

**Enterprise social networking and innovation in the service  
industry: a mixed methods study**

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A thesis submitted to Auckland University of Technology  
in fulfilment of the requirements for the degree of  
Doctor of Philosophy (PhD)

2020

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## Abstract

With the significant growth in the service sector in recent years, researchers are paying increasing attention to the co-creation and application of knowledge in service innovation. Knowledge sharing is a key driver of service innovation, as it encourages decisions to apply knowledge into products, services, and organisational designs. The emergence of social media technologies, especially enterprise social networking (ESN), has made knowledge sharing easier, but has also led to some adverse outcomes. These adverse outcomes include but are not limited to: low productivity, interpersonal conflict, and the possibility of leaking sensitive information to external parties. Two research problems are examined in this study: the low acceptance of ESN by employees, because of the fear that they jeopardise their status by sharing knowledge; and the inappropriate use of ESN, as seen in an increase in interpersonal conflicts or the leaking of information outside the organisation. This study aims to understand how knowledge sharing through ESN can influence innovation in the service industry, and how the strength of this relationship is affected by the governance of ESN. Therefore, the research question addressed in this study is: *How can organisations encourage employees to use ESN for knowledge sharing to enhance their innovation outcomes?*

As the phenomenon of using ESN for knowledge sharing for innovation is a novel area of research, this study used a two-phase sequential mixed methods design. The first phase was a qualitative study (using interview data) that evaluated a conceptual model, which relates ESN for knowledge sharing to service innovation and governance. The second phase is a quantitative study (using survey data), where the relationships between these constructs are statistically examined. The qualitative study was conducted by interviewing 11 participants from banks and investment firms located in New Zealand. For the quantitative study, 104 global participants from the financial industry were surveyed. The interviews revealed that: a) innovation and knowledge sharing are related to developing new products/services or improving existing ones; b) different ESN tools used for knowledge sharing complement each other; e) an open and trusted environment enhances knowledge sharing using ESN, which in turn fosters innovation, and f) users are aware of their organisation's policies and standards for sharing knowledge, including those related to social media. The quantitative study revealed that ESN for knowledge sharing is significantly related to service innovation. Further, the findings suggest that, although trust has a direct effect on service innovation, the use of ESN for knowledge sharing partially mediates the relationship between trust and service innovation. The results also reveal that

governance significantly moderates the relationship between ESN for knowledge sharing and innovation.

This study has both theoretical and practical implications. Theoretically, this paper provides insights into the relationship between trust, knowledge sharing and innovation. Further, the study also demonstrates the role of governance in mitigating the negative aspects of ESN implementation (low acceptance and inappropriate use of ESN), so that they do not outweigh its benefits. The practical implications of this study are that senior executives of firms that are using or intending to use ESN for knowledge sharing should: a) keep track of the evolving nature of ESN and see how it can best enhance knowledge sharing, and b) develop an open culture in their organisations to promote knowledge sharing and social relationships among employees, in addition to implementing ESN applications.

# Table of Contents

Abstract.....	i
List of Figures.....	vii
List of Tables.....	viii
List of Appendices.....	x
Attestation of Authorship .....	xi
Acknowledgements .....	xii
Dedication.....	xiii
List of Abbreviations .....	xiv
CHAPTER 1: INTRODUCTION.....	15
1.1 CHAPTER OVERVIEW.....	15
1.2 SIGNIFICANCE .....	15
1.3 RESEARCH PROBLEM .....	18
1.3.1 Low acceptance of ESN .....	18
1.3.2 Inappropriate use of ESN .....	19
1.4 RESEARCH AIMS AND RESEARCH QUESTION.....	21
1.5 RESEARCH CONTEXT - FINANCIAL SECTOR .....	22
1.6 METHODOLOGY .....	23
1.7 CHAPTER SUMMARY .....	23
CHAPTER 2: THEORETICAL APPROACH AND CONCEPTUAL MODEL.....	27
2.1 CHAPTER OVERVIEW.....	27
2.2 SERVICE INNOVATION .....	27
2.2.1 Service and product innovation .....	29
2.2.2 Service innovation and knowledge sharing.....	32
2.3 KNOWLEDGE SHARING.....	35
2.3.1 Knowledge sharing – definition and taxonomy.....	36
2.3.2 Types of knowledge .....	37
2.3.3 Personalised and codified knowledge sharing.....	38
2.3.4 Knowledge sharing and the use of digital technology.....	40
2.4 SOCIAL MEDIA.....	40
2.4.1 Social media use in organisations.....	41
2.4.2 Enterprise social networking (ESN).....	42
2.4.3 Various functions of ESN.....	43
2.4.4 Single vs multiple ESNs use in organisation.....	44
2.4.5 Comparing enterprise social networking (ESN) and traditional knowledge management systems (KMS).....	46
2.4.6 ESN for knowledge sharing practice .....	47
2.4.7 Challenges with the use of ESN for knowledge sharing .....	49

2.5 THEORETICAL LENSES .....	50
2.5.1 Social exchange theory .....	50
2.5.2 Governance.....	53
2.6 PROPOSED CONCEPTUAL MODEL .....	57
2.7 CHAPTER SUMMARY .....	59
CHAPTER 3: RESEARCH METHODOLOGY .....	60
3.1 CHAPTER OVERVIEW .....	60
3.2 RESEARCH PARADIGM .....	60
3.3 MIXED METHODS RESEARCH DESIGN .....	61
3.4 ETHICAL CONSIDERATIONS .....	66
3.5 LEVEL OF ANALYSIS.....	67
3.6 RESEARCH CONTEXT.....	68
3.7 PHASE I: QUALITATIVE STUDY .....	70
3.7.1 Data source .....	73
3.7.2 Sample size .....	74
3.7.3 Interview protocol .....	75
3.7.4 Data analysis.....	76
3.7.5 Data validity and reliability .....	80
3.8 PHASE II: QUANTITATIVE STUDY.....	82
3.8.1 Developing survey design .....	82
3.8.2 Online survey.....	83
3.8.3 Sample size assessment .....	83
3.8.4 Evaluating the relationship between constructs .....	84
3.8.5 Evaluating validity and reliability .....	84
3.9 CHAPTER SUMMARY .....	85
CHAPTER 4: PHASE I - QUALITATIVE RESULTS AND ANALYSIS .....	86
4.1 CHAPTER OVERVIEW .....	86
4.2 DEMOGRAPHICS OF PARTICIPANTS .....	86
4.3 QUALITATIVE DATA ANALYSIS .....	87
4.3.1 Theme one: Innovation experience .....	88
4.3.2 Theme two: Knowledge sharing experience .....	92
4.3.3 Theme three: Experience with enterprise social networking .....	95
4.3.4 Theme four: Governance .....	98
4.4 DISCUSSION ON QUALITATIVE FINDINGS .....	101
4.5 CONTRIBUTION OF THE QUALITATIVE STUDY TO THE QUANTITATIVE STUDY .....	104
4.6 RESEARCH MODEL AND HYPOTHESES DEVELOPMENT .....	105
4.6.1 Impact of ESN use on service innovation .....	106
4.6.2 Influence of trust on ESN uses .....	107
4.6.3 Role of Governance .....	108

4.7 CHAPTER SUMMARY .....	109
CHAPTER 5: PHASE II - QUANTITATIVE RESULTS AND ANALYSIS.....	110
5.1 CHAPTER OVERVIEW.....	110
5.2 SURVEY DESIGN.....	110
5.2.1 Constructs used in the survey .....	110
5.2.2 Control variables used in the survey .....	112
5.3 VERIFICATION OF SURVEY ITEMS .....	112
5.4 SURVEY PARTICIPANTS .....	113
5.5 SAMPLE SIZE .....	115
5.6 DATA SCREENING.....	116
5.7 PARTICIPANT DEMOGRAPHICS.....	117
5.7.1 The use of enterprise social networking .....	118
5.7.2 The use of ESN by firm attributes .....	120
5.8 ASSESSING THE MEASUREMENT MODEL .....	122
5.8.1 Item-scale reliability .....	123
5.8.2 Exploratory factor analysis.....	124
5.8.3 Measurement model .....	126
5.8.4 Assessing the validity and reliability of the measurement model .....	130
5.8.5 Assessing common method bias.....	132
5.9 STRUCTURAL MODEL AND HYPOTHESIS TESTING .....	132
5.10 DISCUSSION OF SURVEY FINDINGS .....	136
5.11 CHAPTER SUMMARY .....	139
CHAPTER 6 DISCUSSION AND CONCLUSION .....	140
6.1 CHAPTER OVERVIEW.....	140
6.2 RESEARCH AIM AND RESEARCH QUESTION .....	140
6.3 DISCUSSION.....	140
6.4 CONTRIBUTIONS .....	144
6.5 LIMITATIONS AND FUTURE RESEARCH .....	149
6.6 CHAPTER SUMMARY .....	151
References .....	152
Appendices .....	175
1.1 Appendix A Ethics Approval.....	175
1.2 Appendix B Participant Information Sheet (Interview).....	176
1.3 Appendix C Participant Information Sheet (survey) .....	178
1.4 Appendix D Survey questionnaire.....	180
1.5 Appendix E Constructs with operationalised items .....	186
1.6 Appendix F Preparing the data set using SPSS v26 .....	188
1.7 Appendix G 1-2 Inter-item correlation .....	189
1.8 Appendix H 3-4 Inter-item correlation .....	190
1.9 Appendix I Reliability of all items based on four constructs.....	191

1.10	Appendix J Test 1 item loading using Rotated Factor Matrix .....	192
1.11	Appendix K Total Variance Explained based on test 1 .....	192
1.12	Appendix L Test 2 items loading using Rotated factor matrix .....	193
1.13	Appendix M KMO and Bartlett's Test .....	194
1.14	Appendix N Total Variances explained based on test 2 .....	194
1.15	Appendix O Cronbach's Alpha.....	194
1.16	Appendix P Constructs and items with mean, standard deviation, skewness and kurtosis.....	195
1.17	Appendix Q CFA model 1 .....	197
1.18	Appendix R CFA model 2 .....	198
1.19	Appendix S Calculating AVE and Square root of AVE for discriminant validity ..	199
1.20	Appendix T Assessing common method bias (using Principal Axis Factoring) .....	200

## List of Figures

Figure 1 Proposed conceptual model .....	58
Figure 2 Timing and weightage of mixed methods.....	63
Figure 3 Sequential mixed methods approach .....	64
Figure 4 Generating initial coding, data extracted node/code .....	78
Figure 5 Example of parent nodes and their child nodes .....	79
Figure 6 Example of Mind-map using NVivo.....	79
Figure 7 Concept-map using NVivo .....	80
Figure 8 Participants' views on innovation experience.....	88
Figure 9 Participants views on knowledge sharing .....	92
Figure 10 Participants' views of enterprise social networking .....	95
Figure 11 Participants' views on governance.....	99
Figure 12 Research model and hypotheses .....	106
Figure 13 Approaching participants using LinkedIn.....	114
Figure 14 Mode of communication .....	119
Figure 15 ESN use and functions .....	120
Figure 16 ESN use by firm size (number of employees) .....	120
Figure 17 ESN use by Region.....	121
Figure 18 ESN use by Sector .....	121
Figure 19 ESN use by Department.....	122
Figure 20 Measurement model based on construct ESN_KS .....	127
Figure 21 Structural model with three hypotheses .....	133
Figure 22 Mediation-moderation effect .....	134
Figure 23 Simple slope diagram showing the moderating effect .....	136



## List of Tables

Table 1 Overview of Research Topic.....	24
Table 2 Thesis chapter summary.....	25
Table 3 Service and product innovation.....	28
Table 4 Selected Definitions of Service Innovation.....	30
Table 5 Service framework and S-D logic in relation to knowledge sharing.....	32
Table 6 Four dimensions of service innovation .....	32
Table 7 Examples of service innovation industry with four dimensions .....	33
Table 8 Selected definitions of knowledge sharing.....	36
Table 9 Types of knowledge (selected literature) .....	37
Table 10 Knowledge strategy and knowledge sharing.....	40
Table 11 Key differences between SNSs and ESNs .....	41
Table 12 Various literature on internal use of SM .....	42
Table 13 Recent studies on ESN use (chronologically listed) .....	44
Table 14 ESN support for knowledge sharing practices .....	47
Table 15 Challenges with ESN use .....	49
Table 16 Knowledge Governance (formal and informal) .....	54
Table 17 Governance of knowledge sharing .....	55
Table 18 Formal and informal knowledge sharing and type of control .....	55
Table 19 Relationship between different concepts.....	57
Table 20 Research paradigms .....	61
Table 21 Examples of IS studies that have used exploratory mixed methods .....	62
Table 22 Mixed methods sampling approach.....	64
Table 23 Sample size of sequential mixed methods studies .....	65
Table 24 Key points for ethical approval .....	66
Table 25 Key informants used from selected literature .....	67
Table 26 Innovation product/service in financial industry.....	69
Table 27 Different approaches to case study.....	70
Table 28 Demography of five companies .....	71
Table 29 Data source.....	74
Table 30 Interview date and location .....	75
Table 31 Interview guide.....	76
Table 32 Data analysis steps .....	77
Table 33 Guidelines for reliability and validity .....	85
Table 34 Participants.....	86
Table 35 Conducting relevant questions during interview.....	88
Table 36 Constructs used in the quantitative study.....	111

Table 37 Control variables used in the survey .....	112
Table 38 Format for capturing data of survey participants .....	115
Table 39 Contacting Potential Respondents.....	115
Table 40 Demography of participants (N=104) .....	117
Table 41 Distribution of demographic data.....	118
Table 42 Main techniques used in EFA .....	124
Table 43 Retained items in EFA .....	125
Table 44 Multicollinearity check .....	126
Table 45 Correlation between factors .....	126
Table 46 Statistical outcome of CFA model 1 .....	128
Table 47 Model fit indices .....	129
Table 48 Moderation indices.....	130
Table 49 Model fit.....	130
Table 50 Convergent validity .....	131
Table 51 AVE and correlation among constructs .....	132
Table 52 HTMT value.....	132
Table 53 Results for structural model .....	133
Table 54 Mediation results through Bootstrapping.....	134
Table 55 Indirect effect with confidence interval .....	135
Table 56 Unstandardized values used for the simple slope diagram.....	136
Table 57 Control variables: Gender and Age.....	136
Table 58 Results of hypothesis testing.....	137

## List of Appendices

1.1	Appendix A Ethics Approval .....	175
1.2	Appendix B Participant Information Sheet (Interview) .....	176
1.3	Appendix C Participant Information Sheet (survey) .....	178
1.4	Appendix D Survey questionnaire .....	180
1.5	Appendix E Constructs with operationalised items .....	186
1.6	Appendix F Preparing the data set using SPSS v26 .....	188
1.7	Appendix G 1-2 Inter-item correlation.....	189
1.8	Appendix H 3-4 Inter-item correlation.....	190
1.9	Appendix I Reliability of all items based on four constructs .....	191
1.10	Appendix J Test 1 item loading using Rotated Factor Matrix.....	192
1.11	Appendix K Total Variance Explained based on test 1.....	192
1.12	Appendix L Test 2 items loading using Rotated factor matrix .....	193
1.13	Appendix M KMO and Bartlett's Test.....	194
1.14	Appendix N Total Variances explained based on test 2.....	194
1.15	Appendix O Cronbach's Alpha .....	194
1.16	Appendix P Constructs and items with mean, standard deviation, skewness and kurtosis .....	195
1.17	Appendix Q CFA model 1 .....	197
1.18	Appendix R CFA model 2.....	198
1.19	Appendix S Calculating AVE and Square root of AVE for discriminant validity .....	199
1.20	Appendix T Assessing common method bias (using Principal Axis Factoring).....	200

## Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

2 September 2020

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Signature

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Date

## Acknowledgements

I would like to acknowledge the contributions of those who have supported and encouraged me to complete my thesis.

To Associate Professor Harminder Singh, my primary supervisor, for his interest in my thesis topic. I would like to express my deepest gratitude for his useful critiques to improve my thesis. Encouraging me to submit papers in the conferences, attending seminars, and learning different technical skills has given me the confidence to grow in academia. Your consistent support, motivation, guidance, and valuable advice have been the driving force in this research pursuit. Thank you for your patience and for being an excellent supervisor throughout my PhD journey.

To Dr. Maduka Subasinghage, my second supervisor, for her valuable advice on my thesis. I would like to express my sincere gratitude for her constructive feedback on each chapter of my thesis. I thank you for sharing your thoughts with me and support to improve my thesis. Having you on the supervision team made a huge difference. Thank you for being part of my PhD journey.

To Associate Professor Antonio Diaz Andrade and Associate Professor Angsana Techatassanasoontorn for their valuable advice on my PGR9 presentation. I would also like to thank Ms. Ludwina Lafaele, Dr. Eathar Abdul-Ghani, Ms. Carol Young, and Ms. Yvonne Meachen for their administrative support and making my PhD journey smooth and pleasant.

To my eleven interview participants who took their time to share their views on my research topic and 104 global participants who took their precious time to respond the survey questions. In both, I have learned the importance of networking with professionals. I thank each participant for their contribution to my thesis.

No dedication would be complete without mentioning my family. My three children – Asif, Noreen, and Nadia, for their love and endless support. No matter where you are, you have been very supportive – couldn't ask for more! My granddaughter, Jemima, your noble gesture and smile, forced me to relax and be young. Lastly, my heartfelt gratitude to my husband, Professor Asheq Rahman, for his encouragement and giving emotional support throughout my PhD journey. Thank you for giving me the strength to chase my dream and for not letting me give up. You have made me a strong woman, and thank you for being a wonderful husband.

## Dedication

To my husband  
for always supporting and encouraging me

To my son and two daughters  
for always bringing joy and happiness to me

## List of Abbreviations

AMOS	Analysis of Moment Structure
AUTEC	Auckland University of Technology Ethics Committee
ATM	Automated Teller Machine
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CEOs	Chief Executive Officers
CFI	Comparative Fit Index
CMB	Common method bias
COP	Communities of Practice
CR	Composite Reliability
DV	Dependent Variable
EFA	Exploratory Factor Analysis
ERP	Enterprise Resource Planning
ESN	Enterprise Social Networking
ESN_KS	Enterprise Social Networking for Knowledge Sharing
Fintech	Financial Technology
GOVRN	Governance
ICT	Information and Communication Technology
IFI	Incremental Fit Index
IV	Independent Variable
IT	Information Technology
KMO	Kaiser–Meyer–Olkin
KMS	Knowledge Management System
LVC	latent Variable Correlations
MI	Moderation Indices
OECD	Organisation of Economic, Co-operation & Development
PtCode1 - PtCode11	Participant 1 - Participant 11
RMSEA	Root Mean Square Error of Approximation
SER_INN	Service innovation
S-D logic	Service Dominant Logic
SEM	Structured Equation Model
SPSS	Statistical Package for Social Sciences
SNSs	Social Networking Sites
SET	Social Exchange Theory
TLI	Tucker-Lewis Index
VIF	Variance Inflation Factors

# CHAPTER 1: INTRODUCTION

## 1.1 CHAPTER OVERVIEW

The purpose of this study is to understand how enterprise social networking (ESN) can influence innovation in the service industry, and how the strength of this relationship is affected by the governance of ESN. This chapter begins with a brief background of the phenomenon, followed by a discussion on the significance and motivation of this research. Two research problems regarding the use of ESN for knowledge sharing in organisational contexts are identified. Next, the study's aim and context are elaborated. Given the relative novelty of this phenomena, this research used mixed methods to provide more in-depth and authentic insights. The chapter ends with a summary and an explanation of the thesis' structure, including a brief description of each chapter.

## 1.2 SIGNIFICANCE

There has been an increased interest in innovation in the service sector for a few reasons. These include the significant growth of the sector (Chen, 2017; Carlborg et al., 2014; Chang, Linton, & Chen, 2012; Droege, Hildebrand & Forcada, 2009; Castellacci, 2008), greater global competition (Bareghe, Rowley, & Sambrook, 2009), increased interaction with customers (Lu & Tseng, 2010), and rapid advances in information technology, along with its widespread use (Barrett, 2015; Lusch & Nambisan, 2015; Ryu & Lee, 2018). The role of IT in spurring innovation in the service industry can be seen in the entry of new IT-enabled service firms, such as Uber in transportation, Airbnb in hospitality, and Stripe and SoFi in financial services. This “digital disruption” has increased the pressure on existing firms to innovate more quickly to prevent these new start-ups from taking away their customers (Barrett et al., 2015; Hinings et al., 2018; Lokuge et al., 2019).

Innovation refers to how firms develop core products, create value for customers, and offer improved new services (Gadrey et al., 1995; Lu & Tseng, 2010; Yen et al., 2012). Service innovations may include both product and process innovations because new services “often go together with new patterns of distribution, client interaction, quality control, and assurance, etc.” (De Jong et al., 2003, p. 17). The service-dominant logic (S-D logic) perspective asserts that the process of service innovation is collaborative, involving a diverse network of actors (including customers) that integrate or synthesise their knowledge and other resources to co-create value (Chen, 2017; Lusch & Nambisan, 2015; Ordanini & Parasuraman, 2011; Vargo & Lusch, 2004).



Developing new services requires an effective knowledge transfer mechanism (Ordanini & Parasuraman, 2011). This mechanism should be able to access both external and internal knowledge (Barrett et al., 2015; Durst et al., 2015). This is because, besides internal experiences, service firms need knowledge about customer requirements, product quality, processes, and organisational designs to meet their customers' needs (Tavassooli & Karlsson, 2015; Lu & Tseng, 2010). Information technology is often used for knowledge sharing and integration during the innovation process because it connects internal and external networks (Akaka & Vergo, 2014) and supports the systematic storage of information in organisational memory (Calantone et al., 2002).

Technologies used today for knowledge sharing, such as cloud computing, mobile devices, and social media, have different characteristics from technologies that were traditionally used for the same purpose. Traditional technologies, such as knowledge management systems (KMS), were expensive, required training to be used, are usually hosted locally (in-house), lack the flexibility to capture, share and incorporate large varieties and new forms of knowledge (Faraj et al. 2011), have rigid participation boundaries and are not easy for users to customise or modify (Qi & Chau, 2018; Kane, 2017; Leonardi et al., 2013). In contrast, new technologies used for knowledge sharing are relatively inexpensive, available on-demand, (Lokuge et al., 2019), flexible, and support many-to-many interaction (Azaizah et al., 2018). The limitations of traditional knowledge sharing technologies have encouraged firms to adopt the enterprise versions of social media applications, which are termed ESN (enterprise social networking).

A key aspect of technological change in the service sector is the widespread use of social media (Pérez-González et al., 2017), which has transformed the frequency and means of communication (Braojos-Gomez et al., 2015) and collaboration (Pérez-González et al., 2017). Within organisations, social media has increased internal collaboration and knowledge sharing, changed work relationships, and provided more opportunities for social networking (Sun & Shang, 2014). Innovation in service firms is made possible by collaboration with consumers, as well as experiences shared by employees (Calantone et al., 2002).

While social media is usually perceived as being used outside organisations, it can also be used within organisations. The use of social media by employees within organisations to communicate internally and share knowledge is referred to as "internal social media" (Leonardi et al., 2013) or an enterprise social network (Wehner et al., 2017) to differentiate between inter and intra-organisational social media. Enterprise social networks are usually cloud-based

solutions, such as internal wikis and blogs, Yammer, SharePoint, Slack, IBM Connections<sup>1</sup>, Jira, and Workplace by Facebook (Pee, 2018; Chin et al., 2015).<sup>2</sup> A European Union survey in 2017 showed that about 27% of enterprises had implemented enterprise social networks for employees, so that they could “enhance collaboration within the enterprise, optimise resources and develop networks of experts (virtual teams) ... and build a collective knowledge base” (pg. 132, Eurostat, 2017). Another survey found that, by 2015, around 70% of organisations were using social technologies internally to manage knowledge and foster collaboration (Harrysson, Schoder, & Tavakoli, 2016)<sup>3</sup>.

Social networking is directly related to knowledge management, and enterprise social networks support knowledge management (Hacker, 2017) by providing easy access to expertise, integrating knowledge, and stimulating problem solving and decision-making (Aboelmaged, 2018; Dittes & Smolnik, 2017; Leonardi & Neeley 2017). Individuals using ESN to collaborate become more productive (Qi & Chau, 2018; Kane, 2015), especially because they allow knowledge-sharing across organisational hierarchies and foster cross-silo collaboration (Bala et al., 2015). Such collaborative environments encourage innovation (Hsiao, 2019; Muninger et al., 2019).

While enterprise social networks and traditional knowledge integration mechanisms such as KMS are similar in function, enterprise social networks are qualitatively different in a few ways (Giermindl, 2018). The differences are:

*a) Enterprise social networks are more pervasive in work environments:* enterprise social networks can be used not just for generating new ideas or during specific knowledge-sharing sessions (Robertson & Kee, 2017), but also support other work processes, collaboration and are present throughout the workday. While ESN use may accelerate the growth of communication, it can also distract employees from their work (Leonardi, et al 2013).

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<sup>1</sup> IBM sold Connections to HCL in December 2018 (<https://newsroom.ibm.com/2018-12-06-HCL-Technologies-to-Acquire-Select-IBM-Software-Products-for-1-8B>; <https://www.hcltechsw.com/products/connections>)

<sup>2</sup> This class of technologies are known by various terms, such as internal social media (Madsen 2017; Sarigianni et al., 2015), corporate social media (Krischkowsky et al., 2014), organisational social media (Treem & Leonardi, 2012); enterprise social software (Dittes & Smolni, 2017); enterprise social media (Pee. 2018; Engler & Alpar, 2017; van Osch et al., 2015; Kane 2015; Leonardi, 2014), and enterprise social networking (ESN) (Aboelmaged, 2018, Wehner et al., 2017; Choudrie & Zamani, 2016; Stock & Gross, 2016; Mäntymäki & Riemer, 2016, Bala et al., 2015; Chin et al., 2015; Ellison et al., 2015). I chose the last as it captures the important aspects of the technology: its social nature and networking capabilities.

<sup>3</sup> Note: the significant difference between the two surveys- 27% and 70%- is due to the different definitions of “social technologies” and ESN.

*b) Enterprise social networks enhance openness:* by design, the features of enterprise social networks make individuals' social interaction more open and visible (Leonardi & Neeley, 2017; Leonardi & Meyer, 2015), so that individuals cannot 'hide in the crowd'. This could possibly lead to a perception that one's online activities on the ESN are necessary for enhancing or maintaining one's social reputation (Sinaga, et al 2017); and

*c) Enterprise social networks provide online activity:* As ESNs use can easily locate expertise with relevant work, online activities are easily monitored and evaluated (Jarrahi & Sawyer, 2013). Therefore, online activity is used as the basis for awarding incentives or punishments (van Osch et al., 2015).

While both positive and negative outcomes of using ESN are mentioned in the literature, the adverse outcomes are challenging in the organizations (see section 2.4.7). As the use of ESN has made knowledge sharing more open and visible (Leonardi & Neeley, 2017), organizations are struggling to achieve their expected innovation outcome due to the adverse outcomes they face from implementing ESN. Two significant adverse outcomes are low acceptance and inappropriate use of ESN by employees. In the following sections adverse outcomes and theoretical concepts (trust and governance) are elaborated, followed by a research question.

### 1.3 RESEARCH PROBLEM

While ESNs have been widely adopted by organisations with the intention to share knowledge and innovate, there are two major problems with the use of ESN for sharing knowledge. First, their acceptance by employees is low, limiting their impact on organisations; and second, they can potentially be used inappropriately and, therefore, have negative consequences for organisations. These problems are discussed in detail below:

#### 1.3.1 Low acceptance of ESN

ESN acceptance and use by employees has been found to be low (Stock & Gross, 2016; Bala, et al., 2015). A survey by Deloitte, one of the Big Four accounting organisations and the largest professional services network in the world, found that thirty percent of employees do not sign up for an ESN even if they were required by their organisation to do so, and of those who registered, only a third read content once a week and just forty percent could post a comment per month (Deloitte CIO, 2013). Individuals have also reported feeling discomfort and insecurity about using ESNs (Stock & Gross, 2016; Landers & Callan, 2014). A survey of executives conducted by McKinsey (2016) found that resistance to the use of social networks in organisations can also be attributed to the sensitivities raised by the ability of ESNs to breach

intra-organisational walls. The underutilisation of ESNs by employees has been linked to their high failure rates (Chin et al., 2015; Denyer et al., 2011; Li, 2015).

One reason for the resistance to use ESNs could be that, like traditional KMS, ESN users are concerned that when they share their knowledge, they run the risk of becoming less valuable to their organisations (Gibbs et al., 2013). They worry that they could lose their role or position, because their value is tied to the knowledge they possess. This concern may make individuals resist sharing their knowledge in their organisations (Alsharo et al., 2017; Obeidat et al., 2016). In addition to this concern, the low acceptance of ESN use may also be due to the risks employees face of being more easily monitored or of damaging their reputation by making negative comments online. Other concerns related to the low acceptance of such platforms would be feeling discomfort or insecurity (Stock & Gross, 2016); or a fear of taking additional time and effort compared to existing practices, seeing enterprise social networks as just another information system on top of the existing ones (Vurori & Okkonen, 2012).

The obstacles to ESN use mentioned above are associated with the level of trust in their organisations among employees. The social aspect of ESN (He et al., 2009; Faraj et al., 2011) means that knowledge sharing as a publicly-visible activity in an organisation is strongly influenced by the broader levels of connectedness (Majchrzak et al., 2013), as opposed to being driven solely by individual concerns. Employees that perceive their workplaces as being fair and just are more willing to share knowledge (Tsai & Cheng 2012), and adopt new technologies introduced by their organisation (Alblerghini et al., 2014). This can be explained by social exchange theory (SET), which posits that individuals in social relationships reciprocally exchange resources and that recipients of positive actions will respond with similar positive behaviours (Cropanzano et al., 2017). In the context of ESN use, employees who trust their colleagues and managers will be more likely to use ESNs to share knowledge, because the high level of trust reduces their fear of being made redundant after sharing or being monitored through ESN, or that their ESN presence and activities will influence their reputation negatively.

### 1.3.2 Inappropriate use of ESN

While ESN use may encourage idea generation and collaboration because it is easy to use, inexpensive, available on-demand, and flexible, there are at least three potential undesirable outcomes. First, the comments on ESN posts may make employees more aware of their differences with their peers, potentially leading to interpersonal conflict (Gibbs et al., 2013). Second, by providing a platform for individuals to socialise, ESN can distract employees from

their work and may lower their productivity (Leonardi et al., 2013). Third, by making knowledge sharing much more convenient and since ESN use can extend beyond a firm's boundaries, ESN may make it easier for employees to leak firm-sensitive information to external parties, either deliberately or accidentally (Sarigianni et al., 2015, Leonardi & Treem, 2012), hurting a firm's innovativeness (Molok et al., 2011).

Mitigating the potential downsides of technology adoption usually occurs through the implementation of a governance structure. Governance here refers to mechanisms that can influence knowledge sharing, integration, and creation (Foss et al., 2010). The formal governance mainly involves organisational structures, routines, practice and operational guidelines (Foss et al., 2010). The informal governance includes ceremonies and rituals (Foss et al., 2010) and building social interaction to reduce the risk of knowledge leakage. In the ESN context, governance would comprise various formal and informal controls, such as guidelines listing appropriate use and misuse, monitoring mechanisms, and so on (Stohl et al., 2017). Governance can explain the performance of knowledge processes by examining how obstacles are removed to foster knowledge-sharing (Cabrera & Cabrera, 2002; Osterloh & Frey, 2000).

However, the challenge with formal governance is that it relies on explicitly-defined statements and is short-term focused, attributes that do not match with the knowledge-sharing process (Turner & Makhija, 2006). Technology-enabled knowledge-sharing activities, such as those that occur through ESNs, are usually more diffuse (Aboelmaged, 2018) and idea generation often occurs over a longer period (Robertson & Kee, 2017). These attributes indicate that if individuals create a sense of support and obligation (Harden, et al, 2016), there is a high level of shared understanding, desire to reciprocate (Cropanzano et al., 2017), and close connections in their working environment, i.e., with a high level of trust, individuals will be more likely to use ESN appropriately. From a social exchange theory perspective, a high level of trust in an organisation means individuals have “*a positive expectations from other members based on relationships, experiences, and interdependencies*” (Bieńkowska et al., 2018).

The emergence of ESN has made knowledge sharing easier but also led to adverse outcomes. These adverse outcomes include but are not limited to low productivity, interpersonal conflict, and the possibility of leaking sensitive information to external parties. In this study, we examined these adverse outcomes by identifying two specific problems, the reason for the problems, possible theory/concepts underpinning the problems and the implications of problems (Alvesson & Sandberg, 2013), as summarized below:

- a. This study examined two research problems: the low acceptance of ESN by employees and the inappropriate use of ESN by employees.
- b. The low acceptance is that users run the risk of becoming less valuable to their organisation while using ESN. This concern may make individuals resist sharing knowledge. The inappropriate use of ESN is seen in increased use of ESN, causing interpersonal conflicts or the leaking of information outside the organisation.
- c. This study proposed intra-organisational trust and governance concepts to address the low acceptance and inappropriate use of ESN by employees. With a high level of trust, employees are more likely to use ESNs to share knowledge because it reduces their fear of being made redundant after sharing (Bieńkowska et al., 2018; Cropanzano et al., 2017). Additionally, the inappropriate use of ESN for knowledge sharing can be mitigated by using governance (formal and informal) mechanisms (Stohl et al., 2017; Foss et al., 2010), thereby fostering innovation.
- d. The implications of the research problems (low acceptance and inappropriate use of ESNs) for the firm are to ensure that the negative consequences of ESN use do not outweigh its benefits.

Furthermore, organisations in the financial service industry provide a great avenue to study two adverse outcomes because innovation in the financial services industry is crucial. Previous research has discussed the lack of ESN use (Gibbs et al., 2013; Leonardi et al., 2013) and the mechanisms to enhance ESN use (Robertson & Kee, 2017; Wehner et al., 2017; Barrett et al., 2015; Ellison et al., 2015). However, little research explains how financial service organisations can encourage the effective use of ESN for knowledge sharing to achieve innovation outcomes. Both the research problems and theoretical concepts are elaborated in Chapter 2.

## 1.4 RESEARCH AIMS AND RESEARCH QUESTION

While the use of enterprise social networking (ESN) in the organisational context has been studied, there is little work on the impact of ESN enabled knowledge sharing on service innovation. By addressing two adverse outcomes (low acceptance and inappropriate use of ESN use), this research, extending the existing literature, essentially investigates the effectiveness of ESN use in service innovation in the organisation. ESN's use is a new phenomenon, and theoretical and empirical understanding of innovation outcomes from ESN implementation is still in the initial stage. Therefore, this study aims to understand how ESN enabled knowledge sharing can influence innovation outcomes in the service industry and encourage employees to use ESN for this purpose. The research question is articulated in this respect:

*How can organisations encourage employees to use ESN for knowledge sharing to enhance their innovation outcomes?*

This study has two original theoretical contributions. First, individual use of social technologies for knowledge sharing within organisations, such as ESN, is influenced by the level of intra-organisational trust. With a higher level of trust, employees are more likely to use ESN for knowledge sharing and create positive expectations and experiences (Bieńkowska et al., 2018; Cropanzano et al., 2017). Compared to non-social technologies, where online interaction, sharing, and collaboration are less common, these features are inherently a part of social technologies. Since these features are affected by the level of trust among users, social technologies also require a high level of trust. Second, the inappropriate use of social technologies for knowledge sharing within organisations is reduced by formal and informal governance. Formal and informal governance provides operational guidance and social interaction to reduce the risk of knowledge leakage out of organisations and encourages a long-term orientation (Stohl et al., 2017; Zheng & Zhao, 2013; Foss et al., 2010). The social aspect of technologies such as ESN means that formal governance by itself is not sufficient. Instead, informal governance, operating through the community of users that use the technology, which provides exemplars to model their behaviour, is needed to reduce inappropriate use.

In terms of practical contributions, managers in organisations that use ESN should develop a trusted environment in their workplace to encourage ESN use. At the same time, they should also use informal means to establish norms of appropriate behaviour or encourage any that they observe. As a social technology, ESN requires careful and constant oversight through formal and informal mechanisms to ensure it provides value to organisations.

Two original contributions are further elaborated in Chapter 6, section 6.4, page 141.

## 1.5 RESEARCH CONTEXT - FINANCIAL SECTOR

This study was conducted among firms in the financial sector. The finance industry was chosen as the study's context because financial institutions are known to use technologies to innovate (Alt, Beck, & Smits, 2018). Over the last few years, financial technology (FinTech) start-ups have been coming up with new business models that use emerging technologies to transform financial services. Banks and insurance companies have begun to use social media (such as Twitter and Facebook) to channel customer interaction. Besides, the financial sector has lower

employee turnover than other service industries such as retail and hospitality, making it more likely that the use of ESN for knowledge sharing occurs in the financial sector compared to other service industries over the longer term. It is worth noting that the financial sector is very complicated as it requires a vast amount of knowledge for continuous collaboration and knowledge sharing. On the other hand, it also follows strict rules, privacy, and regulation (Ali & Ahmed, 2006). The high regulatory environment makes ESN use for knowledge sharing more difficult than in other industries. Therefore, with limited literature, this study investigates how sharing a vast amount of knowledge using ESN can overcome the challenges mentioned in point 1.3.

## 1.6 METHODOLOGY

To address the research question, this study used a mixed-method sequential approach - qualitative (interviews) followed by quantitative (survey) (Creswell & Creswell, 2018; Venkatesh et al., 2013). A mixed-methods approach was adopted due to limited prior research and theorising on the use of ESN to enhance service innovation. Using the qualitative method first helped evaluate the appropriateness of the conceptual framework put forward here for studying this phenomenon. Combining both methods provide stronger inferences, richer interpretation of the findings, and better validation of the results (Creswell & Creswell, 2018). Additionally, using both approaches to answer the same research questions (triangulation) reduces the potential for bias in the findings, thereby increasing their reliability.

The qualitative study was conducted using purposive sampling with key informants (product managers/owners/developers) from local banks in New Zealand. Interviews were conducted with eleven participants from three banks and two investment firms. The outcomes of interviews enriched the conceptual model that was developed using existing literature. For the quantitative study, a global survey was conducted by contacting prospective participants (key informants) via LinkedIn and other finance associations and communities.

## 1.7 CHAPTER SUMMARY

This chapter laid the foundation for the thesis. A brief theoretical background and the significance of this study were provided to identify the research problems and the research question. The research context and methodology were also highlighted. The following table (Table 1) summarizes the key points of this chapter.



Table 1 Overview of Research Topic

Research topic: Understanding the impact of Enterprise Social Networking (ESN) for knowledge sharing on service innovation			
<i>Research problems</i>	<i>Research question</i>	<i>Theoretical approach</i>	<i>Research method</i>
ESNs can help service firms innovate but they are not effectively used. This could be due to:	The following research question is proposed to address the research problems:	To address the research problems the following concepts are used:	Mixed methods - first qualitative (interview) then quantitative (survey)
<i>a. Low acceptance of ESN:</i> Employees may develop awareness of their peers, potentially leading to <i>interpersonal conflict</i> ; Employees may feel that they can be more easily monitored, therefore, <i>damaging their reputation</i> .	<i>How can organisations encourage employees to use ESN for knowledge sharing to enhance their innovation outcomes?</i>	a. Social exchange theory posits the importance of trusting relationship among employees to encourage ESN use – when there is a high level of trust, employees are more likely to use ESNs to share knowledge because it reduces their fear of being made redundant after sharing.	
<i>b. Inappropriate use of ESN:</i> Employees may be distracted from their work while using ESN, causing <i>low productivity</i> ; Employees may <i>leak firm-sensitive information</i> to external parties, either deliberately or accidentally.		b. Governance mechanisms (both formal and informal) could mitigate the relationship between ESN use for knowledge sharing and innovation	

This thesis is presented in six chapters. A brief description of each chapter is given below with a main point highlighted in Table 2.

*Chapter 1* (this chapter) gives an overview of the thesis to the readers, including research background, significance and motivation of the research, research problems, aims and the research question. This chapter also covers a brief note on methodology, research context as well as main concepts and how they are related to each other.

*Chapter 2* contains the literature review and the theoretical conceptualisation. The main concepts (innovation, knowledge sharing, enterprise social networking, and governance) are elaborated with supporting literature, along with social exchange and governance as theoretical

lenses to support challenges caused by ESN use. Based on literature and theory, a conceptual model is also developed in this chapter.

*Chapter 3* presents the research methodology used in this study. It presents the rationale behind the use of sequential mixed methods, with a case study (phase I) followed by a survey (phase II). This chapter also explains the data analysis techniques for both methods.

Table 2 Thesis chapter summary

THESIS CHAPTERS		CONTENTS
CHAPTER 1	INTRODUCTION	Background, significance along with research problems and the research question given.
CHAPTER 2	THEORETICAL APPROACH AND CONCEPTUAL MODEL	Presents literature review, theoretical approach, followed by conceptual model
CHAPTER 3	METHODOLOGY	Describes the mixed methods (sequential) followed by qualitative and quantitative design
CHAPTER 4	QUALITATIVE RESULTS, ANALYSIS AND RESEARCH MODEL	Presents details of the qualitative study based on interviews and the findings to justify the constructs of the research.
CHAPTER 5	QUANTITATIVE RESULTS AND ANALYSIS	Presents quantitative data results & analysis using Structured Equation Modelling (SEM-AMOS)
CHAPTER 6	DISCUSSION AND CONCLUSION	Discusses and review the finding of the research and link with the literature. The conclusions summarise the main points of the research including contribution, limitations and future research.

*Chapter 4* presents a detailed discussion of the results and analysis of the first phase of the study: the qualitative research. Thematic analysis is applied on the qualitative data (interviews) and the emergent themes are examined to inform the second phase (quantitative) of the study. This is followed by developing a research model and the hypotheses of this study.

*Chapter 5* presents a detailed discussion of the results and analysis of the second phase: the quantitative study. The data collection process is discussed, along with the statistical analyses. Constructs are statistically tested using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) using SPSS-AMOS v26. EFA is used to assess the reliability of the data set, and CFA is used to assess the measurement model and test the hypotheses.

*Chapter 6* is a detailed discussion of both the qualitative and quantitative studies and summarises the key findings. This includes relating the results to the scholarly work in the

literature review, new insights and contributions, and implications for theory and practice. This chapter also presents the conclusions of the research. Both theoretical and practical contributions are discussed. This is followed by the limitations of the study and the future directions for the research.

The next chapter contains the literature review and the proposed conceptual model.

## CHAPTER 2: THEORETICAL APPROACH AND CONCEPTUAL MODEL

### 2.1 CHAPTER OVERVIEW

The purpose of this chapter is to review the relevant literature to understand how knowledge sharing through enterprise social networks influences service innovation. This chapter begins by exploring service innovation and its relationship with knowledge sharing. This is followed by a discussion of the literature on enterprise social networking, which is the technology being studied, and its relationship to innovation, including possible challenges with its use. Thereafter, social exchange theory, which will be used to study the research problem of this study, is explained, followed by a review of formal and informal governance. The chapter concludes with a conceptual model of this study.

Before we proceed to the literature review, four key constructs used in this study are defined. They are:

- a. Service innovation: the development of new and/or improved products and services for customers, including experience shared by employees (Lu & Tseng, 2010; Calantone et al., 2002).
- b. ESN for knowledge sharing: the use of ESN to share knowledge within an organisation (Leonardi et al., 2013; Leonardi & Neeley, 2017; Robertson & Kee, 2017).
- c. Trust: refers to intra-organizational trust, consisting of the level of trust between superiors and subordinates, and the level and trust between co-workers (Bienkoska et al., 2018).
- d. Governance: mechanisms that provide policies and standards (formal) and support open interaction, collaboration (informal) required for sharing knowledge via ESN (Stohl et al., 2017; Foss et al., 2010, Turner & Makhija, 2006).

### 2.2 SERVICE INNOVATION

De Jong et al. (2003) defined services in this way:

“Consumers (usually) pay in advance for something which they hope to receive, meaning that services are, to a large extent, based on trust. For instance, a tourist expects that his/her ticket, which has already been paid for, will actually give him/her access to the plane and if for any reason something goes wrong, he/she expects that the insurance company will compensate him/her for the loss” (p.15).

Service organisations vary in terms of the nature of service, as well as size, ranging from large corporations, such as airlines, banks, and hotels, to small and medium-sized businesses, such as restaurants, laundries, and beauty parlours (Sampson & Spring, 2012, Lu & Tseng, 2010). Although service and manufacturing industries function differently from each other, they both aim to provide better products and services to customers (Lu & Tseng, 2010). For instance, customers are highly engaged when receiving a service or product, and customers' attitude and behaviour affect the way they perceive services or products. On the other hand, manufacturers, unlike service providers, alone determine the appearance and price of a product. The output of manufacturing and services make them different in the sense that one separates the product from sales (manufacturing), while the other integrates both product and sales (Evangelista, 2000).

Some authors distinguish services from manufacturing by characterising services as being more intangible, inseparable, heterogeneous, perishable, and marked by higher customer interactivity compared to manufacturing (Durst et al., 2015; Sampson & Spring, 2012, Lu & Tseng, 2010). These characteristics are also supported by Vermeulen (2001) and De Jong et al. (2003) who examined innovation in services across sectors, such as finance, retail, wholesale, hotels and restaurants, and personal services. The following table distinguished these characteristics based on services and products (Vermeulen, 2001):

Table 3 Service and product innovation

<b>Services</b>	<b>Products</b>
Intangible	Tangible
Simultaneous production and consumption: customers participate in production	Separation of production and consumption: customers do not normally participate in production
Heterogeneous	Homogeneous
Perishable: cannot be kept in stock	Can be kept in stock

(Source: Vermeulen, 2001)

One of the characteristics of services is their intangibility, meaning they cannot be viewed as an object and are therefore not reproducible (Meigounpoory et al., 2015). Similarly, every service is unique (heterogeneous) and it is also not possible to completely be reproduced. Since production and consumption of services take place simultaneously in collaboration with the customers, it is hardly possible to separate them (Gronroos, 2000). Some authors have argued that not all services follow the above characteristics and that manufacturing products may also have these characteristics (De Jong et al., 2003). For instance, in transport services, travel documents and insurance policies are the physical parts of the service; in IT service delivery, software service providers tend to offer homogeneous products which are not produced and

consumed simultaneously; and finally, yet most manufacturing products are increasingly accompanied by additional services, like repair and maintenance services (De Jong, et.al 2003).

