



**A *MODEL* FOR SELF-ASSESSMENT OF SKILLS TO IDENTIFY TACIT
KNOWLEDGE STOCK AND ENABLE KNOWLEDGE TRANSFER**

A Thesis submitted by

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For the award of

Master of Business Research

2019

Abstract

The theory of Resource Based View (RBV) posits the use of internal resources for competitive advantage which is often evaluated using four questions on value (V), rarity (R), imitability (I) and organisation (O), also known as the VRIO framework. This research focuses on the organisational resource of tacit knowledge which is characterised by knowledge that is difficult to transfer. Identification and transfer of tacit knowledge stock is one of the major research problems in the knowledge management discipline. The purpose of this research is to explore whether tacit knowledge stock can be identified using self-assessment of skills to enable knowledge transfer. The research questions of this study include: RQ 1: *To what extent can self-assessment of skills help to identify tacit knowledge stock?* And, RQ 2: *What role does identifying tacit knowledge stock play in knowledge transfer?*

Using Design Science Research (DSR) methodology, an artefact is developed, implemented and evaluated to answer the research questions. The artefact is represented as a *model* that expresses the relationships between three constructs namely: (i) self-assessment of skills, (ii) tacit knowledge stock and (iii) knowledge transfer. The *model* is operationalised using a software tool based on the Skills Framework for the Information Age (SFIA). The *model* is evaluated via semi-structured interviews with twenty-one staff of the Information Technology (IT) department in a case study organisation. This research found that knowledge transfer could be enabled by the identification of tacit knowledge stock. Other enabling factors that affected tacit knowledge transfer were also identified, namely, sender's prior understanding of the receivers' tacit knowledge stock, sender's willingness to transfer knowledge, person-organisation fit, similar knowledge area, organisational culture and self-awareness of tacit knowledge stock. This research argues that the self-assessment of skills is a useful method of identifying tacit knowledge stock. Majority of the research participants found that the self-assessment of skills was effective for identifying tacit knowledge stock at an individual level as compared to an organisational level.

The major contribution of this research is the development of the *model* that can be used to facilitate tacit knowledge transfer based on self-assessment of skills. This *model* extends the literature of the knowledge management discipline by explaining the relationship between tacit knowledge stock and transfer based on self-assessment of skills. The evaluation of the *model* confirms its practical application in knowledge-intensive organisations that intend to understand tacit knowledge stock in order to facilitate tacit knowledge transfer.

Certification of Thesis

This Thesis is entirely the work of Ms. Aastha Pant except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Principal Supervisor: Dr. Mustafa Ally

Associate Supervisor: Dr. Anup Shrestha

Associate Supervisor: Dr. Eric Kong

Student and supervisors signatures of endorsement are held at the University.

Acknowledgements

I want to thank a few people without whom this thesis might not have been written, and to whom I am greatly indebted.

Firstly, I want to express my deep sense of thanks and gratitude to one of my associate supervisors Dr. Anup Shrestha for his patience, motivation and tremendous support throughout my research journey. The door was always open for me whenever I ran into a trouble spot or had a question about my research or writing. I would also like to thank my other supervisors Dr. Mustafa Ally (Principal Supervisor) and Dr. Eric Kong (Associate Supervisor) for their help, encouragement and valuable guidance to complete my thesis. Many thanks to Miss Penelope Muller for her assistance in proof reading my thesis.

Further, I thank Mr. Paul Collins, CEO of SkillsTx Pty. Ltd for his input in providing the digital skills assessment platform for the research artefact. I also thank all the case study participants at Company X for their invaluable time to share their experiences and thoughts about the research artefact. A special mention to Mr. Ashley Lourey, Architecture and Strategy Manager of Company X for helping me with the data collection process at the case study site.

Special thanks to my parents, Mr. Rabindra Pant and Mrs. Reema Pant for the true value of love they showered on me from my early life. I am also indebted to my cousin sister Dr. Barsha Poudel and brother-in-law Mr. Bahadur Baniya for their constant care, help, and moral support. I owe much to them for where I stand today.

Statement of Contribution

During the course of this research, a number of peer reviewed conference papers were published. The publication list follows next.

- **Article I:** Pant, A, Shrestha, A, Kong, E, & Ally, M 2018, 'A systematic literature mapping to investigate the role of IT in knowledge stock and transfer', in *22nd Pacific Asia Conference on Information Systems (PACIS)*, Japan, pp.1-8. Available at SSRN: <https://eprints.usq.edu.au/34656/1/PACIS_2018_paper_400.pdf >
- **Article II:** Pant, A, Shrestha, A, Kong, E, & Ally, M 2018, 'Facilitating knowledge transfer based on a resource-based view of tacit knowledge stock: a skills assessment perspective', in *Australasian Conference on Information Systems (ACIS)*, Australia, pp.1-10. Available at SSRN: <http://www.acis2018.org/wp-content/uploads/2018/11/ACIS2018_paper_133.pdf >

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List of Abbreviations

Abbreviation	Full Form
ACIS	Australasian Conference on Information Systems
AIS	Association of Information Systems
DSR	Design Science Research
EJIS	European Journal of Information Systems
ICT	Information and Communication Technology
IS	Information Systems
ISJ	Information Systems Journal
ISR	Information Systems Research
IT	Information Technology
JAIS	Journal of the Association of Information Systems
JIT	Journal of Information Technology
JMIS	Journal of Management Information Systems
JSIS	Journal of Strategic Information Systems
KBT	Knowledge Based Theory
KIBS	Knowledge Intensive Business Service
MISQ	Management Information Systems Quarterly
PACIS	Pacific Asia Conference on Information Systems
P-O	Person-Organisation Fit
RBV	Resource Based View
RQ	Research Question
SFIA	Skills Framework for the Information Age
UK	The United Kingdom

