for Q2-People key area. Subsequently, by examining Figure 5.5 the key categories with higher impact on this area are identified, and accordingly shaded in Table 5.6.

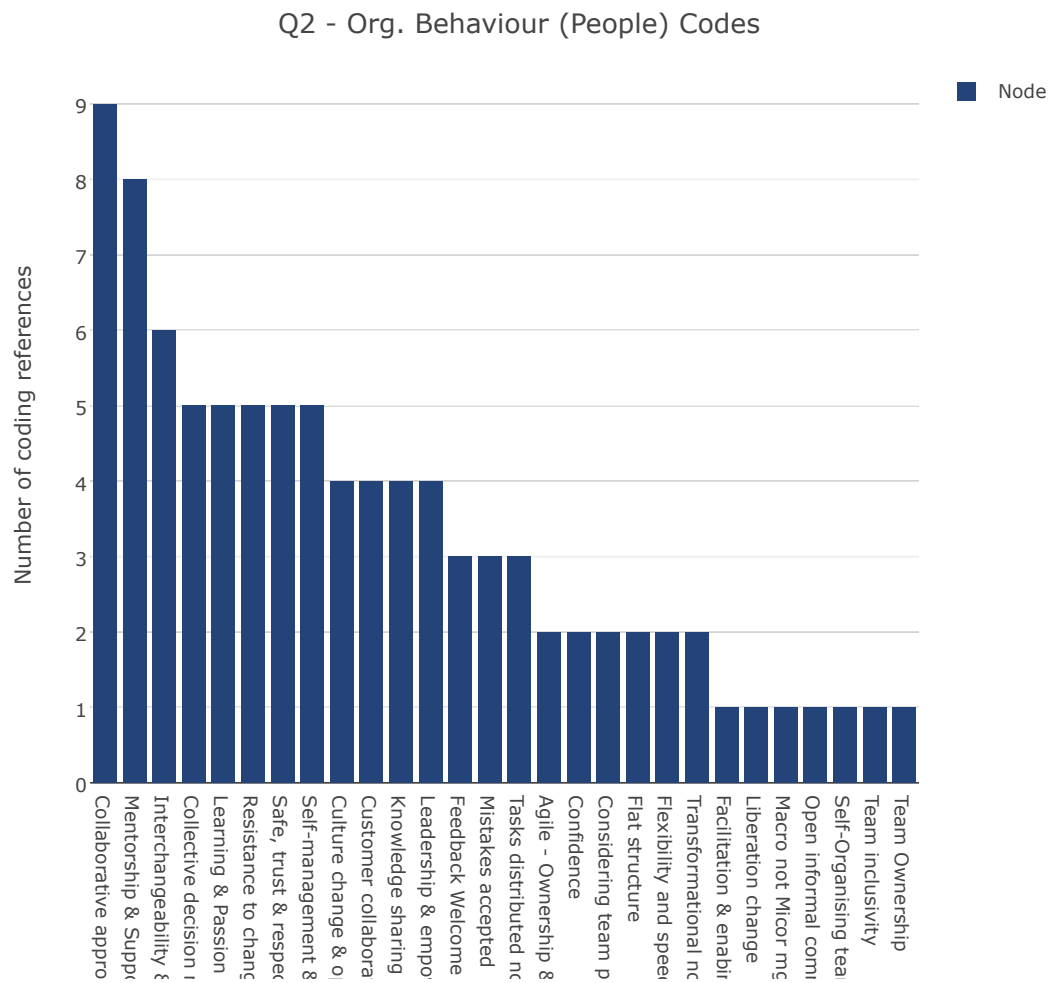


Figure 5.5 Chart of emerged categories of Q2-People

Thereafter, the researcher applies (S06), and consequently the researcher identifies and analyses the relationships between emerged categories, which are listed in Table 5.6 against key categories (potential core categories). Correspondingly, Table 5.7 displays the relationships between categories for Q2-People key area.

Table 5.7 Relationships between categories for Q2-People

Relationships	Collaborativity	Mentorship & Support	Multitasking	Collective decision making	Learning & Passion	Safe, trust & respect environment	Self-management & accountability	Leadership & empowerment
Collaborativity approach	X	X	X	X		X		X
Mentorship & Support	X	X	X		X	X		X
Interchangeability & multitasking	X	X	X	X	X	X		X
Collective decision making	X			X			X	X
Learning & Passion	X	X	X		X	X		
Safe, trust & respect environment	X	X		X		X	X	X
Self-management & accountability	X			X		X	X	X
Culture change & open mindset	X		X		X	X	X	X
Customer collaboration	X			X				
Knowledge sharing	X	X	X	X	X	X		X
Leadership & empowerment	X			X			X	
Feedback Welcome	X	X			X	X	X	
Mistakes accepted	X	X	X	X	X	X	X	X
Tasks distributed not allocated	X					X	X	X
Agile - Ownership & Values	X		X			X		X
Confidence	X	X				X		X
Considering team perspective	X			X		X	X	X
Flat structure	X			X				X
Flexibility and speed	X		X				X	
Transformational not transactional	X			X		X		X

Subsequently, by applying the core category criteria based on the identified relationships of Table 5.7, the categories “*Collaborativity*” and “*Safe environment*” reveal themselves as the *core categories* for Q2-People.

5.2.2.2 OBSERVATION AND HYPOTHESIS

Further to collating and meticulously examining the findings of data analysis in section 5.2.2.1, the researcher is able to conclude and construct an illustrative summary of emerged hypotheses. These are guided by the identified core categories “*Collaborativity*” and “*Safe environment*”. In addressing the impact of adopting Agile methodologies on the organisational behaviour within the banking industry, this section tends to address the “*People*” aspect of behavioural impact. Figure 5.6 displays the emerged hypothesis of research question two - people.

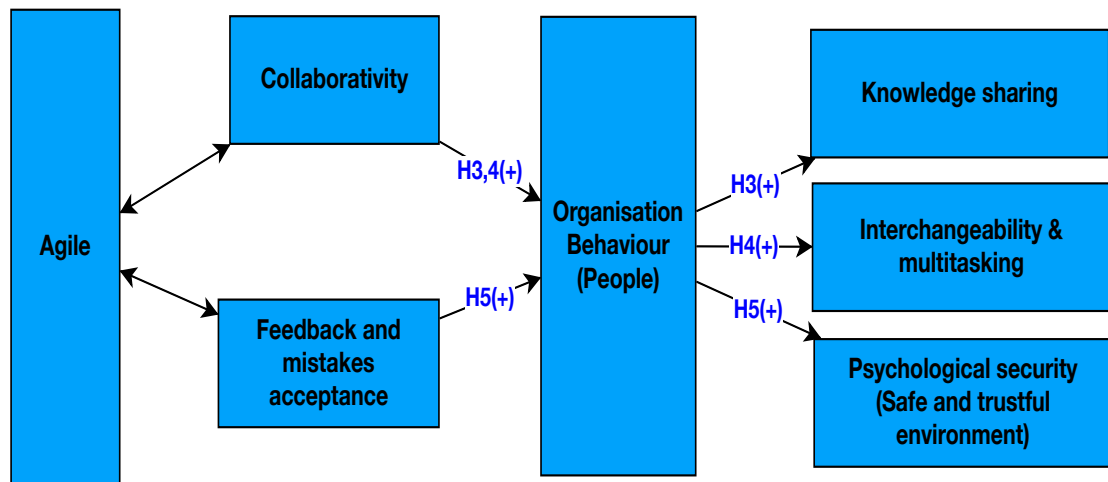


Figure 5.6 Emerged hypothesis of research question two (people)

Correspondingly, in reflection on Figure 5.6 the researcher proposes three hypotheses.

Hypothesis 3: H3(+): Collaborativity feature of Agile positively influences organisational behaviour (people) in terms of knowledge sharing within banking industry.

Hypothesis 4: H4(+): Collaborativity feature of Agile positively influences organisational behaviour (people) in terms of Interchangeability & multitasking within banking industry.

Hypothesis 5: H5(+): Feedback and mistakes acceptance of Agile positively influences organisational behaviour (people) in terms of offering psychological security in a safe and trustful environment within banking industry.

5.2.3 ORGANISATIONAL BEHAVIOUR – COMMUNICATION

The analysis of this section involves the mapped data in Q2-Communication sub-sheet of Figure 4.5, related to Key area *Organisation behaviour – Communication*, and in association with Research question *Two*.

5.2.3.1 DATA ANALYSIS

Similarly, after applying steps (S01→S08) of Table 5.1 the following findings have emerged. Table 5.8 displays emerged codes and concepts out of the open coding process of the key area Q2-Communication.

Table 5.8 Emerged codes of Q2-Communication

Node	Codes	References
Nodes\\Org. Behaviour	Customer collaboration	7
Nodes\\Org. Behaviour	Effective & short Communication	7
Nodes\\Org. Behaviour	Knowledge sharing	6
Nodes\\Org. Behaviour	Open informal communication	6
Nodes\\Org. Behaviour	Collaborative approach	5
Nodes\\Org. Behaviour	Mentorship & Support	4
Nodes\\Org. Behaviour	Retrospective adoption	3
Nodes\\Org. Behaviour	Culture change & open mindset	2
Nodes\\Org. Behaviour	Feedback Welcome	2
Nodes\\Org. Behaviour	Interchangeability & multitasking	2
Nodes\\Org. Behaviour	Learning & Passion	2

Nodes\\Org. Behaviour	Flat structure	1
Nodes\\Org. Behaviour	Mistakes accepted	1
Nodes\\Org. Behaviour	Productivity	1
Nodes\\Org. Behaviour	Safe, trust & respect environment	1
Nodes\\Org. Behaviour	Self-management & accountability	1

Correspondingly, Figure 5.7 illustrates the codes distribution of the key area Q2-Communication.