### 2.2.1 Service and product innovation

Schumpeter (1934) defined innovation as the “carrying out of new combinations” (p. 66). In a similar vein, the Organisation of Economic Co-operation and Development (OECD, 2005) called innovation “the implementation of a new organisational method in the firm’s *business practices, workplace organisation...*innovations in workplace organisation involve the implementation of new methods for *distributing responsibilities and decision making* among employees for the division of work within and between firm activities” (p.46; emphasis added). Innovation can be incremental or radical. Most innovations are incremental as they present modifications or minor improvement of existence products/services (Lee et al., 2017; Roberts & Dinger, 2018). Radical innovations, on the other hand, involves creating a completely new offering, revolutionary ideas and/or creating a new market/s (Lee et al., 2017). Roberts and Dinger (2018) used the term exploitative innovation to denote incremental improvements in firm’s existing products and services, and exploratory innovation to more radical innovations, for instance, new products and services (Abedin & Qahri-Saremi, 2018).

Knight (1967) categorised four different types of innovation:

- *Product or service innovations*: new products or services which the organisation produces, sells or gives away;
- *Product or process innovation*: new elements in the organisation’s task, decision and information systems;
- *Organisational-structure innovation*: altered work assignment, authority or formal reward system); and,
- *People innovation*: altering personnel by dismissing or hiring them, and modifying the behaviour and belief of people in the organisation via education.

These four basic types of innovations are interrelated as one type is likely to create additional changes in other three categories. Additionally, Knight (1967) argued that organisational-structure innovation is a complementary to product/process innovation as the formal includes interactions and relations among the participants in the organisation. This interaction between organisational-structure innovation and product-process innovation was examined by Damanpour (1991), who came up with thirteen determinants of innovation rates (Hage, 1999): *specialization, functional differentiation, professionalism, centralization, managerial attitude toward change, technical knowledge resources, administrative intensity, slack resources, and*

*external and internal communication*. Damanpour (1991) showed that centralization had a negative relationship with innovation, formalization had a weak relationship, and managerial attitudes toward change had a positive relationship with innovation.

Hipp and Grupp (2005) distinguished three types of innovations:

- *service innovations*, i.e., innovation by introducing new or improved services;
- *process innovations*, including new and improved work methods in process by which a specific service is produced; and,
- *organisational innovation*, includes improvements in wider organisational structures or processes.

Other scholars have similar classifications. For instance, ‘service innovation’ has been referred to as *product innovation* (Damanpour & Gopalakrishnan, 2001), *service product innovation* (Oke, 2007) and *innovation in the service concept* (Den Hertog, 2000). These authors, however, did not distinguish process innovation and organisational innovation; instead, they labelled them as *process innovation* (Damanpour & Gopalakrishnan, 2001), *service innovation* (Oke, 2007) or *innovation in the service delivery system* (den Hertog, 2000).

According to Lu and Tseng (2010), service innovation means new methods in business practices, new ways of delivering products and services and new ways of interacting with customers. As competition increased, divergent perspectives of service innovation were proposed (Witell et al., 2016). Table 4 provides various definitions of service innovation. The common themes from these studies include new business thinking, new service experiences, novel ideas, new concepts, and new development (Kuo, Kuo, & Ho, 2014;ENZ, 2012; Lu & Tseng, 2010).

Table 4 Selected Definitions of Service Innovation

Article	Definition
Meigounpoory et al. (2015)	New customer interaction, new value system/business partners, new revenue model, new organisational or technological service delivery system
López & Ramos (2015)	Radical innovations, new or improved services; process innovations; marketing innovations; organisational innovations
Kuo, Kuo, & Ho, (2014)	New way of business thinking, flexible operational procedures and processes, which can transform organisations to meet the needs of their markets
ENZ (2012)	Introduction of novel ideas, new ways of delivery, new service business models, investment in employee performance, or management of the customer experience
Lu & Tseng (2010)	A process which contains new concepts, production, development and implementation

Oke (2007)	New developments to deliver core service products and to make those core service products more attractive to consumers.
Hipp & Grupp (2005)	Organisation of innovation process, Intangibility, Customer integration, Structure of the service sector and Regulatory issues
Avlonitis et al. (2001)	Services new to the market, new to the company services, new delivery processes, service modifications, service line extension and service repositioning
den Hertog (2000)	The service concept, the client interface, the service delivery system and technological options
Gardrey et.al. (1995); Damanpour (1991)	New development of product or service, new structure or administrative systems
Schumpeter (1934)	New good, method of production, new market, new supply of raw materials

Recent research has a broader understanding of innovation (Ryu & Lee, 2016), covering both tangible and intangible products and services (Vergori, 2014). Carlborg, Kindström, & Kowalkowski (2014) examined the evolution of research on service innovation. They reviewed 128 articles published between 1986 and 2010 and found that there were three phases: *formation* (1986–2000), focused on offering development; *maturity* (2001–2005), focused on the involvement of customers; and *multidimensional* (2006–2010), addressed the involvement of both customer and innovation. The last phase studied the integration of service and product innovations, knowledge management practice, the relationship between service innovation and firm resources, and the increased relevance of strategy and policy issues. Silva et al., (2014) also examined how research in service innovation has changed over time and grouped it into four phases: *negligence (until 1980s)* - innovation was only associated with material technology and equipment; *assimilation (1980s to 90s)* - researchers studied the impact of technology on services; *demarcation (1990s to present)* - the service sector was differentiated from manufacturing; and, *synthesis (present day)*: the previous approaches were integrated. Both Carlborg et al (2014) and Silva et al (2014) found that service innovation research has evolved to integrate both products and services (Witell et al., 2016).

Innovation is a “complex phenomenon” (Lam, 2005, p.31) that consists of information flows, changing responsibilities, accountability, command lines, as well as a number of hierarchical levels and divisional structure (Armbruster et al., 2008). Cultural capabilities (Ettlie & Rosenthal 2012), human capital capabilities (Hipp & Grupp, 2005) customer interface and effective communication (Adiguzel, 2019) are more significant in service innovation than manufacturing innovation.



### 2.2.2 Service innovation and knowledge sharing

To analyse the role of knowledge sharing in service innovation, two conceptual frameworks are used: a) service framework, and b) service-dominant (S-D) logic. The table below summarises both frameworks and the role of knowledge sharing in service innovation.

Table 5 Service framework and S-D logic in relation to knowledge sharing

Framework	Dimensions/activities	Role of knowledge sharing
<b>Service framework</b> (Ryu & Lee, 2016; Durst, 2015, Barrett, et at., 2015; den Hertog, 2000)	Concept, interface, delivery and technology (core reference: den Hertog, 2000)	The service delivery system is assessed based on inter- organisational (external knowledge sharing) and intra- organisational service (internal knowledge sharing)
<b>Service-dominant (S-D) logic</b> (Chen, 2017; Lusch & Nambisan, 2015; Ordanini & Parasuraman, 2011; Vargo & Lusch, 2004)	Service eco-system, platform and co-creation (core reference: Vargo & Lusch, 2004)	Operant resources comprise knowledge management strategies that influence new service development performance.

The first framework, proposed by den Hertog (2000), consists of four dimensions that allows a better understanding of service innovation in the knowledge-based economy (Durst et al., 2015). These dimensions are: the service concept, the client interface, the service delivery systems, and technological options (Table 6).

Table 6 Four dimensions of service innovation

Service dimensions	The concept (1)	Client interface (2)	Delivery system (3)	Technology (4)
<b>den Hertog, 2000/2010</b>	Activities that a service provider performs for a customer	Design of the interface between service provider and client	Internally managed, allows service workers to perform their jobs properly	ICTs that have enabled numerous service innovation
<b>Barrett et al., 2015</b>	Activities that a service provider performs for a customer	Design of users/provider interface	Intra-organisational: knowledge integrated (sharing) Inter-organisational: Knowledge integrated (sharing)	Digital technology embedded in products enable innovation

(Source: den Hertog, 2000; Barrett et al., 2015)

As depicted in Table 6, the different dimensions provide a general view of how an organisation develops and delivers core services to its customers:

- the *service concept* refers to the value that is created by the service provider in collaboration with the customer and is highly intangible (e.g., a call centre). The service concept could be combined to provide services to customers in a bundle, for instance, when telecommunication firms offer integrated bundles of their various services (telephone, broadband access and TV);
- the *client interface*, which is the interface between the service provider and its clients, is an important source of innovation (e.g., Electronic Data Interchange; electronic banking, ranging from the introduction of automated teller machine (ATM), to the use of mobile phones in banking),
- the *service delivery system*, which allows service workers to perform their job properly and offer innovative services (e.g., after-sale service)
- *technological options* (e.g., facilitating or enabling factor)
- *new business partners* (i.e., actors involved in jointly co-producing a service); and
- *new revenue models* (i.e., balancing the cost and revenue to the service concepts innovation).

Some authors have argued that service innovation involves more than one dimensions. For instance, automated teller machine (ATM), as an example, involves both a new IT system (new technology) and new client interface (Aas & Pedersen, 2011). Therefore, service innovation could cover more than one activity to affect the service dimensions. The following table provides examples of five service innovation patterns along with the four dimensions of the service innovation framework used by den Hertog (2000).

Table 7 Examples of service innovation industry with four dimensions

<b>Innovation dimension/service industry</b>	<b>The concept (1)</b>	<b>Client Interface (2)</b>	<b>Delivery system (3)</b>	<b>Technology (4)</b>
<b>Retailing</b>	New formulas new locations (e.g., outlet stores)	Electronic interfaces and self- service concepts	Allow clients to co-produce services or add more personal service.	ICT systems allowing for optimisation of logistics.
<b>Transport and logistic service</b>	Contract logistics and service provider	cross checking and supply chain directors	E-auction, tracking and tracing by clients	Scanning technology, on-board computer for navigation E-commerce
<b>Financial services</b>	customer loyalty and integrated financial services	ATM, electronic banking, mobile banking	Customer Relation Management combined with self-service.	ICT for transaction processing and interfacing with clients.

<b>IT services</b>	Helpdesk	Electronic distribution of software and updates.	Virtual team working	CRM, ERP, supply chain software
<b>Technical Engineering</b>	Integrated ‘one stop shopping’	Closer ties with client & mixed project teams	Advanced competence & KMS	virtual project-teams, advanced PMS

(Source: den Hertog, 2000)

Extending den Hertog’s (2000) framework, Barrett (2015) proposed that the “delivery system” dimension could be separated into inter and intra-organisational service delivery systems (see Table 6). Inter-organisational services refer to interactions with customers, suppliers and other stakeholders, whereas intra-organisational services are about knowledge management and integrating the sharing of knowledge by employees into service innovation. For example, an inter-organisation perspective would ask “how do firms in a supply chain interact to produce a service?”, while an intra-organisation service view, on the other hand, would ask “how is knowledge integrated in service activities”? (Barrett et al., 2015). Although innovation in services is made possible by collaboration and communication with consumers, internal arrangements that involves employees are also critical for developing service innovation (Pavlou & El Sawy, 2011). Intra-organisational knowledge sharing is not simply about getting information from different sources, but also includes experiences shared by individuals across departments and systematically storing information in organisational memory (Calantone et al., 2002).

The second framework is based on service-dominant logic (S-D logic). This framework emphasises the value of co-creation to explain the involvement of actors (service provider and service beneficiary, e.g., customer) through resource integration during the development of innovation (Chen, 2017; Lusch & Nambisan, 2015; Ordanini & Parasuraman, 2011; Vargo & Lusch, 2004). This approach to resource integration in S-D logic moves away from traditional views of resource “assimilation”, and “demarcation” to a “synthesis” approach, stressing that service innovation is a collaborative process involving a diverse network of actors (Lusch & Nambisan, 2015), that can lead to value-adding service innovations (Storey & Kahn, 2010).

In S-D logic, a service (the application of specialized skills and knowledge) is the fundamental basis of exchange, and operant resources (knowledge and knowledge renewal) are the fundamental source of competitive advantage; there is thus a need for effective knowledge transfer mechanism, i.e., knowledge interfaces (Ordanini & Parasuraman, 2011). To adapt their

offerings to fit their customers' needs, service firms need to possess a variety of knowledge of customer requirements, product quality, processes, and organisational designs (Tavasooli & Karlsson, 2015; Lu & Tseng, 2010). Knowledge interfaces enable knowledge integration and facilitate knowledge transfer between a firm and its customers (external knowledge transfer) and within firm (internal knowledge transfer). In the quest to gain knowledge, while external knowledge sources are important for acquiring customers' input when developing new services, internal interaction in the innovation process is also essential (Muninger et al., 2019; Barrett et al., 2015; Meyer, 2010; Gallouj, & Weinstein 2009). This emphasises collaborating to integrate and share knowledge and practices (Felix, Rauschnabel & Hinsch, 2017). Knowledge sharing is seen as an antecedent of innovation to sustain competitive advantage (Muninger et al., 2019; Lei, Nguyen, & Le, 2018). To adapt their offerings to fit their customers' needs, service firms, therefore, need to possess a variety of knowledge on topics such as: the requirements of their customers, the quality of their products, the conditions of their processes, and their organisational designs (Tavasooli & Karlsson, 2015; Lu & Tseng, 2010).

Service firms face a high level of uncertainty in their competitive environment because of globalization and disruption caused by the digitization of businesses (Zhang et al., 2016, Nambisan, 2013). Uncertainty makes it important to obtain more information from diverse sources and making decisions to get it quickly and innovate better (Nambisan, 2013). These needs can be fulfilled with the use of digital technology such as social computing technologies (such as enterprise social networking) to facilitate information flow, knowledge integration and innovation process (Abhari et al., 2020; Bhimani et al., 2019; Muninger et al., 2019; Lokage et al., 2019; Ryu & 2018; Abedin & Qahri-Saremi, 2018; Lam, Yeung, Cheng, 2016). Social computing technologies are social applications and services such as blogging services, chat applications and social media platforms that facilitate interaction between service providers and customers to exchange knowledge in a social setting (Lokage et al., 2019; Abedin & Qahri-Saremi, 2018). In the next section, knowledge sharing is elaborated on, and is followed by a discussion of the role of social technology, especially enterprise social networking (ESN), for knowledge sharing.

## 2.3 KNOWLEDGE SHARING

In the previous section, service innovation was explained based on two frameworks (den Hertog, 2000; Vargo, 2004). Both frameworks include intra-organisational knowledge sharing as a key aspect of innovation. In the service framework, the service delivery system is conceptualised as an intra-organisational service that incorporates internal knowledge sharing.

Under S-D logic, operant resources are managed via knowledge management strategies (Storey & Kahn, 2010). This section provides further detail on knowledge sharing, including a taxonomy of knowledge sharing, strategies for sharing knowledge (personalised and codified), and the different processes (knowledge donation and collection) that need to take place during the act of innovating in products and services.

### 2.3.1 Knowledge sharing – definition and taxonomy

Knowledge sharing is defined as collaborating with others, developing and generating new ideas, and solving issues with individuals (Cummings, 2004). Ipe (2003) posits that knowledge sharing is a process by which the tacit knowledge of individuals is converted, understood and used by other individuals. The converted form refers to an explicit knowledge that can be documented and used by other individuals. Various definitions of knowledge sharing are depicted in Table 8 below.

Table 8 Selected definitions of knowledge sharing

<b>Knowledge sharing definition</b>	<b>Reference</b>
Providing and receiving knowledge from others	Hsu & Chau, 2014
Collaborating with others and developing new ideas	Wang & Noe, 2010
Implement processes in collaboration with others.	Cummings, 2004
Knowledge donation and knowledge collection	van den Hooff & de Leeuw van Weenen, 2004
Making knowledge available to others in the organisation	Ipe, 2003
Sharing ideas and expertise with one another	Bartol & Srivastava, 2002

Although both knowledge sharing and knowledge transfer are sometimes used synonymously (Bernsteiner, 2019), some scholars have distinguished knowledge transfer from knowledge sharing (Bosua & Scheepers, 2007). Knowledge transfer is the movement of knowledge from one point of time to another and is context-specific (Grover & Davenport, 2001). The transfer is between different units, divisions, or organisations rather than individuals (Cabrera, Collins, & Salgado, 2006). An example of knowledge transfer is found in helpdesks (check-out) and face-to-face practices. Knowledge sharing is considered a dual process based on activities such as learning-by-observation, listening and asking, sharing ideas and giving advice (Bosua & Scheepers, 2007). Hendriks (1999) states that “it takes knowledge to acquire knowledge and therefore to share knowledge” (p. 92).

Some authors also distinguish knowledge from information. Knowledge is the processed information that resides in the mind of individuals, whereas knowledge becomes information

when it is articulated in words, text and graphics (Alvin & Leidner, 2001). In terms of sharing knowledge, there is not much difference between the two (Alvin & Leidner, 2001; Bartol & Srivastava, 2002). Although knowledge exchange has been used interchangeably with knowledge sharing (Cabrera et al., 2006), knowledge exchange includes knowledge sharing (employees providing knowledge to others) as well as knowledge seeking (employees searching for knowledge from others). In the organisational context, knowledge sharing is about social interaction, which leads employees to exchange knowledge, experiences, skills, and shared decision (Marouf, 2016; Lin, 2007). In this study, the term “knowledge sharing” refers to knowledge that is shared and is internal to an organisation, consistent with previous studies (Marouf, 2016; Wang & Noe, 2010; Lin, 2007; Alvin & Leidner, 2001).

### 2.3.2 Types of knowledge

Although different authors have defined knowledge sharing in different contexts, the epistemological distinctions of knowledge include: subjective versus objective, tacit versus explicit, and procedural versus declarative (Grant, 1996). The most cited distinction is between explicit and tacit knowledge (Polanyi, 1966; Nonaka, 1994). Explicit knowledge is easily documented, captured, codified and transmitted (Polanyi, 1966; Wang & Wang, 2012), and is related to “know(ing) about facts and theories” (Grant, 1996, p.111). On the other hand, tacit knowledge cannot be shared as it resides in the mind of individuals and is difficult to formalize and communicate (Polanyi, 1966); it is related to “know how” (Grant, 1996, p.111). Table 9 lists how some researchers have contrasted tacit and explicit knowledge:

Table 9 Types of knowledge (selected literature)

<b>Reference</b>	<b>Knowledge types</b>
Jalonen (2014)	technical approach (explicit) and people-oriented approach (tacit)
Borgatti and Cross (2003)	Content (know-what), knowledge network (know-who), knowledge processes (know-how)
Smith (2001)	Process (explicit) and practice (tacit)
Alavi and Leidner (2001)	Procedural (know-how), casual (know-why), relational (know-with) and declarative (know-about)
Wasko and Faraj (2000)	Knowledge as an object (explicit), and embedded in people (tacit),
Hansan, et. al (1999)	Personalised and Codified

Some similarities are noted in the above types of knowledge sharing. For instance, Borgatti and Cross’ (2003) knowledge processes (know how) is similar to Alavi and Leidner’s (2001) procedural knowledge (know-how). On the other hand, Jalonen’s (2014) technical approach

leads to a codification strategy that is aligned with explicit knowledge, while the people-oriented approach leads to a personalisation strategy is aligned with tacit knowledge (Hansan, et. al, 1999). Similarly, Wasko and Faraj (2000) reference to knowledge as *an object* is similar to thinking about knowledge as explicit, as it exists independently of human action; while knowledge *embedded in people* is similar to tacit knowledge, as it is not separable of the human actor. Therefore, value is attributed to both tacit and explicit knowledge, which has a significant impact on how individuals share it (Ipe, 2003).

### 2.3.3 Personalised and codified knowledge sharing

Usually, two parties share knowledge: one is the donator (van den Hooff & de Leeuw van Weenen, 2004; van den Hooff & Ridder, 2004; Zhang & Jiang, 2015), or provider (Lee, 2001), who is the source of the knowledge being disseminated, and the other is the collector or receiver (Lee, 2001), who provides “feedback questions, amplifications, and modifications that add further value for the original sender, creating exponential total growth” (Quinn et al., 1996, p. 8). Van den Hooff and de Leeuw van Weenen (2004) imply that knowledge sharing behaviour consists of bringing (donating knowledge) and getting (collecting knowledge). According to Andrawina et al. (2008), “bringing” means communicating one’s personal intellectual capital to others while “getting” means consulting other individuals about their intellectual capital. Individuals are actively sharing knowledge during this process of donation and collection (van den Hooff & Ridder, 2004).

In this study, knowledge sharing is viewed as a process of knowledge donation and knowledge collection (Van den Hooff & de Leeuw van Weenen, 2004) for both personalised and codified knowledge strategy (Hansan et al., 1999). Both strategies are explained below:

- a. *Personalised knowledge strategy*: This strategy focuses on the human dimension (Choi & Lee, 2002), which occurs through people-to-people contact (Hansan et al., 1999), and is based on social interaction (Choi & Lee, 2002), using dialogue to communicate through a social network (Swan et al., 2000), and discussion forums (Greiner et al., 2007). Personalised knowledge is personal, informal, hard to formulate, and incorporates mental models, values and perceptions (Mladenović & Krajina, 2020).
- b. *Codified knowledge strategy*: This strategy points to the system dimension (Choi & Lee, 2002), as knowledge sharing takes place through codifying and storing knowledge (Choi & Lee, 2002), using information technology (Swan, et al., 2000) and a people-to-

document strategy (Hansen et al., 1999). With a codified strategy, companies can reuse knowledge with little cost (Jarrahi & Sawyer, 2013; Greiner et al., 2007; Choi & Lee, 2002). Codified knowledge is systematically organised, stored, documented and accessible on multiple occasions (Mladenović & Krajina, 2020).

Hansen et al. (1999) assert that a personalised strategy is expensive and slow compared to a codified strategy. Firms that use a codified strategy rely on the “economics of reuse”: they hire people and train them to develop and implement change programs and information systems. Other firms that use a personalised strategy rely on “expert economics”: they build networks of people who share knowledge face-to-face and over the telephone, email and online.

Some authors argue that personalised and codified strategies should be combined (Choi & Lee, 2002; Jasimuddin et al., 2005; Mukherji, 2005; Ajith Kumar & Ganesh, 2011; Ng, Yip, Din, & Bakar, 2012). Choi and Lee (2002) refer to this as a “balanced” view (Zack, 1999; Jorden & Jones, 1997). This is because relying on one strategy may not be enough to face the turbulence of the market and bringing people together does not necessarily lead to innovation if the knowledge is not exploited (Greiner et al. 2007). Some of the concerns of codification, such as information overload and imitation by competitor can be overcome by the personalised strategy, and some of the concerns of personalised knowledge sharing, such as employee reluctance to share knowledge and a loss of tacit knowledge when employees leave, could be overcome by codification (Ajith Kumar and Ganesh, 2011). Firms that balance both strategies tend to be profitable (Bierly & Chakrabarti, 1996) and encourage the development of innovative knowledge (Jordan & Jones, 1997). Pham and Hara (2009) argued that integrating both personalised and codified knowledges facilitate problem-solving, decision-making, and knowledge exploration, and enhances firm performance (Choi & Lee, 2003). Therefore, it is vital that employees should be encouraged to use both types of knowledge (Mladenović & Krajina, 2020). Whatever strategy is used by an organisation, proper mechanisms should be in place to achieve its desired goals (Poleacovschi et al. 2018; Turner and Makhija, 2006). These mechanisms could be formal (such as structural, leadership, etc.) or informal (such as networks, management support, etc.) These are discussed later.

Following van den Hooff and de Leeuw van Weenen (2004), this study classifies knowledge sharing into knowledge donation and collection. Knowledge sharing in an organisational context is thus defined as the employees’ ability to actively donate and collect knowledge



donating about their experiences, ideas, expertise (i.e., personalised), and information (i.e., codified). Table 10 below describes how this can be operationalised.

Table 10 Knowledge strategy and knowledge sharing

Knowledge strategy	Knowledge sharing (donation & collection)
Personalised knowledge	When I learn something new, I tell my colleagues in my department about it
	When they learned something new, colleagues within my department tell me about it
Codified knowledge	I share the information I have with colleagues within my department when they ask me to
	My colleagues share information they have within my department when I ask about it

*(Adapted from: Van den Hooff & de Leeuw van Weenen, 2004)*

#### 2.3.4 Knowledge sharing and the use of digital technology

As discussed above, both personalised and codified knowledge are necessary to support firm-wide knowledge initiatives to increase the level of service innovation. As service innovation has become more important, the use of digital technology to conceive, develop, and deliver services has also increased (Ryu & Lee, 2018). The increasing rate of digitization has increased the level of interaction (Ding et al., 2010; Barrett et al., 2015), enabled knowledge to flow more quickly both within and outside organisations (Bhimani, Mention & Barlatier, 2019), and facilitated knowledge integration (Forman & van Zeebroeck, 2019). Thus, using digital technology for knowledge sharing is critical for business success (Lam, Yeung & Cheng, 2016). Social media is a type of digital technology that facilitates knowledge integration, knowledge sharing and innovation (Mladenović & Krajina, 2020; Abhari et al., 2020; Forman & van Zeebroeck, 2019; Lu, 2019; Abedin & Qahri-Saremi, 2018; Qi & Chau, 2018; Ryu & Lee, 2018). The next section is about the role of social media in this process.

### 2.4 SOCIAL MEDIA

The term *social media* incorporates concepts such as “Online Communities”, “Web 2.0”, “Enterprise 2.0”, “Virtual Communities”, and “Social Networking Sites” (Ngai, Tao and Moon, 2015). The features of social media tools include their openness, two-way communication, and open-ended feedback (Kwahk & Park, 2016), thereby enabling individuals to share their thoughts, opinion and knowledge (Kaplan & Haenlein, 2010). Social media tools include blogs, wikis, media sharing tools (audio, photo, video, text), networking platforms (including Facebook), and virtual worlds (Bryer & Zavatarro, 2001).

Social media refers to “Internet-based applications that build on the ideological and technological foundations of Web 2.0, that allows the creation and exchange of user generated content” (Kaplan & Haenlein, 2010, p. 62). Both the ideological and technological foundations are important concepts to understand social media. The ideological foundations means that social media is built on people’s ability to participate and self-govern, which are entirely different from those associated with previous technologies (Treem & Leonardi, 2012). The technology foundations refer to the use of Web 2.0 platforms for social media that are highly interactive (Muninger et al 2019), facilitating information flow and improving internal and external collaboration (Lam et al 2016).

#### 2.4.1 Social media use in organisations

Numerous studies have investigated social media use in business. For instance, Gallagher and Ransbotham (2010) used a case study to investigate how social media can facilitate interaction between Starbucks and its customers. Culnan, McHugh, and Zubillaga (2010) investigated the use of four popular social media platforms (Twitter, Facebook, blogs, and client-hosted forums) by Fortune 500 firms. Most social media tools are developed for marketing and human resources purposes, and there is little agreement on how social media should be used in organisations (Duane and O’Reilly, 2015). Often, using social media requires broader changes in an organisation’s structure, leadership and culture (Chin, Evans, & Choo 2015; Aral et al., 2013). When social media is being implemented in organisations, issues that need to be considered include: work-related activities (Zhang et al., 2010), information availability, the existing underlying technologies (Treem & Leonardi, 2012), tool accessibility, policies, legal issues, and the socio-cultural structure (Wang, Medaglia & Saebo 2015).

Table 11 shows the differences between public-facing social networking sites (SNS) and enterprise social networking sites (ESNs). Both can be used to maintain social relationships and interact with individuals, both internal and external to organisations; however, ESNs are primarily used for work-related goals, such as knowledge sharing.

Table 11 Key differences between SNSs and ESNs

<b>Features</b>	<b>Social networking sites (SNSs)</b>	<b>Enterprise social networking sites (ESNs)</b>
<b>User Behaviour</b>	Influenced by site norms, which may be understood differently among users	Influenced by a set of company user guidelines and/or by informal team
<b>Users</b>	Any individual who creates an account	Employees of an organisation

<b>Design</b>	Generally controlled by a parent corporation, but designed to encourage interaction among individual users	Generally controlled by stakeholders within the organisation, designed to encourage interaction among individual, teams, and other units
<b>Audience</b>	Can be global or targeted to subsets of one's articulated network	Configured by user or possibly organisational structure (work team, department, and division)
<b>Goals for Use</b>	Primarily used for social and interpersonal goals, maintaining social relationships, and entertainment.	Primarily used to accomplish work-related goals, such as knowledge sharing and connections with professional contacts

(Source: Ellison et al., 2015)

Social media is still evolving (Ngai et al., 2015), especially how it is used in organisations. Most of the research on social media has studied inter-organisational communication, i.e., communicating with customers, and other business partners (Ngai et al., 2015; Kietzmann, Hermkens, McCarthy, & Silvestre, 2011; Culnan, McHugh, & Zubillaga, 2010; Di Gangi, Wasko, & Hooker, 2010; Gallagher & Ransbotham, 2010). There has been less investigation on the use of social media for internal communications. The internal use of social media is termed “enterprise social networking” (Kalra & Baral, 2019; Cetto, Klier, Richter, & Zolitschka, 2018; Wehner, Ritter, & Leist, 2017; Leonardi et al., 2013), and this term is elaborated on next.

#### 2.4.2 Enterprise social networking (ESN)

Social media applications that are generally used for internal communication by employees can be referred to as enterprise social networks (Wehner et al., 2017; Leonardi et al., 2013). Other terms that have been used include: enterprise 2.0 (McAfee, 2006), organisational social media (Treem & Leonardi, 2012), social software (Dittes & Smolni, 2017; Cardon & Marshall, 2015), and enterprise social networking (Kalra & Baral, 2019; Wehner et al., 2017). McAfee (2006) refers to enterprise 2.0 as “the use of technology to bring people together and let them interact” (p. 2); and “bringing brains together effectively” (p. 16). Most information systems (IS) and organisational researchers have used diverse terms to denote internal social media (Ellison et al., 2015; Leonardi et al., 2013; Razmerita et al., 2014; von Krogh 2012). Table 12 lists the various terms used to describe the use of social media within organisations.

Table 12 Various literature on internal use of SM

<b>Term</b>	<b>Reference</b>
Internal social media	Madsen 2017; Sarigianni et al., 2015
Corporate social media	Krischkowsky et al., 2014
Organisational social media	Treem & Leonardi, 2012

Enterprise social software	Dittes & Smolni, 2017; Cardon & Marshall, 2015; Meyer, 2010
Enterprise social media (ESM)	Pee, 2018; Lu et al., 2018; Engler & Alpar, 2017; van Osch, et al, 2015; Kane 2015; Leonardi, 2014; Leonardi, Huysman & Steinfield, 2013
Enterprise social networking (ESN)*	Kalra & Baral, 2019; Estell & Davidson, 2019; Cummings & Dennis, 2018; Aboelmaged, 2018, Wehner et al. 2017; Choudrie & Zamani, 2016; Stock & Gross, 2016; Mäntymäki & Riemer, 2016, Bala, et al, 2015; Chin et al. 2015; Ellison et al. 2015

(Note: \* this is the term used in this study.)

ESNs are usually cloud-based applications and can be set up using generic tools such as wikis or blogs, or by using tools sold by vendors, such as Yammer, SharePoint, Slack, Chatter, IBM connection, Jira, and Workplace by Facebook. (Pee, 2018; Chin et al., 2015). In this study, the term enterprise social networking (ESN) is used to give importance to both the *social* and *networking* aspects of social media. The social aspect includes the active participation of employees in the creation and management of content (McAfee, 2006). The networking aspect refers to the various mechanisms to connect and facilitate knowledge sharing, exchange, and collaboration. ESN are relevant for knowledge management because they help integrate knowledge (Meske, et al., 2019; Estell & Davidson, 2019; Aboelmaged, 2018; Wehner et al., 2017; Engler & Alpar, 2017; Hacker, 2017; Mäntymäki & Riemer, 2016; Ellison et al., 2015) and support intra-organisational knowledge sharing (Kalra & Baral, 2019; Cetto et al., 2018; Stock & Gross, 2016).

### 2.4.3 Various functions of ESN

Various functions of ESN have been studied in prior research. For instance, wikis and blogs are useful for collaboration and knowledge share (Papadopoulos, Stamati, & Nopparuch, 2013; Majchrzak, Wagner, & Yates, 2006, Wagner, 2004); improving communication and work visibility (Farell, Kellogg, & Thomas, 2008); as well as enhancing social and informational benefits (Jackson, Yates, & Orlikowski, 2007). In a similar vein, both McAfee (2006) and Paroutis and Saleh (2009) emphasized that blogs and wikis facilitate visibility for employees to practice and engage in knowledge sharing. Commercial tools have similar attributes. For example, Yammer, launched in 2008, supports knowledge sharing within and outside the organisation (Neeley & Leonardi, 2016), and is considered the corporate version of Twitter (Azaizah, Reychav, Raban, Simon, Mchaney, 2018). The difference between the two is that Twitter is access to anyone, while Yammer is restricted to an organisation's employees (Azaizah, et al. 2018). Jira is similar to Facebook, but for internal users and not for the general public. Both Jira and Yammer provide visibility into the actions of co-workers (Neeley &

Leonardi, 2016). Another example is Slack, which was launched in 2014, very popular among professionals, and is used in all operating systems including mobile device (Stray, Moe & Noroozi, 2019).

ESN offers transparency by providing an openness to new ideas and learning (Liew, 2019), and support an ongoing conversation to form a common ground in organisations through its three roles: as a social lubricant, as a leaky pipe, and as an echo chamber (Leonardi et al., 2013). A social lubricant means that it supports ongoing conversations on work-related activities and provides opportunities to make informal contact (face-to-face or online) with others. Additionally, informal networks are “lubricated” by social embeddedness (Leonardi et al., 2013) that can further contribute to creating a robust social relationship (Adler & Kwon, 2002). As a “leaky pipe” enterprise social networks enhance the transparency of communication between two actors, allowing third parties to be the recipients of the content and conversation (Leonardi et al., 2013). However, being exposed might allow people to expand their network and find out who is redundant in terms of their knowledge. The increased visibility can increase cross-departmental communication and overcome knowledge boundaries (Majchrzak et al., 2006). However, this might cause information overload due to the vast amounts of information being generated. ESN as an echo chamber indicates that ESNs can link people with a similar point of view and skills (Leonardi et al., 2013), creating communities of practice (COP) (Wegner, 1990). However, ESNs can also isolate fragmented communities, thereby supporting the avoidance of conflicting ideas and opinions and lowering cross-departmental interaction and knowledge sharing (Van Alstyne & Brynjolfsson, 2005).

#### 2.4.4 Single vs multiple ESNs use in organisation

Research on ESN use has taken place in various contexts, ranging from studies on the use of a single ESN to studies on the use of a variety of ESN applications. The table below lists some recent studies on ESN use (Table 13).

Table 13 Recent studies on ESN use (listed in reverse chronological order: most recent first)

Reference	ESN application used	Findings
Chin et al., 2019	Yammer, IBM Connection, Jira	Both consumptive & contributive use is positively associated with increased overall ESN use.
Cetto et al., 2018	Yammer	Knowledge exchanging behaviour is positively related to Enterprise Social Networks.

Aboelmaged, 2018	Facebook, Twitter, LinkedIn, Yammer, SharePoint, etc.	Using ESN to share internal and external knowledge has a positive significant impact on employee productivity.
Van Osch & Stainfield 2018	Group chat, blogging, social networking, social bookmarking	Using ESN is a unique opportunity for workgroups to simultaneously sustain multiple virtual space
Qi & Chau, 2018	Yammer	ESN system directly and indirectly influence organisational learning and knowledge management processes
Madsen 2017	Yammer, IBM Connection, SharePoint	Introducing internal social media (ISM) into organisations help them reap the benefits of co-worker communication on ISM.
Bolisani & Scarso, 2017	Yammer	Yammer is an effective use of an ESN platform in a medium-sized company.
Anders, 2016	Slack	Team communication platforms enable affordances for communication visibility that support knowledge sharing
Mäntymäki and Riemer, 2016	Yammer	ESN enables users to meet their social and work-related goals simultaneously
Bala, 2016	No specific ESN	ESN platforms with multiple functionalities improve social communication and collaboration in the work environment.
Dyrby et al., 2014	Yammer	The interaction between organisational members can help the progress of different collaborative initiatives on ESN platforms.
Leftheriotis and Giannakos (2014)	No specific ESN	Both utilitarian and hedonic values influence employees to use more social media for their work, and there is important relation between the use of social media and the work performance.

One theme suggested by these researchers is the value of studying the use of ESN longitudinally, rather than at one-point of time (cross-sectionally) (Chin et al., 2019), so that the impact of ESN use on knowledge processes and innovation can be more clearly seen. Some researchers have studied the use of a single ESN (such as Yammer) and suggested having more diverse ESN use (Qi & Chau, 2018; Mäntymäki & Riemer, 2016). The importance of studying different platforms is that they provide different functions to facilitate different tasks (Chin et al., 2019; Madsen 2017). It is also possible for users to feel comfortable with one and not with other platforms, giving some level of flexibility in their use (Chin et al., 2019). Others have suggested that since social media is heterogeneous in terms of technical features, both work-related social media and personal-related social media have important effects on the performance of employees (Song et al., 2019).

#### 2.4.5 Comparing enterprise social networking (ESN) and traditional knowledge management systems (KMS)

Although ESN and KMS are similar in functions, ESN is qualitatively different. What makes ESN unique compared to traditional KMS is that ESN serves multiple goals by allowing employees to a) communicate with co-workers and develop interpersonal communication; b) see which co-workers are connected with whom; c) edit, post and comments on others work, and finally, d) view messages by anyone else in the organisation at anytime, anywhere (Robertson & Kee, 2017; Leonardi et al., 2013). In comparison, users who use e-mail can see the connection they are personally involved with but not the connections of others. With social media, individuals could see who is connected with whom and how individuals are connected with the content (Treem & Leonardi, 2012). This connectivity is referred to by Majchrzak et al. (2013) as “networked-informed associating” and increases the productivity of knowledge-relevant conversations among employees.

The term ‘collaboration’ is also essential for studying ESN because ESN is related to tasks, such as file-sharing or shared editing, that are part of collaborative work environments where innovation can occur (Garcia-Morales, Martín-Rojas, & Lardón-López, 2018). Therefore, the goal of ESN is to support organisation knowledge management (Hacker, 2017) by providing easy access to knowledge and expertise, and stimulating problem-solving and decision-making (Dittes & Smolnik, 2017; Leonardi & Neeley 2017). Collaboration among individuals using ESNs can increase employee productivity (Qi & Chau, 2018; Kane, 2015), and make knowledge sharing more open, continuous, and visible (Leonardi, 2017; Leonardi & Meyer, 2015; Majchrzak et al., 2013). ESN can increase knowledge sharing across organisational hierarchies, fostering cross-silo collaboration, reducing inefficiency, and increasing interaction (Bala et al., 2015).

ESN is usually known for its user-friendliness and open interactivity (Kaplan & Haenlain, 2010; Kietzmann et al., 2011). Social media use in an organisation can provide two capabilities that are not possible with KMS: first, establishing and managing social networks to identify people with a particular skill sets or knowledge; second, finding and accessing digital content so that knowledge is available to all members of the organisation (Kane 2015). These two capabilities can also influence employees’ performance by enabling interaction among them, and, therefore, increasing internal communication and innovation.

Muninger (2019) studied the use of internal social media in the innovation process that consists of different stages from ideation to product launch. During ideation, there is increased input from employees; during the development stage, wikis that support shared collaboration might encourage concepts and evaluation because they facilitate interaction and information sharing; during the launch stage, blogging could be more useful during pre-launch; and finally, further feedback is necessary after the product launch to strengthen customer engagement. Song et al. (2019), on the other hand, investigated the use of social media in two domains: work-related social media (i.e., Yammer, Slack, Jira, IBM Connections, Facebook workplace, etc.) and socialization-related social media (i.e., WeChat, WhatsApp, etc.). He found that both are complementary and generate positive synergy.

#### 2.4.6 ESN for knowledge sharing practice

Although social media can be used to acquire external knowledge (Muninger, 2019; Dong & Wu, 2015), the current study focuses on internal social media for knowledge sharing (Kalra & Baral, 2019; Hacker, 2017; Jarrahi & Sawyer, 2013). Knowledge sharing is widely associated with enterprise social networking (Aboelmaged, 2018; Leonardi, 2017; Oostervink et al., 2016; Majchrzak et al., 2013; Gibbs et al., 2013). Table 14 elaborates on the knowledge practices that are supported by ESNs (Jarrahi & Sawyer, 2013).

Table 14 ESN support for knowledge sharing practices

<b>Knowledge practice</b>	<b>Knowledge objectives</b>	<b>Resultant knowing</b>	<b>Related to ESNs</b>
Expertise locating	Finding relevant piece of work	Knowing how to accomplish certain task (codified knowledge/directly related to work) * Codified knowledge * Directly related to work	Wikis, SharePoint, Newsfeed
Expert locating	Finding a person with relevant expertise	Knowing who holds the relevant expertise: * Often non-codified knowledge * Directly related to work	Yammer, forum, Corporate portals, Skype, internal social platforms
Reaching out	Finding the answer to a knowledge problem	Knowing how to accomplish certain task: * Often non-codified knowledge * Directly related to work	Slack, instant messaging, Skype
Socialising	Generating, learning about and maintaining social ties	Knowing about colleagues and other social contacts – related to non-codified knowledge	Blogs, Facebook (Internal)

(Source: Jarrahi & Sawyer, 2013)



The main objective of locating expertise is to find relevant work without contacting the person who developed it. This type of shared knowledge is recorded in the form of templates and checklists and is referred to as “codified” knowledge (Jarrahi & Sawyer (2013). Since the knowledge is documented, little explanation is required. The focus here is on “knowledge reuse”: knowledge developed by one actor is used by others in the organisation (Hansen et al., 1999). An ESN application that supports the ability to locate expertise is the open source “wiki” format: information posted by initial actors on a website set up as a wiki can be updated by others (Jarrahi & Sawyer 2013). Collaborative document management applications, such as Microsoft SharePoint and content posted for users on intranet “newsfeeds” are examples of codified knowledge that are directly related to work. Locating an expert often occurs through informal and social processes where workers seek advice and input from other people (Jarrahi & Sawyer 2013). The practice of “reaching out” overlaps with the activity of expert locating as both use immediate social networks to access for expert advice. Likewise, socializing practices involve generating new ideas, building communities, and strengthening or extending social ties.

Following the earlier discussion on knowledge sharing, ESN can facilitate people-to-people connection (i.e., personalisation), and people-to-document connection (i.e., codification). Personalisation-based technologies can complement codification-based technologies by connecting knowledge owners (i.e., donating knowledge) and knowledge seekers (i.e., collecting knowledge) to facilitate the exchange of knowledge. Both donation and collection of knowledge sharing can improve using social media. For instance, wikis can be used for viewing knowledge during knowledge collection, as well as for editing and creating content (knowledge donation) (Wagner, 2004). Tagging content and using RSS feeds is also useful for both activities.

Capturing personalised knowledge is difficult because it resides in the mind of individuals (Stenmark, 2001), and is difficult to communicate (Nonaki, 1994). Some researchers have proposed that Web 2.0 technologies such as blogs, wikis, and discussion forums, can overcome these problems (Wagner, 2004; Wagner & Bolloju, 2005; Jalonon, 2014) because they facilitate the continuous sharing of knowledge in an open and visible way (Majchrzak et al. 2013). This dynamic and decentralized knowledge sharing through ESN allows the communal presentation of individual knowledge (Leonardi & Treem, 2012). ESN has been shown to have a positive impact on employee productivity (Aboelmaged, 2018), knowledge-sharing practice (Dittes & Smolnik 2019) employee well-being (Berraies, Lajili, & Chtioui, 2020), and promotes knowledge sharing and learning (Sundaresan & Zhang, 2020).

### 2.4.7 Challenges with the use of ESN for knowledge sharing

It is worth noting that both positive and negative outcomes could occur when organisations share knowledge through enterprise social networking. The positive outcomes are related to better interaction and collaboration between individuals, and the visibility of resources that allows employees more aware of information sharing (Leonardi, 2014). The negative outcomes are, however, challenges to firms. Table 15 lists the challenges and opportunities faced by organisations using ESN.

Table 15 Challenges with ESN use

<b>Reference</b>	<b>Related to:</b>	<b>Challenges, opportunities, motivations, and inhibitors</b>
Chen & Wei (2019)	Enterprise social media	Investigates how enterprise social media (i.e. work- and social-related use) influences employees' perceived overload (i.e. information and social overload)
Laumer et al., 2017	Enterprise social networking	ESN enables finding relevant people, collective intelligent; Inhibitors: loss of power & privacy
Choudrie & Zamani (2016)	Enterprise social network	The motivation behind individual use of ESN and the reasons for not using it, and the outcomes of their choices on the organisation's performance and day-to-day activities
Stock & Gross (2016)	Enterprise social network	ESN motivations (optimism and innovativeness) and inhibitors (discomfort, insecurity) affect innovative behaviour at work.
Sarigianni et al. (2015)	Internal social media	Risks with internal social media: Easier knowledge identification by externals, lack of control over the knowledge, huge impact spread
van Osch et al. (2015)	Enterprise social media	Areas of ESN opportunities and challenges: Boundary work, attention allocation, social analytics, adoption and use of incentives, governance and control
Bala et al. (2015)	Enterprise social networking	Challenges of ESN implementations: lack of interest and use by employees, lack of fit with existing organisational and individual processes, inconsistent performance of the ESN platform, unfavourable business conditions.
Buettner, 2015	Internal social networking	User resistance behaviour concerning internal social networking – the role of privacy concerns.
Krischkowsky et al. (2014)	Corporate social media	Challenges with corporate social media: diverging perspectives & uncertain top-down communication, functionality jungle & high usage complexity, lacking collaboration & customization
White papers: Osterman	Best practice for social media	Opportunities: Faster decision-making capabilities as the primary means of

Research, Inc. (Microfocus, nd)	archiving and security	collaboration. The ability to share documents, have real-time conversations, and maintain better control over document versions. improved by allowing faster response. Absence of social media policy, content is not properly archived, accidental release of confidential information.
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While various negative and positive outcomes of using ESN for knowledge sharing are elaborated in the previous studies, the possible adverse outcomes of ESN use are challenging to organisations (Chen & Wei 2019; Sarigianni et al., 2015; Bala et al., 2015). Because the use of ESN has made knowledge sharing more open (Leonardi & Neeley, 2017), organisations are struggling to achieve their expected innovation outcomes. Two of these significant adverse outcomes are the low acceptance of ESN and the inappropriate use of ESN. In the next section, adverse outcomes and theoretical concepts (trust and governance) are elaborated.