USA	The United States of America
USQ	University of Southern Queensland
VRIO	Valuable, Rare, Imitability, Organisation

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Chapter 1 Introduction

1.1 Chapter Introduction

This research describes the role of tacit knowledge stock identification of organisational members based on self-assessment of skills in knowledge transfer. Using a Design Science Research (DSR) methodology, a research artefact (represented as a *model*) was developed, implemented and evaluated in a case study organisation. The *model* was developed and implemented in a case study organisation to identify the tacit knowledge stock of the Information Technology (IT) staff based on self-assessment of skills. Then, the *model* was evaluated using semi-structured interviews to explore the extent to which self-assessment of skills helps in tacit knowledge identification and obtain the perceived views on the role of tacit knowledge stock identification in knowledge transfer. The *model* was operationalised using a tool based on the Skills Framework for the Information Age (SFIA). This research was conducted at an Australian financial institution. To comply with the ethics guidelines set by the Human Ethics Committee of the University of Southern Queensland (USQ), the name of the institution was changed, and the research participants' names were omitted in order to protect their confidentiality. Accordingly, 'P1' represented Participant 1, and so forth, and the numerical order was not indicative of interview chronology. *Figure 1.1* presents an overview of *Chapter 1*.

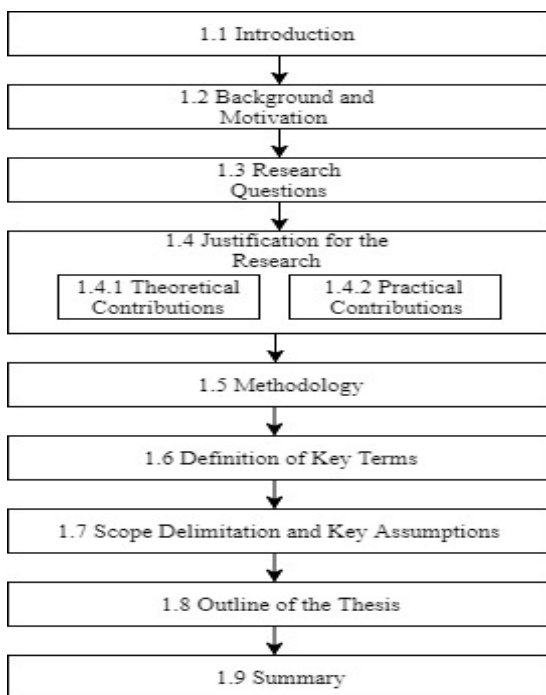


Figure 1.1 Chapter 1 Overview

Section 1.2 provides background information about tacit knowledge stock and transfer, highlighting the importance of tacit knowledge stock identification in knowledge transfer. The research issues and associated research questions are mentioned in *Section 1.3*, followed by the justification and research contributions in *Section 1.4*. The research methodology is outlined in *Section 1.5*. A case study approach was used for implementing the research artefact (*model*). The key terms used in this research are defined in *Section 1.6*. Finally, the scope of the research along with key assumptions are mentioned in *Section 1.7*, followed by an outline of the thesis in *Section 1.8*. The conclusion, including a summary of this chapter is detailed in *Section 1.9*.

1.2 Background and Motivation

This section presents detailed background information about the research context. The Resource Based View (RBV) theory by Barney (1991) states that organisations must use their internal resources to gain competitive advantage. The uniqueness of the resources means that organisations are able to be competitive (Barney 1991; Conner 1991). Built on the RBV, the Knowledge Based Theory of the firm (KBT) mentions that ‘knowledge’ is an important, intangible resource of an organisation which helps it to achieve sustainable growth (Grant 1996). Based on the RBV, Barney (1991) developed the VRIO framework, which is an acronym for ‘Valuable (V)’, ‘Rare (R)’, ‘Imitability (I)’ and ‘Organisation (O)’. VRIO states that a firm’s resources must be valuable, rare, difficult to imitate, and properly organised to obtain maximum advantage.

Due to the increasing importance of knowledge, knowledge management becomes an area that plays a vital role in strategic management and organisational innovativeness (Nonaka & Takeuchi 1995). At an individual level, knowledge stock refers to the information possessed in the mind of a person which may or may not be unique and useful (Alavi & Leidner 2001). It is a set of justified beliefs which increases the ability of a person to perform any task (Huber 1991; Nonaka 1994). Nonaka (1994) mentioned two types of knowledge, namely: ‘tacit knowledge’ and ‘explicit knowledge’. Tacit knowledge refers to knowledge which is difficult to codify and articulate, whereas explicit knowledge refers to knowledge which can be expressed using symbols or languages. Past studies have found that tacit knowledge stock is difficult to identify and transfer as compared to explicit knowledge stock (Sveiby 1997; Gertler 2003; Lai 2005). Therefore, the literature review of relevant articles highlights a research problem in the area of knowledge management, which is stated below:

Tacit knowledge stock is difficult to identify and transfer.

Linking the concept of RBV and KBT with the VRIO framework, it can be argued that tacit knowledge stock, which is an important intangible resource of an organisation, is valuable, rare, difficult to imitate, and must be utilised properly to maximise the advantage obtained from it. The literature review of the VRIO framework has found that there is limited research that discusses the relationship between a firm's organisation of resources ('O') and its performance (Wiklund & Shepherd 2003; Cardeal & Antonio 2012). Therefore, to fulfil this research gap, this study focuses on using 'tacit knowledge stock' as an important organisational resource and explores whether the proper utilisation and management of tacit knowledge stock helps in enhancing an organisation's performance.

At an organisational level, knowledge management is defined as the process of determining and using the collective knowledge of an organisation to obtain competitive advantage (Von Krogh 1998). There are four aspects of knowledge management, which include knowledge creation, knowledge storage/retrieval, knowledge transfer, and knowledge application (Holzner & Marx 1979). *Figure 1.2* shows the four aspects of knowledge management.