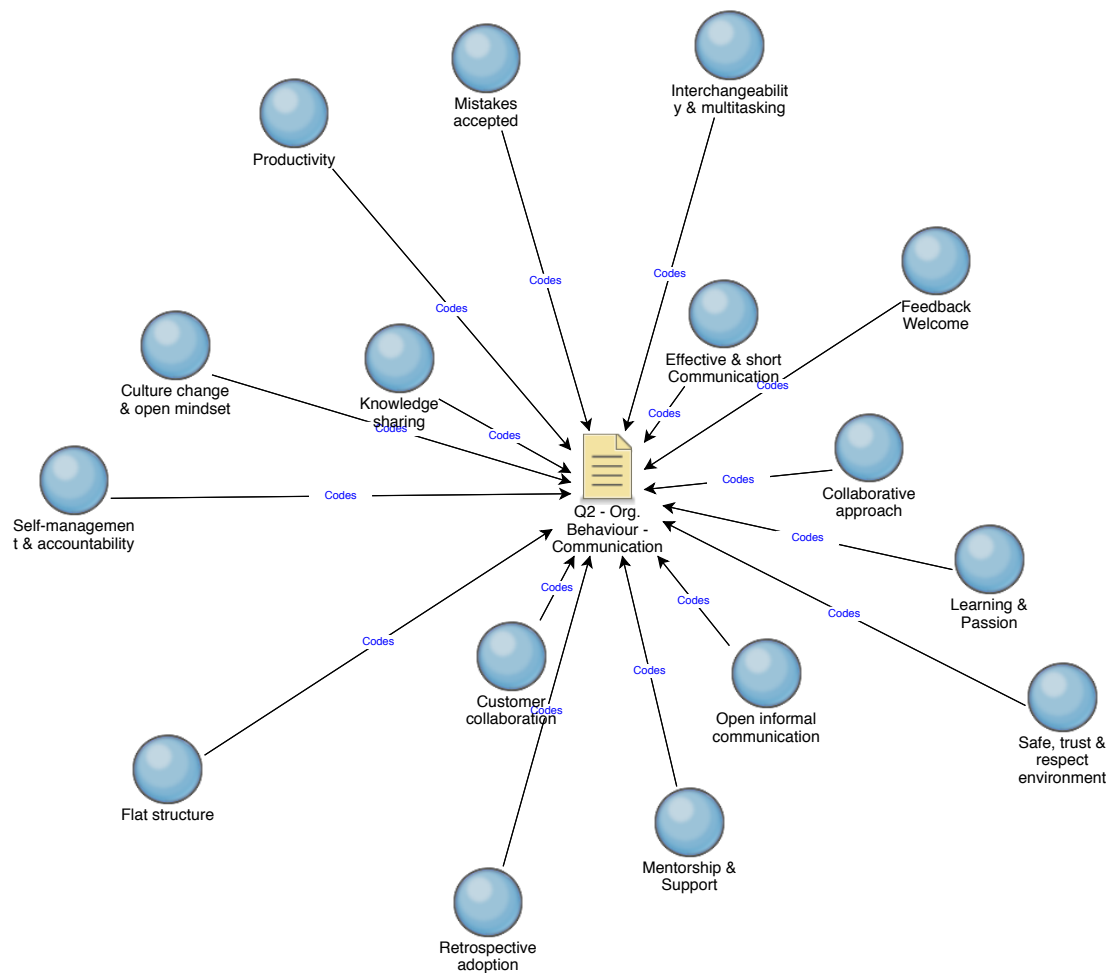


Figure 5.7 Codes distribution of Q2-Communication

Furthermore, Table 5.9 shows the emerged categories after applying axial coding and CCA against Q2-Communication key area.

Table 5.9 Emerged categories of Q2-Communication

Codes	Number of Aggregated references
Customer collaboration	7
Effective & short Communication	7
Knowledge sharing	6
Open informal communication	6
Collaborative approach	5
Mentorship & Support	4
Retrospective adoption	3
Culture change & open mindset	2
Feedback Welcome	2
Interchangeability & multitasking	2
Learning & Passion	2
Flat structure	1
Mistakes accepted	1
Productivity	1
Safe, trust & respect environment	1
Self-management & accountability	1

Correspondingly, Figure 5.8 depicts the chart for ascendingly sorted emerged categories for Q2-Communication key area. Subsequently, by examining Figure 5.8 the key categories with higher impact to this area are identified and accordingly shaded in Table 5.9.

Q2 - Org. Behaviour - Communication

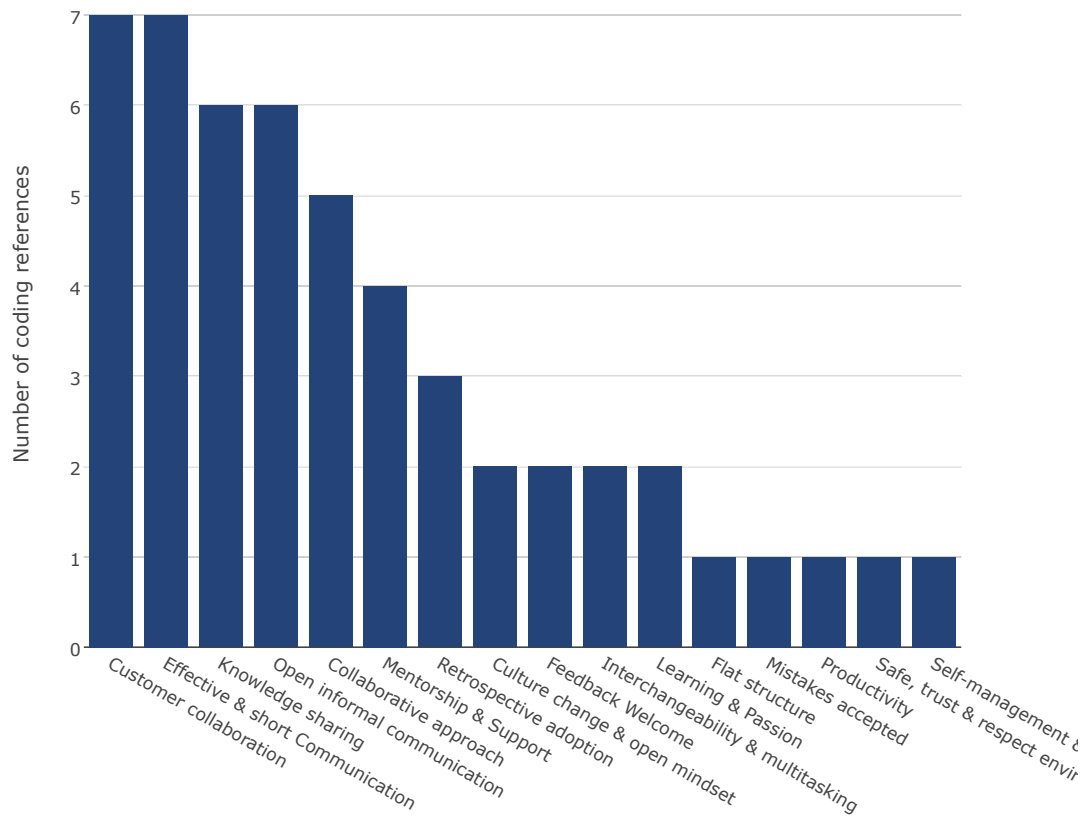


Figure 5.8 Chart of emerged categories of Q2-Communication

Subsequently, Table 5.10 displays the relationships between categories for Q2-Communication key area.

Table 5.10 Relationships between categories for Q2-Communication

Relationships	Customer collaboration	Effective & short Comm	Knowledge sharing	Open informal Comms	Collaborative approach
Customer collaboration	X	X	X	X	X

Effective & short Communication				X	
Knowledge sharing	X	X		X	X
Open informal communication	X	X		X	
Collaborative approach	X	X	X	X	
Mentorship & Support			X	X	X
Retrospective adoption		X		X	
Culture change & open mindset	X	X	X	X	X
Feedback Welcome	X	X		X	X
Interchangeability & multitasking				X	X
Learning & Passion	X			X	
Mistakes accepted	X		X	X	

Subsequently, by applying the core category criteria based on the identified relationships of Table 5.10, the categories “*Effective and short comms*” and “*Open and Informal comms*” reveal themselves as the *core categories* for Q2-Communication.

5.2.3.2 OBSERVATION AND HYPOTHESIS

Further to collating and meticulously examining the findings of data analysis in section 5.2.3.1, the researcher is able to conclude and construct an illustrative summary of emerged hypotheses. These are guided by the identified core categories “*Effective and short comms*” and “*Open and Informal comms*”, in addressing the impact of adopting Agile methodologies on the organisational behaviour within the banking industry. Taking into consideration that this section addresses the “*Communication*” aspect of behavioural impact. Figure 5.9 displays the emerged hypothesis of research question two - communication.

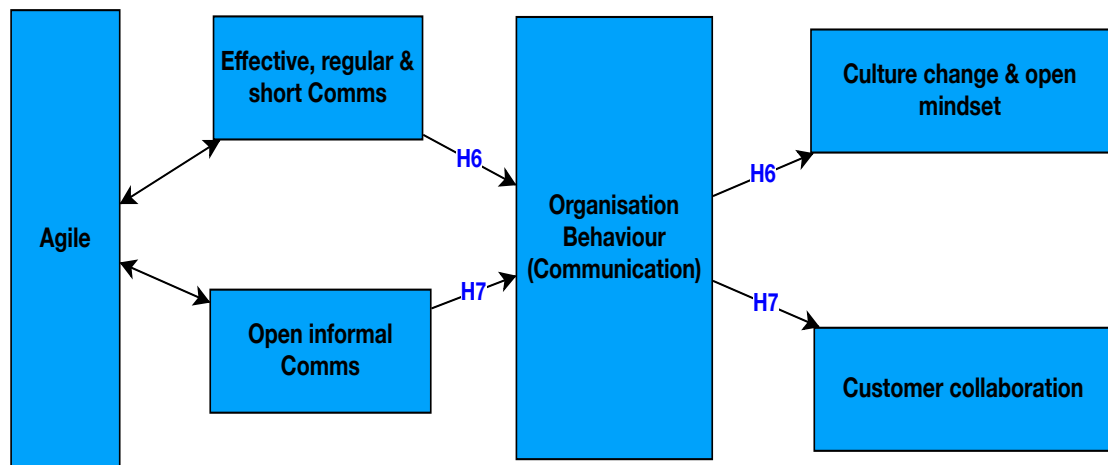


Figure 5.9 Emerged hypothesis of research question two (comms)

Correspondingly, in reflection on Figure 5.9 the researcher proposes two hypotheses.