## 2.5 THEORETICAL LENSES

While using ESN, users are concerned about sharing their knowledge and run a risk of becoming less valuable in the organisation (Gibbs et al., 2013). This can cause them to lose their role because their value is tied to the knowledge they possess. Additionally, since it is easy to keep up with others' activities or interests with ESN, this could also increase awareness of what others see what/whom they know, which may lead to information overload (Chen & Wei, 2019; Chen & Kuo, 2017; Gibbs et al., 2013). Other reasons for the low acceptance of ESN are: feelings of discomfort or insecurity (Laumer et al., 2017; Stock & Gross, 2016), lack of interest (Bala et al., 2015); resistance (Buettner, 2015), an unwillingness to share information (Trier, Fung, & Hansen, 2017), or a reluctance to put in the time and effort required to learn how to use the ESN platform (Vurori & Okkonen, 2012). While enterprise social networking is used within organisations to improve knowledge sharing, its value is related to the number of employees using it and is associated with the overall level of trust in the organisation (Bienkowska et al., 2018). The following section uses the perspective of social exchange theory to articulate the latter.

### 2.5.1 Social exchange theory

Social exchange theory (SET) is a broad conceptual paradigm that has been used in several disciplines, such as management, social psychology, and anthropology. From the perspective of social psychology, various studies have investigated user participation in virtual communities for sharing knowledge. Some studies have examined user participation in electronic networks from the social capital perspective (Guan et al., 2018; Wasko & Faraj,

2005) and others have examined this phenomenon using the lens of social exchange (Harden, Boakye & Ryan, 2018; Rui & Whinston, 2012). Social capital theory focuses on the social relationships between individuals and within teams by looking at the three dimensions: social, cognitive and relational (He et al., 2009); in comparison, social exchange theory examines exchanges between individuals and has trust at its centre. Cropanzano et al. (2017), on the other hand, argue that economic exchanges tend to be less trust dependent and have more active monitoring as compared to the social exchange, which is more open-ended and involves greater trust and flexibility.

SET examines the interactions between two parties that are involved in a sequential, reciprocal relationship and the gains that accrue from this relationship to each party. When individuals engage in interactions, a sense of support and obligation is created from the exchange (Harden et al., 2018). SET posits that exchange between individuals is necessary because individuals desire personal fulfilment and satisfaction (Yan et al., 2016), which leads to reciprocating positive behaviour (Bieńkowska et al., 2018; Cropanzano et al., 2017). Positive behaviour leads to a greater sense of organisational commitment, which, in turn, triggers a desire to stay with the organisation (Harden et al., 2018). Likewise, with an absence of trust, organisational members will not be willing to share their knowledge (Harden et al., 2018; Alarj et al., 2016).

Trust is an outcome of favourable social exchange (Blau, 1964). Cropanzano et al. (2017) argue that economic exchanges tend to be less trust-dependent and have more active monitoring as compared to social exchanges, which are more open-ended and involve greater trust and flexibility. Trust refers to “the positive expectations individuals have about the intent and behaviours of multiple organisational members based on organisational roles, relationships, experiences, and interdependencies” (Bieńkowska et al., 2018; Shockley-Zalabak, Ellis, & Winograd, 2000). Intra-organisational trust includes trust towards superiors/managers, trust towards subordinates, and trust towards co-workers: when employees trust their organisations, they are willing to contribute what they know; when employees trust that what their supervisors do is beneficial to their organisation, they are honest with them; and, when employees trust their colleagues, they provide assistance fairly (Costigan, Iiter, and Berman, 1998).

Trust is an essential factor for sharing knowledge (Kim, Han, Son, & Yun, 2017; Abu El-ella et al., 2016; Brown & Calnan, 2016). Once trust is built, “trusting partners are not only more aware of their knowledge duties but also more motivated to transfer their knowledge” (Zheng & Zhao, 2013; p. 786). Knowledge sharing in turn supports innovation (Lei et al., 2018;

Bieńkowska et al., 2018; Alaarj et al., 2016; Gold et al., 2001). To innovate, employees need to trust number of expectations. These can be encapsulated as innovation trust, which is defined as “an expectancy of reasonable and positive reactions by others in response to individual innovation attempts” (Clegg, Unsworth, Epitropaki, & Parker, 2002, p. 410). For instance, employees expect support from their organisation’s leadership to generate ideas (vertical trust between superiors and subordinates), as well as trust in their peers to develop social ties (horizontal trust among co-workers) (Bieńkowska et al., 2018; Ellonen et al., 2008; Tan & Tan, 2000). Trust makes employees confident that their ideas will be recognised, which improves their productivity (Abu El-ella et al., 2016), their job satisfaction (Kim, Lee, & Carlson. 2010) and their innovative behaviour (Wah, Zawawi, Yusof, Sambasivan, 2018). Likewise, with greater trust, employees communicate more quickly and collaborate more often (Lei et al., 2018; Brown & Calnan, 2016). With highly-trusted employees, managers will be more likely to share knowledge because the high level of trust reduces their fear of being made redundant after sharing. A trusting environment can be developed in organisations if employees have strong social ties, and corporate decision-making is transparent (Samadi et al., 2015).

Research has shown a positive relationship between trust and social media (Tajudeen et al., 2016). Trust makes individuals more willing to believe others and the content they contribute in the form of posts and comments on ESN tools (Hsu & Lin, 2008). Trust also encourages social networking (Salehan et al., 2018). With social networking, individuals can easily and quickly access valuable knowledge (Borgatti & Cross, 2003; Uzzi & Lancaster, 2003). A higher level of trust in social networking sites leads to a better attitude towards knowledge sharing (Salehan et al., 2018; Harden, 2012). Likewise, the higher the trust among members, the more favorable social networking will be with respect to knowledge sharing (Salehan et al., 2018; Chow & Chan, 2008).

While ESN can provide a platform to socialize, it can also be challenging because of the potential for inappropriate use of ESN. For instance, by making knowledge sharing much more convenient and since ESN sites can extend beyond a firm’s boundaries, ESN may make it easier for employees to leak firm-sensitive information to external parties (Sarigianni et al., 2015), either deliberately or accidentally (Leonardi et al., 2013), hurting a firm’s innovativeness (Molok, Chang & Ahmad, 2010). Additionally, ESN use may distract employees from their work and may lower their productivity (Gibbs et al., 2013). If the inappropriate use of ESN is not well managed, the impact of knowledge sharing through ESN on service innovation will be

limited. ESN use can be managed by using appropriate governance mechanisms (Stohl et al., 2017). In the following section, the role of governance is explained.

### 2.5.2 Governance

Governance in this study's context refers to formal and informal mechanisms for ensuring that knowledge is shared in the preferred direction (i.e., to support innovation) when ESN is used (Stohl et al., 2017; Linke & Zerfass, 2013). The concept of governance is derived from agency theory (Jensen & Meckling 1976). In a broader view, agency theory is concerned with resolving the problems that occur between the principal (stakeholder) and the executives/managers of the firm (agents). Agency problems occur when the desired goals of principals and agents are in conflict with each other, or if there are disagreements or different attitudes on how to handle risk sharing (Eisendardt, 1989). Controllers (principals) put in place controls to ensure that controlees (agents) perform tasks appropriately (Eisendardt, 1989). Agency theory argues that corporate governance control mechanisms can be used to ensure managers/executives act in the best interest of the firm's shareholders (Zhang, Chong & Jia, 2019). For instance, Franco-Santos et al. (2017) investigate how academic and professional services are managed and how governance mechanisms measure their sense of stress. Another example is Dimitratos, Lioukas, Ibeh, & Wheeler's (2010) study that used agency theory to understand how internationalised firms achieve their goals by delegating responsibilities to agents/intermediaries. When there are a diverse range of stakeholders, a control portfolio approach can be used to manage them, instead of applying the same controls to all controlees (Soh, Chua & Singh, 2010).

In this study, the governance mechanisms (formal and informal) are relevant to address employees' knowledge sharing practices and managing social media (Link & Zerfass, 2012; Foss et al., 2010). This section first explores the role of governance in knowledge sharing and then looks at how governance can manage the use of social media (Chen, Xu, Cao & Zhang 2016; Foss et al., 2010).

The governance of knowledge sharing is defined as the "choice, combination, and deployment of formal and informal organisational mechanisms to influence individual knowledge sharing behaviour in organisations so that organisational knowledge-based goals can be achieved" (Foss et al., 2010, p. 459). Other related terms are "knowledge governance mechanisms" (Grandori, 2001), "organizing principles" (Kogut & Zander, 1996), or "integrating mechanism" (Grant, 1996). Formal governance involves organisation structures, routine, and practice and stipulates how knowledge is shared, acquired, and used to accomplish collective goals (Zhang

& Zhou; 2013, Huang, Chiu & Lu, 2013; Cao & Xiang. 2012). Informal governance refers to networks and cultural practices, such as rituals (Foss et al., 2010; Huang, Chiu & Lu, 2013; Cao & Xiang, 2012), management style and managerial support (Cao & Xiang, 2012). Using codified procedures for operational guidance and open networks of communication reduces the risk of knowledge leaking out of organisations and encourages a long-term orientation (Zheng & Zhou, 2013). Table 16 below lists examples of formal and informal governance mechanisms from various studies.

Table 16 Knowledge Governance (formal and informal)

<b>Formal knowledge governance</b>	<b>Informal knowledge governance</b>
<ul style="list-style-type: none"> <li>• Organisation Structure (Cohen &amp; Levinthal, 1990)</li> <li>• Reward systems (Beugelsdijk, 2008)</li> <li>• Job design (McEvily et al., 2000)</li> <li>• Leadership (Foss, 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Networks (Dyer &amp; Hatch, 2004)</li> <li>• Company culture (Hansen, 2002)</li> <li>• Management style (Tsai, 2001)</li> <li>• Organisation fairness (Dhanaraj et al., 2004)</li> <li>• Managerial support (Kor and Mahoney (2005)</li> </ul>

Governance can be applied to both codified (i.e., formal/structural) and personalised (i.e., informal/cultural) knowledge sharing. Since codified knowledge is considered to have an unambiguous and indisputable nature, it is easily transferred within organisation and between individuals (Turner & Makhija, 2006). There is no loss of meaning when knowledge is transferred (Grant, 1996). However, codification has drawbacks. It can give rise to information overload (Schulz & Jobe, 2001) when large directories of unprocessed documents are stored, which consumes a large amount of storage space and slows down the searching and retrieval process (Ajith Kumar & Ganesh, 2011). Furthermore, given that codified knowledge is highly mobile, it is possible to transfer documents to the competitors (Ajith Kumar & Ganesh, 2011). In contrast, personalised knowledge is difficult to articulate, because it is mostly dependent on individual experiences (Turner & Makhija, 2006). The more diffuse and less tangible nature of personalised knowledge means that it is easier to provide guidance on governing codified knowledge compared to personalised knowledge.

Table 17 below summarises Turner and Makhija's (2006) explanation of how governance mechanisms should match when the knowledge is processed and the outcome of the knowledge sharing process. While processing codified knowledge, rules and corrective actions can be provided to employees. In contrast, clear directions are of little use for personalised knowledge; rather, some refinements can be made. Outcomes are clear and precise with codified knowledge, so it is possible to give exact individual standards "to which he or she should adhere" (Turner

& Makhija 2006, p.211). However, objectives are less specific in personalised knowledge and understanding is thus based on assumptions and is considered subjective.

Table 17 Governance of knowledge sharing

Governance control	Codified knowledge	Personalised knowledge
<b>Knowledge Process</b>	Employees are given clear direction and procedures for engaging with the process, including specific rules and courses of action	Employees are encouraged to engage with and understand the nature of knowledge.
<b>Knowledge Outcome</b>	Employees are given exact and indisputable standards which they should adhere to.	Employees should reflect on their experiences, observe others' successes and failures, and consider different perspectives of what should be appropriate standards

(Source: Turner & Makhija, 2006)

Table 18 summarises research on the governance mechanisms or controls used for codified and personalised knowledge. Knowledge governance mechanisms can be used in the form of “codified procedures and rules to obtain operational guidance” (formal governance), as well as to increase openness and networks (informal governance) that “reduces the risk of knowledge leakage and foster communication through long-term orientation” (Zheng & Zhao, 2013).

Table 18 Formal and informal knowledge sharing and type of control

Knowledge strategy	Knowledge sharing processes (donation & collection)	Knowledge management strategies	Types of control
<b>Personalised knowledge</b>	Learning among co-workers within department	To search, share, exchange new values, ideas, dialogues	<i>Informal/cultural</i> (Cao & Xing, 2012; Lawson, 2009; Li & Xia, 2014); <i>Clan</i> (Poleacovschi, et al, 2018; Turner and Makhija 2006).
<b>Codified knowledge</b>	Sharing information (codified) among co-workers within department	To create manuals and documents. Gather management figures on products and services.	<i>Formal/structural</i> (Cao & Xing, 2012; Lawson, 2009; Li & Xia, 2014); <i>Bureaucratic</i> (Poleacovschi, et al, 2018)



Knowledge sharing is closely related to knowledge leakage (Durst, Aggestam & Ferenhof, 2015) in the form of knowledge exposure, which is the result of knowledge collaborations and exchanges with different stakeholders (Bernsteiner et al., 2019). Knowledge leakage is “the loss of knowledge intended to stay within a firm’s boundaries” (Frishammar et al., 2015, p.85). Leakage of internal information by employees has been a critical issue for management (Ahmed et al., 2014). Leakage can be deliberate or accidental loss of knowledge (Ritala et al., 2015). Intentional knowledge leakage occurs when employees transfer knowledge voluntarily, unintentional knowledge, or deliberate knowledge leakage occurs when employees transfer knowledge unknowingly or inattentively (Bernsteiner et al., 2019).

Knowledge leakage is often related to the platform used for knowledge sharing, and social media presents a challenging situation for organisations because of its inherent openness, informality, and relative efficiency (Etter, 2014). Social media use in organisations is increasing (Linke & Zerfass, 2013; Pew Internet Research, 2014) especially as the number of social media platforms goes up. The “open” nature of social media presents both opportunities and challenges for organisations. While the opportunities include improved collaboration, participation and information sharing among employees (Bryer & Zavatarro, 2011), implementing social media can also be challenging, as management loses some of traditional control over how IT is used in the organisation and what it is used for (Kane, Fichman, Gallagher & Glaser, 2009).

There is thus a need to consider how the good and bad outcomes of internal social media use for knowledge sharing can be balanced. Having governance mechanisms in place may involve firms encouraging the use of certain aspects of social media while limiting other aspects (Vaast & Kaganer, 2013).

Social media governance refers to policies and documents that guide organisational use of social media (Brajawidagda, & Chatfield, 2016; Chen, Xu, Cao & Zhang 2016). These policies are based on managerial directions and procedures, as well as resource allocation (Mergel & Greeves, 2012). Social media guidelines help employees “understand the boundaries of social media activities” (Boudreaux, 2011, p.274), because there is “a need to educate employees and formulate clear guidelines on the use of social media” (Link & Zerfass, 2012, p.275). de Hertogh, Viaene, and Dedene, (2011) proposed that the governance of social media consisted of empowerment, processes, collaboration and culture. Stohl et al. (2017), on the other hand, focused on governance as an issue of the corporate social responsibility of employees, including

both their personal responsibility as well as their responsibility towards their organisation. Both Chen, et al. (2016) and Vaast and Kaganer (2013) also provided a very comprehensive analysis of social media governance to understand the significance of social media usage “between people and between people and information.” Therefore, it is vital to develop and communicate to employees the organisation’s social media policies (Parker et al., 2019).

## 2.6 PROPOSED CONCEPTUAL MODEL

Table 19 integrates the discussion in the preceding sections.

Table 19 Relationship between different concepts

Concept	Personalised	Codified
<b>Goal</b>	Successful organisational innovation	
<b>Knowledge sharing</b>	Both explicit and tacit knowledge (Han & Mukherjee, 2007)	Transfer only explicit knowledge (Han & Mukherjee, 2007)
<b>ESN use for...</b>	<i>Expert</i> locating - Knowing who holds the relevant expertise	<i>Expertise</i> locating - Knowing how to accomplish certain task
<b>Knowledge process</b>	To encourage, engage and understand the nature of knowledge (Gold, 2006)	Clear direction and procedures to engage with specific course of action (Gold, 2006)
<b>Knowledge outcome</b>	Reflect from experience, observation of others’ success and failure (Gold, 2006); knowledge is disseminated, interpreted and used to accomplish organisational goals (Benbya, 2016)	Give individual exact standards to which he or she should adhere (Gold, 2006); Presented adequately and remains current and up-to-date (Benbya, 2016)
<b>Management challenges</b>	Connecting people to people using collaborative tools to share tacit knowledge	Ensuring important and relevant knowledge is stored, reviewed and updated
<b>Social exchange</b>	Creates effective sharing and willingness to contribute personal information and sustain social exchange (Li, 2015)	Creates effective sharing and willingness to share resources and sustain social exchange (Li 2015)
<b>Governance</b>	Informal/cultural (Cao & Xing, 2012; Lawson, 2009; Li & Xia, 2014); Clan (Poleacovschi, et al, 2018; Turner and Makhija 2006).	Formal/structural (Cao & Xing, 2012; Lawson, 2009; Li & Xia, 2014); Bureaucratic (Poleacovschi, et al, 2018)

The study began by examining how service innovation, which refers to how service organisations develop their core products and deliver better customer service (Lu & Tseng, 2010), requires the integration of employees’ shared knowledge (Barrett, 2015; Calantone et al., 2002). In terms of knowledge sharing, capturing personalised knowledge can be difficult because it resides in the mind of individuals (Choi & Lee, 2002). However, conversational Web

2.0 technologies such as wikis and discussion forum can overcome this problem (Wagner & Bolloju, 2005), encouraging their use in organisations in the form of ESN. Therefore, ESN effort for knowledge sharing to influence service innovation. The successful implementation of ESN is a crucial focus of many organisations to enable knowledge sharing and enhance their innovation efforts (Kalra & Baral, 2019). This study aims to help with this endeavour by addressing the associated challenges, namely the low acceptance and possibly inappropriate use of ESN. Social exchange theory (SET) helps explain how the low acceptance of ESN can be addressed, i.e., by increasing the level of trust within an organisation (Lei et al., 2018; Brown & Calnan, 2016). Part of the SET theory was inspired by the first study (qualitative), and the original theorising, trust and attendant theories were not considered. After the first study's (qualitative) data analysis, trust became a salient concept, which led to further theoretical consideration and review of extant theories that relate to trust and knowledge sharing. In comparison the inappropriate use of ESN can be addressed by putting in place suitable governance mechanisms (Stohl et al., 2017; Foss et al., 2010). In line with the above summary, this conceptual model was developed (Figure 1) for the study:

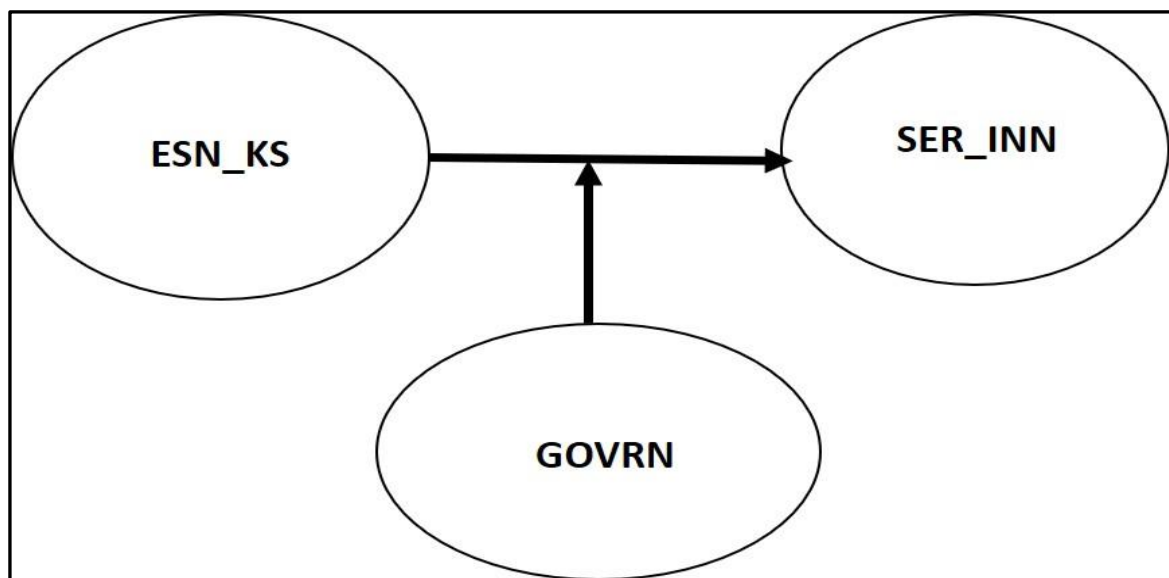


Figure 1 Proposed conceptual model

Note: ESN\_KS (enterprise social networking for knowledge sharing); SER\_INN (service innovation which is internal to organisation); GOVRN (governance both formal and informal)

## 2.7 CHAPTER SUMMARY

This chapter began by introducing the importance of service innovation and its relation to knowledge sharing and trust. Next, the literature on knowledge sharing was discussed, highlighting both personalised and codified knowledge sharing in organisations. Social media technology, specifically the use of ESN in the organisation, was then presented, as it can significantly change the way knowledge is shared. Two potential challenges with the use of ESN for knowledge sharing were then elaborated upon: the low acceptance and inappropriate use of ESN. The theoretical lenses of social exchange theory and governance were proposed to address these challenges. Finally, a conceptual model was developed. The next chapter discusses the research methodology that was used to evaluate this model.

## CHAPTER 3: RESEARCH METHODOLOGY

### 3.1 CHAPTER OVERVIEW

In the previous chapter, a conceptual model was developed for this study. The literature was examined with a view to understand how the use of enterprise social networks influences innovation in the service industry and how the research problems (low acceptance and inappropriate use of ESN) could be addressed. This study uses mixed methods (sequential) design to understand the phenomenon. In this chapter, the study's research paradigm and philosophical assumptions are first explained, followed by an explanation of the mixed methods research methodology that was selected. Next, the ethical considerations, the level of analysis, the research context, and the research design for both qualitative and quantitative methods are presented.

### 3.2 RESEARCH PARADIGM

In mixed methods research, the philosophical assumptions guide the research inquiry at a broader level. The advantage of using mixed methods is that it removes the restriction of using a single study design for data collection and provides several studies to reach an overall objective (Teddlie & Tashakkori, 2009). Likewise, mixed methods provide new ways of thinking about the world, particularly from a social and natural science research perspective (Morgan, 2007), using multiple paradigms (Creswell & Creswell, 2018).

Table 20 summarises the different research paradigms. The current study uses a postpositivist paradigm. From an ontological perspective, post positivism is related to research that is close to reality. It exists “because of flawed human intellectual mechanisms and the fundamentally intractable nature of phenomena” (Guba & Lincoln, 1994, p. 110). In the postpositivist paradigm, an objective epistemology is used and research outcomes can be generalized (Chigbu, 2019). The knowledge developed through a postpositivist lens is based on careful observation and measurement of objective reality (Creswell & Creswell, 2018). This study considers both qualitative and quantitative approaches to research inquiry to be valid ways to investigate, build, and disseminate knowledge (Chigbu, 2019), and hence, adopts a mixed approach.

Table 20 Research paradigms

Research Philosophy	Qualitative	Quantitative	Mixed methods (current study)
<b>Ontology:</b>	Multiple reality	Single reality	Critical realism (probabilistic)
Single reality, multiple reality, critical realism			
<b>Epistemology:</b>	Objectivism	Subjectivism	Modified dualism/objectivism
Objectivism, Constructionism, Subjectivism			
<b>Theoretical perspective:</b>	Interpretivism	Positivism	Post-Positivism
Positivism/Post-positivism, Interpretivism, Critical inquiry, etc.			
<b>Methodology:</b>	Case study	Survey	Exploratory sequential (case and survey)
Case study, Survey, mixed methods, Ethnography, Grounded theory, Action research, etc.			
<b>Methods:</b>	Interviews (themes)	Questionnaires (statistical analysis)	Interviews (thematic analysis) followed by survey questionnaires (statistical analysis)
Sampling, Questionnaire, Interview, Statistical analysis, Observation, etc.			

### 3.3 MIXED METHODS RESEARCH DESIGN

To evaluate the conceptual model, a mixed-methods design is proposed. The reason is to evaluate the phenomenon better and address the research problem. Creswell and Creswell (2018) identify three types of mixed methods: convergent (Cunningham, Seaman & McGuire, 2016), explanatory, and exploratory methods. In the convergent method, both qualitative and quantitative data collection occurs concurrently, whereas, with exploratory and explanatory methods, data collection occurs sequentially. The sequential mixed method is chosen for this study. A qualitative study was conducted to inform the conceptual model, and to uncover any potential emergent themes. The qualitative findings were then tested with a wider sample using a quantitative survey. Since enterprise social networking (ESN) is an emerging field (Kalra & Baral, 2019; Hacker, 2017), mixed methods provided depth (qualitative) and breadth (quantitative) to investigate the phenomenon. A rich explanation will be arrived at by combining both qualitative “stories” and quantitative “data” (Yu & Khazanchi, 2017). By applying both methods, the researcher gains knowledge that is reliable due to different approaches, i.e., triangulation (Bryman & Bell, 2015; Yin, 2018). Table 21 lists information systems studies that have used mixed sequential exploratory methods. The table shows that

qualitative studies can be used to validate (Lokuge et al., 2019; Dutot et al., 2018), generalize (Passey et al., 2018), or confirm (Wu, 2012) quantitative studies.

Table 21 Examples of IS studies that have used exploratory mixed methods

<b>Reference</b>	<b>Purpose of Exploratory (Qualitative followed by Quantitative) mixed methods</b>
Lalegani et al., 2019	To develop and analyse a model of factors influencing interpersonal conflicts, first qualitative study conducted, then questionnaires where developed based on qualitative results.
Wunderlich et al., 2019	To examine the adoption of SMT by consumers, first unearth the antecedents of SMT to develop a model and then test this model with large-scale survey.
Lokuge et al., 2019	To examine organisational readiness for digital innovation, first qualitative (interview) study used then survey to validate the priori model.
Dutot et al., 2018	To investigate the factors affecting the adoption of connected objects (COs) in e-health, first qualitative (interview) study used, then survey to validate the conceptual model.
Cheng et al., 2018	A qualitative investigation is initiated to understand the influencing factors of service quality and survey data to test the hypotheses within the research model
Berman, 2017	To understand data management practice using first qualitative method, then the result to build a survey instruments to data management activities.
Hampshire, 2017	To explore UK consumer perceptions of trust, risk and perceived usefulness of mobile payments through the use of sequential mixed methods.
Carpenter & Lertpratchya, 2016	To develop new measures, a blend in qualitative and quantitative research is required: First, a case study examines the role insights of the social media communicator, then a survey assesses variations in role ambiguity.
Zhang et al., 2014	To explore the cultural value of knowledge sharing process, first semi-structure interviews used followed by cross-sectional survey.
Chen et al., 2012	To explore the usability of social networking services (SNS) games, first interview was conducted, then to analyse the importance of the appeal factors of SNS games
Wu, 2012	To examine user acceptance of technology, first qualitative study conducted, then survey to confirm the acceptance of technology.
He et al., 2009	To validate how social relationship, affect KMS, first qualitative (interview) study conducted, then survey to test the usefulness of KMS.
Boh, 2008	To investigate the research model, first qualitative study used (in-depth interviews) to conduct the plausible arguments, followed by survey to conduct more formal test of the hypothesis.
Oke, 2007	To investigate the different types of innovation and impact on performance, first qualitative interviews used, then using these results to aid in the development of the survey questionnaire.

The sequential mixed method will be used in this study to:

- a) Confirm the conceptual model (Figure 1).
- b) Determine if the qualitative themes can be generalized to a larger sample.

- c) Formulate and identify the constructs for the quantitative model.
- d) Assess the quantitative model with a larger sample.

With sequential mixed methods, researchers need to be cautious about the timing and weighting of the methods used (see Figure 2). Timing refers to the question of whether the two methods are run concurrently (approximately the same point of time) or sequentially (two methods run one after the other) (Kettles, 2011). In this study, the two methods are run sequentially. Additionally, since the qualitative data are used to inform the model, more weight is given to the quantitative stage. (Creswell & Creswell, 2018).

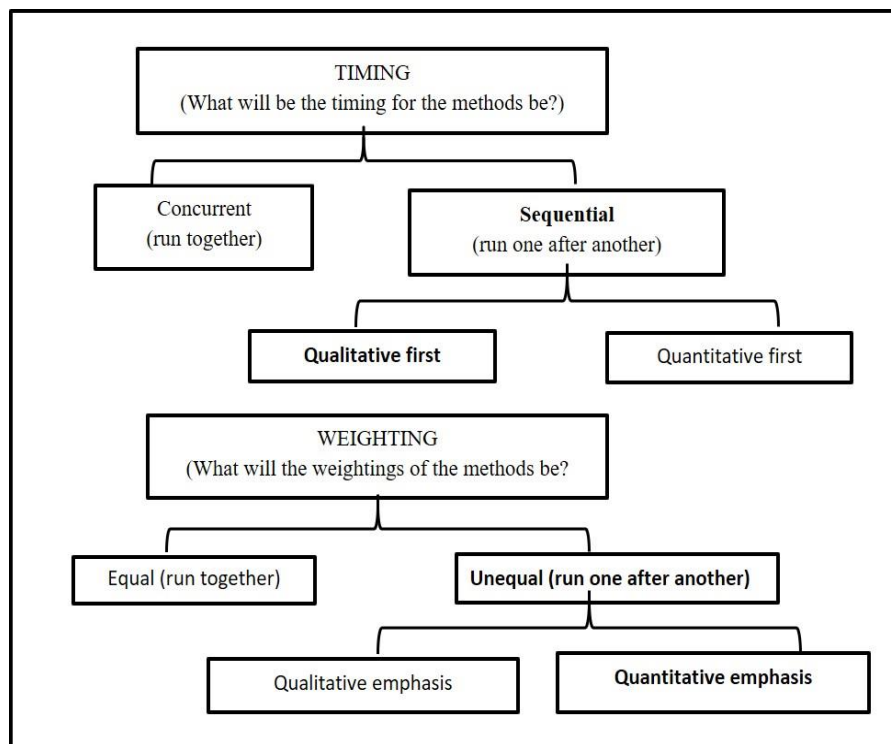


Figure 2 Timing and weightage of mixed methods  
(Source: Kettles, 2011)

The following figure indicates the steps in the sequential mixed methods approach (Creswell & Creswell, 2018; Venkatesh et al., 2013). As indicated in Figure 3, the conceptual model was developed based on the literature review to address the research question. Thereafter, interviews with 11 participants were conducted. An in-depth analysis of the qualitative interviews was used to evaluate the conceptual model with a possibility to identify additional/redundant constructs. Following this, the updated research model was validated using a quantitative survey and the hypothesized relationships were tested structural equation modelling. By using two methods, the researcher gains knowledge that is reliable due to different approaches, i.e., triangulation (Bryman & Bell, 2015). Triangulation refers to using more than one data collection technique and having precious data supporting research findings (Yin, 2018).



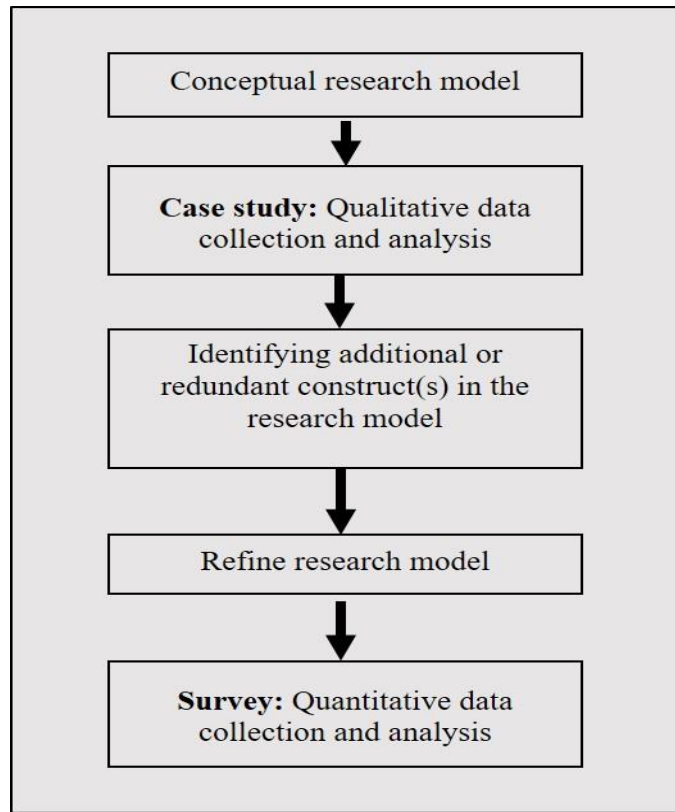


Figure 3 Sequential mixed methods approach  
(Source: Creswell & Creswell, 2018)

Table 22 from Teddlie and Tashakkori (2009) guides the mixed methods sampling approach used in this study.

Table 22 Mixed methods sampling approach

Mixed methods sampling	Purposive sample (Qualitative)	Probability sample (Quantitative)
<b>Purpose of sampling</b>	Typically designed to pick a small number of cases that will yield the most information about a phenomenon	Select a large number of cases that are collectively representative of the population
<b>When is the sample selected?</b>	Before the study begins, or while the study is underway	Before the study begins
<b>How is the sample selected?</b>	Utilizes expert judgement	Often based on mathematical formula

(Source: Teddlie & Tashakkori 2009)

For the current study, purposive sampling and snowballing was used for the qualitative study (further details in Section 3.7), while probability sampling was used for the quantitative study (further details in Section 3.8). For the qualitative study, the final selection was made when the

process of data collection reached saturation, while in the case of the quantitative study, mathematical formulae, rule of thumbs, or supportive evidence from the literature were used to determine the sample size. Table 23 lists the number of participants from some recent mixed methods studies.

Table 23 Sample size of sequential mixed methods studies

Reference	Sample size
Lalegani et al., 2019	Interview: 17 participants Survey: 160 respondents
Lokuge et al., 2019	Interview: 12 participants Survey: 378 respondents
Dutot et al., 2018	Interview: 8 participants, Survey: 226 respondents
Berman, 2017	Interview: 6 participants, Survey: 319 respondents
Hampshire, 2017	Interview: 10 participants, Survey: 101 respondents
Carpenter & Lertpratchya, 2016	Interview: 10 participants, Survey: 126 respondents
Chen et al., 2012	Interview: 11 participants, Survey: 321 respondents
He et al., 2009	Interview; 11 participants, Survey: 53 respondents
Oke, 2007	Interview: 6 participants, Survey: 101 respondents

Two critical points can be drawn from Table 23. First, qualitative studies have smaller samples than quantitative studies, with a minimum sample size of six (Berman, 2017; Oke, 2007). As suggested by Creswell & Creswell (2018), the adequate sample size should be considered on the concept of saturation (i.e., when no new insight reveals from the case). The sample should be sufficient for carefully investigating the relevant themes (Teddlie & Tashakkori, 2009). Second, the sample for the quantitative studies ranged from a minimum of 53 to a maximum of 607. However, this range is related to the research question(s) and the research objective. A more detailed analysis of sample size is provided under the relevant sections of qualitative and quantitative analyses.

A related point to consider in mixed methods is the quality of the data. It is worth noting a quote from Kirk and Miller (1986), who points out that: “no experiment can be perfectly controlled, and no measuring instrument can be perfectly calibrated. All measurement, therefore, is, to some degree, suspect” (p. 21). Nevertheless, significant attempts must be made to assess the validity and reliability of measures to increase the credibility of conclusions drawn from them (Usoro et al., 2007). In the case of mixed methods, the researcher needs to draw inferences from both methods (qualitative and quantitative) and develop multiple measures of validity, thereby improving confidence in the findings (Bryman & Bell, 2015). Guba and Lincoln (1989) used the term ‘trustworthiness’ to evaluate qualitative studies. In this respect, these authors proposed four criteria, each of which has an equivalent criterion in quantitative research. They are credibility (parallel to internal validity), transferability (parallel to external validity), dependability (parallel to reliability), and confirmability (parallel to objectivity) (Bryman and Bell, 2015). Data reliability and validity are elaborated under the relevant sections of the qualitative and quantitative analysis sections.

### 3.4 ETHICAL CONSIDERATIONS

As this study used mixed methods sequential to conduct research, ethical consideration was required for both qualitative and quantitative data collection. The instructions given by the Auckland University of Technology Ethics Committee (AUTEC) were used to fulfil the data collection requirements. The following table shows the key points for ethical approval on mixed methods.

Table 24 Key points for ethical approval

	<b>Qualitative (Interviews)</b>	<b>Quantitative (survey)</b>
Who are the participants?	Product managers, product owners, developers, and innovation managers from the financial industry in New Zealand	Product managers, product owners, developers, and innovation managers from the global financial industry.
How will data be gathered?	Semi-structured interviews will be used; they will be transcribed and coded using NVivo software.	AUT-hosted Qualtrics will be used to prepare the survey. Sample contact details were gathered using LinkedIn, visiting local financial industry events, and through personal contacts.

Ethics approval was granted for both methods of data collection for the period of three years (see Appendix A). For both qualitative and quantitative methods, information sheets and

consent forms were filled in along with instructions for the interviews and surveys, as per instructions from AUTECH (See Appendix B & C).

### 3.5 LEVEL OF ANALYSIS

Informants are individuals whose roles are closely related to the phenomena under study and are chosen based on their formal roles in an organisation. They are usually company owners or general managers (Kumar et al, 1993), and people who occupy specialized roles, instead of those who occupy general positions (Houston and Sudman, 1975). Table 25 lists examples of studies from various disciplines that have used the key informant approach. As indicated in the table, most key informants are those who have knowledge or expertise in the related field. In the current study, the key informants for both the qualitative and quantitative phases are product managers, owners, or developers from the financial industry. These informants were selected purposively to ensure that they are knowledgeable about the study topic (Song et al., 2019).

Table 25 Key informants used from selected literature

Reference	Key informants	Reason for contacting key informants	Method used
Oliphant et al., 2019	professionals from park-index team	Have deep understanding of health-related fields.	Interviews
Mikalef et al., 2019	Chief information officer and IT manager	knowledge about various related domains	survey and case study
Tripathi et al., 2018	Senior managers	Have an understanding of CSR in the hospital.	survey and interviews
Garcia-Morales et al., 2018	Chief executive offices (CEOs)	Have knowledge on how the system as a whole operates	survey
Schilke, 2014	Head of R&D, project leaders	Have an understanding of R&D	Interviews and survey
Kemper et al., 2013	senior managers, managing directors	Have an overview of entire organisation	Survey and archival data
Chuang, Liao & Lin, 2013	functional area managers	Acquired knowledge about organisational factors and firm performance	Survey
Wang & Wang 2012	Top managers or functional managers	Acquired knowledge of the firm as well as the environment it operates.	survey
Hendricks et al., 2012	Senior executives, president and vice president	Have an understanding about Balanced Scorecard as a strategic planning system	survey and archival data
Lau, 2011	product managers, vice presidents or directors	Have knowledge about product development	survey
Yang & Wang, 2010	CEO/general manager and senior manager	Have knowledge and familiar with the environment of the firm	survey

### 3.6 RESEARCH CONTEXT

This study was conducted in the financial industry. Frame and White (2004) define innovation in the financial industry as “activities that internally reduce bank costs and risks or externally better meet the convenience and needs of customers” (p. 1591). They grouped financial innovations into new products (e.g., automated teller machines or ATMs, credit and debit cards, adjustable-rate mortgages, etc.), new production processes (e.g., electronic payments and record keeping, automated credit scoring models, securitization of loans, etc.) and new organisational forms (e.g., interstate banking organisations, diversified banks with traditional and non-traditional financial services, etc.). Factors that tend to increase innovation in financial services are regulation, institution size, higher education and income, and first-mover (Frame & White, 2004). Among these factors, the literature tends to support the institution size and regulation effect in financial innovation. For instance, large banks are more likely to come up with new financial services because they have a larger market share, and hence significant revenue incentives (Bhattacharyya & Nanda, 2000), as well as an advantage in influencing regulatory changes (Frame and White, 2004; Wheelock & Wilson, 1999).

Recently, financial technology (or FinTech) start-ups have been creating new business models and products/services (Wonglimpiyarat, 2017). A classic example of FinTech innovation is the introduction of ATMs and internet banking (Chourchane et al., 2002). FinTech also provides a platform for banks to cross-network transfers and payment services (Shim & Shin, 2017). Other examples of FinTech-based innovations are electronic fund transfer at the point-of-sale (EFTPOS), internet banking, mobile banking, Bitcoin wallet, and Blockchain banking (Wonglimpiyarat, 2017). Banks and insurance companies are adding social media (usually Twitter and Facebook pages) as permanent channels for customer interaction. Many of these companies are using social media to revolutionize the traditional business models that the finance sector has relied upon for decades (Wonglimpiyarat, 2017).

This study focuses on the financial sector for a few reasons:

1. Employee turnover in the financial sector is lower than in other service industry sectors such as retails and hotels. Lower turnover means a high retention rate. This increases the notion of sharing knowledge to sustain the business in the longer term.
2. Innovation is a ubiquitous aspect of the financial sector’s competitive environment, and the disruptive rise of fintech firms has increased the role of innovation.

3. Knowledge sharing is an important influence on service innovation. There has been relatively little substantive research on knowledge sharing in the financial industry (banks, investments and insurance companies), compared to consulting firms, hotels, hospitals and other types of organisations.
4. Governance is a well-established aspect of the financial industry in areas such as asset management, data protection, product development and implementation, legal issues, and compliance. Within this controlled environment, using cutting edge technologies (such as cloud computing, big data, artificial intelligence, and social media) to improve customer service has been a significant challenge for financial institutions (Shih et al., 2010).

The key informants selected for this study had the roles of product managers, product owners, developers, and innovation managers from the financial industry. Individuals in these roles would have insight into the phenomenon in question: sharing knowledge using ESN to develop new products and services in their organisations (Martovoy & Mention, 2016; Sarigianni et al., 2015; Oke, 2007, Vermeulen, 2004, Alam, 2003). Table 26 provides selected literature on product/service innovation in the financial industry.

Table 26 Innovation product/service in financial industry

Citations	Method used	Innovation product/service	Financial institutions
Rajapathirana & Hui, 2017	Survey	Improving product/service innovation	Insurance, Sri Lanka
Wonglimpiyarat, 2017	Case	Managing innovation	Banks, Thailand
Martovoy & Mention, 2016	Survey	New service development processes	Banks, Luxembourg.
Sarigianni et al., 2015	Case	Managing knowledge & improving innovation	Various financial institutions
Yang et al 2013	Survey	Improving innovation strategy	Banks, Taiwan
Bidmeshgipour et al., 2012	Survey	Improving innovativeness and managing knowledge	Banks, Iran
Vermeulen, 2004	Case	Managing product innovation	Dutch financial sector
Alam, 2003	Survey	Innovative product development	Banks, United States

### 3.7 PHASE I: QUALITATIVE STUDY

The first phase of the study was a qualitative study. To assess the conceptual framework developed for this phenomenon, the researcher uses case study research. According to Yin (2018), a case study is an empirical method that “investigates a contemporary phenomenon (the ‘case’), in-depth and within its real-life context,” especially when “the boundaries between phenomenon and context may not be clearly evident.” (p. 15).

The first part of the above definition distinguished case studies from other modes of inquiry. For instance, experimental research separates a phenomenon from its context, and historical research usually deals with noncontemporary events (Yin, 2018). The current study investigates knowledge sharing using ESN for service innovation (a contemporary phenomenon), using financial institution (real-life context). The second part of the above definition arises because the phenomenon and context are not always distinguished in real-world situations. In this respect, Yin (2018) proposed various features while conducting case studies, such as relying on multiple sources of evidence and rich data analysis.

Case studies can be exploratory, descriptive, and explanatory (Yin, 2018). For this study, an exploratory qualitative approach is chosen because it provides rich information from an individual’s point of view in the organisational context; in addition, the researcher’s involvement is high during data collection. Additionally, the purpose of the exploratory approach is to investigate the research question using data collection procedures that are relevant to the subsequent study, such as a survey (Yin, 2018). Table 27 shows the features of the different case study approaches and their importance.