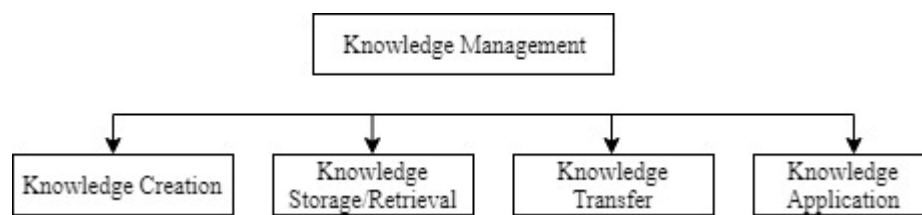


Figure 1.2 Four Aspects of Knowledge Management

All four aspects of knowledge management are equally important, however the focus of this study is on knowledge transfer within an organisation. Knowledge transfer is one of the important requirements for organisational growth (Argote & Ingram 2000). For example, to address customer requirements, organisations are focusing on improving knowledge transfer among their staff (Argote et al. 1990; Beckman 1997; Ranucci & Souder 2015). Several studies have been conducted to explore the factors that enhance tacit knowledge transfer in organisations (Chugh 2015; Ranucci & Souder 2015). For example, previous research suggests that the success of knowledge transfer in organisations is dependent on factors such as the similar knowledge bases of individuals, the extent of interactions among people, the motivation of the source and target, the absorptive capacity, and the extent to which they have identified the tacit knowledge stock of their staff (Gupta & Govindarajan 2000). The importance of identifying tacit knowledge stock in enabling knowledge transfer has been mentioned, but there is limited empirical research that explores its application (Power & Cormican 2015). To

address this gap, this research study focuses on identifying the tacit knowledge stock of organisational members to determine whether it facilitates knowledge transfer.

RBV considers firms' internal resources to be important factors in enhancing organisational competitiveness, whereas KBT considers knowledge (tacit and explicit) to be an important intangible resource in assuring a firm's superior performance. It is vital that every organisation identifies the tacit knowledge stock of its staff, as this assists in enabling knowledge transfer in an organisation (Gupta & Govindarajan 2000). For example, an IT professional may be under-skilled for some jobs and over-skilled for others. Identification of the current skill set of the IT professional will enable him or her to acquire or share his or her knowledge as needed. According to research conducted by Stasser et al. (1995), group performance was improved when group members were aware of the skills of their colleagues. Likewise, job performance was enhanced when an organisation had developed awareness of its employees' skills (Wegner 1987; Hemani & Rashidi 2016). Assessing current skills is one of the important methods of identifying the tacit knowledge stock of organisational members (Bartram 2004). There is evidence of an increase in the use of skills assessment in identifying the competency levels of staff in organisations (Shippmann et al. 2000). Skills assessment software can determine the knowledge capabilities of organisational staff (Grant 1996). Organisations perform skills assessments to measure the capabilities and potential of their staff (Bartram 2004; Nelson & Sidney 2005). There are multiple ways of identifying the tacit knowledge stock of staff in organisations. These include accessing previous projects of staff, interviewing, checking profiles, analysing existing documents produced by staff, and analysing relationships between employees (Newk-Fon Hey Tow et al. 2012). These methods mainly involve staff assessment. Besides, an evaluator's judgement on skills assessment may not be accurate or comprehensive, as tacit knowledge is difficult to codify (Mitri 2003). Limited research has been done to examine the self-assessment of skills as an effective method of tacit knowledge stock identification for enabling knowledge transfer (Shrestha et al. 2017). Therefore, to fill this gap, the focus of this study was to identify the tacit knowledge stock of IT professionals in a case study organisation. This was based on a *self-assessment of skills*, with the aim of enabling knowledge transfer.

Based on the following research problem: It is difficult to identify and transfer tacit knowledge stock, two research questions were developed, which are mentioned in the next section.

1.3 Research Questions

In view of the above, the objectives of this research are twofold:

- a) To explore if the self-assessment of skills helps to identify tacit knowledge stock.
- b) To identify the role of tacit knowledge stock identification in knowledge transfer.

To address these research questions, it is essential to identify the tacit knowledge stock of organisational members based on self-assessment of skills and explore whether this helps in knowledge transfer. Using a DSR methodology, a research artefact that has been represented as a *model*, is developed, implemented and evaluated within a case study organisation. This will be referred to as the '*Self-Assessment of Skills Model*'. In DSR, an 'artefact' refers to an object or process that is developed to solve a research problem. Artefacts can include methods, constructs, models, architecture, design principles, design theories, instantiations, or frameworks (Vaishnavi & Kuechler 2004). A model is defined as a set of statements or propositions that express relationships among constructs (Vaishnavi & Kuechler 2004). The constructs in the *model* include (i) self-assessment of skills, (ii) tacit knowledge stock and (iii) knowledge transfer. For the implementation process, the *model* is operationalised using a software tool based on SFIA. It is a tool for self-assessment of skills that is used to identify the tacit knowledge stock of IT professionals. Following this, a semi-structured interview is conducted for the evaluation of the *model*. The evaluation of the *model* is done in two phases. In the first phase, the IT professionals are asked about their experiences of using the self-assessment of skills method to identify their tacit knowledge stock. In the second phase, IT professionals' perception of the role of tacit knowledge stock identification in enabling knowledge transfer is obtained. In this way, the *model* is evaluated as a whole to fulfil research objectives. Following the research objectives, the overarching research questions (RQs) for this study are:

(RQ 1): *To what extent can self-assessment of skills help to identify tacit knowledge stock?*

(RQ 2): *What role does identifying tacit knowledge stock play in knowledge transfer?*

1.4 Justification for the Research

Past research has shown that it is important for organisations to identify the tacit knowledge stock of their staff. For example, research conducted by Cranfield University in 1998 showed that while most managers were aware of the existence of the required knowledge in their organisations, managers had difficulty in identifying and maintaining the tacit knowledge stock of their staff (Cranfield 1998). In such instances, organisations were presented with challenges

in identifying the tacit knowledge stock of their staff. The first research question (*RQ 1*) will be revisited at appropriate points during the implementation and evaluation of the *model* within a case study organisation, which is operationalised by a software tool based on the SFIA.