Hypothesis 6: H6(+): The regular, effective, and short comms in Agile positively influences organisational behaviour in terms of culture change acceptance within banking industry.

Hypothesis 7: H7(+): The informal and open nature of comms in Agile positively influences organisational behaviour in terms of Customer collaboration within banking industry.

5.2.4 ORGANISATIONAL BEHAVIOUR – MANAGEMENT

The analysis of this section involves the mapped data in Q2-Management sub-sheet of Figure 4.5, related to Key area *Organisation behaviour – Management*, and in association with Research question *Two*.

5.2.4.1 DATA ANALYSIS

Similarly, after applying steps (S01→S08) of Table 5.1 the following findings have emerged. Table 5.11 displays the emerged codes and concepts out of the open coding process of the key area Q2-Management.

Table 5.11 Emerged codes of Q2-Management

Node	Node	References
Nodes\\Org. Behaviour	Collaborative approach	9
Nodes\\Org. Behaviour	Collective decision making	7
Nodes\\Org. Behaviour	Facilitation & enabling	6
Nodes\\Org. Behaviour	Flat structure	6
Nodes\\Org. Behaviour	Leadership & empowerment	6
Nodes\\Org. Behaviour	Considering team perspective	5
Nodes\\Org. Behaviour	Self-Organising team	5
Nodes\\Org. Behaviour	Learning & Passion	4
Nodes\\Org. Behaviour	Macro not Micro mgmt	3
Nodes\\Org. Behaviour	Feedback Welcome	2
Nodes\\Org. Behaviour	Mistakes accepted	2
Nodes\\Org. Behaviour	Safe, trust & respect environment	2
Nodes\\Org. Behaviour	Self-management & accountability	2
Nodes\\Org. Behaviour	Team inclusivity	2
Nodes\\Org. Behaviour	Culture change & open mindset	1
Nodes\\Org. Behaviour	Incremental approach	1
Nodes\\Org. Behaviour	Productivity	1
Nodes\\Org. Behaviour	Transformational not transactional	1

Correspondingly, Figure 5.10 illustrates the codes distribution of the key area Q2-Management.

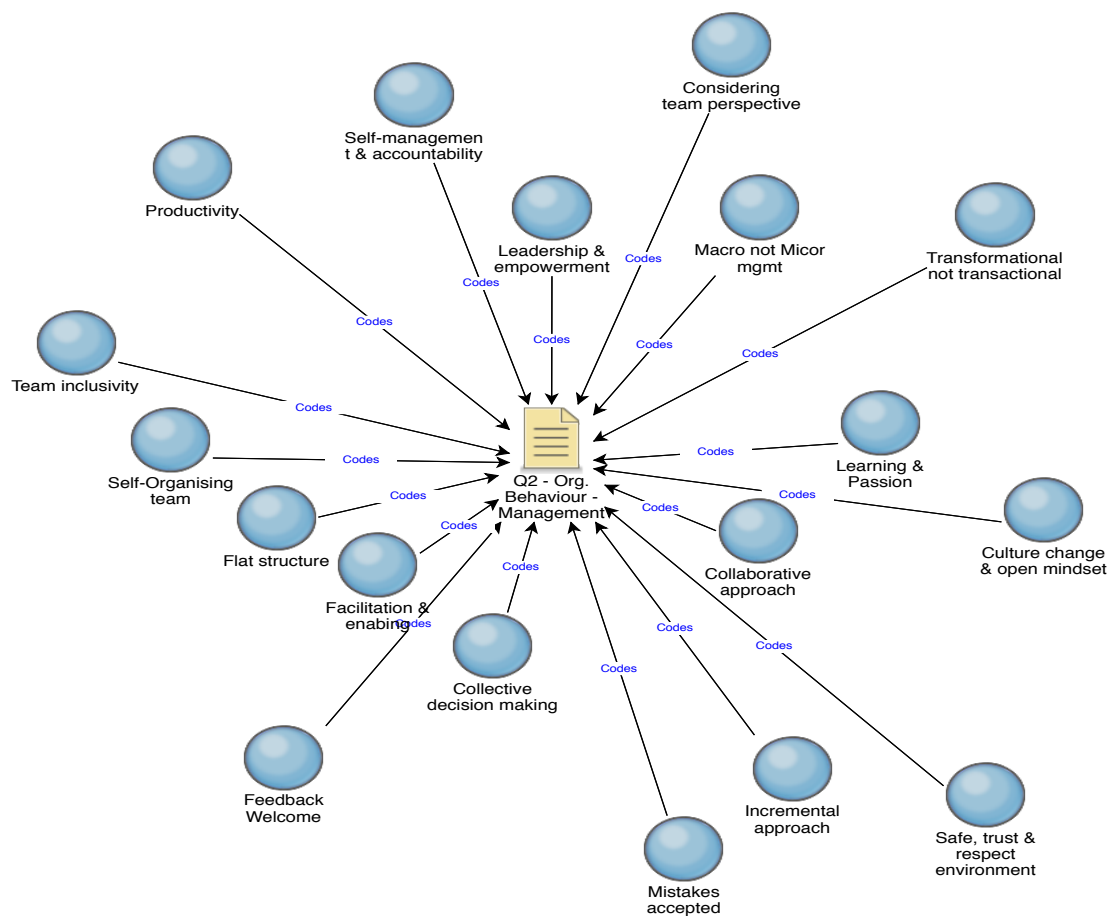


Figure 5.10 Codes distribution of Q2-Management

Furthermore, Table 5.12 shows the emerged categories after applying axial coding and CCA against the Q2-Management key area.

Table 5.12 Emerged categories of Q2-Management

Name	Aggregated References
Collaborative approach	9
Collective decision making	7
Facilitation & enabling	6
Flat structure	6
Leadership & empowerment	6
Considering team perspective	5
Self-Organising team	5
Learning & Passion	4

Macro not Micro mgmt	3
Feedback Welcome	2
Mistakes accepted	2
Safe, trust & respect environment	2
Self-management & accountability	2
Team inclusivity	2
Culture change & open mindset	1
Transformational not transactional	1

Correspondingly, Figure 5.11 depicts the chart for the ascending sorted emerged categories for the Q2-Management key area. Subsequently, by examining Figure 5.11 the key categories with higher impact to this area are identified, and accordingly shaded in Table 5.12.

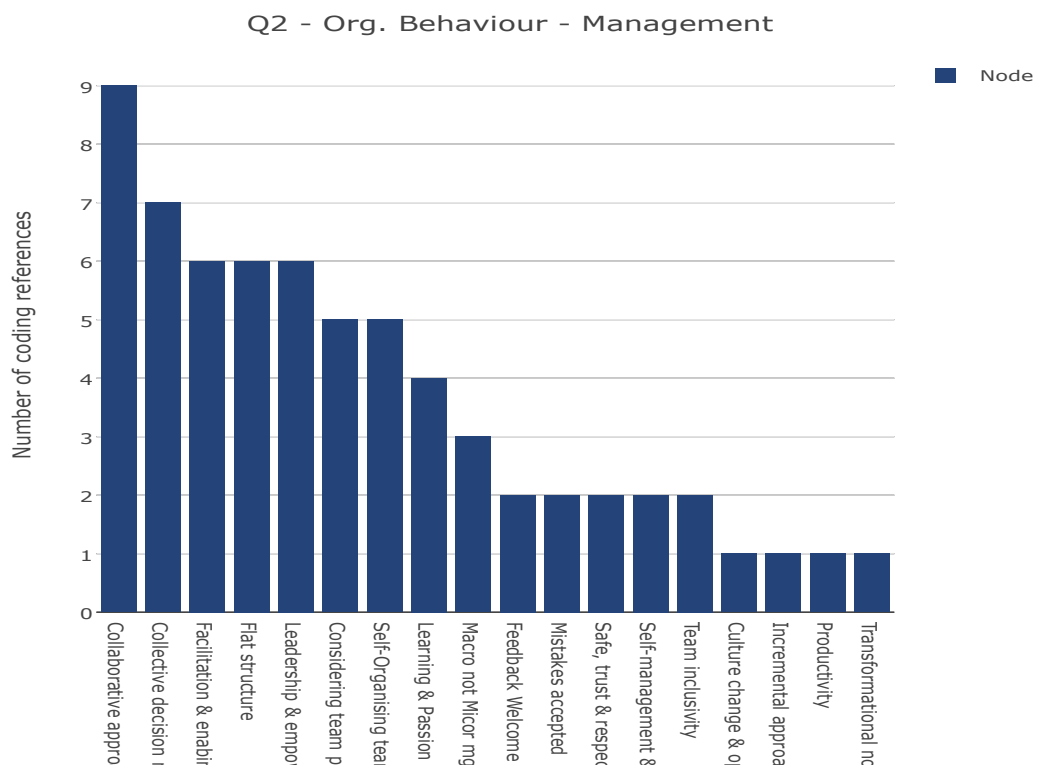


Figure 5.11 Chart of emerged categories of Q2-Management

Subsequently, Table 5.13 displays the relationships between categories for the Q2-Management key area.