Table 27 Different approaches to case study

Features/approaches	<b>Exploratory</b>	Descriptive	Explanatory
Contact with people	<b>Mostly</b>	Rarely	Rarely
Researcher’s involvement	<b>Mostly</b>	Rarely	Rarely
Current study	√	×	×

(Source: Yin, 2018)

Although a single case enables the investigation of a phenomenon in-depth, two reasons favour having multiple cases: first, researchers need to know how much is known about the phenomenon after studying a case, and second, new information is likely to emerge from studying further cases (Cavaye, 1996; Eisenhardt, 1991). Various researchers suggested different number of cases to provide rigour. For instance, Eisenhardt (1991) suggested there

should be between four to ten cases to investigate the phenomenon. On the other hand, Eriksson and Kovalainen (2008) stated that "unlike statistical sampling methods, there is no single rule concerning the minimum number of cases that should be selected for given multiple case research projects. The selection of the number of cases is influenced by the study aim and the research question" (p. 124). In a similar vein, other researchers also suggested that the selection of cases should be left to the researcher's decision (Irani et al., 1999; Romeno, 1989). Additionally, it was important for the researcher to look for similar information in all cases to develop themes from ideas repeatedly occurring in multiple contexts (de Casterlé et al., 2012). Therefore, multiple case studies were selected.

In this study, theoretical saturation (Yin, 2018; Creswell & Creswell, 2018) was used to decide on the number of cases. No further cases were added after the last case failed to reveal any new insights compared to the previous ones. Overall, three banks and two investment companies (five cases) from New Zealand were investigated to explore participants' experiences with the use of ESN for knowledge sharing and its influence on innovation. A brief overview of the five companies is given in Table 28.

Table 28 Demography of five companies

<b>Case (company)*</b>	<b>Demography</b>
Alpha	Provides four core business functions to its customers: retail banking (i.e., savings and investments, home loans, credit cards, personal loans and insurance); business banking (i.e., transactional bank accounts, investments, loans and finance, and international banking services); institutional banking (i.e., wholesale banking, financial institutions and government entities); and private banking (i.e., wealth planning, investment expertise and global solution).
Gamma	Provides three core functions such as Personal (includes home loans, credit cards, personal loans, insurance, investments, and managing money); Business (service includes business credit cards, finance growth, payment solutions, international business, business insurance, economic updates); and Agribusiness (farm finance and credit cards, Agribusiness insurance, Agri specialists and Agri information and resources).
Beta	Supports for personal (including personal and home loans, insurance, Kiwi saver, wealth management, migrants and travel); business (small-medium business, commercial business, accounts, borrowing); Institutional (relationship management, trade and supply, finance and marketing); Rural (investments, borrowing, investments, international business)
Sigma	Provides financial advice on retirement planning including investments, expenditure, portfolio management, risk and growth.



Delta	Provides investment funds to its customers. This also includes, portfolio management, financial advice, risk, growth and training of clients on product and services.
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Note: \* Actual names have been replaced by hypothetical ones to protect the identity of the participating respondents and their companies

While Alpha, Gamma & Beta were banks, Sigma and Delta were investment companies. Other demographic features are provided below:

- Alpha Bank is one of the four major banks operating in New Zealand. Alpha has over 300 branches nationwide. Alpha Bank has experts in the fields of investments, loans, and finance to meet their customers' needs. These experts, including product developers, financing specialists, and communications professionals, work together in collaboration to develop products/services and answers any queries to answer that customers have. While external social media such as Twitter and LinkedIn are useful for communicating with external parties, Alpha Bank uses internal social media applications, such as Yammer, Slack, blogs, wikis, SharePoint, and Microsoft Teams, for internal collaboration. Slack is used by product developers, communication managers and front-line employees for quick updates and issues arising with a trial run of a new product before implementation. On the other hand, Yammer is used for testing and the offering of new products. SharePoint is used to locate important documents so that they are shared and accessed by team members. Alpha Bank's code of practice sets out the principles of good banking practice.
- Gamma Bank provides a full range of banking options (see Table 28) and has a similar structure as Alpha Bank in terms of providing products/services to customers. With around 300 branches nationwide, Gamma aims to provide better service to customers. Product developers and management work together to optimise their services. Gamma also uses a variety of internal social media applications to communicate, such as SharePoint, Yammer, Confluence, and Slack. Confluence is used for risk assessment whereas Slack for idea generation. Communication with different functional units is conducted via email, instant messaging, or video conferencing. Governance of product management, in the form of policies and codes of conduct, are in place to provide support for routine operation of the banking service.
- Beta Bank, with over 200 branches nationwide, has a high-performing workforce, seeks to provide products and services with continuous improvement, and supports the community. Beta has a similar structure as Alpha and Gamma. Beta uses both public (such as LinkedIn), and internal social media. (such as Yammer, Slack, Confluence, Jira

and Skype). Yammer is used across the whole company whereas Jira and Confluence used for core engineering work. Slack is used extensively and has become a standard practice, along with Skype for video conferencing. Beta Bank employees follow a standard framework to do their work as prescribed by the organisation.

- Both Delta and Sigma, smaller compared to Alpha, Beta and Gamma, are established investment firms providing products/services to their clients. Delta specialises in providing investment advice to its clients, such as retirement planning, and is based on a recurring revenue business model. Its staff advise clients on how to invest their funds and help clients monitor and review the performance of their investments on a periodic basis. Most of Delta's internal communication is conducted via email and Skype video calls. Delta has recently started to use SharePoint and Slack for group meetings. Face-to-face meetings for discussions on retirement planning with clients is a common practice. Employees strictly follow the firm's Statement of Investment Policy which is renewed every five years.
- Sigma provides investment funds to its clients, educating them on both short- and long-term risk/return expectations as well as educating clients on their investments. One such fund (product) is call Xerox (a pseudonym). Xerox is an investment product that helps people save in their retirement. As part of the investment scheme, Sigma is also involved in charities and extended communities. Sigma's employees include directors, fund trustees, suppliers, lawyers, and managers. Communication among team members is conducted via email, and face-to face meetings are a common practice. Remote access meetings are conducted via Skype video conferencing. Yammer and SharePoint are recent developments and only used by selected members. As Xerox is one of the most heavily regulated investment products, product developers need to follow information contained within the Product Disclosure Statements and Statement of Investment Principles and Objectives.

As indicated in the above, although the services provided by three banks and two investment companies were not entirely the same, we can nevertheless see that basic organisational structures are very similar in the three banks and the two investment companies. Details of participants' demography are provided in Chapter 4.

### 3.7.1 Data source

According to Yin (2018), the most commonly used data source for case studies are documents, archival records, interviews, direct observations, participant-observations, and physical

artifacts. For this study, semi-structured interviews were used to collect the data because they provide interviewees a “great deal of leeway in how to reply” (Bryman & Bell, 2015, p.481). Both primary and secondary data sources are identified in this study, as shown in Table 29.

Table 29 Data source

Primary data	Secondary data
Eleven semi-structured interviews: Original audio record files Transcriptions of interviews Interview guide Follow-up information via emails	Documents from website Memos from interviews

The primary data consists of eleven semi-structured interviews, including audio recordings of interviews, transcribed interviews, and interview guides which allowed the researcher to prepare before conducting interviews. A follow-up email enabled the retrieval of relevant information that was not clear or missed out at the time of interviews. For instance, information such as “number of years of experience as a product manager” and “number of products developed” would indicate the interviewee’s experience. Some specific follow-up questions such as “Reasons for using different types of ESN,” “Challenges faced with knowledge sharing,” and “Importance of knowledge sharing to product development” provided additional insight to enrich the thematic analysis. Semi-structured interviews supplemented by secondary data such as gathering documents from the firm’s website and memos derived from the interviewer’s reflection on interviews. Relevant information from the website of organisation was also retrieved before the interview was conducted. Information such as records of products offered (i.e., home loans, credit cards, investments, personal loans, etc.), statistics on exchange rates, social media usage, governance, people, community, historical, and upcoming events helped the researcher to know the profile of the organisation.

### 3.7.2 Sample size

A purposive sampling technique was used to conduct the semi-structured interviews. Purposive sampling is non-probability sampling used with relevant experts, commonly used in a qualitative study (Bryman & Bell, 2015). In general, sampling for interviews is through a principle called ‘saturation,’ which means data collection discontinued when no more information is generated (Yin, 2018). In this study, pseudonyms (Alpha, Gamma, Beta, Sigma, and Delta) are used to maintain the anonymity of organisations. This approach enabled the participants to be open and frank on sharing their personal experiences. We interviewed five participants from Alpha bank, two participants each from Gamma and Beta banks, and one each

from Sigma and Delta investment companies. All eleven participants were in Auckland, so the interviews were conducted on their premises. To preserve the anonymity of the interviewees, participant codes were used to denote them, instead of their names.

### 3.7.3 Interview protocol

The following six steps are used to develop the interview protocol (Creswell & Creswell, 2018):

- i. Provide basic information about the interview. The basic information was recorded in Microsoft Excel spreadsheets (Table 30):

Table 30 Interview date and location

<b>Basic information</b>	
Interview date	September 2018 to February 2019
Interview location	Auckland, New Zealand
Interview mode	Face-to-Face

- ii. Introduce the interview procedures so that interviewees have clear instructions before the actual interview. This included: a) sending an email to interviewees with a brief note on the purpose of research and ensuring the confidentiality of acquired information; b) providing interviewees with a participant information sheet and consent form (see Appendices B and C).
- iii. Open with typical “ice-breaker” questions, including: “what is your job/role in this company.” and “How long you have been working in this role.”
- iv. Begin asking content questions: These are based on the phenomenon and related to the concepts of interest, such as innovation, knowledge sharing, and enterprise social networks. Sub-questions were used to examine the main concepts and how they were related to each other. The quality of interviews and the information gathered from interviews improved from the first interview. This helped in revealing important themes and sub-themes.
- v. Continue with probes: these are reminders to the researcher to ask for more information. The probes used in this research are:
  - “Tell me more about your role.” (asking for more information)
  - “Tell me more about the different types of internal communication tools used.” (asking for more information)
  - “Could you explain further about knowledge sharing.” (asking for an explanation)
  - “Could you explain how communication tools are used.” (asking for an explanation)
  - “Tell me more about policy.” (asking for more information)

- vi. Closing instruction to the interviewees: The interviewees were asked questions like, “Would you like to add any further information on innovation, knowledge sharing, and enterprise social networking.” as well as “Is it okay to contact you if I need any further information.”

The following table shows the interview guide that was used during the interviews.

Table 31 Interview guide

How long you have been working in this position/organisation?	Do you interact with co-workers during office hours or outside office hours? Is the interaction online or off-line?
While interacting with co-workers, do you share information/knowledge about new products/services?	Do you use internal ESN such as blogs, wikis, or other similar channels for sharing information/knowledge inside the firm?
Do you consider new products/services competitive?	When you learn something new, do you share with your colleagues using ESN or other similar channels?
On average, how many product/service innovations per year were produced/implemented in your organisation during the recent past (from 2010 to 2018)?	When your colleagues learn something new, do they share with you using ESN or other similar channels?
Which resources of a business are the most important for service innovation to succeed? Example: people, technology, R&D etc.	Does your organisation encourage good culture to share information/knowledge?
What makes service innovation successful in your view?	Do you maintain close relationship with your co-workers?
How is service innovation related to value? For whom is value created?	Do you interact with co-workers to discuss professional matters?
How is service innovation related to information sharing/knowledge sharing in your view?	Do you have social media guidelines in your organisation

### 3.7.4 Data analysis

There are several qualitative data analysis approaches. For instance, Miles and Huberman (1994) used three broad tasks for qualitative data analysis (data reduction, data display, and conclusion). Braun and Clarke (2006), on the other hand, used thematic analysis based on five steps (familiarising with data, coding, searching themes, reviewing themes and findings). and Thomas (2006) used a general inductive approach based on three criteria (analytic strategy and questions, outcome of analysis, and presentation of findings).

Among these approaches, thematic analysis is the most influential and widely used approach to analysing interviews (Castleberry & Nolen, 2018; Bryman & Bell, 2015; Braun & Clarke, 2006). Thematic analysis is used for “identifying, analysing, and reporting patterns (themes)

within the data” (Braun and Clarke, 2006, p.79). The following steps were used in this study to analyse the qualitative data:

Table 32 Data analysis steps

<u>Steps</u>	<u>Meaning</u>
1. Familiarising with data	Transcribing data, reading and re-reading the data; and noting down initial ideas
2. Generating initial coding	Coding interesting features of the data in a systematic fashion across the entire data set; collating data relevant to each code
3. Searching for themes	Collating codes into potential themes; gathering all data relevant to each potential theme
4. reviewing themes	Checking themes from the entire data set (repeat steps 2-3), and make sure themes are unique
5. Findings	Verifying themes in relation to the research question and literature. Identifying emerging potential theme(s) for phase II of mixed method

(Source: Braun & Clarke, 2006)

A brief description of each step is given below:

- i. Familiarising with the data: The first step of thematic analysis is to familiarise oneself with the data. The researcher conducted each interview, which made it easier for the researcher to familiarize herself with the collected data. As soon as the interviews were conducted, they were transcribed by an expert. The expert was hired by the faculty and was approached by the researcher via email. A transcriber signed a confidential form before preceding to transcribe each interview. Relying on expert help saved time; it made it easy to review and verify the transcribed data by listening to audio recordings for missing statements/phrases. Although the researcher had prior knowledge about the topic, the comparison between the transcribed data and the current model was ignored at this stage. More focus was given to reading and re-reading the transcripts to make sense of the entire body of data. Extra notes (i.e., memos) taken during the interviews helped the researcher reflect on each interview.

- ii. Generating initial coding: The second step consists of generating initial coding. The researcher used *NVivo* to identify initial codes, putting raw data and converting them into useable data through identifying themes, concepts, and make sure that they have some connection to each other. Each connecting node was given a meaningful name for a clear understanding. An example of a node (*Innovation experience*) contains statements from the transcript data shown in Figure 4. The researcher identified around 35 initial codes across the entire data set. Some useful nodes are: “products”, “services”, “collaboration”, “communication”, “interaction”, “information”, “decision”, “knowledge sharing”, “networking”, “shared documents”, “social media”, “new ideas”, “willing to share”, “culture”, and “guidelines.”

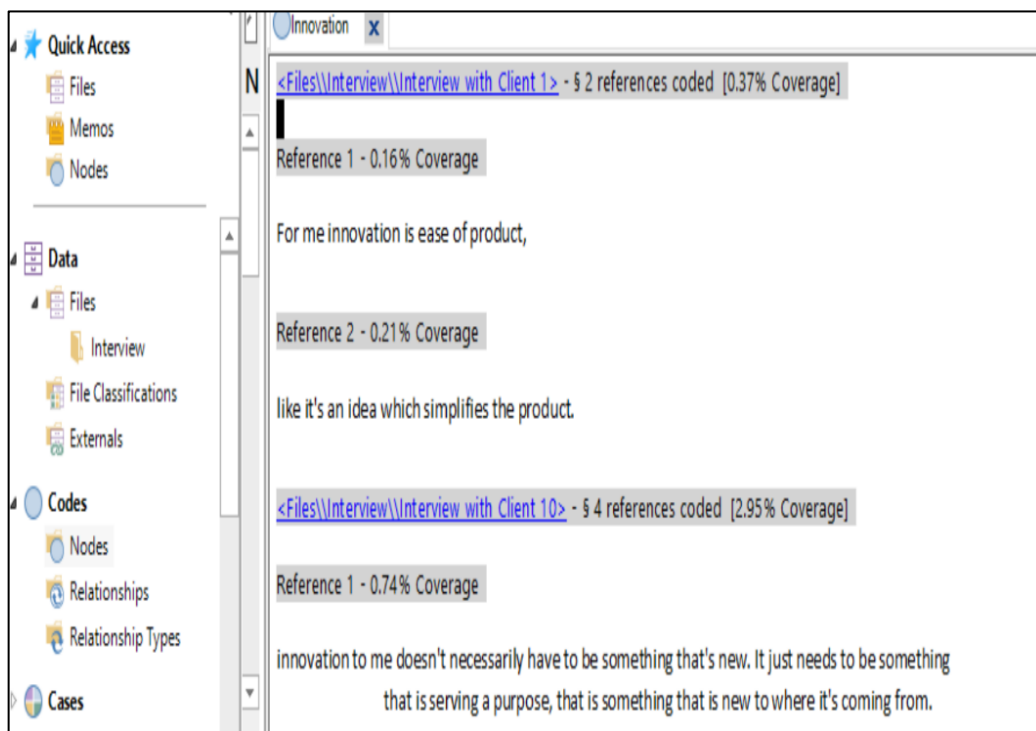


Figure 4 Generating initial coding, data extracted node/code

- iii. Converting codes into themes and sub-themes: The third step is searching for themes and creating relationships using the concept of the parent-child relationship. In this respect, the codes were arranged and re-arranged to make sure they were meaningful, clear, transparent, and comprised of useful themes. Figure 5 shows an example of the theme “knowledge sharing” and “innovation” as parents with child nodes. Other useful themes used are “policy” with a child node “guideline” and “communication” - the child nodes used “face-to-face” and “online.”

Nodes			
	Name	Files	References
	Knowledge sharing	10	24
	Internal KS	3	4
	Willing to share	2	3
	Culture	8	15
	Innovation	10	64
	New idea	6	14
	Future development	1	4
	Product	8	16
	Service	2	4

Figure 5 Example of parent nodes and their child nodes

- iv. Reviewing themes: In this step, the themes were reviewed several times. This means going back and forth and repeating steps 1 to 4 for clarity. This stage also provided an opportunity to integrate nodes into relevant themes, rename nodes for clarity, and discard duplicate nodes.

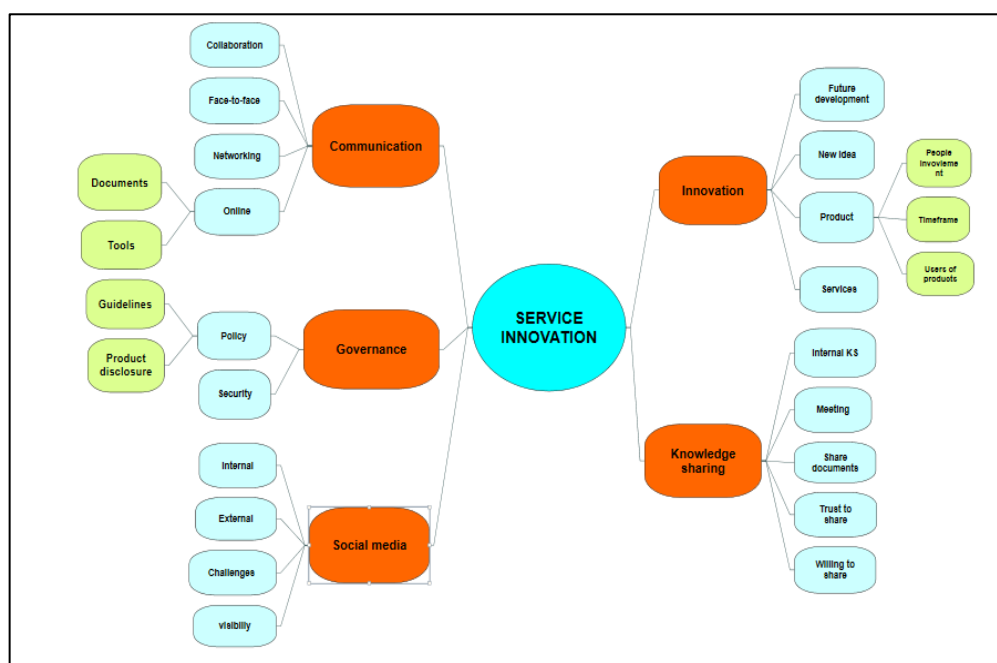


Figure 6 Example of Mind-map using NVivo  
 Note: parent nodes (Orange) and their child nodes (Blue)

The above figure shows nodes for parent-child relationships. However, this figure does not show how the main themes are related to each other. The researcher used five concepts or parent nodes (denoted in orange) and their corresponding child nodes (denoted in blue). During



the interview, the researcher asked additional questions to get a deeper understanding of concepts. For instance, while asking “what is your perception of innovation?” the intention was to relate this to questions such as “who initiated this new idea or innovative idea?” “whom do you talk with about this new idea?” “who is involved in talking about this idea?” or “how often do you meet to discuss this idea, or how do you share ideas?” The following diagram shows the main concepts and their relationship.

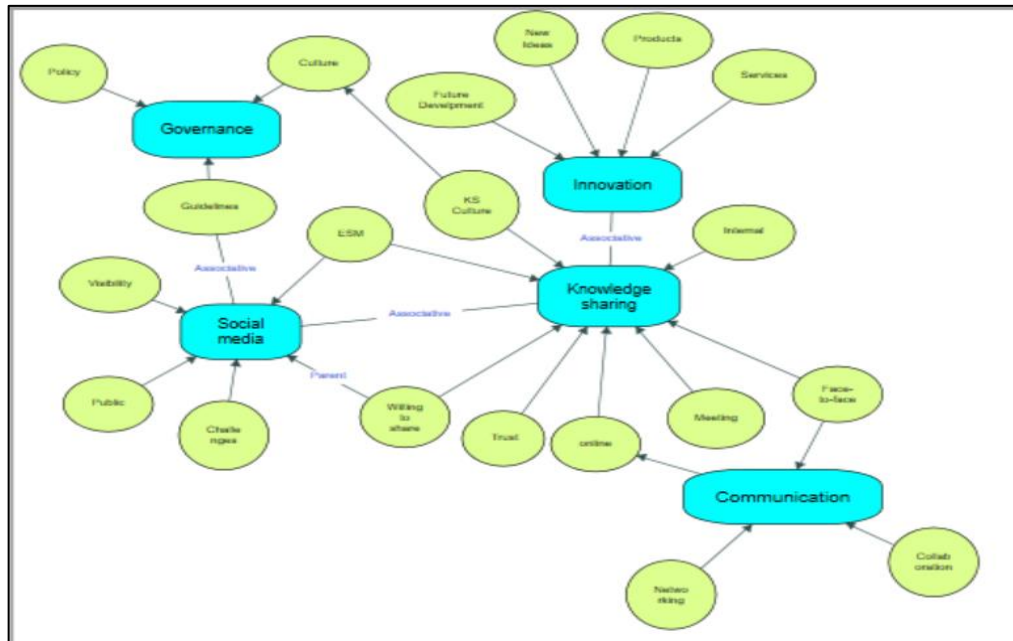


Figure 7 Concept-map using NVivo

- v. **Findings:** Findings from the thematic analysis are reported in Chapter 4. The findings would assist the researcher in evaluating the conceptual model and identify any possible emergent themes.

### 3.7.5 Data validity and reliability

The quality of research is based on the validity and reliability of the data. Several authors have used different strategies for validity and reliability. For instance, Morse et al. (2002) proposed four strategies to verify the validity and reliability (methodology coherence, sufficient sampling, collecting and analysing data concurrently, and thinking theoretically) and ensuring rigor in a qualitative study. Yin (2018) used four tests to judge the quality of the research design: construct validity, internal validity, external validity, and reliability. Since the four tests have been commonly used to examine the quality of most empirical social science, they are also relevant to case study research (Yin, 2018). The four criteria are explained below:

- a. Construct validity deals with establishing correct operational measures for the concepts being studied. To increase construct validity, the first tactic is to provide *multiple sources of evidence*. This is explained in Section 3.7.1 (Data source). The second tactic to increase construct validity is *the chain of evidence* of the information in the case study. This includes interview data, reflection, reference from the website, time and place of interviews, as well as case study protocol (see Section 3.7.3). It is also possible that constructs, such as service innovation, knowledge sharing, governance, and enterprise social networking use, are difficult to operationalize due to the definitions given in this study. To reduce ambiguity, the researcher provides the main concepts with clear definitions, as reflected in Chapter 1.
- b. Internal validity refers to ensuring that research is carried out according to the right practice. In other words, it means whether there is a good match between researchers' observations and the theoretical ideas they develop (Bryman & Bell, 2015). In the current qualitative study, the documents made from the interviews were summarized and sent to the interviewees via email for clarifications and approval. This criterion is also called credibility (Bryman and Bell, 2015), and the technique of interviewees' approval is referred to as *respondent validation* or *member check*.
- c. Reliability deals with demonstrating that the operations of a study – such as the data collection procedures - can be repeated with the same results (Yin, 2018). To increase the reliability, an interview questions guide was created and used during the interviews (see Table 29). The interviews were recorded, transcribed, coded according to the structured coding scheme using NVivo. Because of the open, unstructured nature of the interviews, it was not possible to strictly follow the interview guide. The interviewees had diverse backgrounds and this diversity led to some variances in the data that was gathered. To address this risk, the conceptual model was discussed in every interview. Additionally, to improve the reliability of the coding, the coded transcripts were re-read a few times to check whether they matched the coding results (Miles & Huberman, 1994).
- d. External validity refers to how the case study's findings can be generalized. In this respect, Johnson (1997) suggested that qualitative researchers should provide information, such as the number and kind of people in the study, how they were selected, contextual information, or information about any informants who provided information. This information can be reported in the research methods section to make an informed decision about whom the result may be generalized to, or the decision to replicate the study to new participants. Following Johnson's (1997) recommendation, the case study

consists of five cases with eleven participants. These participants are the key informants as they are expert product managers/owners/developers from the financial industry. Information about all five cases is well-articulated in this chapter for readers to acquire relevant knowledge and generalize to different people or contexts. It is worth mentioning that the outcome of the qualitative data has been used to develop the quantitative study.

All four criteria (construct validity, internal validity, reliability, and external validity) mentioned above required to enhance the validity of the qualitative study's data, and in turn, the quantitative study.

The above discussion is based on the qualitative study. It covered the interview protocol and validity of interview data. The detailed procedures and findings on each theme are provided in the next chapter, along with the outcome that contributes to the subsequent chapter on the quantitative study.

### 3.8 PHASE II: QUANTITATIVE STUDY

The quantitative study is used to validate the theoretical model that was developed out of the findings of the qualitative study. The participants for the survey are from the global financial industry, and does not include the interviewees from Phase I. This selection is essential to ensure a separate dataset is collected on the same phenomenon (Bryman & Bell, 2015). The development of constructs, measurement items, and evaluation are the key steps in quantitative research (Mackenzie et al., 2011). These steps are discussed in Chapter 5. In the following sections, a brief overview of the quantitative method is provided based on the proposed conceptual model, along with the statistical techniques that are appropriate to examine the quantitative data.

#### 3.8.1 Developing survey design

The survey design was developed by considering the measurement items for each construct, which were derived from pre-existing measures (Mackenzie et al., 2011). The measurement items used existing validated scales with some items slightly modified to ensure their suitability for this study. These items incorporate questions about service innovation, ESN use for knowledge sharing, and governance as indicated in the conceptual model. All items were measured using a 7-point Likert-type scale, ranging from 1 ("strongly disagree") to 7 ("strongly agree").

agree”). The 7-point scale is chosen for two reasons: first, this is the most commonly used scale in the empirical studies (Charterina, et al., 2018); and second, the 7-point scale captures greater variation in responses compared to the five-point scale (Lietz, 2010). Following the suggestions of Churchill (1979), the measurement scales are adopted, modified, and extended using the existing scales. More detail on survey design, constructs used in this study are provided in Chapter 5.

### 3.8.2 Online survey

Online surveys have several advantages (faster, cheaper, and simpler) over mailed surveys (Dutot et al., 2018). The survey was sent to a global sample. The researcher identified several sources for contacting potential respondents, such as LinkedIn (a professional social media network), online communities for professional finance bodies (such as the American Banker Association, the British Banker Association, the New Zealand Banker Association, Fintech Folk group, etc.), attendees at local finance events (such as fintech and blockchain conferences, insurance company conference, and finance meetings), as well as personal contacts. Since the intended participants are professionals from the financial industry, an online survey sent via LinkedIn was preferred. LinkedIn worked well for two reasons: it is considered a professional network, and subscribing to the ‘*Premier*’ membership enabled the researcher to reach participants globally; second, it was easy to send the link to the online survey, which was hosted at AUT. More details on survey participants are provided in Chapter 5.

### 3.8.3 Sample size assessment

Different scholars have provided different criteria to assess the appropriate sample size. Some scholars suggested a range between 150 to 300 (Pinsonneault and Kraemer, 1993) and 100 to 200 (Hoelter, 1983) as an acceptable size. A rule of thumb for factor analysis is that there should be five cases for each scale item (Hair et al., 2006), and for regression analysis, a minimum of 200 subjects required (Green, 1991). Other scholars have indicated that an increase in sample size increases the chance of statistical significance and assists in obtaining stable estimates of standard errors (Hinkin, 1998, p. 111). In the behavioural sciences, Cohen’s statistical power analysis (1992) is used to calculate an adequate sample size. Five factors are required in order to perform a statistical power analysis; they are significance level or criterion ( $\alpha = .05$ ), effect size (.10, .30, .50), desired power (.80), as well as the number of latent and observed variables. Power analysis maximises sampling effort within the constraint of time and money (Chaun & Penyelidikan, 2006). The details of the sample size analysis are presented in Chapter 5.

### 3.8.4 Evaluating the relationship between constructs

Structural equation modelling (SEM) will be used to assess the research model. The model has four types of variables: observed variables, latent variables, moderator variables, and control variables. These are explained below:

*Observed and latent variables:* Observed variables, also called measured variables, are variables that are recorded and measured. On the other hand, latent variables also referred to as construct, are hidden and cannot be observed. Observed variables are usually represented as rectangular nodes in SEM diagrams, and latent variables are represented as ellipses. Observed variables usually have measurement errors associated with them, while latent variables do not. The conceptual model has three latent variables: enterprise social network use for knowledge sharing (ESN\_KS), service innovation (SER\_INN), and governance (GOVRN).

*Moderator variables:* A moderator variable is a variable that affects the direction/or strength of the relationship between a predictor (independent) variable and a criterion (dependent) variable (Baron & Kenny, 1998). In the conceptual model, the construct GOVRN (governance) is proposed as a moderator that influences the relationship between the predictor (ESN use) and a criterion (service innovation).

*Control variables:* In this study, various relevant variables are included to control for possible confounding effects on the dependent variable (Donate et al., 2011). They include firm-level and individual-level demographic variables. The choice of control variables was based on prior literature (Chin et al., 2019; Bienkowska et al., 2018; Aboelmaged, 2018; Donate et al., 2011).

### 3.8.5 Evaluating validity and reliability

Reliability (via Cronbach's alpha) is used for measuring internal consistency (Hinkin, 1998; Hinkin, Tracey, & Enz, 1997). Validity (via factor analysis) deals with how a measure assesses and represents the intended concept (Zikmund, Babin, Carr, & Griffin, 2013). The measurement for item reliability uses factor loadings on the construct. According to Hair et al. (2010), individual items with a factor loading above 0.5 should be included, whereas items with a factor loading lower than 0.5 are recommended to be removed. Nunnally (1978) suggested that if a variable's Cronbach's alpha is greater than .70, it can be considered reliable.

Two types of construct validity are used in this study, namely, convergent validity and discriminant validity. Convergent validity refers to the degree to which two measures or constructs are related. Convergent validity is evaluated by examining composite reliability and

average variance extracted (AVE). Composite reliability for all constructs should be above 0.50 to ensure internal consistency. The average variance extracted (AVE) from all constructs should exceed the cut-off criterion of 0.50 and be greater than the squared correlations between any pair of constructs. Discriminant validity is the lack of relationship among latent variables (factors). To justify discriminant validity, the shared variance (squared correlation) between two constructs (latent variables) should be lower than the square root of AVE (Fornell & Larcker, 1981). The table below lists guidelines for measurement model evaluation.

Table 33 Guidelines for reliability and validity

<b>Validity</b>	<b>Criterion</b>	<b>Guidelines</b>
<b>Internal consistency</b>	CR	CR > 0.7 (Significant)
		CR < 0.6 (lack of reliability)
<b>Indicator reliability</b>	Loadings	Loading > 0.7 (significant at least at the 0.5 level)
<b>Convergent validity</b>	AVE	AVE > 0.50
<b>Discriminant validity</b>	Cross loading	Items loading of each indicator is higher for its construct
	Fornell and Larcker	Measured as the square root of the AVE

### 3.9 CHAPTER SUMMARY

This chapter provides a detailed explanation of how the mixed-methods research study was carried out, beginning with the qualitative phase (interviews), followed by the quantitative phase (survey). This mixed-methods approach fits very well with the post-positivist paradigm. The qualitative method is provided with a step-by-step instruction based on the rationale to use case study, interview protocol, data analysis, and validity & reliability that are evident in the literature. In terms of the quantitative methods, considerations are given to the conceptual model developed in the previous chapter. The ethical considerations around how to conduct interviews and the surveys were also accounted for through the ethics review process. The next two chapters provide the analysis and findings of the qualitative study (Chapter 4), followed by the analysis and findings of the quantitative study (Chapter 5).

## CHAPTER 4: PHASE I - QUALITATIVE RESULTS AND ANALYSIS

### 4.1 CHAPTER OVERVIEW

This chapter provides the results and analyses of the qualitative data. Qualitative data analysis is the first step of mixed methods. The goal is to assess the conceptual model, which is conceptualized in Chapter 2, and identify new constructs that emerge. In the next section, the demography of the participants is described, followed by an analysis of the findings from the interview data. Then, the results are discussed, followed by the presentation of a research model.

### 4.2 DEMOGRAPHICS OF PARTICIPANTS

The following table provides a demographics of the eleven participants who were interviewed for this study.

Table 34 Participants

	Code*	Interviewees	Current product	Job tenure	Gender	Age	ESN use	Size
<b>Alpha</b>	PtCode1	Product Manager	Investments	> 5yr	M	30-40	A	> 100
	PtCode2	Product Manager	Wealth management	> 5yr	M	> 40	A	
	PtCode3	Digital Manager	Brand identity advertising	1-5yr	F	> 40	A	
	PtCode4	Product Manager	Wealth business	> 5yr	F	> 40	A	
	PtCode5	Product Manager	Investment scheme	> 5yr	M	> 40	M	
<b>Beta</b>	PtCode6	Product Manager	Home loans	1-5yr	F	< 30	A	> 100
	PtCode7	Digital Officer	Retail/online banking	1-5yr	F	> 40	A	
<b>Gamma</b>	PtCode8	Product Manager	Term deposit/funds	> 5yr	M	30-40	A	> 100
	PtCode9	Product Manager	Product investments	1-5yr	F	> 40	A	
<b>Delta</b>	PtCode10	Financial Advisor	Retirement planning	1-5yr	M	30-40	M	< 50
<b>Sigma</b>	PtCode11	Mkt/Comm Officer	Investments funds	1-5yr	F	30-40	M	50-100

[Alpha, Beta & Gamma denote Banks; Delta & Sigma denote investments]

[ESN use: A = Active; M = moderate]

Note: \* Actual names have been replaced by hypothetical ones to protect the identity of the participating respondents and their companies

The initial contacts with participants were made through the researchers' own communications with potential interviewees, followed by the snowballing technique to contact other potential participants. The interviewees were selected because their roles were related to organisational

innovation, such as product managers/owners/product developers, marketing and communication specialists, ICT specialists, and digital product developers. To preserve the anonymity of the interviewees, pseudonyms (PtCode1 to PtCode11) were used to label them. Additionally, at least two participants were interviewed from each bank. This helped provide a broader perspective of what was taking place, given the large size of the banks. Investment companies were relatively smaller in size, so only one person per firm was interviewed. The participant who could provide sufficient information about the phenomenon was selected. Overall, the depth of information gathered from all firms were relevant for analysing the data.

Interviewees were asked whether they were ‘active’ or ‘moderate’ users of ESN. ‘Active’ users are those who edit content using ESN and collaborate with other co-workers using ESN. On the other hand, ‘moderate’ users are those who only read the contents on ESN and are less or not interested in participating in ESN. This analysis is shown in Table 35 above. Eight out of eleven participants are active users (72%) of ESN and three participants are moderate users (23%). Moderate users are either older (PtCode5) and show less interest in using ESN or are “silent observers” (PtCode10 and PtCode11). Other demographic attributes, such as job tenure and gender, have no influence on ESN usage, except for organisation size, as seen in the last two participants, both from firms with less than 100 employees.

### 4.3 QUALITATIVE DATA ANALYSIS

Thematic analysis is used for analysing the interview data (Braun & Clarke, 2006). The themes are derived from the transcribed data and analysed into first-order evidence, second-order themes, and key themes. In the first-order evidence, the transcribed data is summarized from each case, followed by second-order themes to narrow down evidence into relevant themes. These themes are mostly aligned with the conceptual model, such as service innovation, knowledge sharing, enterprise social networking, and governance. The researcher (interviewer) was also cautious about any emerging theme(s) that could drive from interviews. The use of semi-structured interviews uncovered an emerging theme “trust” which was further explored to understand the importance of trust between supervisor-subordinate and co-workers to improve the use of ESN for knowledge sharing. The emergent theme was used to develop the research model. The following table provides relevant interview questions that were asked during the interviews corresponding with the relevant main concepts used in this study.



Table 35 Conducting relevant questions during interview

Main points/themes discussed during interviews	Interview questions
<i>Innovation experience</i>	<i>What are your thoughts about innovation experience in your organisation? (Probe: types of product/service developed, initiated, people involved etc.)</i>
<i>Knowledge sharing experience</i>	<i>What is your perception on sharing information with your co-workers? (probe: knowledge about product/services, sharing knowledge with others, interaction with others, etc.)</i>
<i>Experience with ESN</i>	<i>How do you communicate with co-workers? (probe: face-to-face, email, meetings, etc.); For online (probe: intranet, blogs, Yammer, SharePoint, etc.)</i>
<i>Understanding guidelines</i>	<i>Do you have formal guidelines to develop products? (probe: informal way to share knowledge? Policy on social media, etc.)</i>

In the following sections, the four themes and representative quotes are presented.

#### 4.3.1 Theme one: Innovation experience

We begin with the first theme ‘innovation experience’ to ensure that most relevant data are obtained and enable us to understand other relevant concepts such as knowledge sharing and ESN for the purpose of this study. Figure 8 summarized the inputs from eleven participants (PtCode1 – PtCode11) from five firms (Alpha, Gamma, Beta, Sigma and Delta).

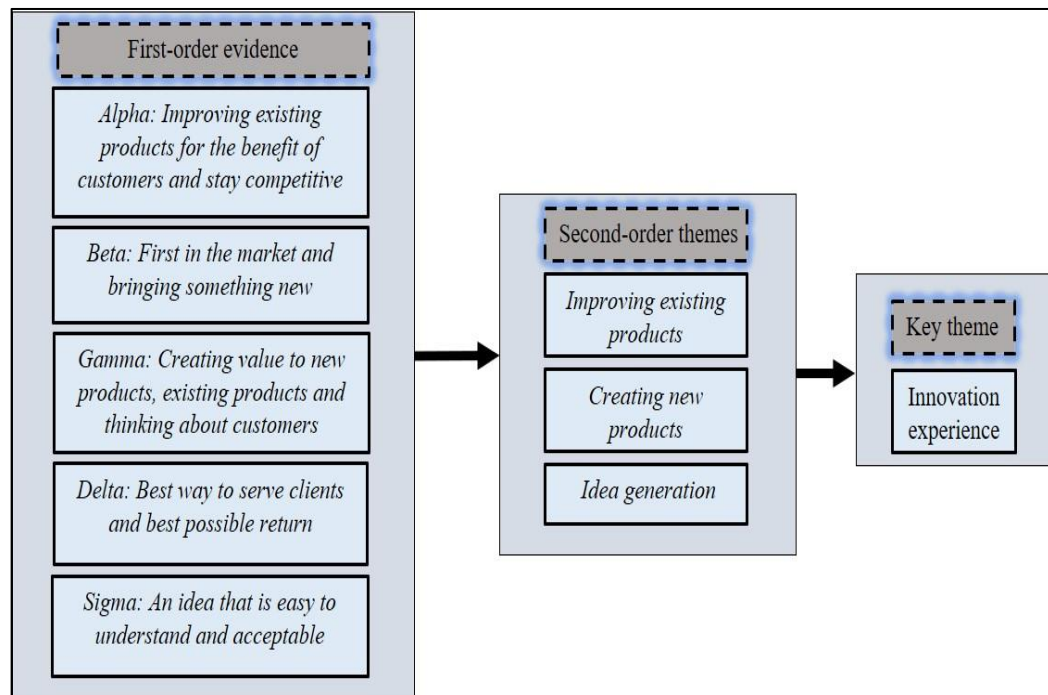


Figure 8 Participants' views on innovation experience

During the interviews, we asked interviewees about their perception of ‘innovation’ related to product/service development. Interviewees defined the term innovation differently. For the first-order evidence, we concentrated on key statements made by interviewees in all firms. For instance, for the first-order evidence, participants from Alpha considered innovation to be:

*“I think we are looking for those opportunities to do things a little bit differently than the competitors”*

*“Coming up with new payment system for customers and communicate with customers with confidence so that customers feel excited about the new development in products”*

*“Stay competitive, bringing out something new and improving existing products for our customers’ need”*

*“An idea that simplifies the product. Anything from new business lines, functionality and existing product”*

These statements were used to summarize the first order-theme for Alpha, as indicated in Figure 8. A similar exercise was conducted for the other firms. For the second-order theme, the most frequently used themes mentioned were a combination of *“improving existing products, creating new products, and idea generation.”* Therefore, these three themes were considered second-order themes that paved the way for reflecting on the key theme ‘innovation experience.’

The following questions were asked to examine the importance of innovation as perceived by interviewees. They are briefly explained below:

a. *How many products have you developed in the last five years?*

On average, the participants have developed three products in the last five years and it took around six months to develop a product, depending on the size and resources. The analysis of data revealed in the following statements from Alpha, Beta, Gamma (banks), Delta and Sigma (investments):

*“The groundwork, such as what to include for product, and scoping in the system takes around three months and then another 2-3 months to rolling out the product and working closely with front staff to make sure they are properly trained and aware of all instructions before delivery to the customers” (Alpha: PtCode1)*

*“It takes 6 months to 3 years to launch a product..depending on the size of product” (Alpha:Ptcode5)*

*“upgrading products take less time than changing products..depends on size of product” (Beta:PtCode6)*

*“Start to finish probably about 18 months.. Around 2-3 within 5 years depending on resource availability” (Gamma: PtCode9)*

*“Around six to nine months to develop product along with final decision from the investment committee who meets quarterly to discuss the best recommendation to serve clients” (Delta: PtCode10)*

*“It depends on the size of the product and resource availability...I guess it takes around 1 to 2 years” (Sigma: PtCode11)*

**b. How many people are involved in developing product(s)?**

All eleven participants mentioned the involvement of a diverse group of people in the development of products/services. Some examples are given below:

<b>Individuals involved in product development</b>	<b>Product developed</b>
<i>“Working group that consists of financial advisor, legal advisor, risk advisor, and representative from different part of distributed network who could provide valuable information during the process of product development” (Alpha: PtCode2)</i>	<i>Wealth management product</i>
<i>“Project leader leading the team, technology team responsible to develop the systems in order to process the applications. Legal team to give legal advice around the documentation and content, marketing team to market the product, and also third party” (Alpha: Ptcode5)</i>	<i>Investment scheme</i>
<i>“It is very comprehensive piece of work involving marketing, taxation, finance, distribution, legal team, compliance team” (Beta: PtCode6)</i>	<i>Home loan</i>
<i>“ICT staff, marketing and Human resource staff get together to understand the needs and provide training to front-line staff once the product is developed” (Beta: PtCode7)</i>	<i>Online banking</i>
<i>“Diverse people are involved in the development of products such as finance, technology partner, marketing, distribution, front-line staff, relationship manager” (Gamma: PtCode8)</i>	<i>Term deposit</i>
<i>“While upgrading or modifying application for product online ICT and front-line staff play a crucial role” (Gamma: PtCode9)</i>	<i>Online loan application</i>
<i>“While developing portfolio other people give advice to ensure we provide proper service to customers, so financial advisor, product developer, legal advisor is part of product development” (Delta: PtCode10)</i>	<i>Retirement planning product</i>
<i>“In my team I work with the marketing manager, CEO, finance and investor” (Sigma: PtCode11)</i>	<i>Funds approval scheme</i>

The participants also spoke about who was involved in the development of products:

“The technology team responsible for developing the systems”

“The legal team gives legal advice around the documentation and content”

“The front-line staff provide service to customers”

“The marketing team market the product”

Interviewees were then asked to provide examples of products/services they considered innovative. Examples included a home loan, a term deposit, and a wealth management product. This question was important for two reasons – first, involving different staff members implies a need for team-building and collaboration; second, these collaborations are quite likely to lead to idea generation. This critical interaction is associated with the next theme ‘knowledge sharing’, described in Section 4.3.2.

*c. What are the challenges you face while developing products/services?*

Participants also shared their views on the challenges they anticipated during the development of products/service. Their responses are given below:

*“It is important as a product manager to understand what customer demands are. We try to identify what the customer wants actually and through that we come up with the new product” (Alpha: Ptcode1)*

*“Product development goes through a process of discussing with team of people, It is challenging to get approval from authorized staff..anything could happen” (Alpha:Ptcode4)*

*“The challenge is to make them quickly and doing it well. We also struggle to execute them well because of the tight resources” (Alpha: Ptcode5)*

*“Identifying features which could benefit our customers and how can we improve” (Alpha: PtCode6)*

*“It is a very comprehensive piece of work... and touch on the base before developing the product -challenging in terms of satisfying the team involved, sometimes not approved to go-a-head” (Beta: PtCode6)*

*“If you are looking at developing something, a research is done through multiple sources, then writing a business case, authorized to approve and then take that idea forward to implementation....so challenging to process the development” (Gamma: PtCode8)*

*“Bringing people to agree on implementation of product...because of different views it takes time...so continuously going back and forth” (Delta: PtCode10)*

*“We have different phases of product development..each has its own challenges” (Sigma: PtCode11)*

The challenges revealed by the participants was that product development whether new or existing ones requires continuous improvement.

#### 4.3.2 Theme two: Knowledge sharing experience

Figure 9 summarizes how knowledge sharing was perceived by the participants. They viewed knowledge sharing as idea generation, learning from each other, and constant discussions with co-workers. The participants also revealed that sharing is possible during meetings and is very useful. They placed emphasis on document sharing for information retrieval. The first-order data was summarized into three second-order themes: face-to-face sharing, document sharing, and sharing with co-workers. The theme ‘sharing with co-workers’ frequently occurred during the interview and complements the other second-order themes, as it is related to sharing with other departments, verbal sharing, or constant discussion.