(RQ 1) *To what extent can self-assessment of skills help to identify tacit knowledge stock?*

One of the key determinants of effective tacit knowledge transfer is the communication between employees in an organisation (Power & Cormican 2015). The issues faced by employees within an organisation arising from the unfamiliarity of their own and others' tacit knowledge stock has not been adequately addressed in past research. Employees may not be aware of the tacit knowledge stock that they can share with their colleagues. It is therefore important to determine their tacit knowledge stock before exploring methods for the transfer of this knowledge. Knowledge transfer becomes easier when the sender and receiver are aware of each other's tacit knowledge stock (Zhao et al. 2015). This study does not focus on exploring different knowledge transfer methods to manage tacit knowledge stock among professionals, but focuses on developing, implementing and evaluating a *model* for knowledge transfer based on identifying tacit knowledge stock. This may provide answers to the second research question: **(RQ 2)** *What role does identifying tacit knowledge stock play in knowledge transfer?*

1.4.1 Theoretical Contributions

This research is expected to contribute to the current academic literature by addressing the current gap in the knowledge management area within the knowledge transfer aspect. The study explains the process of tacit knowledge stock identification to facilitate knowledge transfer. Further, this study uses a method that involves self-assessment of skills to identify the tacit knowledge stock of organisational staff, which is an under-researched method (Shrestha et al. 2017). A major contribution of the research is the development of a *model* for self-assessment of skills to enable tacit knowledge transfer based on the DSR methodology.

1.4.2 Practical Contributions

As organisations are increasingly appreciating the importance of knowledge management, this research study contributes to the existing body of work by exploring whether tacit knowledge stock identification based on self-assessment of skills facilitates knowledge transfer. The development of the *model* using a DSR methodology and its implementation provides organisations with a new approach to identify the tacit knowledge stock of their employees. A self-assessment of skills software tool based on SFIA was used to operationalise the *model*, which helped the IT professionals to self-assess their skills and competency levels. It is

postulated that this will enable effective and efficient tacit knowledge transfer within the organisation. Moreover, the self-assessment of skills may benefit the IT professionals at an individual level, as it helps them to visualise (identify) their skills gaps and systematically plan their careers.

1.5 Methodology

This section gives a brief overview of the methodology used in this research. A DSR methodology is used in this research to address the research problem. A DSR methodology involves the development and application of knowledge to design effective artefacts for solving the research problem (Kuechler & Vaishnavi 2008). This methodology is used to develop a research artefact (represented as a *Self-Assessment of Skills Model*), implement it in a case study organisation, and evaluate its utility to address the research problem. Detailed information about this methodology is provided in *Chapter 3*.

To solve the research problem, the tacit knowledge stock of a group of organisational members is identified and its role in facilitating knowledge transfer is explored. For this, it is essential to examine organisational members' perceptions of the utility of the *model* after identifying their tacit knowledge stock. Therefore, based on the DSR methodology, a *model* for self-assessment of skills to enable tacit knowledge transfer is developed to show the relationship between three constructs, including (i) self-assessment of skills, (ii) tacit knowledge stock and (iii) knowledge transfer. The *model* is operationalised using a software tool based on the SFIA. Finally, the *model* is evaluated using semi-structured interviews to obtain the perceived views of the role of tacit knowledge stock identification based on self-assessment of skills in enabling knowledge transfer.

Semi-structured interviews are best suited to this research, since the study examines IT professionals' perceptions of the '*Self-Assessment of Skills Model*' to enable tacit knowledge transfer. The main objective of this study is to explore the role of tacit knowledge stock identification in enabling knowledge transfer, which is based on the perceived views of the participants. A case study approach is used to implement and evaluate the *model*. This is an exploratory research following the 'critical realistic' research philosophy.

1.6 Definition of Key Terms

There is often a lack of uniformity in the definitions adopted by researchers. Therefore, to provide better understanding of the concepts and terminologies, this section defines all the key and controversial terminologies used throughout this research (Perry 1995). Furthermore, the

literature review chapter critically discusses all of these terms. In this study, the following definitions relate to the key terms that have been used:

Knowledge Management – Knowledge management refers to a process of identifying the collective set of knowledge in an organisation to enhance innovativeness and responsiveness (Hackbarth 1998; Von Krogh 1998).

Tacit Knowledge Stock – Tacit Knowledge stock refers to the knowledge stock possessed in the mind of a person that is difficult for the person to articulate (Polanyi 2009).

Tacit Knowledge Transfer – Tacit knowledge transfer refers to the flow of tacit knowledge through individuals, groups and organisations after it is created (Nonaka 1994).

Self-assessment of Skills – Self-assessment of skills refers to the process of self-identification of potential skills and competencies to explore a person's own capabilities in performing various activities (Patterson et al. 2001).

Skills Framework for the Information Age (SFIA) – SFIA is a popular and well-established framework which helps to identify the digital skills and competencies of IT professionals (SFIA 2018).

Artefact- In Design Science Research (DSR), an artefact refers to an object or process that is developed to solve a research problem. Artefacts can include constructs, models, design theories, design principles, architecture, methods, instantiations, or frameworks (Vaishnavi & Kuechler 2004).

Model- A model is a set of statements or propositions that expresses relationships among constructs (Vaishnavi & Kuechler 2004).