Table 5.13 Relationships between categories of Q2-Management

Relationships	Collective decision making	Facilitation & enabling	Flat structure	Leadership & empowerment	Macro not Micro mgmt
Collaborative approach	X	X		X	
Collective decision making			X	X	
Facilitation & enabling				X	X
Flat structure	X		X	X	X
Leadership & empowerment	X	X		X	
Considering team perspective	X		X	X	
Self-Organising team	X	X	X	X	
Learning & Passion		X		X	
Macro not Micro mgmt	X		X	X	
Feedback Welcome		X	X	X	
Mistakes accepted		X	X	X	
Safe, trust & respect environment			X	X	
Self-management & accountability	X	X	X	X	X
Team inclusivity	X	X	X	X	X
Culture change & open mindset			X	X	
Transformational not transactional	X		X	X	X

Subsequently, by applying the core category criteria based on the identified relationships of Table 5.13, the categories “*Leadership & empowerment*” and “*Flat structure*” reveal themselves as the *core category* for Q2-Management.

5.2.4.2 OBSERVATION AND HYPOTHESIS

Further to collating and meticulously examining the findings of data analysis in section 5.2.4.1, the researcher is able to conclude and construct an illustrative summary of emerged hypotheses. This is guided by the identified core categories “*Leadership & empowerment*” and “*Flat structure*”. In addressing the impact of adopting Agile methodologies on the organisational behaviour within the banking industry, it takes into consideration that this section tends to address the “*Management*” aspect of the behavioural impact. Figure 5.12 displays the emerged hypothesis of the research question two - management.

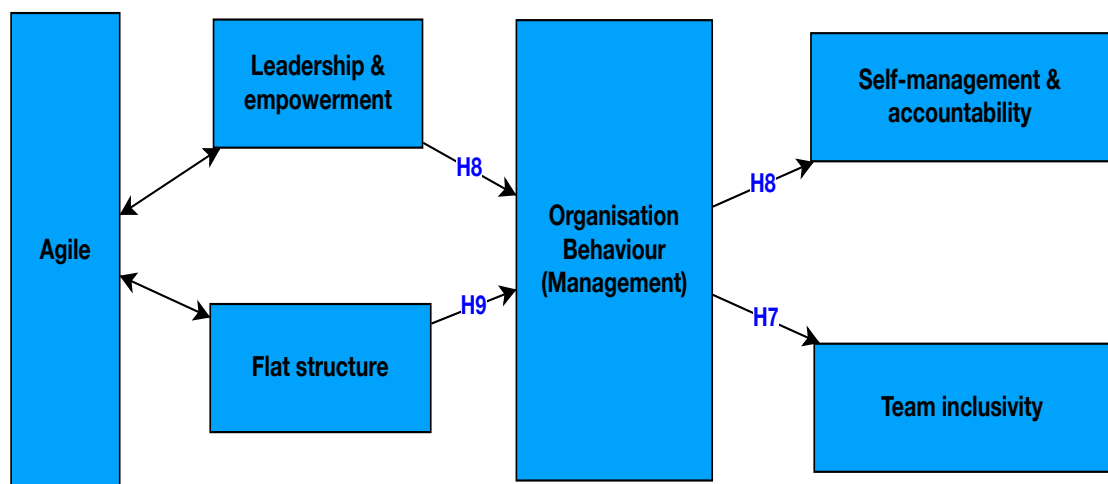


Figure 5.12 Emerged hypothesis of research question two (management)

Correspondingly, in reflection to Figure 5.12 the researcher proposes two hypotheses.

Hypothesis 8: H8(+): The leadership and empowerment feature of Agile positively influences organisational behaviour of self-management and self-accountability within banking industry.

Hypothesis 9: H9(+): The flat structure of Agile positively influences organisational behaviour of team inclusivity within banking industry.

5.2.5 ORGANISATIONAL BEHAVIOUR – CUSTOMER

The analysis of this section involves the mapped data in Q2-Customer sub-sheet of Figure 4.5, related to Key area *Organisation behaviour – Customer*, and in association with Research question *Two*.

5.2.5.1 DATA ANALYSIS

Similarly, after applying steps (S01→S08) of Table 5.1 the following findings have emerged. Table 5.14 displays the emerged codes and concepts out of the open coding process of the key area Q2-Customer.

Table 5.14 Emerged codes of Q2-Customer

Node	Code	References
Nodes\\Org. Behaviour	Customer collaboration	17
Nodes\\Org. Behaviour	Open informal communication	8
Nodes\\Org. Behaviour	Productivity	8
Nodes\\Org. Behaviour	Interactive Timely Requirements	6
Nodes\\Org. Behaviour	Flexibility and speed	5
Nodes\\Org. Behaviour	Effective & short Communication	4
Nodes\\Org. Behaviour	Knowledge sharing	4
Nodes\\Org. Behaviour	Learning & Passion	4
Nodes\\Org. Behaviour	Transparency and openness	4
Nodes\\Org. Behaviour	Feedback Welcome	3
Nodes\\Org. Behaviour	Culture change & open mindset	2
Nodes\\Org. Behaviour	Rapid pace Time-to-market	1
Nodes\\Org. Behaviour	Collaborative approach	1
Nodes\\Org. Behaviour	Competitive advantage	1
Nodes\\Org. Behaviour	Confidence	1
Nodes\\Org. Behaviour	Facilitation & enabling	1
Nodes\\Org. Behaviour	Mistakes accepted	1

Correspondingly, Figure 5.13 illustrates the codes distribution of the key area Q2-Customer.

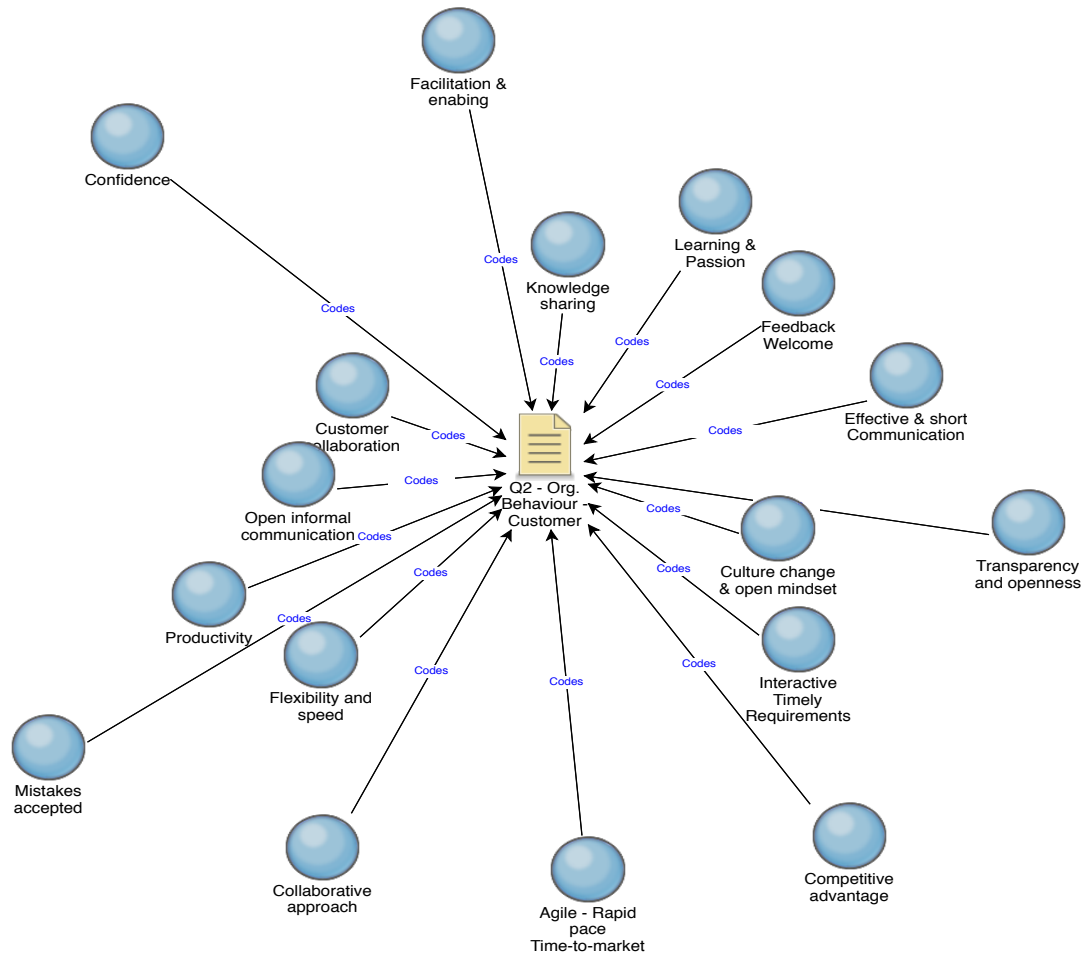


Figure 5.13 Codes distribution of Q2-Customer

Furthermore, Table 5.15 shows the emerged categories after applying axial coding and CCA against the Q2-Customer key area.

Table 5.15 Emerged categories of Q2-Customer

Name	Aggregated references
Customer collaboration	17
Open informal communication	8
Productivity	8

Interactive Timely Requirements	6
Flexibility and speed	5
Effective & short Communication	4
Knowledge sharing	4
Learning & Passion	4
Transparency and openness	4
Feedback Welcome	3
Culture change & open mindset	2
Rapid pace Time-to-market	1
Collaborative approach	1
Competitive advantage	1
Confidence	1

Correspondingly, Figure 5.14 depicts the chart for ascending sorted emerged categories for the Q2-Customer key area. Subsequently, by examining Figure 5.14 the key categories with higher impact to this area are identified and accordingly shaded in Table 5.15.