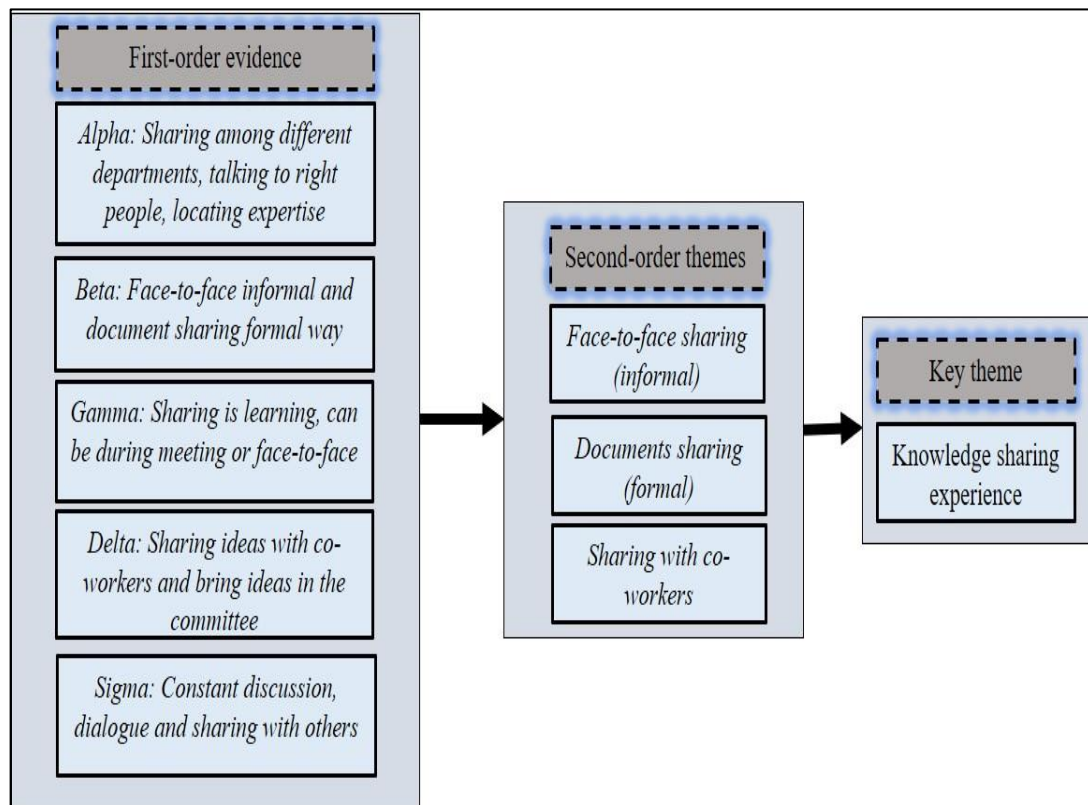


Figure 9 Participants views on knowledge sharing

The participants' responses to other related questions are elaborated on below.

##### *a. Reasons for sharing knowledge with co-workers*

This question was asked to understand if co-workers are willing to share knowledge, and if sharing knowledge improves idea generation.

*“You need to trust each other while sharing ideas...this is important in the working environment” (Alpha: PtCode1)*

*“Building awareness of right knowledge and to be aware of change and provide knowledge of how to change” (Alpha: PtCode2)*

*“people who share information, there is a sense of trust.. the reason for unwilling to share is due to lack of expertise to share” (Alpha: PtCode3)*

*“Most people are willing to share even if they don’t, they are willing to give suggestions..Team sharing culture is supported and very positive” (Alpha: PtCode4)*

*“It’s more about acknowledgement...discussing with team, get together and think about the problem” (Beta: PtCode6)*

*“We support each other at work, sharing knowledge helps in resolving key issues and there is sense of engagement in sharing” (Beta: PtCode7)*

*“Staff are willing to share, so staff are always recognized that they are being listened to and that the feedback is heard” (Gamma: Ptcode8)*

*“It is very friendly environment..while sharing knowledge we make sure right information is given and shared” (Gamma: PtCode9)*

*“We have a small group of people who are very much like a family..so we trust each other..and sharing is common..even a new staff become part of this family” (Delta: PtCode10)*

*“It’s a small company very transparent in terms of knowing each other and exchanging views on products and services, so everyone is willing to share” (Sigma: PtCode11)*

The above discussion suggested that while employees were willing to share knowledge, they emphasized sharing right knowledge. The reason for sharing ideas is because people who share knowledge had a sense of trust, while a lack of sharing was due to a lack of trust and a lack of expertise to share.

*b. Do you share knowledge with other departments?*

The participants responded as follows:

*“Apart from sharing knowledge with a team, there is also sharing of knowledge with other departments. For instance, marketing complement sales, operations complement sales to process orders as quickly as possible. Sharing among different departments create cross learning” (Alpha: PtCode1)*



*“It is not possible to develop product on my own...I may have the idea, but while sharing with other departments improve exchange of ideas and it a normal practice” (Alpha: PtCode2)*

*“Knowledge is shared with different department..depends on the project size..working group of people of every department out there needs to be involved” (Beta: PtCode6)*

*“While developing product other department such as finance, marketing and R&D provide their input..we review documents and exchange ideas” (Beta: PtCode7)*

*“We share knowledge with other department such as, IT, finance and marketing while planning for developing product” (Gamma: PtCode9)*

*“Most of the work I initiated..then ask my boss and finance manager, marketing team to provide their input..yes sharing ideas with other departments is important” (Delta: PtCode10)*

*“We regularly collaborate with other departments such as finance, HR, communication/marketing and share ideas on funds development” (Sigma: PtCode11)*

Participants emphasized that sharing ideas with other departments was important for product development, but also creates cross-learning. When asked whether they preferred sharing knowledge face-to-face or via other channels, the participants replied thus:

*“My personal preference is more face to face” (Alpha: PtCode 1)*

*“the way that information is shared is through ad hoc conversations that might be more like one-on-one rather than a group, or through face to face meetings or verbal-based meetings” (Alpha: PtCode2)*

*“We have regular face-to-face meeting.. weekly with product team and monthly if needed, email is used to share documents and any viewpoints that is important” (Alpha: PtCode3)*

*“We use a combination of face-to-face meeting, informal chat during tea break, and also email to discuss work related matter” (Beta: PtCode6)*

*“We conduct face-to-face group meetings on important issues, while meetings with front office is for training purposes, email is a normal practice here” (Gamma: PtCode8)*

*“Face to face is more effective in meeting (room) than email..sometimes we use combination of both” (Gamma: PtCode9)*

*“I prefer to bring ideas to share face-to-face in the committee..Also share using email when needed” (Delta: PtCode10)*

*“It's a very collaborative workspace so we're constantly having discussions about whether it's to do with a member problem or improving on a system or refining, getting greater efficiencies. There's a constant dialogue and engagement within ourselves” (Sigma: PtCode11)*

Whether knowledge is shared informally (face-to-face) or formally (meetings), participants agreed that knowledge sharing is driven by trust and a willingness to share among the teams who develop products. Interestingly, participants used the term ‘trust’ and emphasized it as an important factor in facilitating knowledge sharing. This encouraged us to explore how this was related to the use of ESN for knowledge sharing.

#### 4.3.3 Theme three: Experience with enterprise social networking

Figure 10 summarizes the data on this theme. Instead of asking directly about ESN use, the participants were asked about the communication tools they used to share knowledge. At this point in time, it was necessary to explain the difference between internal and external use of social media with a focus on internal social media (ESN) so that the desired outcome can be achieved. With this reservation in mind, and to keep the momentum, we allowed participants to freely discuss any communication tools that they perceived as being used for sharing knowledge internally.

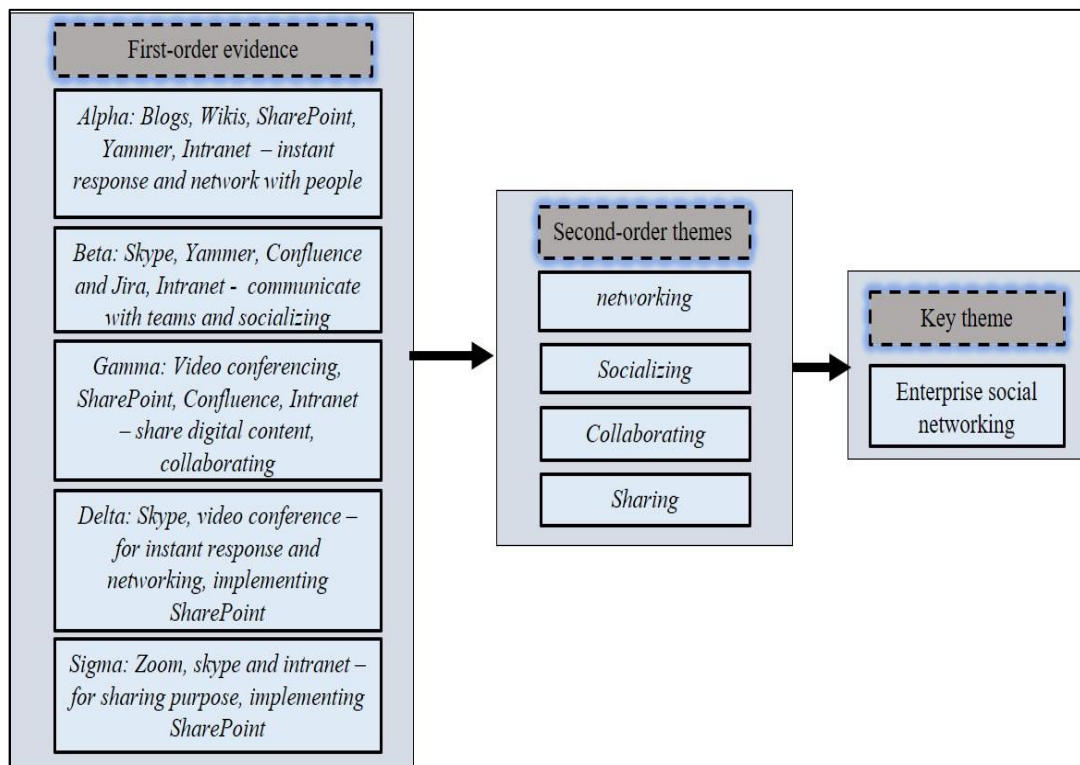


Figure 10 Participants' views of enterprise social networking

As shown in Figure 10, the participants used a combination of email, intranet, Skype, video conferencing as well as ESNs while collaborating with co-workers. The functions of these tools were further explored. The common second-order theme appeared were ‘networking, socializing, collaborating, and sharing.’ Other related questions were asked, as shown below.



a. Can you explain the purpose of using each tool?

*“Email is used for limited audience to discuss or identify problem. Wikis, SharePoint for wider audience, such as head of IT, customer services or marketing” (Alpha: Ptcode1)*

*“Emails to staff are also used before launching the product. Alpha bank also uses Yammer for staff testing and offering of product - this helps in getting around staff and their valuable feedback” (Alpha: PtCode2)*

*“Yammer is rolled out across the whole company and anyone can join to work together as a team. Jira and Confluence are standard engineering software that people used for core engineering work. Trello is used by a lot of teams informally; Slack is used extensively and has become a standard practice. Skype Messenger for individual's person to person chat as well as using video conferencing” (Beta: PtCode7)*

*“SharePoint for storing digital content, Confluence for all of our risk assessments, Slack for sharing ideas, and a lot of communication via video conferencing, virtual meeting service that we call MyMeeting, emails, instant messaging” (Gamma: PtCode8)*

*“We normally use email, instant messaging and Skype video conference, and started to use other tools such as SharePoint and Yammer to give better choice to collaborate with each other” (Delta: PtCode10)*

*“It is useful to use various tools for different purpose, such as email, Skype, and SharePoint” (Sigma: PtCode11)*

The participants used ESN tools such as SharePoint, Yammer, and Slack, in addition to Jira, Confluence, and Teams. Participants also used each tool for different functions. For instance, Slack is used for sharing ideas, Yammer for testing and offering products, and Confluence for risk assessment. In term of using both professional and private networks, few participants stated:

*“I use LinkedIn from a personal perspective. I'm on it every day, because I find it really interesting to read about what's happening in the industry and particularly in finance and banking and digital” (Alpha: PtCode2).*

*“LinkedIn I use mainly to keep in touch with business connections and to see what's going on and if I'm contemplating looking at another job or something, I would use it to do that” (Alpha: PtCode5)*

*“During off work I use LinkedIn to keep up with my professional network as you can connect with anyone in the world” (Beta: PtCode6)*

*“Public facing social media is managed by marketing team and customers, I occasionally use LinkedIn” (Gamma: PtCode8)*

*“Few of my colleagues are in LinkedIn, but we use outside office hours” (Delta: Ptcode10)*

However, for work-related matters participants indicated:

*“We use internal social media; the reason is more about security” (Alpha: PtCode1)*

*“I think social media would be ideal to spread the knowledge of new type of product..what it is and how it is applicable to our customers” (Alpha: PtCode3)*

*“Security is the main reason for using internal social media” (Alpha: PtCode4)*

*“People use these platforms... it’s quite diverse the amount and type of information that’s being shared on these platforms” (Alpha: PtCode5)*

*“These platforms are still growing and my concern is about the security” (Beta: PtCode6)*

*“Internal social media is useful for sharing with diverse sets of people within organisation” (Gamma: PtCode8)*

The interviewees were then asked about their opinion about the use of ESN for sharing knowledge and the type of tools they preferred to use.

*b. What are the benefits and challenges of using internal social media (ESN)?*

The following responses were acquired from participants.

***Benefits of using ESNs:***

*“You see people response, instant response and flow of information’ ‘people collaborate with people on common interest and instant response” (Alpha: PtCode1)*

*“The importance of social media to share knowledge would not only enable sharing knowledge but information received quicker and feedback will be given faster” (Alpha: PtCode2)*

*“If somebody writes a question, everybody can see it so you answer it once and like 1000 people know the answer instantaneously” (Alpha: PtCode4)*

*“Communication between team members work out very well” (Alpha: PtCode5)*

*“Message sent by one person is received by everybody even if they don’t reply to the msg” (Beta: PtCode6)*

*“Information is shared by anyone..can go in and edit, share documents, images” (Gamma: PtCode8)*

*“Communication is faster and you can reach people simultaneously” (Delta: PtCode10)*

*“A lot of engagement and opportunity to share among teams” (Sigma: PtCode11)*

***Challenges of using ESNs:***

*“While using social media which is so open, ideas can be stolen by competitors” (Alpha – PtCode1)*

*“Difficult bringing right people for contribution” (Alpha: PtCode2)*

*“Changing to different channels make people frustrated” (Alpha: PtCode3)*

*“Some people are happy to use email and reluctant to use other tools.. need incentive to use” (Alpha: PtCode4)*

*“Too much information... so the challenge is to get the right type of information” (Alpha – PtCode5)*

*“No standardized tool, anyone can use any tools, so the problem is the multiplication of enormous amount of resources, demands and ideas” (Beta: PtCode7)*

*“It is complex. Feel like no privacy using it and sometimes handling overloaded information” (Gamma: PtCode8)*

*“They are not standardised..so this area needs more attention..not feel comfortable using it” (Delta: PtCode10)*

*“Too much information going around and difficult to manage” (Sigma: PtCode11)*

Although ESN offers users instant responses and makes information is more visible than when email is used, the challenges of using ESN are significant. The participants stated that, as the flow of information coming from ESN is enormous and unprecedented, the problem is to get the right information and share it with the right people. The participants also acknowledged that since social media is open, ideas can be stolen by competitors when they are shared, which ultimately leads to loss of privacy. Other challenges are more about encouraging the use of these platforms.

#### 4.3.4 Theme four: Governance

While discussing the role of governance, we chose to use the term ‘guidance’ to explore the processes and procedures used to manage product/service development. The first-order evidence in Figure 11 below indicates the role of governance as an overarching construct that manages all issues related to risk, compliance, obligations, policies, and the product development framework. The participants explained that their governance teams produce monthly and quarterly reports to ensure that employees are complying with the prescribed procedures rigorously. Apart from policies and rules imposed on employees, participants also acknowledged the importance of the knowledge-sharing culture, arguing that sharing knowledge with co-workers is possible only with an open and collaborative environment. Both formal and informal aspects of governance were surfaced from the data.

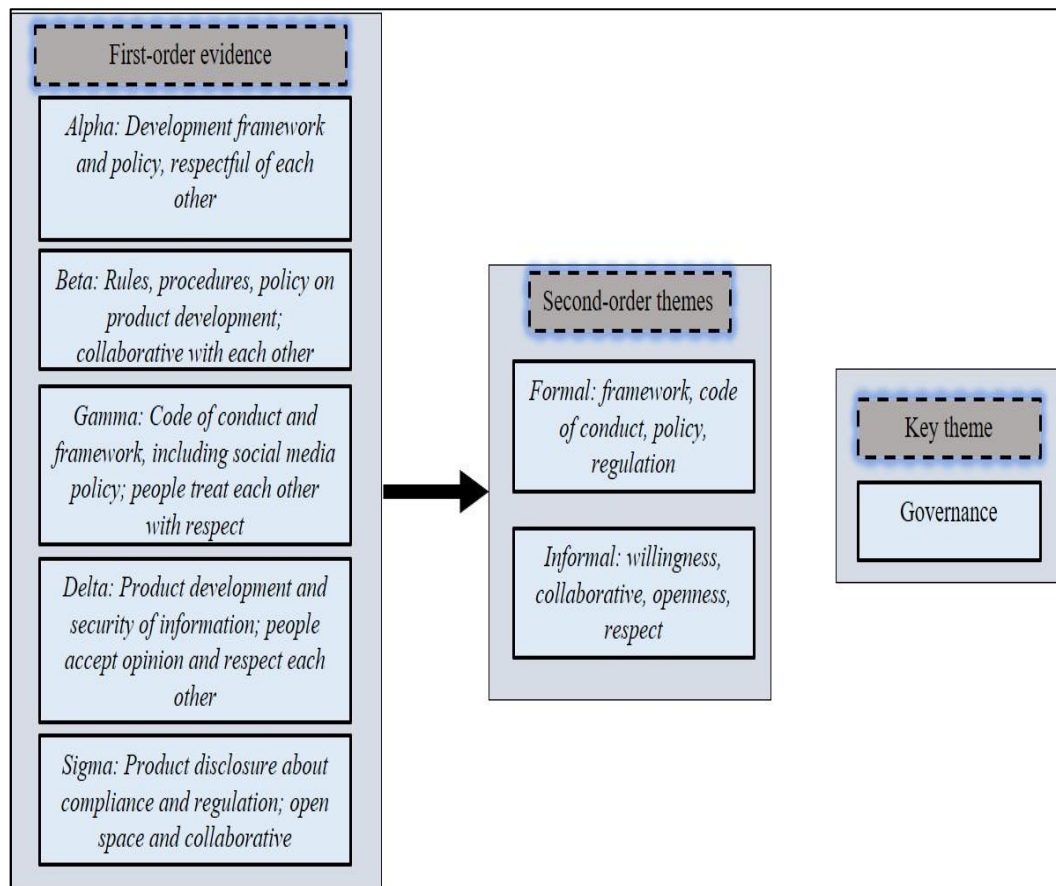


Figure 11 Participants' views on governance

In terms of knowledge sharing for product development, organisations have predefined templates that are centrally located so they can easily be retrieved by individuals involved in product development. This is stated from a few participants below:

*“One of the requirements around product development is standardized templates that record the design features” (Alpha: PtCode2)*

*“Within the governance department... they are constantly looking at new legislation and new obligations... so you're not allowed to do anything that is deemed either illegal or disrespectful for anybody else against the company's reputation” (Alpha: PtCode4)*

*“Governance framework is very clear and precise about the process of developing or changing product” (Alpha: PtCode5)*

*“It's a highly controlled data environment, because obviously we hold very sensitive data” (Beta: PtCode7)*

*“Policy and code of conduct are in place for our back-office processing team; within our frontline teams as well our product management policy” (Gamma: PtCode8)*

*“The governance effectively oversees the templates and framework we use for product development” (Gamma: PtCode9)*

*“Our portfolio is based on a strict framework that we follow..this has to do with policy in place” (Delta: PtCode10)*

*“Product disclosure is related to information about compliance and regulations” (Sigma: PtCode11)*

Participants acknowledged that their firm’s governance function was constantly studying new legislation because they dealt with data that is very controlled and sensitive; thus, employees were not allowed to do anything that is deemed illegal or against the firm’s reputation. In terms of social media policy, participants have different views as highlighted below:

*“How to send and receive information using communication tools” (Alpha: PtCode1)*

*“It is about treating people with respect... so there are social norms that govern how we communicate with each other” (Alpha: PtCode2)*

*“Respectful of each other in terms of code of conduct” (Alpha: PtCode3)*

*“What is right and what is wrong..what are we allowed to do and not to do” (Alpha: PtCode4)*

*“Doing the right way to communicate with each other” (Alpha: PtCode5)*

*“How to use different communication tools to communicate and be respectful” (Beta: PtCode6)*

*“Policy around what to say and not to say while collaborating... and communicating for work related matters” (Beta: PtCode7)*

*“The social media policy is included within the governance framework and comes more into our Code of Conduct – standard procedure, appropriate language and not bullying and that sort of thing” (Gamma: PtCode8)*

*“We are trained to understand the code of practice..they are properly documented” (Gamma: PtCode9)*

*“The policy is related to security of information and part of code of conduct” (Delta: PtCode10)*

*“This is related to educating people..how to use information and be respectful to others” (Sigma: PtCode11)*

All eleven participants admitted that their workplaces' culture influences the level and nature of knowledge-sharing in their organisations. The most common second-order themes were “willingness”, “collaborative”, “openness”, and “respect”, terms that are close to the idea of “informal control” as depicted thus:

*“Here the culture is to ‘succeed as a team and not as an individual’..As a team if you want to succeed, then knowledge sharing is important when you work in a close-knit team” (Alpha: PtCode1)*

*“Alpha is really collaborative. There's a willingness and an expectation that you'll work together with people and that people bring their specialist views and experiences to the table” (Alpha: PtCode2)*

*“People are very friendly..it’s an open space concept and everyone is talking and willing to share” (Beta: PtCode6)*

*“We have respect for each other and it’s very friendly environment to work with people” (PtCode7)*

*“It would be like a family or whatever trying to achieve a common objective and how do we do this, how do we get there faster and do it better” (Gamma: PtCode8)*

*“There's a big push for diversity in culture... you treat people with respect, we won't tolerate bullying or harassment” (Gamma: PtCode9)*

*“It's a very communicative culture. It's an open plan so we can encourage and talk practically, just raise our voice and we can talk” (Delta: PtCode10)*

*“Very open space and collaborative environment... Just like Google has very open, playful workspace and encouraging and inspiring employees – we have a similar kind of philosophy” (Sigma: PtCode11)*

Terms such as “close knit-team”, “work together with people”, “just raise our voice”, and “inspiring employees”, indicate how co-workers work together in an open environment creating close relationships and adding a personal touch to support each other.

In the following section, the overall findings from the interviews elaborated.

#### 4.4 DISCUSSION ON QUALITATIVE FINDINGS

The findings demonstrated that the conceptual model captured the phenomena reasonably well. This section examines how the interview findings inform our understanding of ESN enabled knowledge sharing to improve innovation in the financial industry and the importance of ‘trust’ and ‘governance’ to address two research problems. Likewise, the findings further triangulated with the literature mentioned in chapter 2. The following points are discussed in this respect.

**First**, most participants shared their view that innovation is about “improving new or existing products/services” and “creating new products/services”. This is similar to the literature, where innovation is considered to be “new/improved ways of production and services” (Lu & Tseng, 2010; Calantone et al., 2002) and “new development and new service concept” (den Hertog, 2000). Participants revealed that while interaction with customers is important, internal interaction among employees is also essential while developing products and services to fit their

offerings to customers' needs (Barrett et al., 2015; Lu & Tseng, 2010). This is also reflected in the literature (Muninger et al., 2019; Barrett et al., 2015). The comments pointed to a need to clarify the difference between incremental and substantial innovation (Bienkowska et al., 2018; Liao et al., 2007), as knowledge sharing through ESN may have different impacts on each of them.

**Second**, while developing products, interviewees indicated that they collaborate and share their views with individuals from a variety of functions. Sharing knowledge with different functions such as marketing, sales, legal, risk, and IT plays an essential part in developing new products/services and is treated as a routine practice. Involving a diverse group of people implies a need for team-building and collaborations and likely to lead to idea generation and innovation. This is related to the importance of intra-organisational knowledge sharing with diverse groups (Barrett et al., 2015; den Hertog, 2000). The sharing of experiences by individuals across departments encourage close relationships among themselves (Calantone et al., 2002).

**Third**, although it was difficult to relate directly to how personalised and codified knowledge is used for knowledge sharing (van den Hooff & de Leeuw van Weenen, 2004; Lee and Choi, 2003), participants indicated the importance of face-to-face (informal) interaction and document sharing (formal). Statements such as “face-to-face meeting”, “informal chat”, “instant response”, and “acquire knowledge from different places” indicate the use of personalised and codified knowledge, matching previous studies (Cao & Xing, 2012; Ajith Kumar & Ganesh, 2011; Turner & Makhija, 2006; Choi & Lee, 2002). Personalised knowledge (face-to-face interaction) mostly depends on individual experiences while codified knowledge (acquiring knowledge from different places) mostly indicates clear procedures and sharing information (Cao & Xing, 2012; Turner & Makhija, 2006).

**Fourth**, the interviews revealed that participants use a combination of the corporate intranet, email, and ESN tools (Yammer, Slack, Jira, Wikis, SharePoint, IBM Connect, Facebook Workplace, etc.) for knowledge sharing. Our findings were consistent with previous studies that indicate diverse ESN use for collaboration and knowledge sharing (Chin et al., 2019; Aboelmaged, 2018; Madsen, 2017; Bala, 2016). Diverse ESNs are used because they provide different functions to facilitate tasks and different levels of flexibility in their use (Chin et al., 2019; Madsen, 2017).



In terms of formal and informal sharing, the findings from the interviews also indicate that ESN is used not only for collaboration but also for file sharing and easy access to knowledge, expertise, problem sharing and increase productivity (Leonardi & Neeley, 2017; Kane, 2014). For instance, interviewees indicate using Slack for quick updates and to share ideas, Yammer for testing products, and SharePoint for sharing documents. These points also elaborate that there is a need for the survey to investigate the variety of ESNs use in organisations, as discussed in the literature (Chin et al., 2019; Madsen et al., 2017). The data indicate that ESN was not fully utilized in the organisations studied (Ngai et al., 2015), limiting its impact and momentum, and leading to a few knowledge-related interactions. This could perhaps be due to employees being more used to viewing social media as a tool for personal (non-work-related) interactions (Song et al., 2019; Aboelmaged, 2018).

**Fifth**, in terms of using ESN for knowledge sharing, interviewees revealed that although ESN offers users instant responses and make information more visible, the challenges are more significant. Such challenges are “information overload”, “get the right type of information”, “difficult to manage”, and “ideas stolen by competitors”. This matches the literature, where the positive outcomes of ESN use, such as better collaboration and interaction (Leonardi, 2014), are contrasted with its negative outcomes (Chen & Wei, 2019). Addressing these challenges is essential to increase the level of ESN use. Overall, the impression was that the use of ESN for knowledge sharing was not fully utilized in the organisations. Also, participants viewed ESN as mainly a tool for operational purposes, instead of purposeful knowledge sharing.

**Sixth**, ‘trust’ emerged several times during the interviews. It appeared during the discussion on using enterprise social networking for knowledge sharing. Participants revealed the importance of trust when knowledge is shared, which is influenced by a knowledge-sharing culture essential for fostering innovation. Likewise, participants acknowledged that people who share information have a ‘sense of trust’ that helps resolve and exchange views on products and services. This matches prior studies, where trust has been found to positively influence social networking (Salehan et al., 2018), to increase collaboration, and reduce fear among individuals being made redundant (Bieńkowska et al., 2018).

In terms of the relationship between supervisors-subordinate and co-workers, a trusting environment is vital for a successful exchange of knowledge and to promote innovation (Lei et al., 2018; Bieńkowska et al., 2018). Since ESN use can increase the speed of knowledge sharing, this study posits that trust influences the level of innovation in a firm through the mediating role of knowledge sharing using ESN.



**Seventh,** evidence from the interviews indicate that while sharing knowledge, governance was extensively carried out through a code of practice, policies, and standards while developing products. Participants agreed that they were aware of the procedures and practices and were necessary for developing products. Participants acknowledged that governance function was constantly studying new legislation because they dealt with very controlled and sensitive data. Likewise, participants also agreed that while sharing knowledge using internal social media, it was necessary to follow the social media policy prescribed by their organisation. Literature suggested the importance of governance mechanism (formal and informal) that provides operational guidelines and increases in openness and network to reduce the risk of knowledge leakage to external parties (Stohl et al., 2017; Zheng & Zhao, 2013; Foss et al., 2010).

**Eight,** all participants indicated that their workplace has an open and warm culture, which was important for sharing knowledge among co-workers and across departments. This interaction builds collaboration and increases social relationships among employees for sharing knowledge in the workplace (Wasko & Faraj, 2005; Cummings, 2004). This point was notable because few interviewees were aware of social media policies or rules, compared to the procedures and practices required for developing products. The contrast between governance and culture made us consider whether the two concepts were two ends of a continuum (with culture being closer to informal control) and whether we should include both of them in the second phase of the study (the large-scale survey).

The discussion on the interviews' findings elaborated above indicates participants' views on each theme, as demonstrated in the conceptual model and literature review. The following section elaborates on the contribution of a qualitative study to a quantitative study.

#### 4.5 CONTRIBUTION OF THE QUALITATIVE STUDY TO THE QUANTITATIVE STUDY

The main objective of the qualitative study was to verify the conceptual model. The previous section explained how this occurred. In addition, the qualitative study identified an emergent theme: “trust”. During the interviews, all interviewees acknowledged that it was important to have an open and trusted culture to share knowledge among employees and superiors. Gaining such evidence from interviewees provided a deeper understanding of the importance of trust in

relation to sharing knowledge. This matched the role of trust for knowledge sharing as explained by social exchange theory in the literature review.

Besides the conceptual contribution, the qualitative data provided greater insight into the phenomenon of ESN use. For example, ESN applications that were frequently mentioned by interviewees, such as Slack, Yammer, and SharePoint, were listed in the questionnaires for respondents to indicate which tools they used. In terms of innovation, the interviewees noted that they were involved in both improving existing products/services and developing new ones. The survey did not specify whether the respondents should think about incremental or radical innovation. In terms of the rate of product development, the participants revealed that developing an innovative product took, on average, around six months, depending on the number and availability of resources. The participants' roles and experience (Table 32) indicate their expertise in identifying customers' needs. Therefore, there is a need in the second phase (the survey) to identify both the number and the type of innovative products that have been developed by respondents.

Therefore, besides validating the conceptual model, the results of the qualitative study informed the structure and content of the quantitative study. The next section discusses the research model and hypothesis development based on the literature and qualitative results.

#### 4.6 RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

The constructs used in this research are derived from the literature (Chapter 2). The conceptual model (Figure 3) was further enhanced through the qualitative study, which uncovered the role of trust between supervisors-subordinates and co-workers to encourage knowledge sharing. This new theme was added to the conceptual model, leading to the development of the final research model (Figure 12) for the quantitative study. This section puts forward the hypotheses that will be tested statistically.

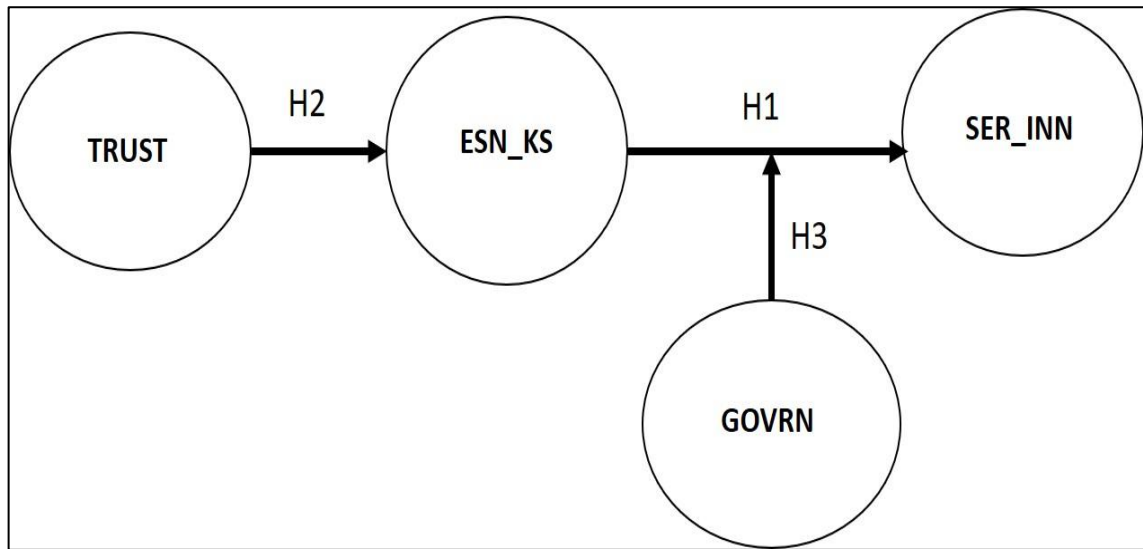


Figure 12 Research model and hypotheses

Note: trust (trust between co-workers and between co-workers and superior; ESN\_KS (enterprise social networking for knowledge sharing); SER\_INN (service innovation which is internal to organisation); GOVRN (governance both formal and informal)

#### 4.6.1 Impact of ESN use on service innovation

Several studies have put forward that knowledge sharing is a key factor for innovation (Lin, 2007; Leonardi & Meyer 2015; Majchrzak et al., 2013), regardless as to whether the knowledge is personalised and codified (Greiner et al., 2006). Although capturing personalised knowledge is difficult because it resides in the minds of individuals (Stenmark, 2001). ESN tools such as blogs, wikis, and discussion forums can overcome these problems by reducing the time to interact and increase better collaboration (Wagner, 2004; Wagner & Bolloju, 2005; Jalonen, 2014). Additionally, ESN can change the knowledge management process from one that is centralized and repository-based to one that is decentralized and openly available (Majchrzak et al., 2013). Likewise, with the use of internal social media, individuals can see “who is connected with whom” and how individuals are “connected with content” (Treem & Leonardi, 2012). These interactions between employees reduce organisational knowledge stickiness (Leonardi & Meyer 2015), and knowledge duplication and enhanced innovativeness (Leonardi, 2014). ESN use can facilitate the continuous sharing of knowledge in an open and visible way (Majchrzak et al., 2013).

During the interviews, participants expressed their views on knowledge sharing for product development using varieties of ESNs (such as SharePoint, Yammer, Jira, Slack etc.) to interact with co-workers. This also includes face-to-face knowledge sharing, which is aligned with personalised knowledge sharing (informal) and document sharing which is aligned with codified knowledge sharing (formal) (Al Saifi, 2016; Ajith Kumar & Ganesh, 2011).

Participants revealed that they use and SharePoint to share documents and Slack for quick updates. Thus, they are examples of formal and informal way of sharing knowledge. Therefore, the following is hypothesised:

*Hypothesis 1: ESN use for knowledge sharing is positively related to service innovation*

#### 4.6.2 Influence of trust on ESN uses

While the use of ESN in organisations has been widely discussed, its acceptance and use by employees has remained fairly low. This low acceptance has been discussed in the scholarly and practitioner literature (Stock & gross, 2016; Bala et al., 2015; McKinsey, 2016). The low acceptance of ESN for knowledge sharing in organisations is possibly due to employees' concern that they might be less valuable in the organisation and could lose their position if they share their knowledge (Gibbs et al., 2013). Other possible reasons for the low acceptance of ESNs could be the need to spend additional time and effort learning another platform on top of existing ones (Vurori & Okkonen, 2012) and a lack of interest in learning (Bala et al., 2015). These obstacles can be addressed by the level of trust among employees and explained by social exchange theory (SET). SET posits that individuals, while in social relationships, engage in interactions and create obligations from the exchange, thus creating a positive behaviour (Cropanzano et al., 2017).

During the interviews, interviewees perceived trust as an increased awareness of knowledge sharing with a notion to improve better collaboration among employees. According to interviewees, “*people who share information, there is a sense of trust*”, and that it is essential to “*trust each other while sharing ideas.*” As the notion of trust appeared a couple of times during the interviews, it was decided to use trust as an emerging theme to answer the research question. The literature also suggests that it is vital to have an environment where trust is built to enhance the relationship between supervisors-subordinate and co-workers (Lei et al., 2018; Bieńkowska et al., 2018), and to promote innovation (Lei et al., 2018). Likewise, trust has a positive influence on social networking (Tajudeen et al., 2016) to promote knowledge sharing culture. Trust could also be related to the tendency to believe in others and their contributions in the form of posts and comments on collaborative Web 2.0 applications (Hsu & Lin, 2008). For Tajudeen et al. (2016), trust is an antecedent of social media use because a higher level of trust facilitates a higher level of online knowledge sharing (Salehan et al., 2018; Harden, 2012). Borgatti and Cross (2003) and Uzzi and Lancaster (2003) emphasized that individuals can easily access valuable knowledge within a short period with social networking. Likewise, the higher the trust among members, the more favourable social networking will be with respect to

knowledge sharing (Chow & Chan, 2008). As such, the more employees share knowledge using ESN, the more productive they are in the organisation (Abu El-ella et al., 2016). Therefore, the following is hypothesized:

*Hypothesis 2: Trust is positively related to the use of ESN for knowledge sharing*

#### 4.6.3 Role of Governance

While the low acceptance of ESN use in organisational context is formulated using trust as discussed above, the inappropriate use of ESN is challenging for organisations as well. Since ESN use can be extended outside a firm's boundaries, it is relatively easy for employees to leak sensitive information outside (Sarigiannai, et al, 2015). Therefore, governance is necessary to strengthen the relationship between knowledge sharing through ESN use and innovation. While knowledge governance ensures that knowledge is valid and reliable (Foss et al, 2010; Turner & Makhija, 2006), social media governance refers to policies used to guide the use of social media (Chen et al., 2016; Linke & Zerfass, 2013; (Stohl et al., 2017), as well as for resource allocation (Mergel & Greeves, 2012). Stohl et al. (2017) provided a comprehensive list of guidelines by investigating social media use by organisations and their employees. For instance, the guidelines indicate "how to stay safe when connecting with people online" or "how social media are places to create what organisation is about by listening to employee voices". Such guidelines, an example of governance tools, can be used to reduce the occurrence of adverse outcomes from ESN use (Wood & Grant, 2017), such as employee distraction (Leonardi et al., 2013), information overload (Gibbs et al., 2013), knowledge leakage, and increased interpersonal conflict (Sarigianni et al., 2015; Molok et al., 2011).

During the interviews, the participants provided their views on the importance of formal governance while developing products and how codes of practice, policies and standards are necessary while sharing knowledge via social media. In terms of informal governance, participants asserted that their workplace has an open and warm knowledge-sharing culture that supported open interaction among employees, creating good relationships between supervisors-employees as well as co-workers. This study argues that governance positively moderates the relationship between ESN use for knowledge sharing and the level of service innovation. The following is hypothesized:

*Hypothesis 3: Governance positively moderates the relationship between the use of ESN for knowledge sharing and service innovation*

## 4.7 CHAPTER SUMMARY

This chapter describes the findings of the qualitative study, which was the first phase of the mixed methods approach. Based on the literature review, a conceptual model was developed. To assess the conceptual model, interviews were conducted with 11 professionals from the financial industry and their responses were analysed with thematic analysis. The results revealed the validity of the conceptual model. In addition, an additional construct, trust, emerged from the analysis. This addresses the first research problem, namely, the low acceptance of ESN use among employees. For the second research problem (the inappropriate use of ESN among employees), the role of governance was highlighted in the data. Based on the results, a research model with three hypotheses was developed. In the next chapter, this model is tested statistically using survey data.

## CHAPTER 5: PHASE II - QUANTITATIVE RESULTS AND ANALYSIS

### 5.1 CHAPTER OVERVIEW

This chapter describes the design, analysis, and results of the quantitative study, the second step of the mixed methods approach used in this thesis. The goal is to test the hypotheses and the research model detailed in the previous chapter. The chapter begins by providing detailed information on the design and verification of the survey, the sample, the measurement items, and the demographic information of the participants. This is followed by a statistical analysis of the three hypotheses. The hypotheses are tested using structured equation modelling (SEM) with the SPSS-AMOS v26 application. The chapter concludes with a discussion of the findings.

### 5.2 SURVEY DESIGN

The survey questionnaire (Appendix D) has three sections. The purpose of the first section (Q1 to Q3) is to understand the use of enterprise social networking (ESN). These questions were essential to evaluate participants' perception on the use of ESN. Section two (Q4-Q7) gathers data on the four key constructs: service innovation, knowledge sharing using ESN, trust, and governance. These constructs were used for testing the hypotheses. Section three (Q8-Q14) asks the participants for their demographic information.

#### 5.2.1 Constructs used in the survey

There are four constructs in the research model: service innovation (SER\_INN), enterprise social networking for knowledge sharing (ESN\_KS), trust (TRUST), and governance (GOVRN). They are summarised in Table 36 below. The items used to measure each construct and the sources for them are provided in Appendix E.

Service innovation (SER\_INN) is the dependent variable, and is measured by eight items. The first five (SER\_INN1 to SER\_INN5) items are from Calantone et al. (2002) and are well-established items that have been used by other scholars (e.g., Gunu & Ajayi, 2015). Items SER\_INN6 and SER\_INN7 are from Bienkowska et al. (2018), while item SER\_INN8 is from the Liao et al. (2007). All eight items specify the development of products and services that takes place within an organisation, that is, without the participation of external parties.

Table 36 Constructs used in the quantitative study

Construct	Definition	Adapted from
<b>SER_INN (Service innovation)</b>	The development of new and/or improved products and services for customers, including experienced shared by employees.	Lu & Tseng, 2010; Calantone et al., 2002
<b>ESN_KS (Use of enterprise social networking for knowledge sharing)</b>	The use of ESN to share knowledge within an organisation.	Leonardi et al., 2013; Robertson & Kee, 2017
<b>TRUST (Trust)</b>	Intra-organisational trust, consisting of the level of trust between superiors and subordinates, and the level of trust between co-workers.	Bienkowska et al., 2018
<b>GOVRN (Governance)</b>	Mechanisms that provide policies and standards (formal), and support open interaction and collaboration (informal) required for sharing knowledge via ESN.	Stohl et al., 2017; Foss et al., 2010

The use of enterprise social networking for knowledge sharing (ESN\_KS) is a mediating or intervening variable in the relation between trust and service innovation. ESN\_KS is measured with five items. The first two items (ESN\_KS1 and ESN\_KS2) derived from van den Hooff and de Leeuw van Weenen (2004), ESN\_KS3 and ESN\_KS4 are from Lin (2007), and ESN\_KS5 is from Choi and Lee (2002). All five items have been reworded to reflect the use of ESN. One such example is: “In my organisation when I have learned something new, I share it with my colleagues using ESN” (van den Hooff & de Leeuw van Weenen, 2004).

TRUST is an emerging theme derived from interviews thereby triangulated with the literature in chapter 2. It is used in the model to address the first research problem related to low acceptance of ESNs use for knowledge sharing (ESN\_KS). To measure trust, seven items developed by Bienkowska et al. (2018) were used. These items are geared towards trust between employees and superiors as well as trust between co-workers. Trust between employees and superiors and co-workers is essential to create a trusted environment that could facilitate the use of enterprise social networking for knowledge sharing (ESN\_KS). In this case, the use of



enterprise social networking for knowledge sharing (ESN\_KS) mediates the relationship between trust and service innovation.

Governance (GOVRN) is a construct used in the model to address the second research problem related to the inappropriate use of ESN for knowledge sharing (ESN\_KS). The items used to measure governance (GOVRN) are related to both formal and informal control mechanisms, as validated by the findings from the qualitative study. GOVRN1 to GOVRN6 are based on knowledge sharing governance and are from Choi and Lee (2002) and Gold et al. (2001), while GOVRN7 to GOVRN10 are related to social media governance and adopted from Stole et al. (2017). The statements were reworded to reflect formal and informal governance. For instance, formal governance would read: “My organisation stresses the use of ESN to generate new knowledge from existing knowledge” (Gold et al., 2001); and informal governance would read: “My organisation encourages employees to search and share new values and thoughts through ESN” (Choi & Lee, 2002).

### 5.2.2 Control variables used in the survey

Apart from the constructs mentioned above, data was also gathered on several control variables (Table 37) for two reasons. The first reason was to develop a profile of the survey respondents in terms of their experiences, location, and use of social media. The second reason was to statistically analyse whether the focal constructs varied across the control variables, such as gender.