Digital Transformation- A process involving the integration of digital technologies and their operations in organisations to achieve business goals and opportunities (Matt et al. 2015).

1.7 Scope Delimitations and Key Assumptions

The previous section provided the definitions of the key terms which have been used throughout the thesis. The key assumptions and scope delimitations for this research are also discussed in this section.

This research has some limitations in terms of time, locations and participants involved in the research. For the implementation of the *model*, the software tool based on SFIA has been operationalised in only one case study site in Queensland, Australia over a time period of one

year. The participants involved in the research are solely the IT staff of the Australian financial institution (represented as ‘Company X’ in this research), who possessed digital skills. Among various methods of identifying tacit knowledge stock (Bartram 2004), this research focused on using a method that involved self-assessment of skills, because it is an important and under-used method for identifying tacit knowledge stock (Shrestha et al. 2017).

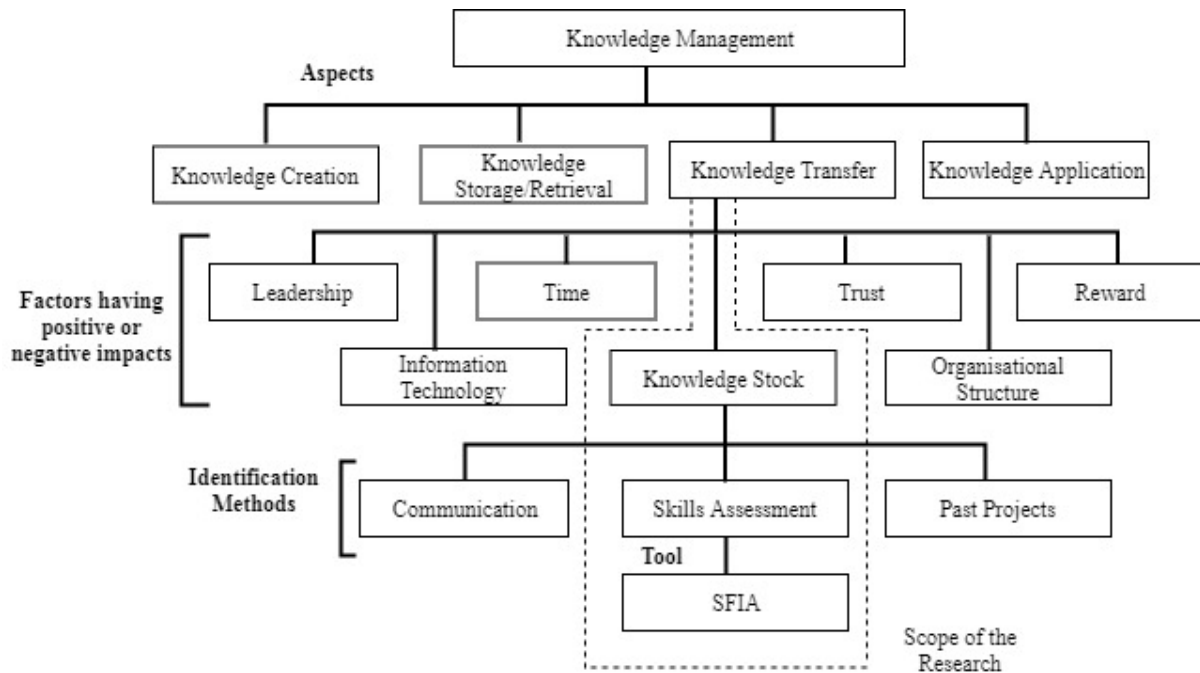


Figure 1.3 Scope of the Research

Figure 1.3 illustrates the scope of the research. The four aspects of Knowledge Management, namely Knowledge Creation, Knowledge Storage/Retrieval, Knowledge Transfer and Knowledge Application were initially discussed by Holzner and Marx (1979) and Pentland (1995). Knowledge Transfer is the area of this research. There have been studies conducted to identify the factors affecting knowledge transfer (Paulin & Suneson 2012; Ahammad et al. 2016). Different research introduced various factors. The most common factors are mentioned in Figure 1.3. Gupta and Govindarajan (2000) introduced five factors, namely the similar knowledge bases of individuals, the extent of interactions among people, the motivation of the source and target, the absorptive capacity, and the identification of the tacit knowledge stock of staff. Tacit knowledge stock identification was seen as one of the most important factors. Research by Ismail Al-Alawi et al. (2007) proposed that organisational structure, information technology, rewards, and trust have a great influence on knowledge transfer. Similarly, leadership and lack of time are the factors affecting knowledge transfer in organisations (Lee & Ahn 2007). Of these factors, this research focuses on identifying tacit knowledge stock,

which includes several methods such as making communication (interviewing), accessing past projects, and skills assessment (Bartram 2004). Of these methods, this study focuses on identifying tacit knowledge stock using self-assessment of skills, because this is a valuable and under-used method of tacit knowledge identification (Shrestha et al. 2017).

1.8 Outline of the Thesis

The outline of the thesis is based on the structure suggested by Perry (1998). The thesis contains six chapters.

Chapter 1: Introduction

Chapter one provides background to the research. It provides a broad overview of the area of tacit knowledge stock and transfer in organisations, and identifies the existing problem, resulting in the research problem statements. The research questions are stated in this chapter. A brief discussion of the research methodology, theoretical and practical contributions, definitions of key terms and scope of the research are also provided.

Chapter 2: Literature Review

Chapter two provides a discussion of the relevant prior literature and highlights the literature gaps in the area of tacit knowledge stock and transfer. A summary of literature on tacit knowledge stock, tacit knowledge transfer and skills assessment are provided and the research questions are justified based on the literature gaps. This chapter also presents the discussion of the parent theories of tacit knowledge stock and transfer and designs a research conceptual model based on the literature review.