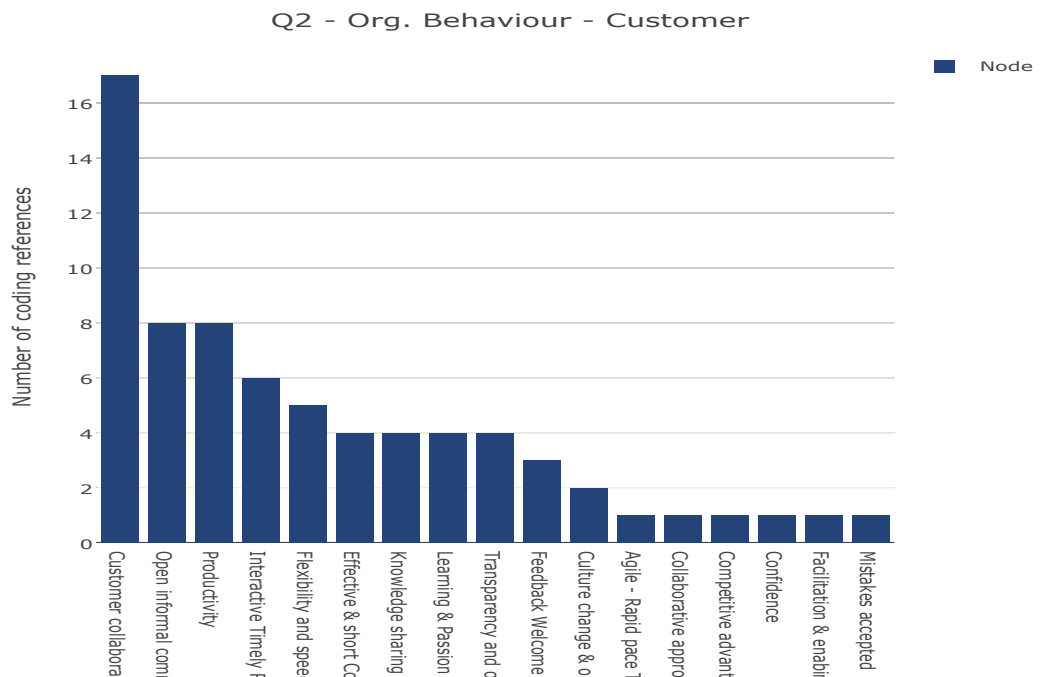


Figure 5.14 Chart of emerged codes of Q2-Customer

Subsequently, Table 5.16 displays the relationships between categories for the Q2-Customer key area.

Table 5.16 Relationships between categories of Q2-Customer

Relationships	Customer collaboration	Open informal communication	Interactive Timely Requirements	Flexibility and speed	Effective & short Communication
Customer collaboration	x	x	x		
Open informal communication	x				x
Productivity	x	x	x	x	
Interactive Timely Requirements	x	x	x		
Flexibility and speed	x		x		x
Effective & short Communication	x				
Knowledge sharing	x	x	x	x	x
Learning & Passion	x		x		
Transparency and openness	x	x	x	x	x
Feedback Welcome	x				
Culture change & open mindset	x		x		
Rapid pace Time-to-market	x	x	x	x	
Competitive advantage	x		x	x	
Confidence	x				x

Subsequently, by applying the core category criteria based on the identified relationships of Table 5.16, the categories “*Customer Collaboration*” reveals itself as the *core category* for Q2-Customer.

5.2.5.2 OBSERVATION AND HYPOTHESIS

Further to collating and meticulously examining the findings of data analysis in section 5.2.5.1, the researcher is able to conclude and construct an illustrative summary of emerged hypotheses. It is guided by the identified core category “*Customer Collaboration*”. In addressing the impact of adopting Agile methodologies on the organisational behaviour within the banking industry, this sections tends to address the “*Customer*” aspect of behavioural impact. Figure 5.15 displays the emerged hypothesis of research question two - customer.

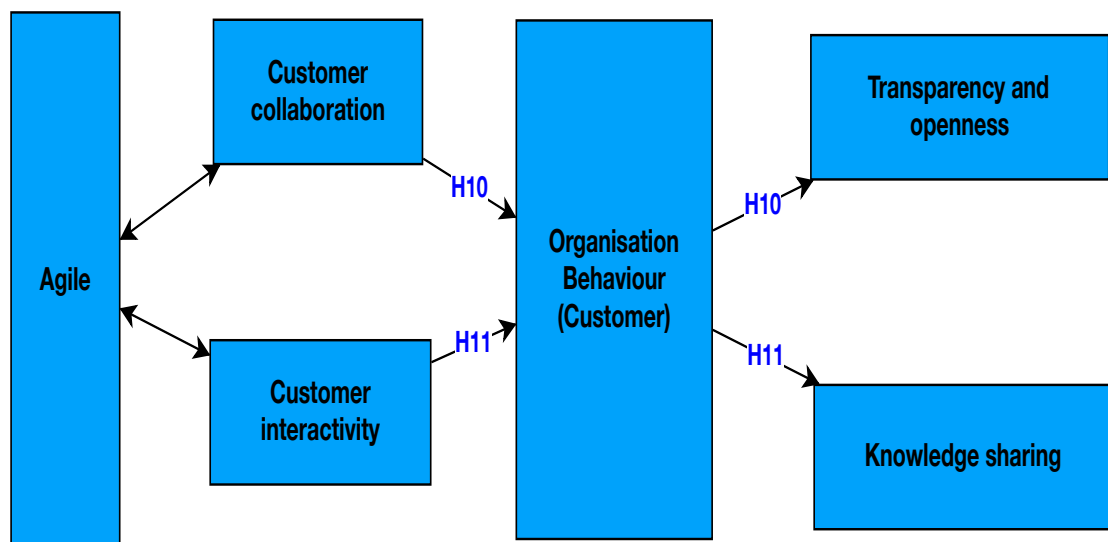


Figure 5.15 Emerged hypothesis of research question two (customer)

Correspondingly, in reflection on Figure 5.15 the researcher proposes two hypotheses.

Hypothesis 10: H10(+): The customer collaboration in Agile positively influences organisational behaviour of having more open and transparent relationship with customers within banking industry.

Hypothesis 11: H11(+): The customer interactivity in Agile positively influences organisational behaviour of the knowledge sharing between customers and service providers within banking industry.

5.3 RESEARCH EVALUATION

In evaluating interpretive qualitative studies, Lincoln & Guba (1985) recommend using the criteria in Table 5.17. Additionally, Fidler, Halaweh, & McRobb (2008) suggest using the same criteria for studies, which adopt the use of combined research methodology (Case study: Grounded theory). These criteria are “*Credibility, Transferability, Dependability, and Conformability*” (Fidler, Halaweh, & McRobb, 2008, p. 8; Lincoln & Guba, 1985). Accordingly, Table 5.17 displays the current research evaluation based on these criteria.

Table 5. 17 Research evaluation

ID	Criteria	Evaluation
E01	Credibility	Which is the “ <i>confidence in the truth of the findings</i> ” (Lincoln & Guba, 1985). In this research, the definition and design of research methodology in addition to case study protocol were clearly identified before commencing data collection. Furthermore, for transparency of conduct the researcher clearly identified participants, subject of studies and the unit of analysis. Additionally, sources for secondary data were carefully selected against rigid eligibility criteria of inclusion or exclusion matrix. Moreover, the researcher presented the supervisor with the study progress step by step, seeking feedback and guidance.
E02	Transferability	Which is the ability to “ <i>generalise the findings to other situations</i> ” (Fidler, Halaweh, & McRobb, 2008). First, the generalisation of this qualitative findings is “ <i>Analytical</i> ” but not “ <i>statistical generalisation</i> ” (Halaweh, 2012, p. 45).

		However, the nature of generalisation highlights the possibility of applying the findings to produce the same outcomes when it is applied to different situations, when they share the same properties (Fidler, Halaweh, & McRobb, 2008). In order to achieve the objective, the researcher explained in detail the framework and all associated steps, procedures, and techniques used in designing and conducting this study, including data collection and analysis. Hence, this gives the confidence that if other researchers conduct the research they can acquire the same findings.
E03	Dependability	Which is showing that the “ <i>research process is systematic and well documented and can be traced</i> ” (Fidler, Halaweh, & McRobb, 2008, p. 8). Accordingly, the researcher in this study clearly identifies the aim and objective of the research, and documents thoroughly the progress of the study.
E04	Conformability	Which is to “ <i>assess whether the findings emerge from the data collected from cases and not from preconceptions</i> ” (Fidler, Halaweh, & McRobb, 2008, p. 8). Accordingly, the researcher presents excerpts of secondary quotes in Chapter 4 – collected from participants- showing the relevancy and conformity of data to the researched topic.

Upon analysing the responses to the research evaluation criteria, the researcher is satisfied that this study conforms and adheres to the guidelines set out earlier.

5.4 CONCLUSION

This chapter presents the analysis of secondary data collected in the previous chapter. First, it offers a detailed account of the steps in conducting the data analysis against the selected secondary dataset. Furthermore, this chapter explains the framework’s

techniques, procedures, and logical thought process in progressing through the pre-defined analytical steps. Moreover, it highlights the mechanism of applying those steps against each of the identified key areas (methodology, people, communication, management, and customer) in relation to answering the two research questions for the study.

Accordingly, the analysis mechanism -guided by Grounded theory- presents the findings upon conducting the open coding process, then it shows the codes distribution for each key area. Subsequently, it presents the results of applying axial coding combined with CCA processes, and applies a higher level of data abstraction resulting in emerging categories associated with each key area. Furthermore, upon identifying the key category (categories) and examining the interlinked relationships between categories, the patterns and associated patterns of this study begin to emerge.