Table 37 Control variables used in the survey

Control variables	Reference
Gender, age, years of experience, number of employees	Chin et al., 2019; Bienkowska et al., 2018; Liao & Chen, 2007; Lin, 2007; Cai, 2018, Chen & Kuo, 2017
Region/sector/department	Liao & Chen, 2007; Lin, 2007
Social media and ESN applications used	Chin et al., 2019; Aboelmaged, 2018; Chen & Kuo, 2017

## 5.3 VERIFICATION OF SURVEY ITEMS

To ensure questionnaires are simple, unambiguous, and easy to complete, a pre-test is necessary before the actual survey is conducted (Bryman & Bell, 2011). A pre-test helps in deleting vague questions and this process is possible by providing an initial list of questions to two or three

people who are not part of the target group (Bryman & Bell, 2011). In this respect, three PhD students were chosen to provide feedback on the format and contents of the questionnaires. An email was sent to three PhD students in May 2019, requesting them to assist with the survey questionnaires. The feedback received was mostly on the format of the questionnaires. Following the pre-test with PhD students, the researcher approached participants from the first phase of the interview to assess the readability and clarity of the survey questionnaires. Some scholars view that pre-test helps in adjusting the questions for the preparation of a full-scale study (Tashakkori & Teddlie, 2003). Dutot et al. (2018), on the other hand, included interviewees from a qualitative study in the pre-test to review the questionnaires for further improvement and refinement before the actual survey in the mixed-method study. As recommended, since the interview data was collected in the first phase of the mixed method study, it was decided to conduct a pre-test study using interview participants as they would have a better understanding of the topic. All eleven interviewees were emailed in June 2019 with a request to complete an online survey. Detailed information with a link to the Qualtrics web survey was emailed. They were asked to provide feedback on the wording problem, clarity of questions, question sequence, structure, format, and time to complete the survey (Bryman & Bell, 2011). Out of 11 interviewees, only three provided feedback on the questionnaire.

The outcome of the pre-test study was complimentary. Two of the pre-testers stated that there were “no major problems in terms of wording and structure”, and suggested “a few minor phrasing modifications”. The third pre-tester stated that the survey questionnaires were a “good mix of different response types” and the “clarity of wordings was good”. The first two pre-testers took around 20 minutes to complete the survey, whereas the third pre-tester took around 15 minutes. This information was useful while providing instructions in the final survey. Overall, no major changes were required in the survey questionnaires. After the pre-tests, it was necessary to make the final adjustments, based on feedback from the two supervisors. After the final amendments, the survey was launched in September 2019 via the Qualtrics online survey platform hosted by AUT.

## 5.4 SURVEY PARTICIPANTS

As mentioned in Chapter 3, several sources were identified to collect survey data. To approach the desired key informants (product managers/owners/developers from the global financial sector), LinkedIn was deemed to be the most appropriate method. Figure 13 explains how

potential participants were approached on LinkedIn, using AAA Bank (a pseudonym) as an example.

The top-left screenshot shows the results when LinkedIn is searched for product managers from AAA Bank, and the top-right screenshot shows the results for the same search query but with the added criterion of location (in this case, Singapore). Once a potential participant was identified, an invitation was sent by the PhD researcher to connect with the potential participant (centre screenshot). Once the connection was built or when the individual showed interest in connecting, a survey request was sent to her/him. This request included the purpose of the research, the survey link, instructions on how to complete the survey, and the time that would be required to finish the survey.

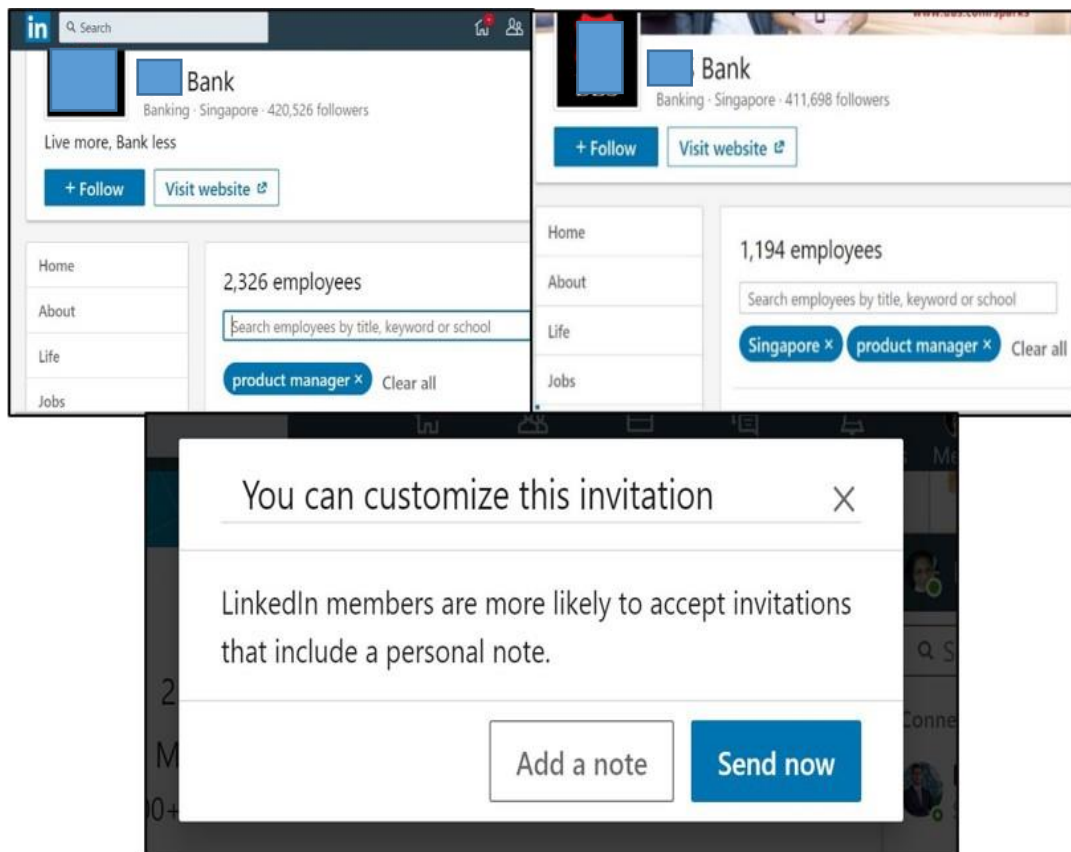


Figure 13 Approaching participants using LinkedIn

As the survey was conducted anonymously, the participants were assured that no personal information was recorded, and only aggregate data would be reported. The date the survey link sent was recorded in the Excel spreadsheet to avoid multiple requests and to reduce duplications in the record-keeping. A follow-up message was sent after 4 to 6 weeks reminding participants about the survey and requesting that they complete the survey. This follow-up date was also

recorded in the Excel spreadsheet. Table 38 shows the format that was used to track the invitations sent and responses received.

Table 38 Format for capturing data of survey participants

<b>Name*</b>	<b>Role</b>	<b>Organisation+</b>	<b>Location</b>	<b>Mode of Contact</b>	<b>Follow-up</b>
XXX	Product manager	AAA	Singapore	Contact -> accept invitation -> send survey link.	Follow-up after 4-6 weeks
YYY	Product developer	BBB	UK	Use InMail if required.	
ZZZ	Product manager	CCC	South Africa	Record all information in Excel.	
WWW	Product owner	DDD	USA		

*(Note: \*+ = Name and Organisation have been replaced by pseudonyms. to protect the identity of the respondents)*

The survey was conducted for six months, from September 2019 to February 2020. 1455 participants from banks, investment firms, and insurance companies from across the world were contacted via LinkedIn. Examples of such organisations include: HSBC, Bank of America, American Express, Citibank, DBS Bank, Standard Chartered Bank, JP Morgan, Barclays, Wells Fargo, Credit Suisse, Prudential Financial, AIG, MetLife, AXA, and Allianz. As indicated in Table 39, out of these 1455, around 31% (n = 446) accepted the invitation to “connect” on LinkedIn. Around 10% (n = 147) of those contacted completed the survey.

Table 39 Contacting Potential Respondents

<b>Date participants contacted</b>	<b>Number of participants contacted via LinkedIn</b>	<b>Number of participants who responded</b>	<b>Number of participants who completed the survey</b>
Sept-Dec 2019	1165	363	102
Jan-Feb 2020	290	83	45
<b>Total</b>	<b>1455</b>	<b>446</b>	<b>147</b>

## 5.5 SAMPLE SIZE

As mentioned in Chapter 3, the rule-of-thumb for sample sizes (Hair et al., 2011) is that the minimum sample size should be equal to 10 times the largest number of structural paths directed

toward a particular latent construct in the structural model. In this case, the construct “governance” receives ten incoming paths, and therefore the minimum sample size would be 100. Based on statistical power analysis (Cohen, 1992), the calculation for the sample size would be: given the number of observed and latent variables (i.e., 4) in the model, the anticipated effect size, and the desired probability and statistical power levels (Westland, 2010), the minimum sample size would be 137.

Although 147 respondents completed the survey, only 104 responses could be used because of missing data. Although this is lower than what the power analysis recommends, Anderson and Gerbing (1984) suggested that “with three or more indicators per factor, a sample size of 100 will usually be sufficient for convergence” (pp. 170 -171). Others have suggested that if the measurement is strong (3 or 4 indicators per factor, and good reliabilities) and if the structural path model not overly complex, a sample size of 50 to 100 will be enough (Fabrigar et al. 2010; Iacobucci, 2010). These arguments provide adequate justification for this study’s sample size.

## 5.6 DATA SCREENING

The Qualtrics online survey service allows researchers to format and download the survey response data set in the SPSS format, and this convenient feature was used. Data screening is the first step in structural equation model analysis (Schumacker, & Lomax, 2016). It is necessary to conduct data screening for missing data and preparing the dataset for statistical analyses (Pallant, 2016). Missing data often occurs when the respondent fails to answer one or more questions in the survey (Hair et al., 2014). Out of 147 responses, 40 cases contained no data and were deleted from the data set. After examining the remaining 107 responses, it was found that three data sets were incomplete. These responses were also deleted. The remaining 104 were checked for errors such as values being outside the range of the response scales (Pallant, 2016; Schumacker & Lomax, 2016). After ensuring that there was no missing data, the next step was to prepare each variable of the data set for the statistical analysis followed by identifying outliers and assess the normality of the data. Variable preparation includes providing an appropriate name convention, defining the variable type (numeric/string), variable width, variable size and type of measure (nominal/ordinal) (Pallant, 2016; Field, 2012). Appendix F provides more details on how the data was prepared. Both outliers and nonnormality can be detected by using techniques such as descriptive statistics, frequency distribution, univariate test, skewness, and kurtosis statistics (Pallant, 2016; Schumacker & Lomax, 2016). There were no significant issues with outliers and nonnormality in the dataset. In the next section, the demographics of the participants are discussed.

## 5.7 PARTICIPANT DEMOGRAPHICS

Table 40 below lists the descriptive demographic statistics of the 104 survey participants by individual and firm. The statistical report includes the size of the overall data set (N), frequency of each item (f), and the percentage of each item (%).

Table 40 Demography of participants (N=104)

		Frequency (f)	Percent (%)
<b><i>INDIVIDUAL</i></b>			
GENDER	Male	59	56.7
	Female	40	38.5
	Prefer not to disclose	5	4.8
AGE	Between 21 - 30	8	7.7
	Between 31 - 40	64	61.5
	Between 41 - 50	28	26.9
	More than 50	4	3.8
YEAR of EXPERIENCE	Less than 1 year	8	7.7
	1-10 years	70	67.3
	11-20 years	23	22.1
	21-30 years	2	1.9
	Over 30 years	1	1
<b><i>FIRM</i></b>			
SIZE	1-50	3	2.9
	51-100	7	6.7
	101-200	39	37.5
	Over 200	55	52.9
REGION	New Zealand	9	8.7
	Australia	3	2.9
	Europe	13	12.5
	Asia	33	31.7
	USA	20	19.2
	UK	4	3.8
	South Africa	15	14.4
	Others	7	6.7
	Commercial		
	Bank	35	33.7
SECTOR	Retail	37	35.6
	Investment house	11	10.6
	Insurance firm	10	9.6
	Others	11	10.6
DEPARTMENT	Sales/Marketing	11	10.6
	Human Resource	9	8.7
	Finance/Account	28	26.9
	Product development	27	26.0
	R&D	20	19.2

These respondents had roles as product managers, owners or developers in the financial sector. Out of the 104 who responded, most of the participants were male (n=59, 56.7%) followed by female (n=40, 38.5%), and only a few decided not to disclose their gender identity (n=5, 4.8%). Most participants were between the ages range 31- 40 years (61%), followed by those between 41-50 (27%). The rest of the participants (12%) are recorded as being less than 30 years or over 50 years old. Since there was no response for age less than 21 years, this data was not recorded. Most participants had worked for between 1 to 10 years (n=70, 67%) followed by 11 to 20 years (22%) and the rest had either less than 1 year or over 21 years (11%) of experience.

Since the survey was conducted globally, the attributes of the firms where the respondents worked was also examined. Most participants were from Asia (n=33; 32%), followed by the USA (n=20, 19%) and South Africa (n=15, 14%). About 36% worked in the retail departments and around 53% were in the finance/accounting and product development departments. In the following table, the distribution of demographic data shows, in general, a normal distribution with skewness and kurtosis within an acceptable range (Pallant, 2016).

Table 41 Distribution of demographic data

<b>Attributes</b>	<b>Mean</b>	<b>SD</b>	<b>Skewness</b>	<b>Kurtosis</b>	<b>Min</b>	<b>Max</b>
Region	4.53	1.87	0.06	-0.40	1	8
Sector	2.28	1.31	0.89	-0.34	1	5
Depart	3.61	1.40	-0.21	-0.59	1	6
Years of experience	2.21	0.65	1.07	3.14	1	5
Size	3.40	0.74	-1.25	1.45	1	4
Gender	1.48	0.59	0.80	-0.33	1	3
Age	3.27	0.66	0.49	0.50	2	5

### 5.7.1 The use of enterprise social networking

Participants were asked the proportion of time they spent each week to share knowledge with co-workers across the different modes of communication, such as enterprise social networking (ESN), email, face-to-face, public social networks (Public-SN), and telephone/mobile phone. The figure below shows the mean proportion of time spent across the different modes. On a weekly basis, most employees prefer to use email (37%) and face-to-face communication (28%) to interact with their co-workers, followed by ESN (16%). The least used communication tool was telephone/mobile (14%) and public social networks (5%). Although email and face-to-face

communication among employees is a common practice in organisations, there is a growing trend towards using ESNs as well.

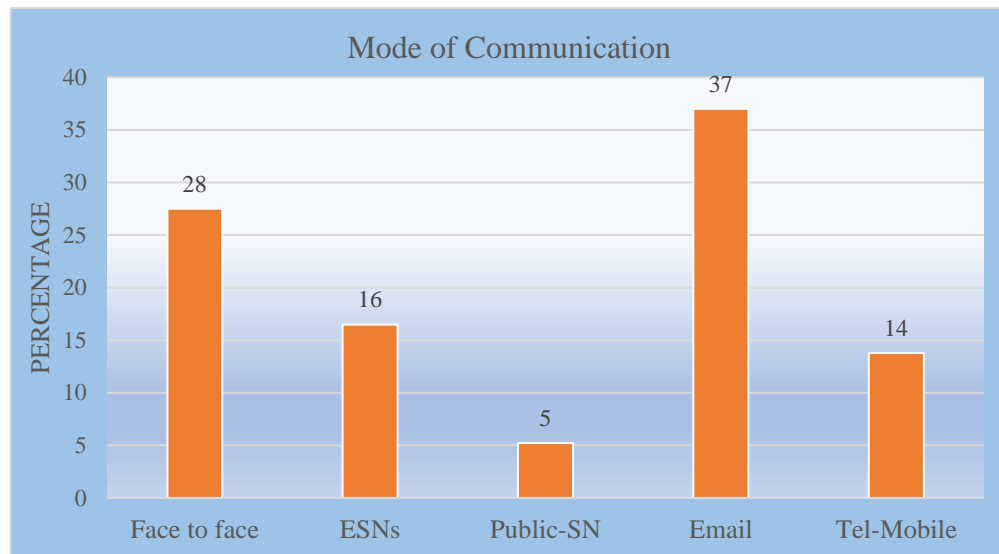


Figure 14 Mode of communication

Participants were also asked to explain the functions of ESN that they used. The survey concentrated on the most popular tools: Slack, Yammer, and SharePoint (Chin et al., 2019; Aboelmaged, 2018). These tools were also rated the most commonly used ESNs by the interview respondents. The survey had an option for “others” so that participants could specify which other ESN application they used. These included Microsoft Teams, followed by Trello, Confluence, Jira, and Workplace by Facebook. The following figure shows the distribution of ESNs and the functions as perceived by participants.

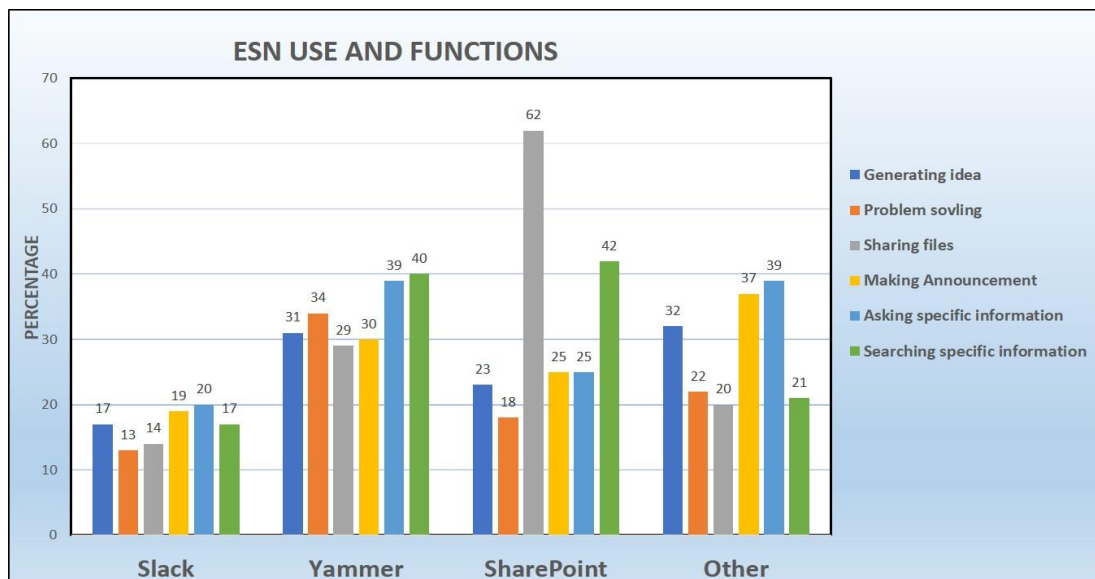




Figure 15 ESN use and functions

The above statistics show that participants use different ESN applications to share knowledge in their organisations (Chin et al., 2019; Aboelmaged, 2018). Sharing files and asking for specific information were the most commonly cited functions for using ESN applications.

### 5.7.2 The use of ESN by firm attributes

Since the survey respondents were from across the world, the data was analysed to find out how the use of ESN applications varied globally. In this case we asked participants “*when you use social media tools to share information with your co-workers, which type do you use most often*” by giving three options: 1: “*enterprise social networking*”, 2: “*publicly available social networking*” or 3: “*both public and ESN tools*”. As shown in Figure 16, out of 104 respondents, 52 (51%) use both public and ESN applications, while the rest (49%) preferred to use ESN applications to communicate with co-workers. There were no responses for solely using publicly available social networking.

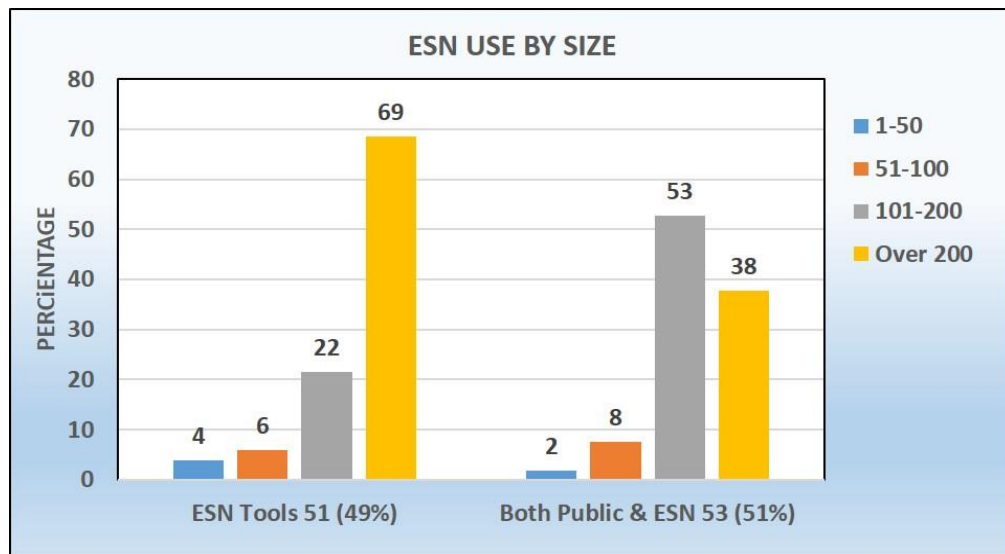


Figure 16 ESN use by firm size (number of employees)

Figure 16 also shows that the use of ESNs is more common in firms with more than 100 workers. This matches previous studies (Azizah, 2018; Cai et al., 2018). In the following section we correlate the use of ESN tools and both public and ESN tools with the firm demography.

Figure 17 shows that ESN applications and both public-SN and ESN applications are more popular in Asia (27% & 36%), followed by the USA (18% & 21%). This could be due to a larger number of respondents from Asia during the time of the survey.

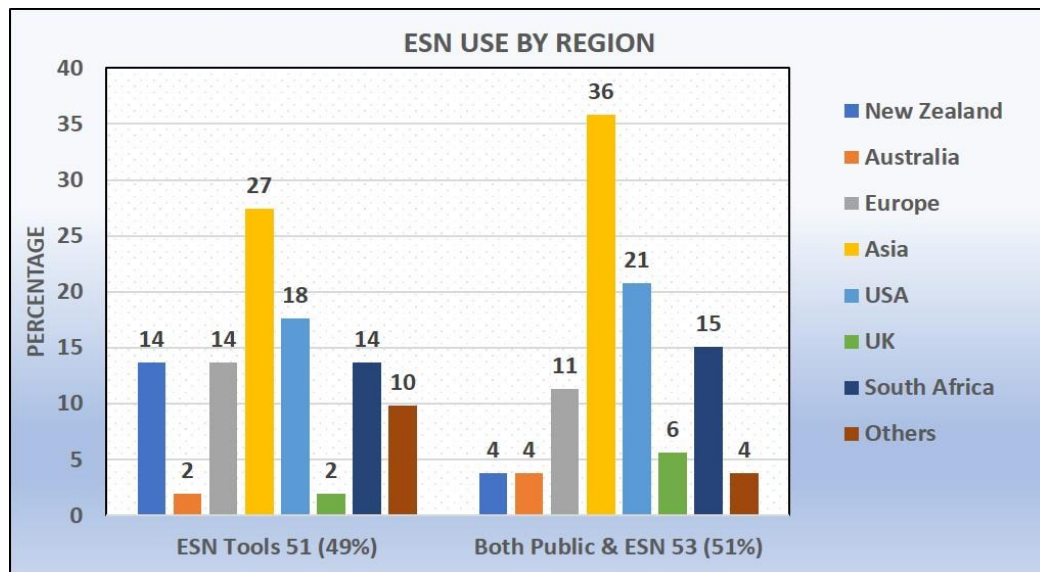


Figure 17 ESN use by Region

Figure 18 shows that commercial and retail banks use public-SN applications and ESN applications the most in the industry (68%, 70%). One reason could be that these sectors seemed to be larger than other sectors in the financial industry.

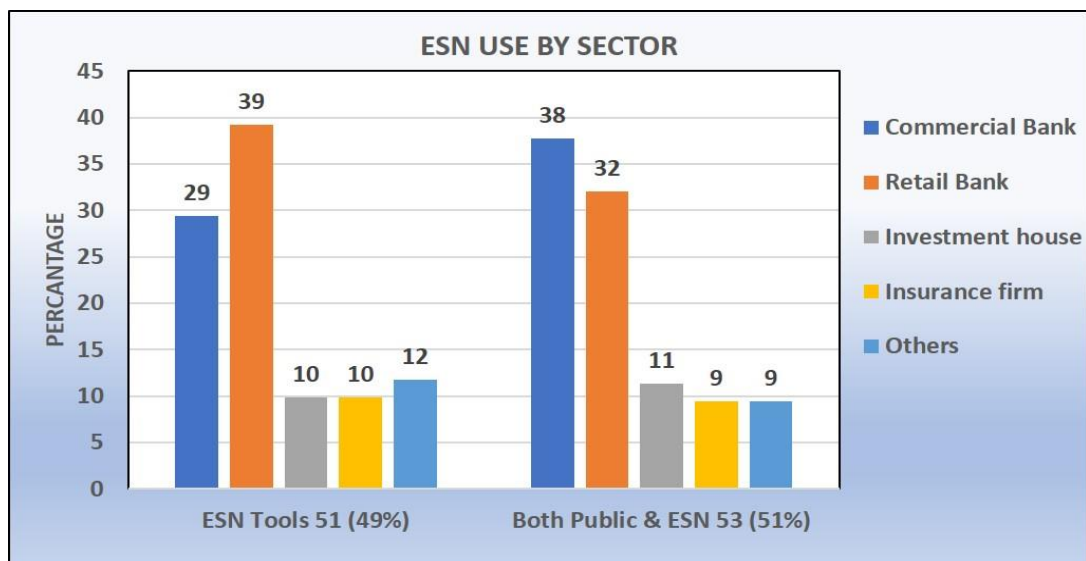


Figure 18 ESN use by Sector

We examined the use of ESN by functional department because the interviews revealed that participants developed products and services in collaboration with other departments, such as financial/accounting, human resources, and sales/marketing. Figure 19 shows that ESN applications are more highly used in the product development department (35%) followed by finance/accounting (22%). On the other hand, the combination of ESN and public-SN

applications is used more by finance/accounting staff (32%) and the sales/marketing department (25%). This observation gives a mixed view on the usage of ESNs. It could be due to the nature of product development and people who are involved during the time of development.

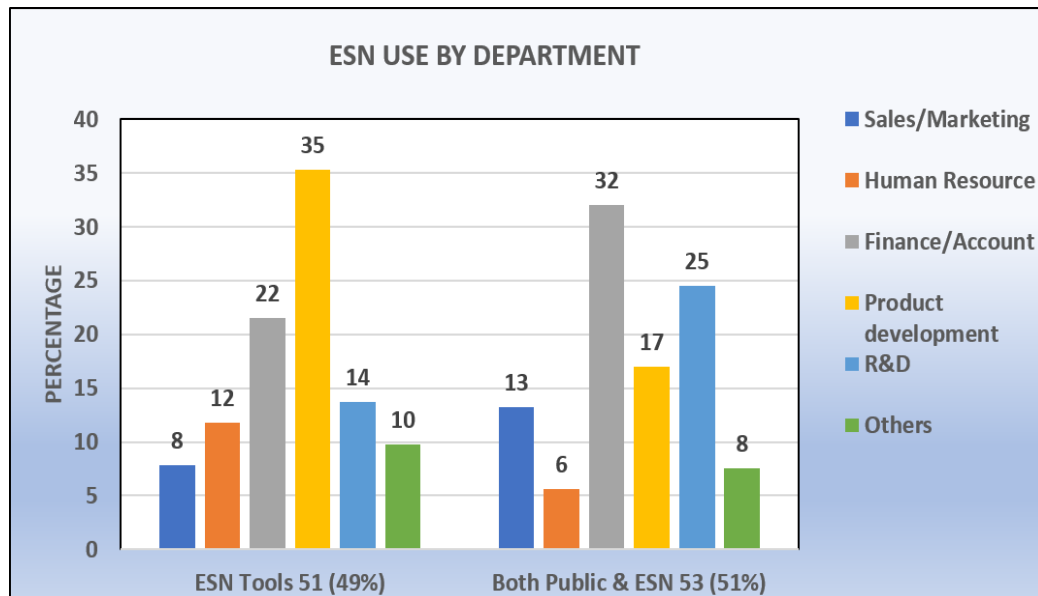


Figure 19 ESN use by Department

In summary, the demographics provides important insights about the employees who participated in this survey. In the next section, we discuss the measurement model.

## 5.8 ASSESSING THE MEASUREMENT MODEL

Two statistical techniques, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), were used to evaluate the measures. Factor analysis is a multivariate technique for uncovering the underlying structure among variables in an analysis (Hair et al., 2014). The goal of EFA is to reduce large number of observed variables into a smaller number of factors (Hair et al., 2014). There is no predetermined relationship between the variables and factors, that is, no measurement model is specified. In contrast, a CFA, carried out as part of a structured equation modelling (SEM) analysis, starts with a hypothesis about how many factors there are and which items load on which factors (Tabachnick & Fidell, 2013).

Several studies have suggested testing both EFA and CFA in one data set (Chen & Kuo, 2017; Chow & Chan, 2008). The initial step is to check the reliability of item scales using Cronbach's alpha, followed by factor analysis to assess item loading and cross-loading. This is followed by using CFA to validate the factors (Dwivedi, Chaturvedi & Vashist, 2020; Mohammed & Kamalanabhan, 2019; Phogat & Gupta, 2019; Subhakaran & Dyaram, 2018; Hussien & Lopa, 2018; Chen & Kuo, 2017). Some scholars have suggested checking EFA (reliability,

correlation, and factor analysis) after the CFA assessment of the measurement model (Kim et al., 2016).

This study will first assess the reliability of the measures and their internal consistency (Phogat & Gupta, 2018; Kim et al., 2016), followed by an exploratory factor analysis to uncover the factor structure. A CFA will then be conducted using SPSS-AMOS v26 to assess the measurement model and evaluate the structural model to test the causal relationships among the latent variables (Dwivedi et al., 2020; Kim et al., 2016). The latent variables are: ESN\_KS, SER\_INN, TRUST and GOVRN.

### 5.8.1 Item-scale reliability

Before checking the reliability of all scales, the inter-item correlation of items was checked, as shown in Appendix G1 and G2 (SER\_INN & ESN-KS), and Appendix H3 and H4 (TRUST & GOVRN). This checks if the items are correlated with the same latent construct (Cronbach, 1951). The results show that items SER\_INN4, ESN\_KS5, and GOVRN1 have low values and are poorly correlated with other items in their respective factors. To confirm this, the reliability analysis was also examined for the consistency of measured items in each latent construct by checking these other indicators: inter-item correlation matrix (cut-off 0.30: Hair et al., 2014), corrected item-total correlation (cut-off 0.50: Hair et al., 2014) for low scores values, and whether the Cronbach's alpha values of the constructs when an item is deleted is higher than the final alpha value (which is called the "Cronbach's Alpha if Item Deleted" statistic) (Pallant, 2016).

Based on the above analyses, each construct and the measurement items were examined as part of the reliability check (Appendix I). SER\_INN4 was dropped due to a negative value in the corrected item-total correlation, as well as a Cronbach's Alpha if Item Deleted value of 0.92 (which was higher than .85, the final alpha value). Item ESN\_KS5 is dropped as its Cronbach's Alpha if Item-Deleted statistic indicated a value 0.90 (which was higher than 0.86, the final alpha value). All items for the TRUST construct were retained as there were no negative values or values higher than the final alpha values found in the reliability test. GOVRN1 was dropped as its Cronbach's Alpha if Item Deleted value was 0.94 (which was higher than the final alpha value of 0.92). Cronbach's alpha simply measures if the items on the instrument 'hang together' (Pallant, 2016); however, they cannot verify if the items would be reflected in other factors. For example, items developed for factor ESN\_KS could cross load into factor SER\_INN or/and GOVRN. To do this, an exploratory factor analysis was run. This is explained below.

### 5.8.2 Exploratory factor analysis

The reason for conducting an exploratory factor analysis (EFA) is to determine the factor structure among the variables in a dataset. EFA also prepares the variables to be used for structural equation modeling (SEM). This means that EFA can spot any problematic variables much earlier than CFA. EFA is performed using the maximum likelihood technique with Promax rotation as suggested in previous studies (Mohammed & Kamalanabhan, 2019; Hussien & Lopa, 2018) (see Table 42).

Table 42 Main techniques used in EFA

EFA	Techniques Available	Technique used in this study
<b>Factor Extraction</b>	Principal Component Analysis (PCA), Principal Axis Factoring (PAF), Maximum Likelihood (ML)	Maximum likelihood (ML) with four factors is used.
	<b>Rotation types</b>	Promax used because it is faster and provides better results (Tabachnick & Fidell, 2013).

Based on the EFA technique, the items loadings for each factor are examined for cross-loading and low loadings. As a rule of thumb, the greater the loading of an item on a factor, the better the item measures the factor (Tabachnick & Fidell, 2013). Comrey and Lee (1992) suggested that loadings higher than 0.71 are excellent, 0.63 is very good, 0.55 is good, 0.45 is fair and 0.32 is poor. Others have indicated item loadings less than 0.40 are candidates for elimination (Tabachnick & Fidell, 2013; Ladhari, 2010). In terms of sample size, Hair et al. (2014) suggests that “in a sample size of 100 respondents, factor loadings of 0.55 and above are significant” (p.115).

Keeping the above points in mind, the remaining items (after dropping three items in Section 5.8.1) were investigated using EFA. The first extraction of factor loadings and communalities value for each item is shown in Appendix J. The pattern matrix shows item ESN\_KS4 is cross-loaded (0.30) in factor GOVRN. As suggested by Hair et al. (2010), when deciding to retain items, it is important to select items that are most suitable for study, thus helping in detecting incorrect items on the factor loadings. One way to do this is to assess the items, then remove that if they load significantly on more than one factor or fail to load significantly on any factor (Raubenheimer, 2004), at the same time keeping the items loading to at least to 0.5 (Hair et al.,

2010). Also, the total variance explained (Appendix K) shows five factors with no values on the fifth factor. It was decided to drop ESN4 and see if the issue resolved. The results (Appendix L) with a pattern matrix indicate that all items loaded in their respective factors with a value above 0.5 (Hair et al., 2010) and communalities value above 0.35 (cut-off > 0.30; Pallant, 2016).

To check the sample adequacy and overall patterned relationships of variables, KMO (Kaiser–Meyer–Olkin) and Bartlett’s Tests of Sphericity ( $p < .001$ ) were carried out (Appendix M). A sampling adequacy cut-off higher than 0.50 is recommended by Kaiser (1974). Tabachnick and Fidell (2001) suggested that KMO values of 0.60 and higher are required for good factor analysis. The results show a KMO value of 0.888 for sampling adequacy (cut-off > 0.50). Appendix N shows eigenvalues greater than 1.0, variance explained 67% (> 60%), and factor loading >0.5 were used to determine the number items/factor retained (Hair et al., 2010). Appendix O shows that the Cronbach’s alpha is above 0.9 for the factors (Hair et al., 2010), indicating a high value of reliability. The following table shows the original items and the reasons for dropping items.

Table 43 Retained items in EFA

<b>Factors</b>	<b>Original items</b>	<b>dropped</b>	<b>Reasons for dropping items</b>	<b>Retained items in EFA</b>
ESN_KS	5	2	ESN_KS5 (low correlation/reliability check), ESN_KS4 (cross loading/dropped - EFA)	3
SER_INN	8	1	SER_INN4 (low correlation/reliability check)	7
TRUST	7	0	nil	7
GOVRN	10	1	GOVRN1 (low correlation/reliability check)	9
<b>Total</b>	<b>30</b>	<b>4</b>		<b>26</b>

It is also important to check multicollinearity at this stage to see if the predictors provide redundant information about the responses. Multicollinearity was measured by variance inflation factors (VIF) and tolerance. If VIF values exceeding 4.0 or tolerance is less than 0.2, then there is a problem with multicollinearity (Hair et al., 2010). The linear regression result is given below:

Table 44 Multicollinearity check

Predictors	Tolerance	VIF
ESN_KS	0.526	1.900
TRUST	0.642	1.556
GOVERN	0.552	1.813

The result shows that the tolerance values of all three predictors exceed 0.4, providing assurance that multicollinearity is not a problem with the data. VIF also meets the recommended, threshold. Next, we check the correlation between the four factors, as shown in Table 45. As recommended, all factors are above the threshold of 0.40 (Pallant, 2016), with a significant level of 0.01. The results show the relationship between IDVs and DV (threshold of .40). Also, the correlation between each factor is not too high (0.7 or more).

Table 45 Correlation between factors

	SER_INN	TRUST	ESN_KS	GOVRN
SER_INN	1			
TRUST	.633**	1		
ESN_KS	.544**	.555**	1	
GOVRN	.421**	.525**	.637**	1

\*\* Correlation is significant at the 0.01 level (2-tailed)

Additionally, all retained items with mean, standard deviation, skewness, and kurtosis are examined. In general, a normal distribution is depicted (Appendix P). Following this, a CFA with 26 items was carried out to examine the measurement model before testing the hypotheses.

### 5.8.3 Measurement model

The next step is to test the measurement model with a CFA (Dwivedi et al., 2020; Mohammed & Kamalanabhan, 2019; Awang, 2014; Hair et al., 2010,). Once that is done, the structural model can be evaluated to test the hypotheses. The structural model examines the casual relationships among the constructs or latent factors to verify the proposed hypotheses. The CFA was performed using AMOS using the maximum likelihood estimation method. The measurement model assesses latent factors and indicators for the stability of the factor structure (Hinkin, 1995). The model fit will be assessed using a variety of fit indices.

An example measurement model is shown below for construct ESN\_KS. The standardized estimates (factor loading) and squared multiple correlations ( $R^2$ ) are shown for each item. The same process was performed for other constructs (SER\_INN, trust, and GOVRN) to check the estimated standardized regression weight and  $R^2$ .

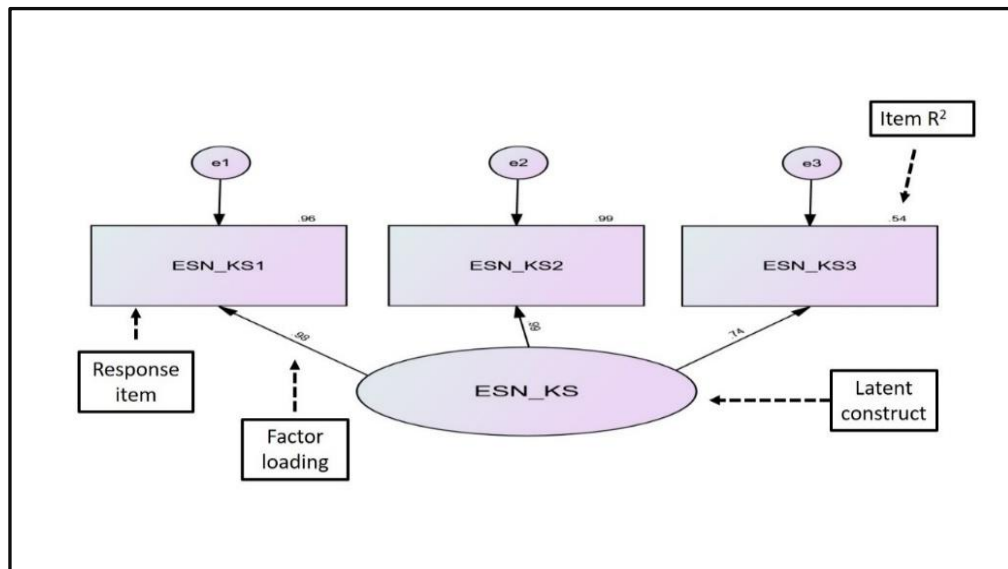


Figure 20 Measurement model based on construct ESN\_KS

Appendix Q illustrates the results of the first CFA model with four latent factors. The measurement model is identified by four interrelated constructs connected to each other with double-headed arrows representing a pattern of intercorrelations (range between 0.47 - 0.68). These values determine the discriminant validity. The single-headed arrows leading from the latent constructs to the boxes are regression paths representing the link between the factors and their respective set of observed variables. These coefficients represent factor loadings (range between 0.63 and 0.99). High factor loadings indicate that they converge on a common point, i.e., the latent construct (Hair et al., 2014). Finally, the single-headed arrows pointing from ellipses to rectangles represent measurement error associated with observed variables.

The outcome of the first CFA model is presented below in Table 46. The table shows the standardized regression weights of the observed items of each construct (analogous to the factors loadings in exploratory factor analysis), squared multiple correlations ( $R^2$ ), unstandardized regression weight, estimated standard errors (s.e), critical ratios (C.R - t value), and levels of significance (p-value < .0001). The coefficients for items GOVRN2, SER\_INN1, trust1, and ESN\_KS1 are set at 1.00 as the minimum identification requirement for the model (Arbuckle, 1996). As such, no critical ratio or standard error is calculated for these items. Critical ratios greater than 1.96 demonstrate significance at  $p < .05$  (Hair et al., 2010). As suggested, factor loadings in the range of 0.5 and 0.6 indicate low loading (Awang, 2014), as they should generally exceed 0.60 (Bagozzi & Yi, 1988).  $R^2$  values should be at least 0.40 to be considered to have good reliability (Awang, 2014). All items had loadings above 0.60 and  $R^2$  values of at least 0.40.



Table 46 Statistical outcome of CFA model 1

Construct	Items	Standardized regression weight ( $\beta$ )	Squared Multiple correlation ( $R^2$ )	Unstandardized regression weight (B)	S.E.	C.R. (t value)	P value
ESN_KS	ESN_KS1	0.980	0.961	1			
	ESN_KS2	0.986	0.973	0.969	0.03	32.127	***
	ESN_KS3	0.737	0.544	0.641	0.06	10.703	***
SER_INN	SER_INN1	0.869	0.755	1			
	SER_INN2	0.759	0.576	0.817	0.087	9.424	***
	SER_INN3	0.881	0.776	1.078	0.088	12.235	***
	SER_INN5	0.682	0.466	0.835	0.104	8.028	***
	SER_INN6	0.736	0.542	0.701	0.078	8.987	***
	SER_INN7	0.811	0.658	0.8	0.076	10.527	***
	SER_INN8	0.812	0.660	0.933	0.088	10.553	***
TRUST	TRUST1	0.857	0.735	1			
	TRUST2	0.803	0.645	1.056	0.104	10.133	***
	TRUST3	0.830	0.689	0.919	0.086	10.707	***
	TRUST4	0.849	0.721	0.953	0.086	11.137	***
	TRUST5	0.830	0.688	1.02	0.095	10.699	***
	TRUST6	0.703	0.494	0.805	0.097	8.262	***
	TRUST7	0.631	0.398	0.672	0.094	7.121	***
GOVRN	GOVRN2	0.760	0.578	1			
	GOVRN3	0.929	0.863	1.233	0.119	10.404	***
	GOVRN4	0.849	0.721	1.124	0.121	9.317	***
	GOVRN5	0.865	0.749	1.132	0.119	9.536	***
	GOVRN6	0.785	0.617	0.964	0.114	8.48	***
	GOVRN7	0.789	0.622	0.908	0.106	8.526	***
	GOVRN8	0.698	0.487	0.870	0.118	7.393	***
	GOVRN9	0.662	0.438	0.782	0.112	6.959	***
	GOVRN10	0.708	0.501	0.802	0.107	7.517	***

Once the measurement items are assessed, the next step is to examine the model fit of the CFA model all four constructs for validity check. In SEM, there are three model fit categories: absolute fit, incremental fit, and parsimonious fit. It is recommended to report at least one fitness index from each category (Hair et al., 2014). Some scholars suggest that among SEM fit indices, the ChiSq ( $\chi^2$ ) is the only inferential statistics that is regarded as significant or hypothesis testing, and the rest are only ‘rules-of-thumb’ to assess goodness-of-fit (Iacobucci, 2010). Kline (2005), on the other hand suggested that a model demonstrates a reasonable fit if the statistics adjusted by their degree of freedom do not exceed 3.0. The model fit category and level of acceptance is presented below:

Table 47 Model fit indices

Name of category	Name of index	Index full name	Level of Acceptance
1. Absolute fit	<b>Chi Square</b>	Discrepancy Chi Square	P-value > 0.05 (not applicable for large sample size (>200))
	<b>RMSEA</b>	Root Mean Square of Error Approximation	<0.08 (Hair et al, 2010; Awang, 2012), <= 0.08 (Little, 2013)
	<b>GFI</b>	Goodness of Fit Index	>0.90 (Hair et al, 2010; Awang 2012); >=0.80 (Forza & Filippine, 1998; Greenspoon & Saklofske, 1998)
	<b>AGFI</b>	Adjusted Goodness of Fit	>0.90 (Hair et al, 2010; Awang 2012)
2. Incremental fit	<b>CFI</b>	Comparative Fit Index	>0.90 (Hair et al, 2010; Awang 2012, Little, 2013; Byrne, 1998)
	<b>NFI</b>	Normed Fit Index	>0.90 (Hair et al, 2010; Awang, 2012; Byrne, 1998)
	<b>TLI</b>	Tucker-Lewis Index	>0.90 (Hair et al, 2010; Awang, 2012; Forza & Filippine, 1998; Byrne, 1998)
	<b>TLI</b>	Tucker-Lewis Index	>0.90 (Hair et al, 2010; Awang, 2012; Forza & Filippine, 1998; Byrne, 1998)
3. Parsimonious fit	<b>ChiSq/df</b>	Chi Square/Degree of Freedom	< 5.0 (Awang, 2012, Wheaton et al, 1977); <= 3.0 (Kline, 2005)

Niemand and Mai (2018) provided a comprehensive study of fit indices for evaluating CFA models and revealed that many indices are biased. In forty empirical studies, most of them reported ChiSq ( $\chi^2$ ), ChiSq/df, and CFI to assess model fit. Green (2016) and Byrne (2001) found that the most common indices being reported are ChiSq ( $\chi^2$ ), CFI as well as RMSEA. Byrne (2001) similarly emphasized that fit indexes do not reflect the plausibility of a model, and “this judgment rests squarely on the shoulders of the researcher” (p. 88). Based on the recommendation of Hair et al. (2010), this study uses the ChiSq, Root Mean Square Error of Approximation (RMSEA) (which related to residuals in the model), Comparative Fit Index (CFI) (which is equal to the discrepancy function adjusted for sample size), NFI, TLI, and ChiSq/df.