Chapter 3: Research Methodology

This chapter provides details about the DSR methodology used in this research. More specifically, this chapter discusses the research design, philosophy and method that were used for data collection and analysis. The ethical considerations of the research are also discussed in this chapter.

Chapter 4: Artefact Development, Implementation and Evaluation

This chapter presents a detailed explanation of how the artefact (represented as a *model*) was developed, implemented and evaluated at Company X. This chapter also presents the results and findings obtained from the implementation and evaluation of the *model*. The findings are presented and explained based on the context of the research methodologies and literature reviewed.

Chapter 5: Discussion

This chapter discusses the findings obtained from the data collection. Each research question is discussed clearly based on the results obtained. Various themes that were generated through interviews are presented in detail.

Chapter 6: Conclusion

This chapter provides summary of the research findings and explains how the research problems have been addressed. It discusses the theoretical and practical contributions of the study and the limitations associated with it. Directions for future research and recommendations are also briefly described in this chapter.

1.9 Summary

This chapter briefly explained the research background and developed important grounds for conducting the research. It further defined the research problem and research questions and justified them clearly. The methodologies adopted for conducting the research were briefly explained. Moreover, this chapter provided an outline of the thesis which is followed by the definitions of key terms used in the thesis. The literature review and the methods applied in the research are explained in detail in the following chapters. Along with this, a clear description of the data analysis, research findings, conclusion and research implications are provided in the following chapters.

Chapter 2 Literature Review

2.1 Introduction

Chapter 1 states the research problem: *Tacit knowledge stock is difficult to identify and transfer*. This chapter provides a review of the relevant existing literature to develop a theoretical foundation and justification of the research problem. The main purpose of this chapter is to identify the research opportunities which have not been addressed by previous researchers in the area of tacit knowledge stock and transfer. *Figure 2.1* presents an overview of this chapter.

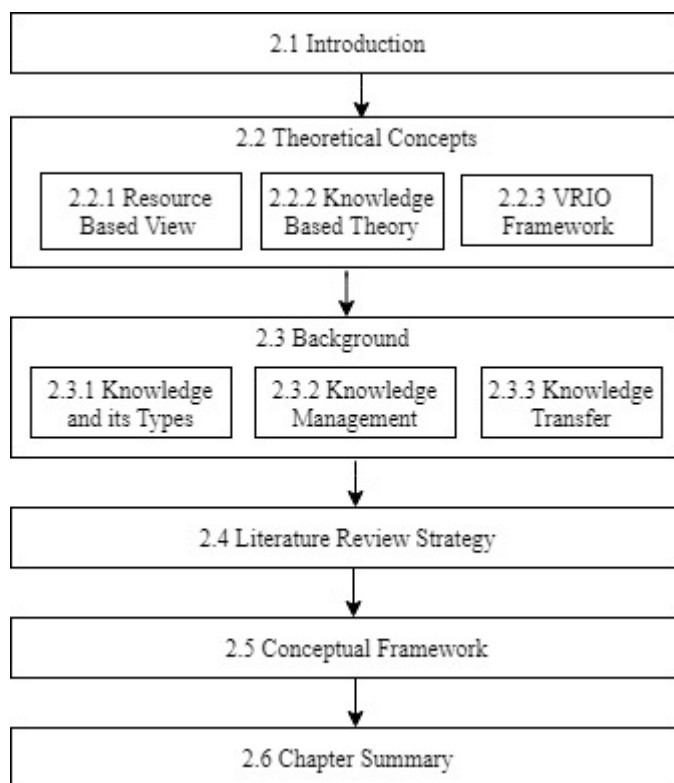


Figure 2.1 Chapter 2 Overview

This chapter has six sections. *Section 2.2* presents a description of the relevant theories and frameworks underpinning the area of tacit knowledge stock and transfer followed by a discussion of the concepts of knowledge types, knowledge management, and knowledge transfer in *Section 2.3*. In *Section 2.4*, the literature review strategy used in the study is presented in detail. This section defines all the steps used in a literature mapping of the study, and provides a clear explanation of each step, followed by a conceptual framework in *Section 2.5*. Finally, *Section 2.6* presents an overall summary of the chapter.

2.2 Theoretical Concepts

Figure 2.2 illustrates an overview of the theories and frameworks which are used in this study to address and justify the research questions. The theories and frameworks used in Information Systems (IS) case studies can play various roles, and provide initial guidance for designing and collecting data (Walsham 1995).

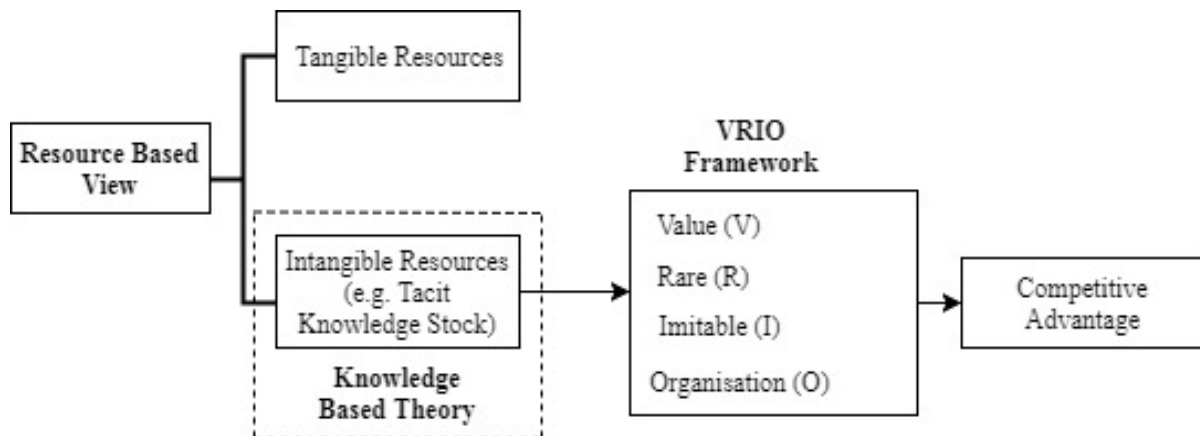


Figure 2.2 Overview of Theories and Framework

2.2.1 Resource Based View (RBV)

One of the widely used theoretical frameworks in the field of Information Management and other areas of management is Resource Based View (RBV) (Barney 1991). RBV states that it is very important for an organisation to utilise its core competencies as they increase organisational competitiveness. This theory is deeply rooted in the management strategy literature and claims that organisations are able to compete with each other due to their “unique” resources (Barney 1991; Conner 1991).