Furthermore, after in-depth examination and evaluation of the emerged patterns and paradigms, this chapter proposes 11 hypotheses in answering the two identified research questions in section 1.3. Table 5.18 shows this study's proposed hypotheses in correspondence to the research questions and key areas.

Table 5. 18 Research hypothesis

Research question	Key Area	ID	Hypothesis
One	Methodology	Hypothesis 1	H1(+): Responsiveness feature of Agile positively influences the Time-to-market rate in banking industry.
One	Methodology	Hypothesis 2	H2(-): Unresponsiveness feature of Waterfall negatively influences the Time-to-market rate in banking industry.

Two	People	Hypothesis 3	H3(+): Collaborativity feature of Agile positively influences organisational behaviour (people) in terms of knowledge sharing within banking industry.
Two	People	Hypothesis 4	H4(+): Collaborativity feature of Agile positively influences organisational behaviour (people) in terms of interchangeability & multitasking within banking industry.
Two	People	Hypothesis 5	H5(+): Feedback and mistakes acceptance of Agile positively influences organisational behaviour (people) in terms of offering psychological security in a safe and trustful environment within banking industry.
Two	Communication	Hypothesis 6	H6(+): The regular, effective, and short comms in Agile positively influences organisational behaviour in terms of culture change acceptance within banking industry.
Two	Communication	Hypothesis 7	H7(+): The informal and open nature of comms in Agile positively influences organisational behaviour in terms of customer collaboration within banking industry.

Two	Management	Hypothesis 8	H8(+): The leadership and empowerment feature of Agile positively influences organisational behaviour of self-management and self-accountability within banking industry.
Two	Management	Hypothesis 9	H9(+): The flat structure of Agile positively influences organisational behaviour of team inclusivity within banking industry.
Two	Customer	Hypothesis 10	H10(+): The customer collaboration in Agile positively influences organisational behaviour of having more open and transparent relationship with customers within banking industry.
Two	Customer	Hypothesis 10	H11(+): The customer interactivity in Agile positively influences organisational behaviour of the knowledge sharing between customers and service providers within banking industry.

Subsequently, the next Chapter 6 discusses the findings displayed in Table 5.18 and covers all aspects of the researched topic. Furthermore, it explores the association and compatibility of findings to both existing literature and available professional sources in the banking industry.

Chapter 6: Discussion

6.1 INTRODUCTION

Conducting research is an apprenticeship journey in which participants aim to learn methodologies, concepts, extract knowledge from data, and develop the art of reflecting on findings (Grix, 2001). Furthermore, Sutrisna (2009) argues that qualitative studies with complex dimensions are capable of yielding very rich findings, which is -in essence- very helpful for knowledge. However, the richness of data and emerging findings can overwhelm researchers and take them astray from achieving the study's goals and objectives (Sutrisna, 2009).

Accordingly, with above notions in mind, the researcher adopts a cognitive approach, in which the conducted discussion enjoys neutrality, focus, and critical thinking demeanors. Moreover, this chapter aims to discuss the findings of Chapter 5 and the proposed hypotheses highlighted in Table 5.18. Ultimately, this is done by critically examining the underlying connotation of these findings, highlighting their compatibility to the current study, connecting them to the research questions, and relating them to existing literature and practice. Furthermore, this chapter aims to clearly answer the research questions identified in section 1.3; and proposes potential solutions -based on the findings- to the addresses problems and issues of this research as discussed in sections 2.6 and 2.7.

Furthermore, the scope of this chapter is limited to the findings highlighted in Chapters 4. Therefore, the researcher refrains from introducing new findings or unrelated concepts. Additionally, this chapter highlights the limitation of this study, and points out challenges and difficulties, which have been encountered during the course of this study.

6.2 FINDINGS DISCUSSION

Fundamentally, this study is set out with the aim to address the shift and impact of adopting appropriate methodologies within the banking industry in responding to surrounding changes and their different natures. Subsequently, the research questions

identified in section 1.3 are constructed to focus on the researched topic. Furthermore, upon the completion of data analysis in Chapter 5, a total of 11 hypotheses are proposed as listed in Table 5.18. Accordingly, this section discusses each of the research questions separately against their corresponded findings.

6.2.1 RESEARCH QUESTIONS ONE

In answering the first research question (*The impact of Waterfall and Agile methodologies on the time-to-market rate within the banking industry*), the current study proposes two competing hypotheses H1(+)/H2(-) with positive and negative influences, respectively, as highlighted in section 5.2.1.2.

Firstly, the hypothesis concerning H1(+) addresses the impact of adopting Agile methodologies on time-to-market rate. It indicates that adopting Agile within the banking industry produces a positive impact in terms of reducing the time-to-market rate. Additionally, as illustrated in Figure 5.3 and Table 5.4, the positive nature of influence is derived from the “*Responsiveness*” feature of Agility.

Secondly, the hypothesis concerning H2(-) addresses the impact of adopting a Waterfall methodology on time-to-market rate. It indicates that adopting a Waterfall within the banking industry produces a negative impact in terms of increasing the time-to-market rate. Additionally, as illustrated in Figure 5.3 and Table 5.4, the negative nature of influence is derived from the “*Unresponsiveness*” nature of a Waterfall methodology.

Accordingly, upon reflecting on these hypotheses, the *responsiveness* nature in Agility does not manifest itself autonomously or appear as a stand-alone feature. In fact, by examining Table 5.4, the responsiveness from a holistic point of view, is cultivated with the support of other qualities; most specifically, flexibility and speed. Ultimately, when banks have the quality of being flexible in observing the change in surroundings, processing the nature of change, and speedily enough adjusting to this change. Thenceforth, these banks are deemed responsive to change, and accordingly do enjoy a shorter time-to-market rate in delivering timely responses to the changes.

On the other hand, with the nature of Waterfall being inflexible with mandatory sequential phases, the characteristic of *unresponsiveness* is the dominant theme. Subsequently, this nature of stiffness, inflexibility, and lack of speed causes banks to be insensitive to change. Thenceforth, these banks are deemed unresponsive to change, and accordingly do suffer from a longer time-to-market rate in delivering appropriate and timely responses to changes.

Furthermore, with the competing nature of H1(+) and H2(-) in addressing the impact of responsiveness (associated with Agile) and unresponsiveness (associated with Waterfall), the researcher concludes a negative correlated relationship between responsiveness/unresponsiveness and time-to-market rate within the banking industry. In this inverse relationship, having a higher responsiveness leads to shorten the time-to-market rate; and having a lower responsiveness (unresponsiveness) leads to lengthen the time-to-market rate.

Additionally, in terms of the compatibility of these two hypotheses to existing literature. H1(+) and H2(-) are in fact in alignment and do not contradict the existing literature. Fundamentally, the responsiveness nature of Agile is highlighted in Table 2.6 as one of the key Agile features as discussed by (Gill & Henderson-Sellers, 2006). Furthermore, the concept of flexibility as a key quality in making organisations responsive to changes -whether expected or unexpected ones- is discussed in detail in studies by (Stoica, Mircea, & Ghilic-Micu, 2013; Sharma, Sarkar, & Gupta, 2012; Gill & Henderson-Sellers, 2006) as highlighted in Table 2.7. Also, the advantage of Agile in achieving an improved time-to-market rate due to its iterative mechanism is examined by (Livermore, 2007). Similarly, the inflexibility leading to lack of responsivity in Waterfall is highlighted by its founder Winston Royce (Royce, 1987). Additionally, the associated longer time-to-market rate, which is due to the sequential nature of Waterfall, is also examined by Hartlen (2015) as highlighted in Table 2.5.

Accordingly, taking into account that the discussed hypotheses H1(+) and H2(-) are applicable to the current study, and able to answer the first research question, compatible

to existing literature. Therefore, the researcher is satisfied accepting them as valid findings in the current research.

6.2.2 RESEARCH QUESTION TWO

In answering the second research question (*The impact of Agile processes on organisational behaviour within banking industry*), the current study proposes nine hypotheses H3→H11 as displayed in Table 5.18 with positive influences as highlighted in sections 5.2.2.2, 5.2.3.2, 5.2.4.2 and 5.2.5.2. Furthermore, the impact of organisational behaviour is broken down into four main key areas as identified in section 4.3. Hence, this discussion addresses the behavioural impact separately on each of the key areas including people, communication, management, and customer.

6.2.2.1 PEOPLE

In terms of *people*, the study proposes three hypotheses H3(+), H4(+), H5(+) in addressing the impact of adopting Agile on the behaviour of people as highlighted in section 5.2.2.2. Firstly, the hypothesis concerning H3(+) indicates that adopting Agile within the banking industry produces a positive impact in terms of facilitating a more effective knowledge sharing environment. Additionally, as illustrated in Figure 5.6 and Table 5.7, the positive nature of this influence is derived from the “*Collaborativity*” feature of Agility.

Secondly, the hypothesis concerning H4(+) indicates that adopting Agile within the banking industry produces a positive impact in terms of enticing interchangeability and multitasking practice. Additionally, as illustrated in Figure 5.6 and Table 5.7, the positive nature of this influence is also derived from the “*Collaborativity*” feature of Agility.

Thirdly, the hypothesis concerning H5(+) indicates that adopting Agile within the banking industry produces a positive impact in terms of securing a safe and trustful environment, where people can enjoy a sense of psychological security. Additionally, as

illustrated in Figure 5.6 and Table 5.7, the positive nature of this influence is derived from the “*feedback and mistakes acceptance*” feature of Agility.