Model fit needs to be assessed even if the factor loadings are above 0.60 in the initial CFA model, as shown in Appendix Q. The moderation indices (MI) can be examined to improve model fit (Hair et al., 2010; Awang 2012). A high MI indicates that a high covariance exists between error terms that are part of the same factor, and if they are allowed to covary, the model fit will improve. For this study, high MIs are shown in the table below. These were used to modify the CFA model.

Table 48 Moderation indices

			<b>M.I.</b>	<b>Par Change</b>
e10	<-->	e11	26.826	0.334
e8	<-->	e9	28.648	0.478
e5	<-->	e6	38.774	0.437
e2	<-->	e3	15.969	0.206
e1	<-->	e3	26.807	0.411
e1	<-->	e2	18.645	0.267

The final CFA model (model 2) is presented in Appendix R. The fit statistics of the final model are provided below:

Table 49 Model fit

<b>Name of category</b>	<b>Name of index</b>	<b>Model 1 (initial model)</b>	<b>Model 2 (final model)</b>
<b>1. Absolute fit</b>	Chi	727.92;	452.68;
	Square	df=293 <0.001	df=276 <0.001
	RMSEA	0.120	0.080
<b>2. Incremental fit</b>	CFI	0.827	0.930
	NFI	0.829	0.930
	TLI	0.808	0.920
<b>3. Parsimonious fit</b>	ChiSq/df	2.484	1.640

As shown above, model 2 provides a satisfactory fit to the data. As recommended (Hair et al, 2010), the values of CFI, IFI, and TLI are higher than 0.9 (Byrne, 1998) and RMSEA is 0.08 (Little, 2013), which indicates an acceptable model fit.

#### 5.8.4 Assessing the validity and reliability of the measurement model

Once the model fit for CFA was successfully achieved, the next task was to measure the validity and reliability of the construct. The validity is achieved based on convergent validity (AVE exceed 0.50), construct validity (required level of fitness indexes), and discriminant validity (by deleting redundant items or constrained as “free parameter”). The validity and reliability are achieved based on Average Variance Extracted (AVE) and Composite Reliability (CR). The calculation of AVE and square root to AVE for discriminant validity is provided in Appendix S.

Convergent validity means that the measures or items of constructs that are related to each other should be strongly correlated (see Table 50). For instance, the construct ESN-KS (Enterprise Social networking for knowledge sharing) contains three items that measure the construct ESN-KS. Convergent validity would suggest that all three items correlate very strongly with each

other. The convergent validity of measurement model is assessed by using Average Variance Extracted (AVE).

Table 50 Convergent validity

Construct	Composite reliability (CR)	Average variance extracted (AVE)
GOVRN	0.925	0.581
SER_INN	0.918	0.616
TRUST	0.921	0.631
ESN_KS	0.933	0.826

Convergent validity was assessed with standardized factor loadings for each item and an average variance extracted (AVE). The measurement model reaches convergent validity when the AVEs of all factors are at least 0.50 (Chin, 1998), or higher than the 0.50 threshold value (Kline, 2005; Hair et al., 2011; Bagozzi, Yi, & Phillips, 1991). When AVE is 0.50 it indicates that the construct explains at least 50 percent of the variance of its items (Hair et al., 2014). To have good internal consistency, it was suggested that the composite reliability (CR) should be over the threshold value of 0.7 (Fornell & Larker, 1981). CR is preferred over Cronbach's alpha at the construct level when SEM is used (Hair et al., 2010). The above table shows all AVE is above .50 indicating good validity of construct items. The CR for all items above the threshold of 0.7 indicating good internal consistency as well.

Discriminant validity is the opposite of convergent validity - it measures the degree to which the operationalization of items is not similar to (or diverges from) other operationalizations. In other words, the measures of different constructs should not correlate highly with each other. To measure the discriminant validity of each construct, AVE and inter-construct correlations of variables were compared, as suggested by (Fornell & Larker, 1981): the square root of AVE should be greater than latent variable correlations (LVC) to prove discriminant validity. In the following table, the square root of construct trust (.794), KS-ESN (.909), SER\_INNOV (.785), and GOVRN (.763) are greater than corresponding LVC. Furthermore, the value of maximum shared variance (MSV) is less than AVE, suggesting as a valid model. Discriminant validity was performed using the plugin as suggested by Gaskin & Lim (2019) using AMOS.

Table 51 AVE and correlation among constructs

FACTOR	CR	AVE	MSV	GOVRN	SER_INN	TRUST	ESN_KS
GOVRN	0.925	0.581	0.466	<b>0.762</b>			
SER_INN	0.918	0.616	0.477	0.454***	<b>0.785</b>		
TRUST	0.921	0.631	0.477	0.527***	0.690***	<b>0.794</b>	
ESN_KS	0.933	0.826	0.466	0.682	0.544	0.569	<b>0.909</b>

Note: The diagonal values (in bold) represent the square root of the AVE (p-value < 0.001)

We also checked the HTMT (Heterotrait-Monotrait Ratio). To prove the discriminant validity of the model and the reflective constructs, the HTMT value must be well below .85 (Hair et al., 2014). As shown in Table 52, the HTMT values were below that figure. We can therefore conclude that discriminant validity was established.

Table 52 HTMT value

	GOVRN	SER_INN	TRUST	ESN_KS
GOVRN				
SER_INN	0.447			
TRUST	0.557	0.687		
ESN_KS	0.685	0.584	0.598	

### 5.8.5 Assessing common method bias

To reduce the chances of common method bias, the following procedures were used (Podsakoff et al., 2003). First, participants were assured about their anonymity during the survey. Second, incomplete/non-responses were not included in this study: there were 147 recorded observations, and out of them, 40 were dropped due to non-response and three dropped due to incomplete response). Third, a proper explanation of each question was provided and was visible before each question. The Harman's single factor test was also carried out to detect any bias (Podsakoff et al., 2003). To perform this test, factor analysis is conducted with independent and criterion variables (Podsakoff et al., 2003) using an eigenvalue of 1, as shown in Appendix T. The percentage of variance from the sum of squared loading is 43.832, which is below 50%. Therefore, the possibility of CMB was minimised.

## 5.9 STRUCTURAL MODEL AND HYPOTHESIS TESTING

After examining the CFA model and verifying the model fit along with the validity and reliability of the measurement model and construct, the next step is to test the hypotheses. Figure 21 illustrates the research model and the hypotheses to be tested. Hypothesis one proposed a positive relationship between ESN\_KS and SER\_INN. Hypothesis two proposed that trust was an antecedent of ESN\_KS and had an indirect effect on SER\_INN. Hypothesis

three proposed that GOVRN positively moderates the relationship between ESN\_KS and SER\_INN.

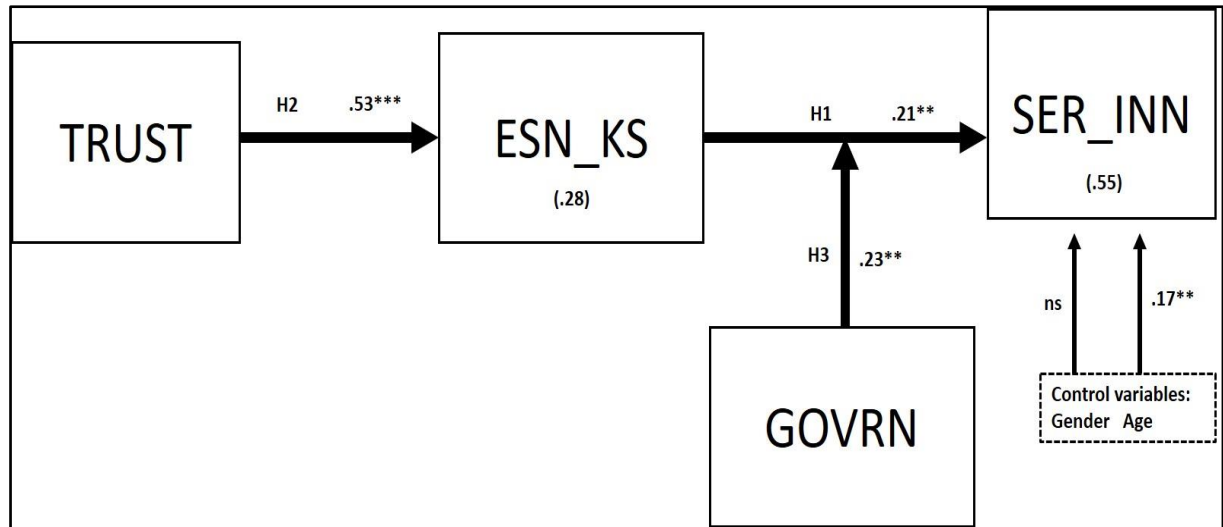


Figure 21 Structural model with three hypotheses

Note:  $p < .0001$ ,  $p < .05$

The standardized estimates, along with p values of each construct, are provided in Table 53.

Table 53 Results for structural model

Construct	Path	Construct	Standardized estimate ( $\beta$ )	Unstandardized estimate (B)	S.E.	C.R.	P value	Significant
ESN_KS	<--	TRUST	0.526	0.541	0.086	6.276	***	√
SER_INN	<--	TRUST	0.459	0.547	0.110	4.986	***	√
SER_INN	<--	ESN_KS	0.212	0.246	0.090	2.741	0.006	√
SER_INN	<--	GOVRN	0.230	0.244	0.101	2.422	0.015	√
SER_INN	<--	ITGOESN	0.250	0.134	0.043	3.081	0.002	√
SER_INN	<--	AGE	0.172	0.302	0.121	2.505	0.012	√
SER_INN	<--	GENDER	0.088	0.171	0.133	1.287	0.198	×

Note:  $p < .0001$ ,  $p < .05$

The results showed a positive relation between ESN\_KS and SER\_INN ( $t > 1.96$ ,  $p < .05$ ). In other words, participants perceived that knowledge sharing using ESNs could enhance innovation in their organisation. This relationship is also aligned with previous studies (Song et al., 2019). To evaluate hypotheses two and three, which featured mediation and moderation, the relationships of the constructs was examined following Hayes (2012). The mediation and moderation effects are shown in the diagram below:

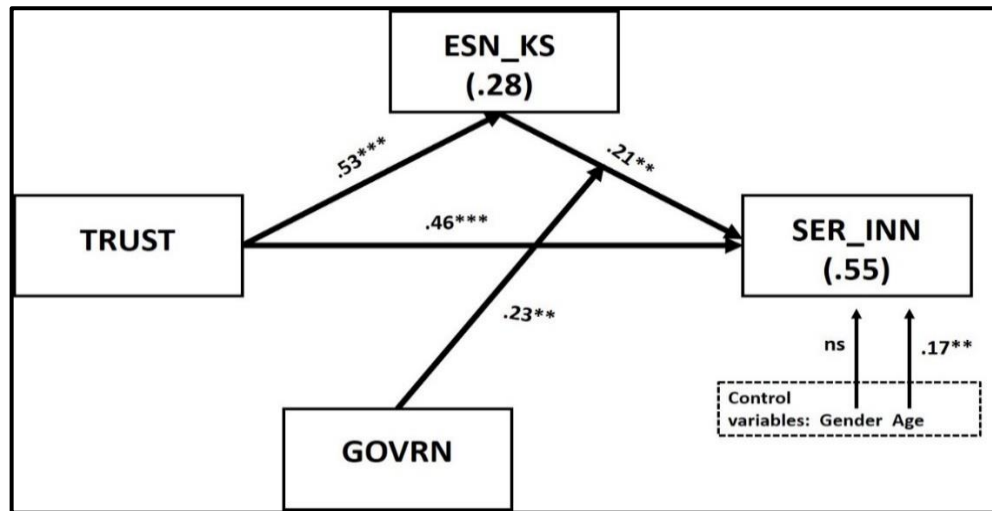


Figure 22 Mediation-moderation effect

The mediation analysis tests whether the effect of trust on SER\_INN may be transmitted through a mediator ESN\_KS. The results were as follows:

- The effect of trust on ESN\_KS was positive and significant:  $t$  value = 6.28 ( $> 1.96$ ), and  $p$ -value .000 ( $< .0001$ ).
- The effect of trust on SER\_INN was positive and significant:  $t$  value 4.97 ( $> 1.96$ ) and  $p$ -value .000 ( $< .0001$ ).
- The effect of ESN\_KS on SER\_INN was positive and significant:  $t$  value 2.74 ( $> 1.96$ ), and  $p$  value .006 ( $< .05$ ).

The above results indicate that the effect of Trust on SER\_INN was partial mediated through ESN\_KS. The relationship between trust and SER\_INN with a mediator ESN\_KS is also tested using bootstrapping (Table 54).

Table 54 Mediation results through Bootstrapping

Standardized direct effect		
CONSTRUCT	TRUST	ESN_KS
ESN_KS	0.002	...
SER_INN	0.004	0.021
Standardized indirect effect		
ESN_KS	...	...
SER_INN	0.017	...

Note:  $p$  value  $< .005$ ,  $p$  value  $< .05$

The results show that the standardized direct (unmediated) effect of trust on SER\_INN is significantly different from zero at the 0.05 level ( $p=.004$ , two-tailed test). The standardized direct (unmediated) effect of ESN\_KS on SER\_INN is significantly different from zero at the 0.05 level ( $p=.021$  two-tailed). The standardized indirect (mediated) effect of trust on SER\_INN

is significantly different from zero at the 0.05 level ( $p=.017$  two-tailed). We can conclude that trust has a direct as well as an indirect effect on SER\_INN, this relationship is called partial mediation.

We also examined the indirect effect using lower-and-upper bounds, as suggested by Gaskin (2016). Table 55 shows the results and indicate that there is an indirect effect of trust on SER\_INN via ESN\_KS with a 95% confidence interval (CI) range is bound by 0.031 (threshold 0.00) on the lower end and 0.266 (threshold 0.10) on the higher end indicating that indirect effect would be statistically significant.

Table 55 Indirect effect with confidence interval

Indirect Path	Unstandardized Estimate	Lower	Upper	P-Value	Standardized Estimate
TRUST ->ESN_KS -> SER_INN	0.131	0.031	0.266	0.038	0.110*

Note:  $p<0.05^*$

To examine the moderating effect of GOVRN, a third pathway was added to the model to represent the interaction effect (Little, Bovaird & Widaman, 2006; Gaskin, 2013). Both GOVRN and ITGOESN (the interaction effect) variables were mean-centred, as suggested by Hayes (2013). The effect of GOVRN on SER\_INN was positive and significant:  $t$  value = 2.42 ( $> 1.96$ ) and,  $p$ -value 0.015 ( $<.05$ ). The effect of ITGOESN (interaction) was positive and significant:  $t$  value 3.08 ( $> 1.96$ ) and  $p$ -value 0.002( $< .005$ ).

A simple slope diagram, as suggested by Gaskin (2016), was also examined to understand how the outcome (SER\_INN on the y-axis) changed over different values of the predictor (ESN\_KS on the x-axis) and the moderator (GOVRN). The results (Figure 23) indicate that increased use of ESN\_KS has a positive effect on SER\_INN, and that this effect is enhanced as GOVRN increases. Figure 23 was prepared using values of unstandardized regression coefficients (Gaskin, 2016) provided in Table 56.



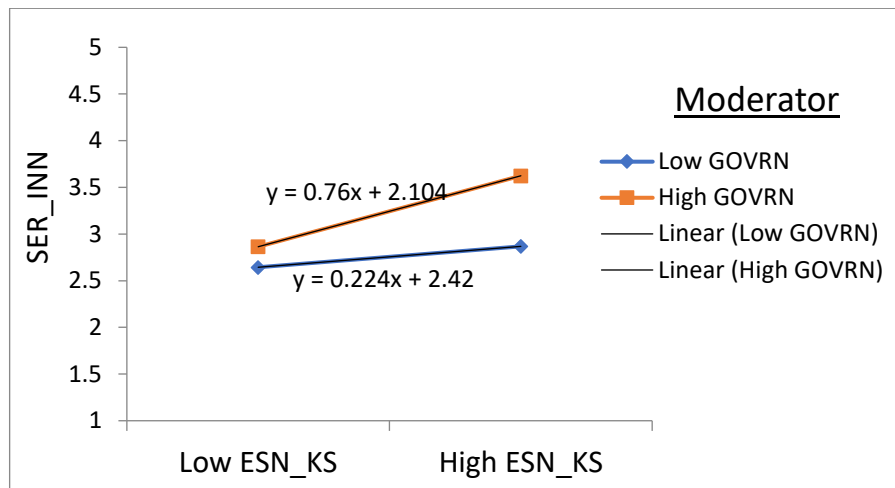


Figure 23 Simple slope diagram showing the moderating effect

Table 56 Unstandardized values used for the simple slope diagram

Variable names:	
Independent variable:	ESN_KS
Moderator:	GOVERN
Dependent variable	SER_INN
Unstandardized Regression Coefficients:	
Independent variable:	0.246
Moderator:	0.244
Interaction:	0.134
Intercept / Constant:	3

The analysis of the effect of gender and age on service innovation (Table 57) show that gender is not significantly related to service innovation ( $t < 1.96$ ,  $p > .05^{**}$ ), while age is ( $t > 1.96$ ,  $p < .05^{**}$ ). This could be due to around 89% of the survey respondents being between 31 to 50 years of age, and thus having more experience in developing products and services.

Table 57 Control variables: Gender and Age

Control variables	t value	p value	Result
GENDER	1.287	0.198	Not supported
AGE	2.505	0.012	Supported

## 5.10 DISCUSSION OF SURVEY FINDINGS

This section summarises the findings of the quantitative phase of the study. The results are summarised below in Table 58.

Table 58 Results of hypothesis testing

Hypotheses	Relationship	p value	Result
H1: ESN_KS related to SER_INN	ESN_KS → SER_INN	0.006	Supported
	TRUST → SER_INN (bootstrap direct effect)	0.004	Supported
H2: Trust is related to ESN_KS	TRUST → ESN_KS → SER_INN (bootstrap indirect effect)	0.017	Partial supported
	GOVRN → SER_INN	0.015	Supported
H3: Governance (GOVRN) as a moderator	Interaction (ITGOESN) → SER_INN	0.002	Supported
Control variables:			
GENDER	GENDER → SER_INN	0.198	Not supported
AGE	AGE → SER_INN	0.012	Supported

\*\*\*p &lt; .005, \*\*p &lt; .05

First, the demographic analysis showed how ESN usage varied with participants' profiles. This points to the importance of investigating the varieties of ESN applications used in organisations (Chin et al., 2019; Madsen et al., 2017). The result revealed that participants preferred a combination of ESN tools such as Yammer, Slack, SharePoint, Teams, and Jira for knowledge sharing, instead of specific individual tools (Muninger, 2019; Song et al., 2019). Our findings were consistent with previous studies that indicate diverse ESN use for collaboration and knowledge sharing (Chin et al., 2019; Aboelmaged, 2018; Madsen, 2017; Bala, 2016). This includes face-to-face knowledge sharing (informal) which aligns with personalised knowledge sharing and document sharing (formal) which aligned with codified knowledge sharing (Ajith Kumar & Ganesh, 2011). SharePoint for sharing documents and Slack for giving and receiving quick updates are example revealed by participants during interviews. They are examples of formal and informal ways of sharing knowledge. Additionally, our demographic data revealed that participants developed products and services in collaboration with other departments, similar to what we found in the qualitative study and the literature (Barrett et al., 2015; Calantone et al., 2002; den Hertog, 2000).

Second, the constructs and measurement model were evaluated using an EFA and a CFA. Out of thirty items, four items were dropped after the EFA due to low loadings and cross-loadings. The remaining twenty-six items were used for the CFA and to evaluate the structural model. The SEM analysis revealed that all three hypotheses were supported. The outcome of first hypothesis revealed that ESN has a significant positive effect on SER\_INN ( $t > 1.96$ ,  $p < .05$ ). This result is aligned with the previous study that revealed the use of ESNs support employee's

productivity (Aboelmaged, 2018) and drive innovation (Song et al., 2019, Abedin & Qahri-Saremi, 2018; Lam et al., 2016).

Third, the effect of trust on service innovation is partially mediated through the use of ESN for knowledge sharing ( $t > 1.96$ ,  $p < .0001$ ). One reason could be that, although trust has a positive effect on the use of ESN for knowledge sharing, a high level of trust is required to improve the relationship between supervisors-subordinate and co-workers to promote innovation (Bieńkowska et al., 2018; Lei et al., 2018; Alaarj et al., 2016). During the interviews, the participants perceived trust as an increased awareness of knowledge sharing to improve collaboration among employees. Likewise, trust is an antecedent of social media use because a higher level of trust facilitates a higher level of online knowledge sharing (Salehan et al., 2018), within a short period (Uzzi & Lancaster, 2003). With a high level of trust, employees are more likely to use ESN applications for knowledge sharing to reduce their fear of being made redundant after sharing. Seven items were tested (Bieńkowska et al., 2018), and the results show partially mediated trust in services innovation through ESN use for knowledge sharing.

Fourth, governance positively and significantly moderates the relationship between ESN use for knowledge sharing and service innovation ( $t > 1.96$ ,  $p < .05$ ). This is reasonable because greater use of ESN, perhaps through using more ESN applications or using the same applications more intensively, would make the knowledge-sharing environment more complicated in an organisation, and potentially lead to a higher possibility of adverse outcomes being realised (Sarigiannai et al., 2015). This makes governance more critical in such environments. Previous literature has suggested the importance of governance to ensure knowledge is valid and reliable, and shared among employees (Foss et al., 2010; Turner & Makhija, 2006, Chen et al., 2016). Since social media's importance is relevant in knowledge sharing, governance plays a vital role in encouraging and providing guidelines to employee use of social media (Stohl et al., 2017; Vaast & Kaganer, 2013). Such guidelines can be used to reduce the occurrence of adverse outcomes from ESN use, such as information overload (Gibbs et al., 2013), knowledge leakage, and increased interpersonal conflict (Sarigianni et al., 2015; Molok et al., 2011). Thus, items used in governance construct are statistically tested, and the results show governance significantly moderates the relationships between ESN for knowledge sharing and innovation.

Lastly, by examining the influence of control variables such as gender and age, it was found that age is significantly correlated with firm innovation (Chin et al., 2019; Cai, 2018). This implies that, regardless of gender type, employees (aged between 30 - 50 years) are more

experienced in sharing knowledge with others (Cai, 2018; Hsu & Lin, 2008) and developing innovative products and services in the organisation. The interview data also revealed that gender has no significant influence on ESN use.

## 5.11 CHAPTER SUMMARY

This chapter describes the results of the quantitative phase of the study, which is the second phase in the mixed methods methodology. Based on the literature and the results of the qualitative study, a research model was developed. The statistical results show a positive relationship between ESN\_KS and SER\_INN (H1); ESN\_KS has partially mediated the relation between TRUST and SER\_INN (H2), and governance (GOVRN) has a positive relation to influencing the relation between ESN\_KS and SER\_INN (H3). Additionally, the statistical results show GENDER is not significantly related to SER\_INN, and that AGE is positively related to SER\_INN. The analysis shows that the hypotheses were supported. The next chapter discusses the qualitative and quantitative results of the study.

## CHAPTER 6 DISCUSSION AND CONCLUSION

### 6.1 CHAPTER OVERVIEW

This chapter begins by discussing the findings presented in Chapters 4 and 5, and how they can help answer the research problems mentioned at the beginning of this thesis. This is followed by a description of the contributions and limitations of this research. The chapter concludes with potential directions for future research.

### 6.2 RESEARCH AIM AND RESEARCH QUESTION

The aim of this research study is to understand how the use of ESN for knowledge sharing affects service innovation. Two research problems were identified: the low acceptance of ESN applications in organisations and the inappropriate use of ESN. The low acceptance of ESN by employees to share knowledge can be attributed to various reasons, such as their fear of losing their value once they have contributed what they know, concern over damaging their reputation if their comments or posts are not favourably viewed by their supervisors or co-workers, or their perception that using ESN applications will enable their supervisors to monitor them more easily. ESN applications could be inappropriately used if employees leak firm-sensitive information to external parties, either deliberately or accidentally, or spend too much time on them instead of their assigned work tasks. These two research problems led to the following research question: *How can organisations encourage employees to use ESN for knowledge sharing to enhance their innovation outcomes?*

Based on the research question, this study proposed two theoretical lenses: social exchange theory to address the first research problem and governance to address the second research problem. Once a conceptual model was developed, a mixed methods study was carried out. The first qualitative phase used interviews to gain an in-depth understanding of the phenomenon and validate the model. The results of the first phase led to the development of a research model that was statistically evaluated using data gathered by a survey of international financial professionals. In the following sections, the results of the data collection and analysis are discussed.

### 6.3 DISCUSSION

To innovate, organisations need to share both personalised and codified knowledge with their diverse functions. However, codification can lead to information overload and possible

imitation by competitors, while personalization can be difficult to carry out because of employee reluctance to share knowledge causing loss of knowledge when employees leave (Ajith Kumar & Ganesh, 2011). ESN applications could possibly be used to overcome these challenges. ESN supports codified knowledge by providing repositories, such as SharePoint, to store information, locate expertise using Wikis, and use SharePoint to post relevant content for users (Jarrahi & Sawyer 2013). Likewise, ESN supports personalised knowledge by indicating experts within organisations, who can be approached informally by co-workers via applications such as Yammer and Slack, building on existing informal and social processes through which workers seek advice and input from other users (Jarrahi & Sawyer 2013). Thus, ESN supports intra-organisational knowledge sharing by enabling easy ways for individuals to share their experiences as well as systematically store information in their organisation's memory (Calantone et al., 2002). Knowledge integration, knowledge sharing practices, and collaboration are essential for innovation (Forman et al., 2019; Muninger, Hammedi & Mahr, 2019; Barret, 2015; Ding et al., 2010). Therefore, ESN-enabled knowledge sharing provides a better understanding of both personalised and codified knowledge to improve the level of innovation (Mladenović & Krajina, 2020; Forman et al., 2019).

As hypothesized, the current study found a positive relationship between the use of ESN for knowledge sharing (ESN\_KS) and service innovation (SER\_INN). This is in line with prior studies that use ESN to fulfil information needs to create value for innovation (Mantymaki & Reimer, 2016) and a positive relationship between social media use for knowledge sharing and innovation (Pérez-González, Trigueros-Preciado, & Popa, 2017). However, these authors did not explicitly use the importance of ESN-enabled knowledge sharing. For instance, Mantymaki and Reimer (2016) studied only one ESN application, such as Yammer, and how this application also found a positive relationship between social media use for knowledge sharing and innovation. The current study used various ESN applications such as Yammer, Slack, SharePoint, etc. The results show a positive relationship between ESN applications used for knowledge sharing and innovation.

The qualitative findings revealed that employees use various ESN tools to share knowledge with their co-workers and complement each other. This is because each tool is used for different purposes. Although employees did not explicitly mention personalised and codified knowledge sharing, they provided evidence of sharing information and collaboration using ESN tools, such as using Slack for information sharing and using Yammer and Wikis to retrieve information. Other studies have shown that social media facilitates information flow and knowledge sharing

within and across organisations, which in turn improves firms' innovation process (Aboelmaged, 2018; Lam, 2016). These authors used both ESN and public-facing social media to assess the importance of innovation in the organisation, indicating that innovation occurred acquiring external knowledge as well. Overall, it can be concluded that ESN for knowledge sharing (both personalised and codified) is vital as both are required to achieve the desired goal, i.e., innovation.

However, there are potential adverse outcomes when employees share their knowledge through ESN and are challenging to organisations (Chen & Wei, 2019; Stock & Gross, 2016). Two of these adverse outcomes are the low acceptance of ESN use and the inappropriate use of ESN, as discussed below.

The low acceptance of ESN for knowledge sharing could indicate that individuals are wary of becoming less valuable in the organisation (Gibbs et al., 2013) because their value is tied to the knowledge they possess. Other reasons for the low acceptance of ESN could be feelings of discomfort or insecurity (Stock & Gross, 2016). Employees who perceive their workplaces to be fair and just are more willing to share knowledge and adopt new technologies introduced by their organisation (Alblerghini et al., 2014). This fits the perspective of social exchange theory, which examines long-running interactions, such as employer-employee relationships. The theory argues that while both parties interact to fulfil their personal desires, obligations are created from the exchange, and positive behaviour is reciprocated. Applied to the study's context, a higher level of trusting relationships between superiors and co-workers and between co-workers will encourage ESN use. When there is a high level of trust, employees are more likely to use ESNs to share knowledge because it reduces their fear of being made redundant after sharing (Bieńkowska et al., 2018; Cropanzano et al., 2017). Therefore, establishing a secure environment featuring trusted relationships between superiors and subordinates will enhance collaboration (Bieńkowska et al., 2018).

Trust was an emergent theme from the qualitative study. The outcome results suggested that employees perceived that trust increased the level of knowledge sharing with their co-workers in the organisation. In the quantitative study, both the direct and indirect effects of trust on innovation were tested. The results show that the effect of trust on service innovation was partially mediated via ESN use for knowledge sharing. This finding is similar to recent research. For instance, Lei, Nguyen, and Ba Le (2018) investigate the relationship between interpersonal trust in innovation capability (both product and process) with a mediated role of knowledge sharing. Their findings suggest that interpersonal trust affects a firm's innovation capability

directly and indirectly via knowledge sharing. Wah et al. (2018) investigate the impact of trust on innovation via tacit knowledge sharing as a mediator. These authors used affect-based trust and cognition-based trust to test mediation relationships. The results suggest that trust (both affect and cognitive) directly affects innovative behaviour and an indirect effect via tacit knowledge sharing (mediation). Sankowosko (2013) investigates the impact of trust on innovativeness via knowledge attributes such as knowledge transfer and creation. The findings suggest that trust affects innovativeness directly, but also indirectly via knowledge transfer and creation. Although these studies and the present research support the argument that innovation can be fostered through knowledge sharing and trusting work environments, the approach was different. For instance, Lei et al. (2018) used interpersonal trust between co-workers and leadership support as a moderator, and the operationalisation reflected these relationships. However, the current study used trust between co-workers and co-workers and superiors and the operationalisation reflected on these relationships. On the other hand, Wah et al. (2008) used the impact of effect-based trust and cognition-based trust on innovation behaviour via tacit knowledge sharing. These authors did not show how trust (interpersonal) impacts ESN-enabled knowledge sharing for innovation outcomes.

Governance in this context refers to formal and informal mechanisms that ensure that knowledge is shared in a preferred direction when ESN is used (Stohl et al., 2017). Formal governance provides procedures and rules on how knowledge is shared within a given framework, whereas informal governance indicates norms and cultural practices (Cao & Xiang, 2012; Foss et al., 2010). Governance has a clear role in improving knowledge sharing. When knowledge is codified, employees can be given specific directions to guide their engagement with existing knowledge. With personalised knowledge, employees can be encouraged to share their knowledge, experience, and shared goals (Turner & Makhija, 2006; Gold et al., 2001).

The qualitative study results showed that employees were aware of formal and informal governance mechanisms for knowledge sharing and their role in influencing product/service development. Evidence from the qualitative study also revealed that there is an increased awareness and recognition of organisational social media policies. The quantitative study results show that governance significantly and positively moderated the effect of ESN use on innovation and that the impact was substantial at higher levels of ESN use. Most previous studies on knowledge governance were either conceptual arguments or literature reviews (Zheng & Zhao, 2013; Foss, Husted & Michailova, 2010). Although a few studies had empirical findings, they did not directly relate to governance's role in supporting the use of enterprise



social networking for knowledge sharing to enhance innovation. For instance, Huang, Chiu & Lu (2013) studied the relationship between governance (formal and informal) on knowledge sharing behaviour via knowledge sharing motivation and opportunity. Cao and Xiang (2012) studied the relationship between governance (formal and informal) on knowledge sharing and the effect of *guanxi* (i.e., a special characteristic in Chinese culture which indicates mutual effect within formal and informal systems) as a mediator effect. In both studies, the outcomes indicated a positive relationship between these variables. Research on social media governance mainly consisted of guidelines on social media usage in organisations (Stohl et al., 2017; Vaast & Kaganer, 2013). The results of both phases (interview and survey) of the study support the argument that the inappropriate use of ESN for knowledge sharing can be mitigated by using governance mechanisms.

To summarise, the outcome of the above discussion is that the relationships between constructs are statistically significant. The next section lists the contributions of this research project and possible directions for future researchers in this domain.

## 6.4 CONTRIBUTIONS

The research findings have several implications for both theory and practice. The theoretical contribution suggests recommendation around theoretical lenses, and practical implication offered recommendations for management for better use of concepts in the organisation. From a theoretical perspective, the findings provide the following contributions.

**First**, this study contributes by providing the importance of intra-organisational trust to address the low acceptance of ESN use among employees. The low acceptance of ESN for knowledge sharing could indicate that individuals are wary of becoming less valuable in the organisation (Gibbs et al., 2013) because their value is tied to the knowledge they possess. This fits the importance of the ‘trust’ concept used in social exchange theory (SET). Through the lens of SET, positive relationships between employers-employees have been examined. The theory argues that when there is a high level of trust, employees are more likely to use ESNs to share knowledge because it reduces their fear of being made redundant after sharing (Bieńkowska et al., 2018; Cropanzano et al., 2017). The qualitative findings revealed the emerging theme of ‘trust’ which was reviewed several times during the interviews. According to interviewees, when knowledge is shared there is a sense of trust among co-workers and was influenced by knowledge-sharing culture. Therefore, employees perceived that trust among employees could reduce the fear of sharing knowledge. Likewise, the quantitative study suggested that the effect

of trust on service innovation was partially mediated via ESN for knowledge sharing. Although few studies had empirical findings (Lei et al., 2018; Sankowosko, 2013), they did not relate the role of trust supporting innovation via ESN use for knowledge sharing. For instance, Lei et al. (2018) used interpersonal trust between co-workers and leadership support as a moderator, and the operationalization reflects these relationships. However, the current study used trust between co-workers and co-workers and superiors and reflected on these relationships. Therefore, the results of both phases (interview and survey) of the study support the argument that low acceptance of ESN use for knowledge sharing can be improved by addressing the level of trust among employees. Applied to the study's context, trusting relationships between co-workers and superiors and co-workers would encourage ESN use for knowledge sharing. Therefore, establishing a secure environment featuring trusted relationships between superiors and subordinates will enhance collaboration (Bieńkowska et al., 2018).

**Second**, this study contributes by providing the importance of governance to address an inappropriate use of ESN use by employees. This study contributes by providing strong evidence for the moderating role of governance, which is distinctive compared to prior research (Zheng & Zhao, 2013; Foss et al., 2010). ESN research is fragmented, and there is limited empirical research on the role of governance (Zheng & Zhao, 2013; Foss et al., 2010) for ESN-mediated knowledge sharing. The qualitative study improved our understanding of employees' awareness of governance (formal and informal) and their role in influencing product/services. While formal governance provides policies, standards and operational guidance, informal governance supports open interaction, networks, collaboration and participation to share knowledge via ESN (Stohl et al., 2017; Foss et al., 2010). Using operational guidance and open interaction reduces the risk of knowledge leakage out of organisations and encourages a long-term orientation (Stohl et al., 2017; Zheng & Zhao, 2013). Qualitative study also revealed in recognition of social media policies (Stohl et al., 2017; Vaast & Kaganer, 2013). This study, therefore, extends the field of knowledge governance to both knowledge management and social media. The items used to measure the governance construct (formal & informal) significantly differ from operationalized items due to the combined effort to use ESN for knowledge sharing. These items were statistically tested in the financial industry context and revealed a positive effect of governance that mitigate the relation between ESN for knowledge sharing and innovation. Therefore, there is an excellent chance to extend the use of governance as a construct in other industry settings.

**Third,** the study shows how ESN use has a substantive effect on innovation, an important indicator of firm performance. ESN is a fairly recent phenomenon, and there is still much uncertainty around its impact and role in organisations (Aboelmaged, 2018). This can be ascribed to its origins in the public-facing social media world, the variety of functions it has (Qi & Chau, 2018), and the range of applications the label can be used for. For example, it is much easier to point to an ERP (i.e., enterprise resource planning) application and identify it as an ERP application (Nah et al., 2001) compared to an ESN application (Chen & Wei, 2019; Aboelmaged, 2018). The diffuse nature of ESN has made it difficult to find out if ESN applications can help firms perform better (Chen & Wei, 2019). From that standpoint, this study has contributed and helped provide some guidance on how ESN applications can be useful for firms.

**Fourth,** this study improves our understanding of verities of ESN tools used for sharing knowledge. Previous researchers suggested having more diverse ESN use (Qi & Chau, 2018; Mäntymäki & Riemer, 2016) because they provide different functions to facilitate different tasks (Chin et al., 2019; Madsen 2017). Employees use various ESN tools to share knowledge with their co-workers and complement each other because each ESN tool is used for different purposes (Chen & Wei, 2019; Madsen et al., 2017). The quantitative findings also revealed that participants using various ESN tools. It is also possible for users to feel comfortable with one and not with other platforms, giving some level of flexibility in their use (Chin et al., 2019). Others have suggested that, since social media is heterogeneous in terms of technical features, work-related social media and personal-related social media have essential effects on employees' performance (Muninger, 2019; Song et al., 2019).

Although in the qualitative study, employees did not explicitly mention personalised and codified knowledge sharing, they provided evidence of sharing information and collaboration using ESN tools, such as using Slack for information sharing and using Yammer and Wikis for information retrieval. Previous studies have shown that social media facilitates information flow and knowledge sharing within and across organisations to improves firms' innovation processes (Aboelmaged, 2018; Lam, 2016). Overall, we can conclude that ESN for knowledge sharing (both personalised and codified) is vital as both are required to achieve the desired goal, i.e., innovation. Therefore, this study contributes to and improve our understanding of the importance of using different ESN tools in the organisation.

**Fifth,** it is worth noting that the financial sector is very complicated as it requires, on the one hand, a vast amount of knowledge for continuous collaboration and knowledge sharing. On the

other hand, it also follows strict rules, privacy, and regulation (Sarigianni et al., 2015). The high regulatory environment makes ESN use for knowledge sharing more difficult than in other industries. Furthermore, the financial industry has sensitive financial information. Thus, inappropriate use of ESN can leak this sensitive information to external parties. Therefore, with limited literature (Robertson & Kee, 2017; Wehner et al., 2017; Barrett et al., 2015), this study contributes by investigating how sharing a vast amount of knowledge using ESN in the financial industry can overcome the challenges to achieve innovation outcomes.

**Sixth**, this study contributes to using the exploratory sequential mixed methods research design (Venkatesh et al., 2013). The mixed-methods design is suitable when addressing a complex socio-technical topic. The qualitative analysis was conducted first by recruiting participants from the financial industry through snowballing, thereby verifying the conceptual model which was derived through the literature review. Moreover, the qualitative analysis gave the ability to provide more substantial evidence. For example, the ‘trust’ theme emerged through the qualitative data. This study successfully provides a model and systematically link qualitative and quantitative data, thus broadening the literature regarding the application of the sequential mixed methods research design (Venkatesh et al., 2013).

**Lastly**, this study contributes by broadening the lens applied to the phenomena. Unlike prior studies that focus on the positive effect of ESN use in the organisational context (Mantymaki & Riemer, 2016; Ali-Hassan et al., 2015; Leonardi, 2014), this study contributes to the extant ESN research by exploring the potential negative consequences (low acceptance and inappropriate use of ESN) at work. Although ESN can improve employees’ knowledge sharing, their low acceptance and inappropriate use can induce adverse outcomes and should receive more attention and investigated by researchers. Our findings demonstrate that ESN enables knowledge sharing to improve innovation outcomes by providing a trusted environment and placing governance to mitigate these relationships.

From a practical standpoint, the study has several implications for managers.

**First**, it is essential to deploy one or a few ESN applications at workplaces and support its/their use so that employees can share their views and the firm can benefit from this interaction. One way to do this is to integrate ESN in the organisational portal to encourage its use (Chin et al., 2019). It is also essential for managers to keep track of the evolving nature of ESN to see how it can best enhance knowledge sharing (Chen & Wei, 2019; Azaizah et al., 2018). Additionally, the results provide insights for ESN developers who wish to design functionalities that may create value to ENS users (Mantymaki & Riemer, 2016). For instance, managers should ensure

that the ESN platform is easily accessible with user-friendly capabilities to search for people, post content and upload documents (Chin et al., 2019; Chen & Wei, 2019).

**Second**, employees who share knowledge using ESN need their leadership to promote a trusted environment so that employees can freely discuss issues regarding developing products and services. When employees are positive and trust each other, they are more likely to accept the use of enterprise social networking, building on ESN's ability to be a social lubricant (Leonardi & Meyer, 2015). Therefore, we suggest managers create a culture that improves the importance of vertical and horizontal relationships among employees, showing employees' interests and sharing knowledge (Chin et al., 2019). Likewise, the presence of trust will also minimise any restrictions on the usage of ESNs and maximise the benefits. Thus, managers should enhance employees' trust, ensuring to increase the ESN use in the organisation. Besides, managers should act as role models and use ESN to reduce fears of its use (Stock & Gross, 2016). It is also advisable for organisations to encourage non-work-related discussions via ESN to create a positive relationship between employees. Perhaps, organisations should allow employees to share knowledge in an environment that nurtures their creativity, positively impact their innovation performance.

**Third**, to reduce the inappropriate use of ESN, it is essential for management to create policies, guidelines and informal norms to support its proper use (Cao & Yu, 2019; Vaast & Kaganer, 2013). In this respect, managers should build a strong culture to encourage and empower ESN use by establishing cross-functional teams who can work effectively on knowledge sharing and decision-making processes. It is also important for managers to provide guidelines to educate employees on how social media should be used (Cao & Yu, 2019). Management should also regularly update and inform employees about any changes in policies that may influence their work processes.

**Lastly**, due to the high regulatory environment, ESN-enabled knowledge sharing is difficult in the financial industry (Sarigianni et al., 2015). The financial sector is very complicated as it follows strict rules and regulation, yet it requires a vast amount of knowledge for continuous collaboration and knowledge sharing. Therefore, managers and CEOs should mitigate the negative effect of ESN use regarding knowledge sharing. To do so, managers might enhance employees' trust in the organisation by ensuring they do not misuse ESN for knowledge sharing. The manager should also act as a role model by using ESN at work themselves to reduce fears.

We can conclude that internal social media adoption is of high consideration in the financial industry due to the strict rules and regulation. The pressure from customers and the workforce already using social media grows, forcing financial institutions to adopt social media. Our qualitative and quantitative results show that the financial industry employees are keen to use ESN for knowledge sharing. However, to overcome the adverse outcomes (low acceptance and inappropriate use of ESN), management needs to create both a trusted environment and governance to improve ESN use for knowledge sharing, resulting in innovation outcomes.

## 6.5 LIMITATIONS AND FUTURE RESEARCH

This study has some limitations, which we believe provides opportunities for future research.

**First**, this study is limited to enterprise social networking; public-facing social media is not included in it. During the interviews and survey data, the use of public-facing social media was reflected in the demographic data that was collected. Details of the use of public-facing social media were not part of the study, as it focused on ESN, an internally-directed technology. It is possible that the use of public-facing social media may influence the findings because organisational use of externally-directed social media or personal use of public-facing social media may be related to individuals' use of ESN. The knowledge of stakeholders, such as customers and suppliers, is a valuable resource for generating new ideas, and can be accessed using public-facing social media. Future studies should aim to conceptualise social media use more broadly to include its public-facing as well as internally-focused dimensions (Muninger, 2019; Song et al., 2019). The interviews also highlighted how different technologies, although nominally considered to be “ESN” applications, were used for distinct purposes. Future researchers should thus capture the use of a variety of ESN applications by individuals to better reflect how they share knowledge.

**Second**, we only considered ‘trust’ as an antecedent variable affecting ESN for knowledge sharing as it was an emerging theme which frequently appeared during interviews. The explanation for the role of trust depended on Bieńkowska et al.’s (2018) research on how trust improves knowledge sharing between supervisor-subordinates and between co-workers. Other factors (such as altruism and self-interest) indicated by social exchange theory (Lei et al., 2018; Bieńkowska et al., 2018) could also have played relevant roles in influencing ESN use and innovation. Likewise, inter-organisational trust (trust between organisations) and trust between organisation and customers are also excluded in this research. Future researchers may test the effect of other factors in this respect.

**Third,** this study uses cross-sectional data, and a longitudinal design would have been preferable. The interviews revealed that the use of ESN changes over time, and that individuals create value from ESN in different ways to meet their personal goals, which may impact the innovation process. Some scholars also reflected on this issue by emphasising the use of ESN use for knowledge sharing on innovation process in the longer term to fully understand the impact and implication of achieving their outcomes (Chin et al., 2019; Kalra & Baral, 2019; Corcoran et al., 2018). Thus, future researchers may want to incorporate longitudinal data to obtain better insights into the phenomenon.

**Fourth,** we used key informants who are professionals in the field of product development. Since product development usually involves experts from marketing, finance, legal, and R&D, the findings could perhaps be limited to professionals from such backgrounds. Future researchers may want to include experts from other backgrounds to investigate how ESN use for knowledge sharing affects their work processes and outcomes.

**Fifth,** the research sample included only 104 respondents from the global financial industry. Although CFA is not very sensitive to small samples, larger sample sizes will be preferable for generalisation and verification of the findings. Likewise, eleven participants in the qualitative study were selected through a snowballing sample across five financial firms. Further research may explore whether the use and interpretation of ESN use differ across various firms and whether the size of the organisations' matters.

**Sixth,** this study is limited to the financial industry, which has some unique attributes, such as a relatively highly educated workforce, which makes them more likely to adopt new technologies, and a strong culture of formal regulations. Individuals working in this industry may be more private and less willing to share their knowledge because of strict rules against information-sharing. Thus, choosing the financial industry as the research context may bias the results, especially in terms of the role of trust, governance and ESN use. Future researchers should explore how ESN use has affected firms in other industries, both service, such as hospitality and retail, and manufacturing sectors.