Based on the theory of RBV, firms are packages of both internal and external resources (Barney 1991). Organisations must consider using their internal resources first rather than focusing on seeking external opportunities, as organisations usually have greater control over their internal resources (Barney 1991). Thus, organisations must invest managerial effort in organisational learning to create, nurture and maintain their key resources (Barney 1991; Mills et al. 2003). Organisations are able to grow if their key resources are utilised properly. RBV argues that not all organisational resources have equal value and importance, nor can they provide the same level of benefits and competitive advantage (Wernerfelt 1984). The extent of imitation and substitution of any resource determines the sustainability of any competitive advantage (Barney 1991).

Internal resources of an organisation are given the highest priority by RBV, which promotes a resource-based model. According to the model, there are two types of resources: (i) tangible resources such as physical assets of an organisation (e.g. machines, plant) and (ii) intangible resources, such as brand reputation, skills, experiences and competencies (Wernerfelt 1984). The RBV considers knowledge as a generic source for sustainable organisational benefits, but fails to recognise the various types of knowledge-based abilities such as acknowledging the importance of human resources, competencies, and intellectual capital for development (Marrone 2010). Particularly in service organisations, sustainable development can be achieved through the continuous process of knowledge creation (Nonaka 1994).

2.2.2 Knowledge Based Theory (KBT)

Knowledge Based Theory (KBT) is built on the RBV of a firm, and considers 'knowledge' to be an important internal resource of a firm (Grant 1996). While RBV talks about the importance of a firm's internal resources as a whole; KBT focuses on arguing the importance of 'knowledge' for a firm's competitive advantage. KBT supports the argument that knowledge, particularly tacit knowledge, is difficult to copy, socially complex, and its transfer between people is slow and uncertain (Kogut & Zander 1992). This makes it the major determinant of the superior performance of an organisation. It assumes that knowledge resources are heterogeneous in nature, and immobile unless transferred. The term 'heterogeneous' means that an organisation's tacit knowledge stock varies from one organisation to another. The term 'immobile' means that those properties cannot move from one organisation to another without one's efforts in transferring them (Grant 1996). Based on the 'tacit knowledge stock as a resource' view, it is clear that the skills and knowledge of organisational staff are critical factors for organisational growth (Tzabbar et al. 2008).

2.2.3 VRIO Framework

Barney (1991) is considered to be the first scholar to create a theoretical tool which is an explanatory of RBV (Newbert 2008). Barney (1991) mentioned that a firm's sustainable competitive advantage can be obtained when a resource is valuable, rare, inimitable and non-substitutable (VRIN). Contrasting with VRIN, Peteraf and Barney (2003) argued that a firm's competitive advantage can be obtained if the critical resources are used in a superior way. Firms cannot benefit from the VRIN resources if they are managed by unskilled people (Katkalo et al. 2010). The VRIO framework was later developed by Barney (1991), and states that in order to enhance organisational growth, the resources must not only be valuable, rare, and costly to imitate, but the organisation should also utilise the resources effectively. VRIO

considers that a firm's internal organisation of the resources result in the accomplishment of competitive advantage (Barney 1995; Busenitz & Barney 1997). The VRIN Framework focuses on the integration of a firm's resources, whereas the VRIO framework focuses on the functionality and usefulness of the resources. For example, the VRIN framework mentions that a resource (e.g. tacit knowledge stock) must be non-substitutable by any other resources, whereas the VRIO framework mentions that the resource must be well-organised and properly utilised to obtain competitive advantage in a firm.

However, the unit of analysis for both frameworks is the 'resource' which is based on the concept of RBV (Barney 1991). Therefore, it can be argued that RBV explains the conditions under which a firm's specific resources help to obtain competitive advantage (Barney 1991), whereas the VRIO is a framework based on RBV which helps to understand *which* resources are valuable, rare, difficult to imitate, and how they can substantially be managed by the firm (Barney & Hesterly 2006). Based on the concept of dynamic capabilities, Eisenhardt and Martin (2000) argue that organisational strategy and processes are as important as organisational resources, because they enable resources manipulation to enhance an organisation's performance. The main focus of the empirical studies were on the direct connection between resource configurations and organisational performances, whereas there is limited attention towards effective utilisation of resources (Armstrong & Shimizu 2007).

When the concept of RBV (organisation's internal resources must be utilised to gain competitive advantage) and KBT ('knowledge' is an important resource of a firm), with the concept of VRIO framework (a firm's resources must be valuable, rare, costly to imitate, and well-organised) is linked together, it is known that knowledge can potentially be considered an essential resource of a firm which is valuable (V), rare (R), costly to imitate (I) and must be properly organised (O) in order to offer maximum competitive advantage for the firm.