Accordingly, upon reflecting on these hypotheses, the adoption of Agile processes leads to a direct impact on the behaviour of people. However, the degree of this impact varies due to other factors such as the level of agile maturity within teams, and individuals’ receptiveness to change. Nonetheless, the key feature of *Collaborativity*, which is driven by the notion of self-organising teams, leads to a shift in the behaviour of people. This shift, accordingly, transforms the mindset from I to We. Subsequently, individuals feel more inclined and comfortable in knowledge sharing. Accumulatively, the knowledge sharing leads to acquiring new skills which is utilised in enabling individuals to become multitasking, which allows them to fulfill various responsibilities. Likewise, Agile philosophy advocates for innovation and encourages the trialing of new ways of doing work by offering an umbrella of psychological security. Furthermore, this is achieved by seeding a culture of mistakes acceptance and facilitating effective feedback mechanisms; which comes in structured forms and avenues such as retrospective sessions and daily stand up meetings.

Additionally, these findings are in accordance with existing literature as addressed in section 2.6.2. Essentially, the shift in people’s mindset as a result of adopting Agile is examined closely in studies by (Cockburn, 2002; Boehm & Turner, 2003). Moreover, the concept of migrating from individualism to collectivism is also covered in studies by (Mahalakshmi & Sundararajan, 2013; Highsmith & Cockburn, 2001). Furthermore, the relationship between allowing feedback and psychological security is examined in studies by (Highsmith & Cockburn, 2001; Hoda, 2011).

6.2.2.2 COMMUNICATION

In terms of *communication*, the study proposes two hypotheses H6(+) and H7(+) in addressing the impact of adopting Agile on communication as highlighted in section 5.2.3.2. Firstly, the hypothesis concerning H6(+) indicates that adopting Agile within the banking industry produces a positive impact in terms of increasing the acceptance of

culture change within banks. Additionally, as illustrated in Figure 5.9 and Table 5.10, the positive nature of this influence is derived from the “*regular, effective, and short communications*” of Agility.

Secondly, the hypothesis concerning H7(+) indicates that adopting Agile within the banking industry produces a positive impact in terms of increasing customer collaboration. Additionally, as illustrated in Figure 5.9 and Table 5.10, the positive nature of this influence is derived from the “*informal and open nature of communication*” of Agility.

Accordingly, upon reflecting on these hypotheses, Agile is driven by regular, timely, and accurate line of communication with informal and effective mechanisms. Furthermore, individuals at banks are more receptive to change when they are informed about the nature, details, and magnitude of the proposed change; hence the importance of regular, transparent, and direct communications. Moreover, the open communication nature in Agile allows customer and team members to interact directly and freely with no need for an intermediary, or an umbrella of hierarchal formality in between. Subsequently, this open two-ways communication channel leads to an increase in customer involvement and interactivity with banks.

Additionally, these findings are in alignment with existing literature as addressed in section 2.6.3. Fundamentally, Agile transforms the communication nature from being Formal, Structured, and OnDemand to become Informal, Open, and Continuous, allowing for an uninterrupted and unambiguous communication with the customer as examined by (Mangalaraj, Nerur, & Mahapatra, 2005). Furthermore, the risk and criticality of not having effective communication between stakeholders leading to a possible breakdown in the accuracy of requirements and deliverables is also examined by (Turk, Robert, & Rumpe, 2005).

6.2.2.3 MANAGEMENT

In terms of *management*, the study proposes two hypotheses H8(+) and H9(+) in addressing the impact of adopting Agile on management as highlighted in section 5.2.4.2.

Firstly, the hypothesis concerning H8(+) indicates that adopting Agile within the banking industry produces a positive impact by enabling the self-management and self-accountability for individuals. Additionally, as illustrated in Figure 5.12 and Table 5.13, the positive nature of this influence is derived from the “*empowerment leadership*” of Agility.

Secondly, the hypothesis concerning H9(+) indicates that adopting Agile within the banking industry produces a positive impact by increasing the sense of inclusivity within banks. Additionally, as illustrated in Figure 5.12 and Table 5.13, the positive nature of this influence is derived from the “*flat structure*” feature of Agility.

Accordingly, upon reflecting on these hypotheses, Agile transforms a traditional management style from micro-transactional with hierarchical structure, into becoming macro-transformational leadership with an organic flat structure. Subsequently, this inflicts a change on both management and staff behavioural norms; which affects positively the relationship between management (middle, senior, and executive) and staff across the bank. Eventually, the manager becomes a leader and the employee is welcomed to take a seat at the decision making table. Ultimately, the shift in this relationship influences individuals, and as a result they can feel more included and trusted in the decision making process, and most importantly empowered by leadership. Correspondingly, this triggers a change in the staff behaviour where they are exhibiting more inclination towards being responsible, self-managed, and self-accountable.

Additionally, these findings are in alignment with existing literature as addressed in section 2.6.1. Furthermore, the notion of inclusivity in decision making in Agile is examined in studies by (Nerur & Balijepally, 2007; Stoica, Mircea, & Ghilic-Micu, 2013). Additionally, the transformation in management behaviour towards dropping classic managerial characteristics into becoming leaders is also examined carefully in studies by (Highsmith & Cockburn, 2001; Nerur & Balijepally, 2007). Moreover, the change in the structure of the decision-making table is examined by (Hoda & Murugesan, 2016). Likewise, the concept of self-management is also indirectly addressed by Hoda (2011) in her analysis of self-organising teams.

6.2.2.4 CUSTOMER

In terms of *customer*, the study proposes two hypotheses H10(+) and H11(+) in addressing the impact of adopting Agile on the customer as highlighted in section 5.2.5.2. Firstly, the hypothesis concerning H10(+) indicates that adopting Agile within the banking industry produces a positive impact by enabling a transparent relationship between customers and banks. Additionally, as illustrated in Figure 5.15 and Table 5.16, the positive nature of this influence is derived from the “*customer collaboration*” of Agility.

Secondly, the hypothesis concerning H11(+) indicates that adopting Agile within the banking industry produces a positive impact by increasing the knowledge sharing between customers and banks. Additionally, as illustrated in Figure 5.15 and Table 5.16, the positive nature of this influence is derived from the “*customer interactivity*” feature of Agility.

Accordingly, Agile welcomes customer interactions, and it invites customers to the centre stage allowing them to interact directly with teams; in order to provide feedback, validate products, refine requirements, and suggest change initiatives. Furthermore, in traditional methodologies customers are out of the planning circle and sometimes left behind -intentionally manufactured- high walls. However, the change of having effective customer collaboration and an ongoing customer interaction triggers a positive change in the behaviour of customer. Subsequently, the relationship between banks and customers is impacted positively to become transparent and open; where banks feel more comfortable in informing and sharing information with customers without holding back. Likewise, customers are becoming more satisfied and eager to share their knowledge, feedback, and perspectives on products and services back to the banks. Practically, this two-way knowledge communication is a form of socialising where customers are part of the process of mandating and suggesting what to expect, and similarly, what to reject or approve. Accordingly, with the application of Agile in the

banking digital channels, customers are becoming closer than ever to banks, and likewise, banks are able to reach and listen to more from customers.

Additionally, these findings are in alignment with existing literature as addressed in section 2.6.4. Furthermore, the customer interaction linkage to knowledge sharing in Agile process is examined in depth in multiple publications by (Boehm, 1996; Boehm & Turner, 2003; Gladden, 1982). Additionally, the linkage between the customer involvement and customer satisfaction is also examined by (Sharma, Sarkar, & Gupta, 2012).

After examining sections 6.2.2.1, 6.2.2.2, 6.2.2.3 and 6.2.2.4, and taking into consideration that the discussed hypotheses (H3 → H11) as applicable to the current study, the researcher is able to answer the second research question. The answers fit each segment, and is compatible to the existing literature. Therefore, the researcher is satisfied accepting them as valid findings of the current research.

6.3 SOLUTIONS

This section is predominantly applying the findings discussed in this chapter against the identified issues and problems of this study highlighted in section 2.7 and explained in section 2.6. Subsequently, the study suggests that banks should manage their risks more closely; and in order to do that, they must be more vigilant and sensitive to change in the surroundings. Irrespective from the nature of this change -whether it is inflicted by the regulator, technological advancements, or customer sophistication- it is crucial for banks to respond appropriately, in a timely way, and rapidly. Therefore, banks are in an ongoing mission of perusing different avenues in order to become more effective, swift, and responsive.

In this way, based on the findings of this study, banks are advised to adopt methodologies and processes, which allow them to be more dynamic. Furthermore, as the findings suggest the adoption of Agile leads to an increase in responsiveness which is based on the emerged inverse relationship to shorten the time-to-market rate in responding to changes.

Furthermore, in adopting Agile banks are expected to experience an impact on their organisational behaviour. However, according to this study the impact is with a positive nature which allows banks to become more linked and closer to their customers. Furthermore, it is achieved by activating multiple open communication channels, and ultimately leads to a change in the nature of communication to become of socialising. At the same time, the adoption of Agile brings about a change in management, staff, and the harmony between them, leading to a more trustworthy relationship between different management tiers and individuals; and subsequently self-organising teams are becoming self-managed and self-accountable. However, any sort of impact must be managed closely especially the ones which involve a change in social and behavioural practices within banks, hence the warning.

Furthermore, applying Agile processes on their own is not the ultimate solution for banks, because it brings both advantages and disadvantages as highlighted in Table 2.8 and Table 2.7. In reality, Agile adoption is a non-ending journey which needs the support and contribution of all stakeholders in order to become fruitful. Furthermore, with scaling Agile comes with other challenges as addressed in Table 2.8 of section 2.4.2.2. These can hinder the essential objectives of adopting Agile of becoming responsive to change.

6.4 LIMITATION OF THE STUDY

This is a qualitative research based on secondary data and uses a combined methodology of Case study and Grounded theory. The research is faced with three main limitations.