**Lastly,** another area that future researchers/practitioners could explore and compare with this study is the impact of ESN use during pandemics. With the Covid-19 pandemic, many firms and organisations are taking advantage of social media to communicate with co-workers and manage work remotely. They are using both in-house as well public social media to do so. It would be interesting to examine how ESN use for knowledge sharing is changing, and how the

increased use of ESN, in the current situation, is enabling or inhibiting innovation and productivity.

## 6.6 CHAPTER SUMMARY

This chapter discusses the qualitative and quantitative findings of the study and how they help answer the research question. Drawing upon the findings from both qualitative and quantitative study, this research has demonstrated the importance of ESN for knowledge sharing on service innovation. The chapter concludes by highlighting the study's contributions (both theoretical and practical), limitations, and ideas for future research by providing important suggestions for successful adoption of ESN for knowledge sharing.



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# Appendices

## 1.1 Appendix A Ethics Approval



### Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology  
D-88, Private Bag 92006, Auckland 1142, NZ  
T: +64 9 921 9999 ext. 8316  
E: [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz)  
[www.aut.ac.nz/researchethics](http://www.aut.ac.nz/researchethics)

August 2018

Harminder Singh  
Faculty of Business Economics and Law

Dear Harminder

Re Ethics Application: **18/292 How employees share knowledge to increase innovation in organisations**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 16 August 2021.

### Non-Standard Conditions of Approval

1. Forward to AUTEC any variations to the survey once the pilot test has been completed;
2. In the 'How was I identified...' section of the Information Sheet advice that 'you responded to an advert published on public websites such as INFNZ, NZ Bankers Assoc';
3. Ensure that when you send out the reminder email/advert you add a statement something like 'If you have already completed the survey, thank you and please ignore this email'.

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be submitted to or reviewed by AUTEC before commencing your study.

### Standard Conditions of Approval

1. A progress report is due annually on the anniversary of the approval date, using form EA2, which is available online through <http://www.aut.ac.nz/research/researchethics>.
2. A final report is due at the expiration of the approval period, or, upon completion of project, using form EA3, which is available online through <http://www.aut.ac.nz/research/researchethics>.
3. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form: <http://www.aut.ac.nz/research/researchethics>.
4. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.

Please quote the application number and title on all future correspondence related to this project.

AUTEC grants ethical approval only. If you require management approval for access for your research from another institution or organisation then you are responsible for obtaining it. If the research is undertaken outside New Zealand, you need to meet all locality legal and ethical obligations and requirements. You are reminded that it is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.

For any enquiries, please contact [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz)

Yours sincerely,

A handwritten signature in black ink, appearing to read 'K O'Connor', is written over a light blue horizontal line.

Kate O'Connor  
Executive Manager  
Auckland University of Technology Ethics Committee

Cc: [nrahman@aut.ac.nz](mailto:nrahman@aut.ac.nz)



## 1.2 Appendix B Participant Information Sheet (Interview)



Participant Information Sheet (Case)  
Date Information Sheet Produced: 25 May 2018

**Project Title:** Understanding the impact of enterprise social media on service innovation: a knowledge-sharing and governance perspective

An Invitation

Dear sir/madam,

This project is being undertaken by Naseem Rahman, a PhD candidate from the Faculty of Business and Law. Participation in this project is voluntary, and you may withdraw from the study at any time prior to the completion of data collection.

### **Purpose of this research**

The purpose of this study is to understand how you share information/knowledge with co-workers about new or existing products/services using enterprise social media (ESM). ESM is a kind of social media that is internal to organisation. Examples of internal social media are; wikis, blogs, microblogs, Yammer, etc. The findings will help management in understanding the role of internal social media (ie. Enterprise social media) used in your organisation to facilitate knowledge sharing for products/services. This research is conducted to obtain my Doctor of Philosophy degree in Business Information Systems. It is expected that this research will also potentially result in the publication of research papers, conference papers, and academic journal articles.

### **What will happen in this research?**

You will be asked to sign a consent form and take part in a simple semi structured interview. The interview will involve number of statements relating to service innovation and how you share information/knowledge using some sort of ESM which is internal to organisation. The interview will discuss this as well as further questions about your experiences in relation to sharing information with your workers and any policies that is implemented for knowledge sharing and ESM. With permission, the interview will be recorded via audio tape and note taking. The interview data will be analysed by common themes.

### **How the privacy be protected?**

No identifying data from the interview will be used in the write up of results or any subsequent publications and your private information will be kept fully confidential. The final published proceedings will identify participants by a code (participant A, participant B, etc).

### **What are the costs of participating in this research?**

There are no direct monetary costs involved in the participation of this research, however, It is anticipated that participation in this project will involve 60 to 90 minutes of your time.

### **How do I agree to participate in this research?**

If you agree to participate in the research please return the attached consent form to the researcher Naseem Rahman (contact email is provided below). Naseem will then be in contact with you to arrange a convenient time to conduct interview.

### **What are the discomforts and risks?**

There is no significant discomforts and risks in participating in the interview process. Your responses are only used for academic purpose and you will not be identified in the writing of theses, conference papers and journal articles. The recorded transcripts will be secured at AUT.

How will these discomforts and risks be alleviated?

If you do experience risk and/or discomfort, you may choose not to answer questions, terminate the interview, and/or withdraw from the research up to the end of data collection. No identifying data from the interview (relating to either participant or organisation) will be used when writing up results or any subsequent publications,

.

**What are the benefits?**

It is expected that participation in this project will help both researchers as well as participants to gain insights into service innovation as well as importance of ESM to share information/knowledge in their organisation. Both researchers and participants will also gain their understanding of importance of governance that play an important role to mitigate any issues related to knowledge sharing using ESM to improve the level of innovation.

**Will I receive feedback on the results of this research?**

As a participant the results will be available for you to consider and comment on once all data has been collected from all participants. You will also be offered an opportunity to review the interview transcript once this has been transcribed. It is anticipated that a full summary of research findings will be available from approximately 12 months from the completion of the project. Copies may then be requested.

**What do I do if I have concerns about this research.**

Any concerns regarding the nature of this research should be notified in the first instance to the research Supervisor, Dr. Harminder Singh; harminder.singh@aut.ac.nz; 64 9 921 9999 – ext: 5029;

Concerns regarding the conduct of the research can also be notified to the Executive Secretary of AUTECH, Kate O'Connor, ethics@aut.ac.nz , 921 9999 ext 6038.

*Researcher Contact Details:*

Naseem Rahman

Email: nrahman@aut.ac.nz

Phone: 0211802707

### 1.3 Appendix C Participant Information Sheet (survey)



#### Participant Information Sheet (Survey) Date Information Sheet Produced: 25 May 2018

**Project Title:** Understanding the impact of enterprise social media on service innovation: a knowledge-sharing and governance perspective

**An Invitation**

Dear sir/madam,

This project is being undertaken by Naseem Rahman, a PhD candidate from the Faculty of Business and Law. Participation in this project is voluntary, and you may withdraw from the study at any time prior to the completion of data collection.

**Purpose of this research**

The purpose of this study is to understand how you share information/knowledge with co-workers about new or existing products/services using social media which is internal to organisation. Examples of internal social media are; wikis, blogs, Yammers, etc. The findings will help management in understanding the role of internal social media (ie. Enterprise social media) used in your organisation to facilitate knowledge sharing for products/services. This research is conducted to obtain my Doctor of Philosophy degree in Business Information Systems. It is expected that this research will also potentially result in the publication of research papers, conference papers, and academic journal articles.

**What will happen in this research?**

You will be asked to complete short an anonymous questionnaire. The questions relate to your experiences and understanding of service innovation. It will take you about 20 minutes to complete the survey. If you feel at any point that you do not wish to continue answering the questionnaires, you are free to withdraw from the survey. The findings based on your responses will be used to produce a thesis and related conference papers and journal articles.

**How the privacy be protected?**

Your participation is voluntary, your responses are anonymous. Therefore, your privacy is completely protected. Once the research survey is completed, all the information that you provide will be securely stored in a locked cabinet in an office at the Auckland University of Technology. Only the researchers who are involved in this research will be able to access to the data. All data will be destroyed after six years. The final published proceedings will identify participants by a code (participant A, participant B, etc).

**What are the costs of participating in this research?**

There are no direct monetary costs involved in the participation of this research

**How do I agree to participate in this research?**

Completion of the attached questionnaire will be taken as an indication that you have given your consent to participate in this research.

**What are the discomforts and risks?**

There is no significant discomforts and risks in participating in completing questionnaires. Your participation is anonymous and voluntary. Your responses are only used for academic purpose and you will not be identified in any case including writing thesis, conference papers, and journal articles.

**How will these discomforts and risks be alleviated?**

If you feel discomfort, you may choose to discontinue or withdraw your participation at any time. No identifying data from the interview (relating to either participant or organisation) will be used when writing up results or any subsequent publications.

**What are the benefits?**

It is expected that participation in this project will help both researchers as well as participants to gain insights into service innovation as well as importance of ESM to share information/knowledge in their organisation. Both researchers and participants will also gain their understanding of importance of governance that play an important role to mitigate any issues related to knowledge sharing using ESM to improve the level of innovation.

**Will I receive feedback on the results of this research?**

As a participant the results will be available for you to consider and comment on once all data has been collected from all participants. You will also be offered an opportunity to review the interview transcript once this has been transcribed. It is anticipated that a full summary of research findings will be available from approximately 12 months from the completion of the project. Copies may then be requested.

**What do I do if I have concerns about this research.**

Any concerns regarding the nature of this research should be notified in the first instance to the research Supervisor, Dr. Harminder Singh; [harminder.singh@aut.ac.nz](mailto:harminder.singh@aut.ac.nz); 64 9 921 9999 – ext: 5029; Concerns regarding the conduct of the research can also be notified to the Executive Secretary of AUTECH, Kate O'Connor, [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz), 921 9999 ext 6038.

***Researcher Contact Details:***

Naseem Rahman

Email: [nrahman@aut.ac.nz](mailto:nrahman@aut.ac.nz)

Phone: 0211802707

## 1.4 Appendix D Survey questionnaire

### THE SURVEY QUESTIONNAIRE

#### Enterprise social networking and innovation

Dear participant,

I am Naseem Rahman, a PhD candidate in the Faculty of Business, Economics and Law, at Auckland University of Technology. I would like to invite you to participate in a survey to understand how the use of social media influences innovation in the financial industry.

The survey will ask how you communicate with your co-workers using social media applications approved by your organisation, such as Slack, Yammer, SharePoint, etc. When social media applications are used within organisations, they are referred to as "Enterprise Social Networking" (ESN). Throughout this survey, I will use the term ESN.

Please read each question carefully and provide your honest reply. The information that is collected through this survey will be confidential and all responses will be anonymized. The information collected from the survey will be aggregated and only overall summary results will be reported.

Your participation in the survey will be highly appreciated. However, your participation is voluntary, and you may withdraw from the study at any time prior to the completion of data collection. You will need about 25 minutes to complete the whole survey. If no response is received, a follow up reminder email will be sent after a month.

The results of the study will be available on the website for participants. It is anticipated that a full summary of research findings will be available approximately 12 months after the completion of the study.

The link to the survey is:

[https://aut.au1.qualtrics.com/jfe/form/SV\\_3lwxXawZIpJhl3v](https://aut.au1.qualtrics.com/jfe/form/SV_3lwxXawZIpJhl3v)

By clicking the link, you agree to participate in this survey

Please complete your questionnaire before 28 February 2020

Thank you for your participation

If you have any questions about this survey, please address them to:

Naseem Rahman (Researcher)

Email: [nrahman@aut.ac.nz](mailto:nrahman@aut.ac.nz)

Phone: +64 211802707

Associate Professor Harminder Singh (Supervisor)

Email: [harminder.singh@aut.ac.nz](mailto:harminder.singh@aut.ac.nz)

Phone: 64 9 921 9999 ext. 5029

## SECTION1: USAGE of SOCIAL MEDIA

Q1 When your co-workers share information with each other, what proportion of each mode of communication listed below do they use on a weekly basis?

Face-to-face conversation:	
Enterprise Social Networking (such as Slack, Yammer, SharePoint, etc.):	
Publicly available social networking (such as Facebook, LinkedIn, etc):	
Email:	
Telephone (mobile/fixed-line):	
Total (must sum to 100%):	100%

Q2 When you use social media tools to share information with your co-workers, which type do you use most often? (please tick one)

- ☐ Enterprise social networking (those provided by your organisation), such as Slack, Yammer, SharePoint, etc.
- ☐ Publicly available social networking (such as Facebook, LinkedIn, Twitter, etc.)
- ☐ Both tools (enterprise and publicly available social networking)

Q3 In your opinion, how effective are the following enterprise social networking applications for sharing information in your organisation? (You can tick more than one box under each option)

	Generating ideas	Problem-solving	Sharing files	Making announcements	Ask for specific information	Searching for specific information
Slack						
Yammer						
SharePoint						
Others, please specify:						

## SECTION 2: MAIN SURVEY ITEMS

Q4 This section asks about the importance of knowledge sharing using enterprise social networking applications or ESN (such as Slack, Yammer, SharePoint, etc.) with co-workers in your organisation. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly Agree
In my organisation when I have learned something new, I share it with my colleagues using ESN							
In my organisation when my colleagues have learned something new, they share it using ESN							

Knowledge sharing using ESN among colleagues is considered normal in my organisation							
Knowledge can be easily acquired from experts and co-workers through ESN							
Knowledge can be easily acquired from formal documents and manuals that are stored on ESN							

Q5 This section asks about your perception of innovation in your organisation. How much do you agree or disagree with the following statements? (Note: “innovation” refers to the development of new products/services or improvement of existing products/services)

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
My organisation frequently tries out new ideas							
My organisation seeks out new ways to do things							
My organisation is creative in its methods of operation							
Innovation is perceived as too risky in my organisation and is resisted							
Over the last five years, my organisation has increased the rate at which it introduces new products							
The quality of products/services in my organisation is high							
The quality of products/services in my organisation is constantly increasing							
My organisation always develops novel skills for transforming old products into new ones for the customers							

Q6 This section asks about the relationships between employees and supervisors in your organisation. How much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Employees freely express their opinions and ideas							
Employees are not afraid to express opinions which are contrary to the management's vision							
Employees willingly share their ideas with superiors							
Employees are free to talk about their difficulties with their superiors and know that they will be heard							
Supervisors are trusted by employees							
Employees are willing to share their ideas with co-workers							
Employees are free to discuss their difficulties with co-workers and know that they will be heard							

Q7 This section asks about the extent to which knowledge sharing and the use of ESN (such as Slack, Yammer, SharePoint, etc.) in your organisation are governed. How much do you agree or disagree with the following statements? (please see questions on the next page)



	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
My organisation stresses the creation of manuals and documents on products and services							
My organisation stresses the use of ESN to systematically store documents on our products and services							
My organisation stresses the use of ESN to generate new knowledge from existing knowledge							
My organisation stresses the use of ESN for distributing knowledge throughout the organisation							
My organisation encourages employees to search and share new values and thoughts through ESN							
My organisation encourages employees to exchange ideas and conduct dialogues through ESN							
My organisation encourages the use of ESN to collaborate with other employees inside the organisation							
Employees are encouraged to interact with other groups of employees through ESN							
My organisation has a policy to ensure that employees do not engage in illegal activities via ESN							
My organisation's guidelines state that employees should respect differences that may arise when using ESN							

### SECTION3: DEMOGRAPHICS

Please provide your demographic information below. Like your other responses, this information will be kept confidential.

Q8 Which region/country do you work in? (Please ✓ one):

- ☐ New Zealand      ☐ Australia      ☐ Europe  
☐ USA      ☐ UK      ☐ Other (please specify): \_\_\_\_\_

Q9 Which sector does your organisation belong to? (Please ✓ one):

- ☐ Commercial Bank      ☐ Retail Bank      ☐ Investment house  
☐ Insurance firm      ☐ Other (please specify): \_\_\_\_\_

Q10 Which of the following best describes the department you work in? (Please ✓ one):

- ☐ Sales/Marketing      ☐ Human Resource  
☐ Finance/Account      ☐ Other (please specify): \_\_\_\_\_

Q11 How many years of experience do you have in your current organisation? (Please ✓ one):

- ☐ Less than 1 year      ☐ 1-10 years      ☐ 11-20 years  
☐ 21-30 years      ☐ Over 30 years

Q12 How many employees does your organisation have? (Please ✓ one):

- ☐ 1-50      ☐ 51-100      ☐ 101-200      ☐ Over 200

Q13 What is your gender? (Please ✓ one):

- ☐ Male      ☐ Female      ☐ Prefer not to disclose

Q14 What is your age? (Please ✓ one):

- ☐ Less than 21      ☐ Between 21 – 30      ☐ Between 31 – 40  
☐ Between 41 - 50      ☐ More than 50

Thank you for completing our survey  
 We truly value the information you have provided  
 \*\*\*\*\*

## 1.5 Appendix E Constructs with operationalised items

Construct	Item code	Original items wordings	Items used in this study	Source
ESN-KS	KS_ESN1	When I've learned something new, I tell my colleagues in the department about it	In my organisation when I have learned something new, I share it with my colleagues using ESN	Van den Hooff & de Leeuw van Weenen, 2004
	KS_ESN2	When they've learned something new, colleagues within my department tell me about it	In my organisation when my colleagues have learned something new, they share it using ESN	
	KS_ESN3	Knowledge sharing among colleagues is considered normal in my company	Knowledge sharing using ESN among colleagues is considered normal in my organisation	Lin, 2007
	KS_ESN4	My Knowledge can be easily acquired from experts and co-workers	Knowledge can be easily acquired from experts and co-workers through ESN	Choi & Lee 2002
	KS_ESN5	Knowledge can be acquired easily through formal documents and manuals	Knowledge can be easily acquired from formal documents and manuals that are stored on ESN	
SER_INN	SER_INN1	our company frequently tries out new ideas.	My organisation frequently tries out new ideas	Calantone et al, 2002
	SER_INN2	our company seeks out new ways to do things.	My organisation seeks out new ways to do things	
	SER_INN3	our company is creative in its methods of operation.	My organisation is creative in its methods of operation	
	SER_INN4	Innovation in our company is perceived as too risky and is resisted.	Innovation is perceived as too risky in my organisation and is resisted	
	SER_INN5	our new product introduction has increased over the last five years	Over the last five years, my organisation has increased the rate at which it introduces new products	
	SER_INN6	The quality of products/services in our organisation is high.	The quality of products/services in my organisation is high.	Bienkowska et al, 2018
	SER_INN7	The quality of products/services in our organisation is constantly increasing.	The quality of products/services in my organisation is constantly increasing.	
	SER_INN8	Our company always develops novel skills for transforming old products into new ones for market.	My organisation always develops novel skills for transforming old products into new ones for customers	Liao et al 2006
TRUST	TRUST1	Employees freely express their opinions and ideas.	Same as original	Bienkowska et al 2018
	TRUST2	Employees are not afraid to express opinions which are contrary to the management's vision.	Same as original	
	TRUST3	Employees willingly share their ideas with superiors.	Same as original	

	TRUST4	Employees are free to talk about their difficulties with their superiors and know that they will be heard.	Same as original	
	TRUST5	Superiors are trusted by employees.	Same as original	
	TRUST6	Employees are willing to share their ideas with co-workers.	Same as original	
	TRUST7	Employees are free to discuss their difficulties with co-workers and know that they will be heard.	Same as original	
GOVRN	GOVRN1	My company stresses creating manuals and documents on products and services	My organisation stresses the creation of manuals and documents on products and services	Choi & Lee, 2002
	GOVRN2	Our company provides IT support for systematic storing	My organisation stresses the use of ESN to systematically store documents on our products and services	
	GOVRN3	My organisation has processes for generating new knowledge from existing knowledge	My organisation stresses the use of ESN to generate new knowledge from existing knowledge	Gold et al, 2001
	GOVRN4	My organisation has processes for distributing knowledge throughout the organisation	My organisation stresses the use of ESN for distributing knowledge throughout the organisation	
	GOVRN5	My company stresses searching and sharing new values and thoughts	My organisation encourages employees to search and share new values and thoughts through ESN	Choi & Lee, 2002
	GOVRN6	My company stresses exchanging various ideas and dialogues	My organisation encourages employees to exchange ideas and conduct dialogues through ESN	
	GOVRN7	In my organisation employees are encouraged to interact with other groups	Employees are encouraged to interact with other groups of employees through ESN	Gold et al, 2001
	GOVRN8	Organisations needs to protect business secret so that they are not revealed via SM	My organisation has a policy to protect business secrets so that they are not revealed via ESN	Stohl, et al, 2017
	GOVRN9	Organisations needs to ensure that employees do not engage in illegal activities when using SM	My organisation has a policy to ensure that employees do not engage in illegal activities via ESN	
	GOVRN10	Guidelines ask employees to respect differences that may arise when using social media	My organisation's guidelines state that employees should respect differences that may arise when using ESN	

## 1.6 Appendix F Preparing the data set using SPSS v26

To prepare the data set for statistical analysis the following important variables were examined as recommended (Pallant, 2016; Hair, et al 2014; Field, 2012).

- ✓ **Name variable:** It helps in identifying the variables in the data view (Pallant, 2016; Field, 2012). The name column provided only the question numbers and not the name convention and so I changed each variable with appropriate names. There are seven demographical variables (region/country, sector, department, size, years of experience, gender, age). For items, as it is suggested to use abbreviation (Pallant, 2016), for each construct I used appropriate item name that correspond the construct. For *Innovation* there are five items, for *ESN* eight items, for *Trust* nine items and for *innovation* thirteen items. *All data are given appropriate name convention.*
- ✓ **Type variable:** The type variable shows if the name variable is numeric (i.e. numbers), string (i.e. letters), date, etc. *All data are numeric in the data set.*
- ✓ **Width:** A standard width size is 8 characters (Field, 2012). All numeric data changed to 8 to keep it consistent and string variable to 20.
- ✓ **Labels:** Labels describe the meaning of Name variable. Both variable and labels are given same name to maintain consistent.
- ✓ **Values:** Values are used to assign numbers to represent groups of people known as grouping variables or coding variables (Field, 2012). *All values are recorded accordingly in Qualtrics so no change required.*
- ✓ **Missing:** This column is used to assign missing data (Field, 2012) and often occur when respondent fails to answer one or more questions in the survey (Hair, et al 2014). Out of 147 data set 40 cases contained no data and were deleted from the data set. Basic frequency distribution conducted to check for any other missing data. After analyzing the remaining 107 data set 3 cases were related to not completing the questions and finishing half way through. Because of this reason they were also deleted from the data set giving a list of 104 data set. *The missing column denote none for all data set.*
- ✓ **Measure:** This column is used to identify the level of measurement used. Nominal and Ordinal (also called categorical) and scale measurement are used. Nominal data only represent categories and commonly used nominal scaled data include demographic attributes (Hair, et al 2014). The demographic data such as region, sector, department, Gender, age, year of experience are measured as nominal data. The ordinal scale provides the order of value and indicate only relative position (Hair, et al 2014). In this study items scale such as strongly disagree to strongly agree (7 Likert scale) are used as ordinal scale.

## 1.7 Appendix G 1-2 Inter-item correlation

	SER_IN N1	SER_IN N2	SER_IN N3	SER_IN N4	SER_IN N5	SER_IN N6	SER_IN N7	SER_IN N8
SER_IN N1	1.00							
SER_IN N2	0.80	1.00						
SER_IN N3	0.80	0.70	1.00					
SER_IN N4	-0.19	-0.18	-0.05	1.00				
SER_IN N5	0.54	0.39	0.55	0.09	1.00			
SER_IN N6	0.59	0.47	0.67	-0.08	0.51	1.00		
SER_IN N7	0.66	0.56	0.66	-0.05	0.70	0.64	1.00	
SER_IN N8	0.65	0.53	0.70	0.01	0.66	0.65	0.75	1.00
Mean	5.64	5.57	5.18	4.20	5.44	5.69	5.53	5.14
SD	1.38	1.29	1.47	1.67	1.47	1.14	1.18	1.38

	ESN_KS1	ESN_KS2	ESN_KS3	ESN_KS4	ESN_KS5
ESN_KS1	1				
ESN_KS2	0.97	1.00			
ESN_KS3	0.71	0.73	1.00		
ESN_KS4	0.53	0.55	0.67	1.00	
ESN_KS5	0.19	0.20	0.31	0.54	1.00
Mean	4.41	4.40	4.75	4.73	4.88
SD	1.86	1.79	1.59	1.44	1.29

### 1.8 Appendix H 3-4 Inter-item correlation

	TRUST1	TRUST2	TRUST3	TRUST4	TRUST5	TRUST6	TRUST7
TRUST1	1.00						
TRUST2	0.74	1.00					
TRUST3	0.77	0.72	1.00				
TRUST4	0.74	0.65	0.71	1.00			
TRUST5	0.65	0.68	0.59	0.75	1.00		
TRUST6	0.54	0.45	0.59	0.57	0.67	1.00	
TRUST7	0.51	0.42	0.53	0.59	0.49	0.63	1.00
Mean	5.70	5.16	5.74	5.54	5.41	5.78	5.75
SD	1.24	1.39	1.17	1.19	1.30	1.21	1.13

	GOV RN1	GOV RN2	GOV RN3	GOV RN4	GOV RN5	GOV RN6	GOV RN7	GOV RN8	GOV RN9	GOVR N10
GOVR N1	1									
GOVR N2	0.27	1.00								
GOVR N3	0.31	0.79	1.00							
GOVR N4	0.25	0.81	0.85	1.00						
GOVR N5	0.22	0.56	0.81	0.69	1.00					
GOVR N6	0.27	0.45	0.66	0.60	0.75	1.00				
GOVR N7	0.21	0.45	0.67	0.59	0.75	0.84	1.00			
GOVR N8	0.33	0.44	0.64	0.59	0.62	0.59	0.60	1.00		
GOVR N9	0.25	0.58	0.60	0.50	0.53	0.56	0.56	0.34	1.00	
GOVR N10	0.30	0.52	0.60	0.53	0.57	0.65	0.67	0.50	0.74	1.00
Mean	5.88	4.95	4.61	4.75	4.84	4.91	5.17	5.09	5.81	5.43
SD	1.20	1.46	1.48	1.47	1.46	1.37	1.28	1.39	1.32	1.26

### 1.9 Appendix I Reliability of all items based on four constructs

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Cronbach's Alpha = 0.85					
SER_INN1	36.76	44.22	0.76	0.78	0.82
SER_INN2	36.84	47.11	0.63	0.67	0.83
SER_INN3	37.22	42.41	0.81	0.74	0.81
SER_INN4	38.20	59.04	-0.07	0.12	0.92
SER_INN5	36.96	44.56	0.68	0.56	0.82
SER_INN6	36.71	48.01	0.67	0.54	0.83
SER_INN7	36.88	46.01	0.78	0.69	0.82
SER_INN8	37.26	43.71	0.79	0.68	0.81
Cronbach's Alpha = 0.86					
ESN_KS1	18.77	23.71	0.80	0.94	0.80
ESN_KS2	18.78	24.04	0.82	0.94	0.79
ESN_KS3	18.43	26.38	0.78	0.64	0.81
ESN_KS4	18.45	28.79	0.69	0.58	0.83
ESN_KS5	18.30	34.83	0.34	0.31	0.90
Cronbach's Alpha = 0.92					
TRUST1	33.38	36.72	0.81	0.71	0.90
TRUST2	33.92	36.07	0.74	0.68	0.91
TRUST3	33.35	37.53	0.80	0.71	0.90
TRUST4	33.55	37.12	0.82	0.72	0.90
TRUST5	33.67	36.42	0.78	0.72	0.90
TRUST6	33.31	38.58	0.69	0.63	0.91
TRUST7	33.34	40.23	0.62	0.49	0.92
Cronbach's Alpha = 0.92					
GOVRN1	45.56	103.05	0.33	0.17	0.94
GOVRN2	46.48	90.68	0.71	0.75	0.92
GOVRN3	46.83	86.20	0.88	0.86	0.91
GOVRN4	46.68	88.32	0.79	0.79	0.91
GOVRN5	46.60	88.38	0.80	0.76	0.91
GOVRN6	46.52	90.41	0.78	0.75	0.91
GOVRN7	46.26	91.85	0.77	0.76	0.92
GOVRN8	46.35	92.77	0.67	0.53	0.92
GOVRN9	45.62	93.83	0.66	0.63	0.92
GOVRN10	46.00	93.17	0.73	0.66	0.92



### 1.10 Appendix J Test 1 item loading using Rotated Factor Matrix

Items	Factor				Communalities
	1	2	3	4	
GOVRN4	0.93				0.78
GOVRN3	0.89				0.88
GOVRN2	0.81				0.64
GOVRN7	0.79				0.68
GOVRN5	0.77				0.76
GOVRN6	0.76				0.62
GOVRN9	0.73				0.46
GOVRN10	0.67				0.50
GOVRN8	0.55				0.51
ESN_KS4	0.30				0.40
SER_INN3		0.90			0.80
SER_INN1		0.89			0.80
SER_INN2		0.79			0.62
SER_INN8		0.79			0.63
SER_INN7		0.74			0.62
SER_INN6		0.70			0.54
SER_INN5		0.59			0.48
TRUST4			0.92		0.76
TRUST3			0.87		0.72
TRUST1			0.84		0.76
TRUST2			0.75		0.72
TRUST7			0.59		0.39
TRUST5			0.57		0.72
TRUST6			0.54		0.50
ESN_KS1				0.93	0.98
ESN_KS2				0.93	0.96
ESN_KS3				0.57	0.56

Extraction Method: Maximum Likelihood.  
Rotation Method: Promax with Kaiser Normalization.

### 1.11 Appendix K Total Variance Explained based on test 1

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	12.434	46.05	46.05	10.418	38.583	38.583	9.159
2	3.471	12.856	58.906	3.015	11.167	49.75	8.633
3	1.844	6.829	65.735	2.879	10.663	60.413	8.693
4	1.466	5.43	71.165	1.444	5.348	65.761	7.405
5	1.004	3.719	74.883				
6	0.964	3.57	78.453				
7	0.841	3.115	81.568				

## 1.12 Appendix L Test 2 items loading using Rotated factor matrix

Items	Factor				Communalities
	GOVRN	SER-INN	TRUST	ESN_KS	
GOVRN4	0.92				0.78
GOVRN3	0.89				0.88
GOVRN2	0.81				0.65
GOVRN7	0.78				0.67
GOVRN5	0.76				0.76
GOVRN6	0.75				0.61
GOVRN9	0.72				0.46
GOVRN10	0.66				0.50
GOVRN8	0.54				0.50
SER_INN3		0.90			0.80
SER_INN1		0.89			0.80
SER_INN2		0.79			0.62
SER_INN8		0.78			0.63
SER_INN7		0.73			0.62
SER_INN6		0.69			0.54
SER_INN5		0.58			0.47
TRUST4			0.92		0.76
TRUST3			0.87		0.72
TRUST1			0.84		0.75
TRUST2			0.75		0.71
TRUST7			0.59		0.39
TRUST5			0.57		0.73
TRUST6			0.55		0.50
ESN_KS1				0.92	0.98
ESN_KS2				0.91	0.95
ESN_KS3				0.56	0.55

### 1.13 Appendix M KMO and Bartlett's Test

Test 1: all items	KMO		0.886
	Bartlett's Test	Chi-Square	2671.769
		df	351
		Sig.	0
Test 2: after dropping ESN4	KMO		0.888
	Bartlett's Test	Chi-Square	2580.874
		df	325
		Sig.	0

### 1.14 Appendix N Total Variances explained based on test 2

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	12.015	46.211	46.211	9.779	37.611	37.611	8.765
2	3.466	13.331	59.542	3.202	12.315	49.926	8.336
3	1.826	7.023	66.565	2.920	11.229	61.155	8.469
4	1.401	5.387	71.952	1.440	5.537	66.692	6.939
5	0.995	3.825	75.777				
6	0.890	3.424	79.201				
↓							

### 1.15 Appendix O Cronbach's Alpha

Factors	Cronbach's Alpha (covariances among items)	Cronbach's Alpha based on standardized items (correlation among items)	Items
ESN_KS	.90*	.93	3
SER_INN	.92*	.92	7
TRUST	.92*	.92	7
GOVRN	.94*	.94	9

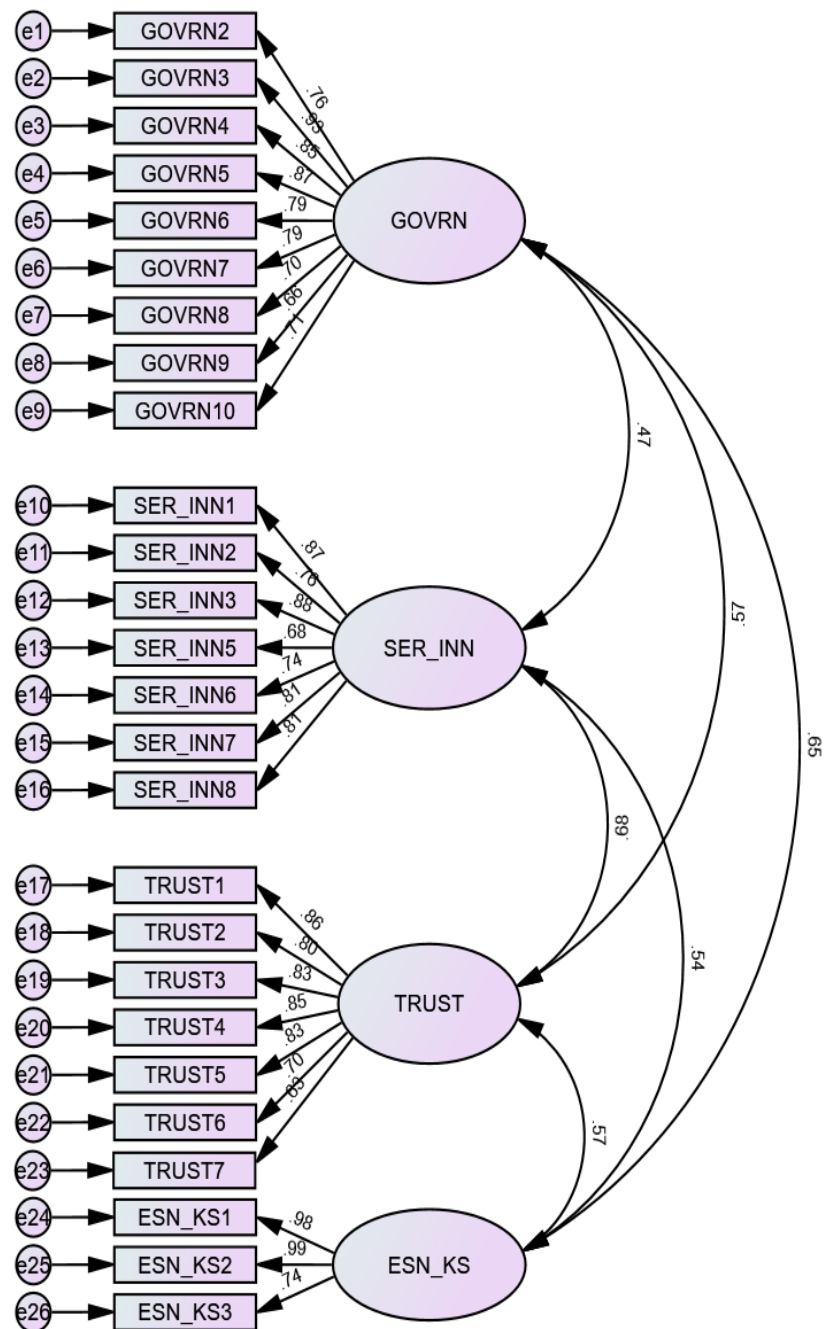
Note: \* Alpha reported in the 'Cronbach's Alpha If Item deleted'

### 1.16 Appendix P Constructs and items with mean, standard deviation, skewness and kurtosis

Construct	Items	Mean	SD	Skewness	Kurtosis
KS_ESN	KS_ESN1: In my organisation when I have learned something new, I share it with my colleagues using ESN	4.41	1.86	-0.56	-1.04
	KS_ESN2: In my organisation when my colleagues have learned something new, they share it using ESN	4.40	1.79	-0.61	-0.94
	KS_ESN3 Knowledge sharing using ESN among colleagues is considered normal in my organisation	4.75	1.59	-0.75	-0.26
SER_INN	SER_INN1: My organisation frequently tries out new ideas	5.64	1.38		
	SER_INN2: My organisation seeks out new ways to do things	5.57	1.29	-1.28	1.37
	SER_INN3: My organisation is creative in its methods of operation	5.18	1.47	-1.41	2.05
	SER_INN5: Over the last five years, my organisation has increased the rate at which it introduces new products	5.44	1.47	-1.06	0.88
	SER_INN6: The quality of products/services in my organisation is high	5.69	1.14	-1.45	1.71
	SER_INN7: The quality of products/services in my organisation is constantly increasing	5.53	1.18	-1.53	3.03
	SER_INN8: My organisation always develops novel skills for transforming old products into new ones for the customers	5.14	1.38	-1.38	2.81
TRUST	TRUST1: Employees freely express their opinions and ideas.	5.70	1.24	-1.26	1.97
	TRUST2: Employees are not afraid to express opinions which are contrary to the management's vision.	5.16	1.39	-1.04	0.89
	TRUST3: Employees willingly share their ideas with superiors.	5.74	1.17	-1.24	1.85
	TRUST4: Employees are free to talk about their difficulties with their superiors and know that they will be heard.	5.54	1.19	-1.00	0.78
	TRUST5: Superiors are trusted by employees.	5.41	1.30	-1.28	2.07
	TRUST6: Employees are willing to share their ideas with co-workers.	5.78	1.21	-1.23	1.30
	TRUST7: Employees are free to discuss their difficulties with co-workers and know that they will be heard.	5.78	1.04	-1.34	2.33
GOVRN	GOVRN2: My organisation stresses the use of ESN to systematically store documents on our products and services	4.95	1.46	-1.26	1.82
	GOVRN3 My organisation stresses the use of ESN to generate new knowledge from existing knowledge	4.61	1.48	-0.64	0.14
	GOVRN4: My organisation stresses the use of ESN for distributing knowledge throughout the organisation	4.75	1.47	-1.07	1.01

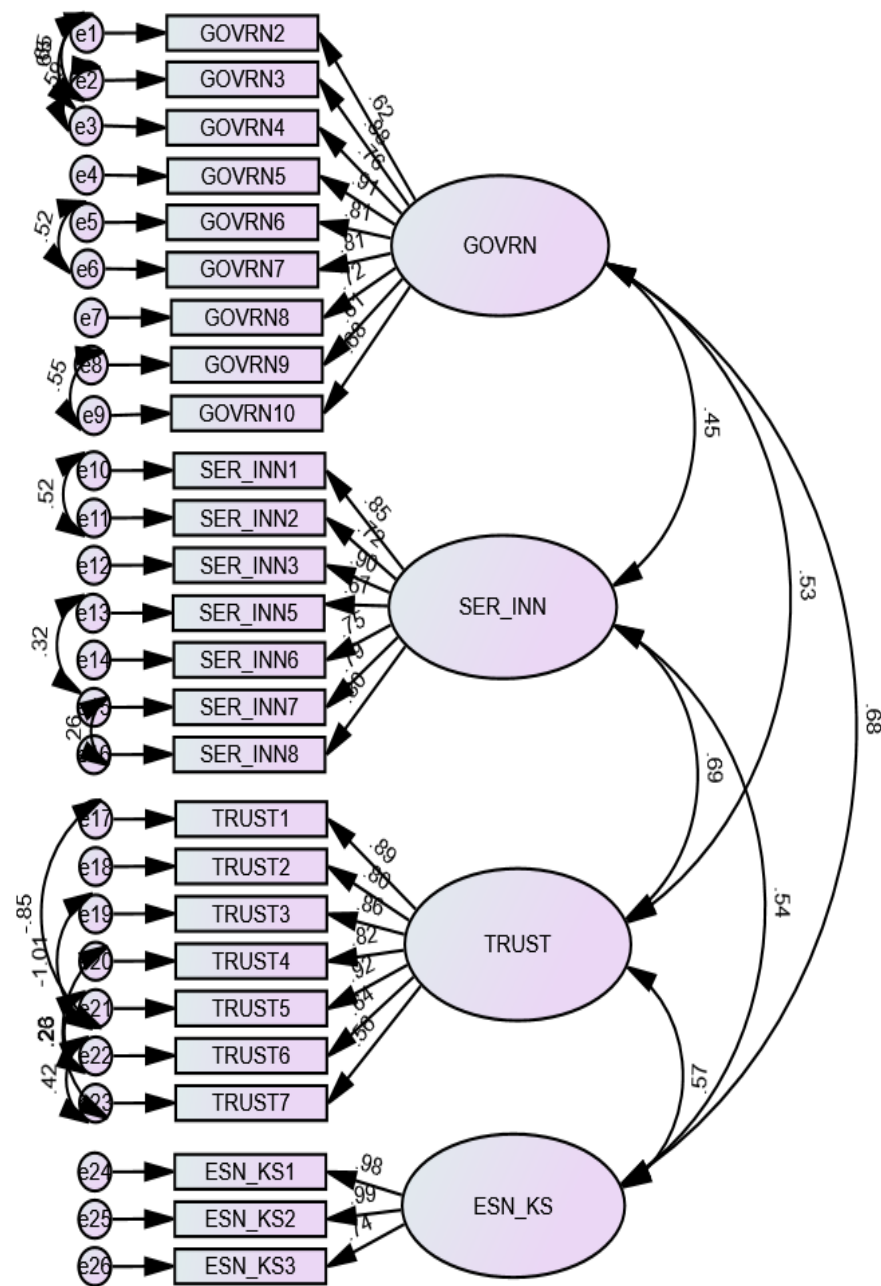
GOVRN5: My organisation encourages employees to search and share new values and thoughts through ESN	4.84	1.46	-0.83	0.04
GOVRN6: My organisation encourages employees to exchange ideas and conduct dialogues through ESN	4.91	1.37	-1.08	1.41
GOVRN7: Employees are encouraged to interact with other groups of employees through ESN	5.17	1.28	-1.12	1.34
GOVRN8: My organisation has a policy to protect business secrets so that they are not revealed via ESN	5.09	1.39	-1.16	1.37
GOVRN9: My organisation has a policy to ensure that employees do not engage in illegal activities via ESN	5.81	1.32	-1.72	3.53
GOVRN10: My organisation's guidelines state that employees should respect differences that may arise when using ESN	5.43	1.26	-0.99	1.05

## 1.17 Appendix Q CFA model 1



$\chi^2 = 727.92$ ,  
 $df = 293$ ,  $p < 0.001$   
 $\chi^2/df = 2.484$   
 $CFI = 0.827$   
 $IFI = 0.829$   
 $TLI = 0.808$   $RMSEA = 0.120$

## 1.18 Appendix R CFA model 2



$\chi^2 = 452.685$ ,  
 $df = 276$ ,  $p < 0.001$   
 $\chi^2/df = 1.640$   
 $CFI = 0.930$   
 $IFI = 0.930$   
 $TLI = 0.920$   $RMSEA = 0.080$

### 1.19 Appendix S Calculating AVE and Square root of AVE for discriminant validity

Indicator variables		Latent variables	Standardized loading	Square of standardized loadings	Sum of the Squared Standardized loading	Number of Indicators	AVE	Square root of AVE
SER_INN1	<---	SER_INN	0.853	0.728	4.314	7	0.616	0.785
SER_INN2	<---	SER_INN	0.717	0.514				
SER_INN3	<---	SER_INN	0.897	0.805				
SER_INN5	<---	SER_INN	0.665	0.442				
SER_INN6	<---	SER_INN	0.751	0.564				
SER_INN7	<---	SER_INN	0.787	0.619				
SER_INN8	<---	SER_INN	0.801	0.642				
ESN_KS1	<---	ESN_KS	0.979	0.958	2.477	3	0.826	0.909
ESN_KS2	<---	ESN_KS	0.987	0.974				
ESN_KS3	<---	ESN_KS	0.738	0.545				
TRUST1	<---	TRUST	0.890	0.792	4.416	7	0.631	0.794
TRUST2	<---	TRUST	0.796	0.634				
TRUST3	<---	TRUST	0.864	0.746				
TRUST4	<---	TRUST	0.820	0.672				
TRUST5	<---	TRUST	0.916	0.839				
TRUST6	<---	TRUST	0.643	0.413				
TRUST7	<---	TRUST	0.565	0.319				
GOVRN2	<---	GOVRN	0.625	0.391	5.228	9	0.581	0.762
GOVRN3	<---	GOVRN	0.877	0.769				
GOVRN4	<---	GOVRN	0.760	0.578				
GOVRN5	<---	GOVRN	0.908	0.824				
GOVRN6	<---	GOVRN	0.807	0.651				
GOVRN7	<---	GOVRN	0.812	0.659				
GOVRN8	<---	GOVRN	0.720	0.518				
GOVRN9	<---	GOVRN	0.608	0.370				
GOVRN10	<---	GOVRN	0.684	0.468				



## 1.20 Appendix T Assessing common method bias (using Principal Axis Factoring)

Total Variance Explained						
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.937	45.911	45.911	11.396	43.832	43.832
2	3.472	13.355	59.266			
3	1.826	7.025	66.291			
4	1.385	5.328	71.619			
5	1.078	4.146	75.765			
6	0.987	3.796	79.561			
7	0.791	3.043	82.604			
8	0.628	2.414	85.018			
9	0.494	1.902	86.920			
10	0.490	1.884	88.804			
11	0.368	1.414	90.218			
12	0.327	1.256	91.474			
13	0.292	1.123	92.597			
14	0.267	1.025	93.622			
15	0.248	0.954	94.576			
16	0.223	0.859	95.435			
17	0.194	0.745	96.179			
18	0.175	0.674	96.853			
19	0.168	0.646	97.499			
20	0.144	0.553	98.052			
21	0.139	0.535	98.587			
22	0.113	0.433	99.020			
23	0.090	0.346	99.366			
24	0.080	0.308	99.674			
25	0.062	0.240	99.914			
26	0.022	0.086	100.000			