Firstly, according to many academics the major limitation of quantitative studies is the generalisation of findings. However, as explained in section 3.8, the findings of this research are analytically -not statistically- generalisable (Yin, 1994). Accordingly, the “*findings are not generalisable to the universe but more to similar theoretical proposition*” (Yin, 2003, p. 10). Additionally, the Grounded theory procedure of data abstraction facilitates the generalisation within comparable conditions “*the more abstract the concepts, the more theory applicability*” (Fidler, Halaweh, & McRobb, 2008, p. 7).

Hence, these findings are generalised to other situations which share a similar context and conditions of the current study.

Secondly, with the use of secondary data the researcher was not able to pursue potential leads during data coding and abstraction. This is because the researcher does not have access to the participants in order to investigate further. For example, the researcher wants to explore further leads on the impact of Agility on organisational behaviour in terms of socialising, and examine the nature of this potential relationship. However, the researcher has kept notes of these potential leads for future work.

Thirdly, there is a lack in previous research studies of detail concerning Agile practice within the banking industry in New Zealand. Subsequently, the researcher is going to suggest extra work in this field in the future study section.

6.5 DISCUSSION SUMMARY

This chapter discusses in-depth the findings of Chapter 5. Furthermore, it sets out a comprehensive criteria of how to conduct such a discussion in a systematic process. Additionally, this process is accomplished by examining the eligibility of hypothesis in terms of confirming firstly, the applicability to the study. Secondly, the ability to answer research questions. Thirdly, the compatibility to existing literature. Subsequently, when these conditions are met then the hypotheses are deemed valid for the current study.

Furthermore, the discussion proposes an inverse relationship between responsiveness and time-to-market rate. Subsequently, this relationship is able to answer the first research question in comparing the impact of Agile and Waterfall methodologies on the time-to-market rate. The responsiveness of Agile is able to shorten the time-to-market rate, however, the unresponsiveness of Waterfall lengthens the time-to-market rate.

Additionally, in answering the second research question the discussion highlights multiple relationships in analysing the impact of adopting Agile for organisational behaviour. Moreover, the discussion explains how collectively the impact of Agile on people, communication, management, and customer results. Firstly, the Agility

constitutes a transparent relationship between customers and banks, and customer centricity, open communication channels, and effective knowledge sharing, drive such a relationship. Secondly, Agility triggers the sense of inclusivity within the banking staff which allows self-organising teams to be part of the decision making process. Individuals feel comfortable following the practice of self-management and self-accountability. Ultimately, such a change is driven by effective communication and the empowerment by leadership.

Lastly, this study transitions to the next and final Chapter 7 in which the researcher presents a conclusion to this study. It also proposes a set of recommendations to the banking industry, and suggests potential future research directions for further exploration.

Chapter 7: Conclusion

7.1 INTRODUCTION

This chapter summarises the construction, progress, and findings of the current research. Furthermore, the chapter presents a practical set of recommendations to the banking industry based on the findings of the research. These have been discussed in Chapter 6, and the conclusion suggests procedures of applying these recommendations into practice. Also emerging and unexplored potential research areas are presented for the professional and academic communities, with possible future work for further research.

7.2 SUMMARY OF THE STUDY

This study contributes to research knowledge in general, and the banking industry in particular in terms of answering the two questions of this research. The first question addresses the impact of Waterfall and Agile methodologies on the time-to-market-rate, while the second questions address the impact of adopting Agile processes on organisational behaviour.

Accordingly, Chapter 2 reviews existing literature in relation to the examined topics in addition to the research areas of interest. Subsequently, this review provides insights of existing publications in links to the topics of interest, and at the same time, it equips the researcher with knowledge to investigate the Waterfall and Agile delivery methodologies, their key advantages and disadvantages, and their application in the practice of the banking industry. Upon completion, the researcher is able to identify the problems and issues concerning the researched topic, detect associated gaps, and highlight potential research areas.

Furthermore, Chapter 3 sets out to define, select, and analyse the optimal research methodology for the current study. Accordingly, the study selects the approach of a combined methodology of Case study and Grounded theory, and justifies this choice of selection by highlighting its aptness and suitability to the current study. Ultimately, this study -as a qualitative research based on secondary data- applies Case study research for

performing data collection, and facilitates Grounded theory procedures for conducting the data analysis. Furthermore, the chapter illustrates the research design and selected methodology framework, and accordingly states the limitations associated with this framework.

Moreover, Chapter 4 defines the data search strategy, and its eligibility criteria in selecting relevant secondary data sources, and further outlines the inclusion or exclusion conditions of the interview of participant secondary data. Furthermore, the chapter presents the selected data from different points of view. It establishes its relevance to the study, and significance to the research questions. Additionally, the collected data is sliced and mapped using key area identifiers resulting in categorised sub-datasets based on the research areas.

Subsequently, Chapter 5 displays the framework and systematic steps of data analysis; which are guided by the Grounded theory procedures. Fundamentally, the study applies the techniques of open coding combined with constant comparative analysis. Then, this is followed by identifying the core categories and resuming with the selective coding process. Moreover, this interplay of theoretical sampling, constant comparison analysis, and coding processes stays in action -in order to achieve a higher level of data abstraction- until reaching theoretical saturation. This stops both theoretical sampling and coding processes. Subsequently, further detailed analysis is applied in order to examine the relationships between core categories and other emerged abstracted ones, which allows for the emergence of hypothesis based on the key research areas. Hence, with the assistance of visual illustrations, 11 hypotheses emerge as pertaining answers to the two research questions, as displayed in Table 5.18.

Chapter 6 offers in-depth discussion and interpretation of the 11 hypotheses (H1 ➔ H11) in connection to the research questions. Firstly, concerning H1 and H2 hypotheses which are the answer to the first research question, the study identifies an inverse correlated relationship between responsiveness and the time-to-market rate within banking industry. Furthermore, in this inverse relationship, having a higher responsiveness (associated with Agile) leads to shorten the time-to-market rate; however,

having a lower responsiveness (associated with Waterfall) leads to lengthen the time-to-market rate. Secondly, concerning hypotheses H3 → H11, which are the answer to the second research question, the study identifies a positive impact on organisational behaviour in general, and its key segments (people, communication, management, customer) in particular, as a direct result of implementing Agile processes within banks. Furthermore, although this positive impact is multifaceted, its primary manifestation is in the transformation of the nature of external and internal relationships concerning banks.

These relationships whether external -between banks and their customers-, or internal -between staff and management- have been significantly improved to become interactively transparent, and organically inclusive. Moreover, such a transformation in behaviour is fundamentally driven by, firstly, establishing effective and open multi-communication channels within and outside the banks. Secondly, instituting a supportive leadership management style, which operates in a safe workspace resulting in stimulating psychological security for team members. Furthermore, Agile triggers a change in communication nature between banks and the customer. This is in making it more interactive and transforming it from being a mere communiqué into becoming a form of conversational socialising.

7.3 RECOMMENDATION TO THE BANKING INDUSTRY

It is critical for banks to have the qualities of flexibility and the ability in order to respond to the surrounding changes in a timely, appropriate, and swift way. This is to sustain their capabilities of competing within the market and to retain their customer base. However, banks which are failing to rectify their outdated practices of being slow to react, insensitive to changes, and lacking effective interactivity with customers are at risk of falling behind in terms of competition and subsequently becoming irrelevant to the customers.

Accordingly, guided by the findings of this research, this study recommends the banking industry to take into consideration the following practical actions:

- The banking industry to implement a change detection mechanism, which allows it to be vigilant and highly anticipant of the changes occurring within their operational environments, and accordingly, transforms the nature of their reaction to be proactive, rather than a reactive responsive to surrounding changes.
- The banking industry to be aware of the unprecedented level of customer sophistication, and accordingly taking necessary steps to adopt customer centricity schools of thought as the core and soul of their strategies.
- The adoption of an appropriate choice of Agile processes for the following reasons:
 - Driven by customer centricity, Agile offers banks the much needed effective, rapid and elastic delivery processes.
 - The responsiveness in Agile processes is a key factor in meeting customer's wants and needs as swiftly as possible with shorter time-to-market rates.
 - Driven by digitization, Agile enables effective multi-communication channels with customers, which result with increases of the depth and length of interactivity, establishes transparency, enables knowledge sharing, and encourages feedback mechanisms between customers and banks.
 - Agile -depending on the maturity degree- leads to a transformation in the nature of the relationship with customers from being merely transactional to become pleasantly conversational and a sociable experience.
 - Agile adheres to a flat managerial structure and leadership mindset, which are key factors in influencing, positively, the inclusivity and self-organising teams within banks.
- The scalability of Agile across the bank is a lengthy process, which must be handled with care, and closely managed in terms of risk and change.

7.4 FUTURE RESEARCH

Each of the hypotheses identified in Table 5.18 could be a subject for further exploration in examining the impact of Agility on organisational behaviour. However, by revisiting section 6.4, which addresses the limitations of this study, the researcher is able to offer multiple promising leads for potential future research work driven from this thesis.

Firstly, narrowing down and choosing a specific location allows for constructing similar research in examining the impact of Agile processes on organisational behaviour within geographical boundaries. For example, addressing the research in the context of the New Zealand banking industry. However, given the scarcity of academic publications and studies concerning Agile in New Zealand banking industry as highlighted in section 6.4, the researcher suggests considering the use of primary data for such potential research.

Secondly, building on the findings of this research in terms of examining in-depth the impact of Agility on staff psychological security within the banking industry. Moreover, such a topic gains its significance from the current concept of securing a safe working environment. In addition, the possible affect of Agile in the workplace as psychological security and on the bank's overall productivity.

Thirdly, building on the findings of this study, the researcher suggests conducting further research in examining the potential relationship between Agility and socialising as a form of augmented communication between banks and the customers. Furthermore, this potential research has two significances; firstly, it touches upon two contemporary phenomena of Agile and socialising. Secondly, it explores the future outlook -in terms of style and nature- of the mechanism in which banks will be communicating with customers.

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