There are two types of knowledge, namely tacit (possessed in mind of a person and difficult to imitate) and explicit (knowledge that is documented or in a written form, and is easily imitated) (Polanyi 1962; Nonaka 1994). Among these two types, tacit knowledge is considered more valuable, rare, and difficult to imitate as compared to explicit knowledge (Polanyi 1962; Nonaka 1994). Reviewing past studies, it is known that there is a limited focus on the interrelationship between a firm's organisation ('O') and its resources ('VRI') to explain its performance, even if the positive impact of effective utilisation of the firm's resources has been established (Cockburn et al. 2000; Wiklund & Shepherd 2003; Cardeal & Antonio 2012). Therefore, to fulfil this research gap, this study focuses on using the firm's tacit knowledge stock as a resource to explore whether it's proper organisation and utilisation helps in

enhancing a firm's performance. Detailed information about knowledge types is provided in *Section 2.3.1*.

2.3 Background

2.3.1 Knowledge and its Types

Davenport and Prusak (1998) have drawn a classification between data, information and knowledge where data is a set of discrete and objective facts about incidents. Data is defined as symbols representing characteristics of objects and events (Ackoff 1989). For example, the number '100' represents data, as it doesn't have a relation to any other things. Likewise, information refers to the processed data that may or may not be useful, and provides answers to "who", "what", "where" and "when" questions (Bellinger et al. 2004). Information brings changes to the way a receiver perceives something and influences his or her judgment and perspectives on it (Davenport & Prusak 1998). Information is intended to provide shape to the receiver's perceptions to make some differences in his or her insights. For example, if a person says "100 km per hour is the speed limit", this is referred to as information.

Knowledge is defined as the use of data and information to answer "how" questions (Ackoff 1989; Bellinger et al. 2004). For example, if a person says, "You have to reduce your speed limit to 100 km per hour if you are driving over that speed", then it is considered knowledge, because it provides awareness or familiarity gained through experience or education (Zagzebski 2017). Knowledge belongs to the group of slowly expanding corporate assets, such as management systems, customer information, corporate identities and reputation (Pascarella 1997). The term 'knowledge' also refers to a justified belief that expands the abilities of a person to perform their activities effectively (Huber 1991; Nonaka 1994).

There are two types of knowledge including 'tacit' and 'explicit' (Nonaka 1994; Polanyi 2009). In simple words, tacit knowledge is knowledge that is difficult to articulate and is not explicated yet (Polanyi 2009). It refers to a composition of cognitive and technical elements, and consists of mental models, perceptions, values, insights and assumptions (Spender 1996). The technical elements comprise skills and ideas which are demonstrated when a person masters a specific knowledge body in a specific area. The cognitive elements include the implicit mental models, views and thoughts of a person which are taken for granted by the person (Nonaka 1994). For example, the skills and abilities needed to master a musical instrument cannot be fully expressed in words, hence this is tacit knowledge. Polanyi (1962) describes tacit knowledge as knowledge, which is more than what we can tell, or the process of knowing how to perform actions without thinking about them. For example, knowing how to ride a bicycle is tacit

knowledge. It is a highly personal and subjective knowledge form that is informal in nature (Wagner & Sternberg 1991). Tacit knowledge tends to be local, and cannot be found in manuals, books, or databases (Wagner & Sternberg 1991). Various metaphors, analogies, demonstrations and stories are used by people to express their tacit knowledge (Sternberg 1997).

On the other hand, explicit knowledge refers to knowledge which can be expressed and transferred in symbolic forms or using simple language (Alavi & Leidner 2001). It can be articulated and captured in the form of text, tables and images. It is defined as technical or academic data that is explained in formal language, such as in manuals, or as mathematical terms, expression and copyright (Smith 2001). This type of knowledge can be communicated and shared via print, and through other electronic and formal methods. Explicit knowledge is technical in nature and requires a high level of academic knowledge to understand (Smith 2001). An example of explicit knowledge is an owner’s manual of a product that explains how to operate it, where the knowledge is presented in codified form. *Table 2.1* provides a clear illustration of the differences between tacit and explicit knowledge.

Tacit knowledge	Explicit knowledge
<ul style="list-style-type: none"> • Personal and context specific • Experiential • Difficult to document and communicate • Examples: hands-on skills; special know-how; employee experiences 	<ul style="list-style-type: none"> • Formal • Coded • Easy to document, transfer and reproduce • Examples: online tutorials; policy and procedure manuals

Table 2.1 Differences between Tacit and Explicit Knowledge

An organisation’s competitive success depends on its ability to create, identify and share tacit knowledge stock (Maskell & Malmberg 1999; Holste & Fields 2010). Several studies have mentioned that tacit knowledge is difficult to identify and transfer as compared to explicit knowledge (Gertler 2003; Hau et al. 2013). The main reason behind this is the nature of tacit knowledge, which is slippery, elusive, context-specific, and embedded (Gertler 2003). RBV describes the importance of the internal resources of the firm (e.g. tacit knowledge assets) in the sustainable growth and development of the firm, whereas one of the aspects of the VRIO framework supports the fact that a firm’s resource must be difficult to imitate (e.g. tacit knowledge stock) to gain competitive advantage (Barney 1991).

Inkpen and Dinur (1998) mention that tacit knowledge is highly context specific and possesses a personal quality, which makes it complex to formalise and communicate. From the perspective of knowledge management, the use of IT makes the management and sharing of

explicit knowledge easy, whereas it is the opposite in the case of tacit knowledge, due to its unstructured nature (Bloodgood & Salisbury 2001; Lai 2005).

Tacit knowledge is difficult to codify, and requires a lot of time, effort and cost for codification, sometimes causing an impossibility in identification and explicit transfer (Boiral 2002). Transferring tacit knowledge is more complicated as compared to the transfer of explicit knowledge (Dhanaraj et al. 2004). This is because tacit knowledge is progressively increased via interactions and observations, whereas explicit knowledge is relatively easy to learn and code (Doz et al. 2001).

Rather than explicit knowledge, the main issue that knowledge management is associated with is the management of tacit knowledge, particularly its identification and transfer (Bollinger & Smith 2001; Mirza 2009). All these studies signify the research problem, which is: *Tacit knowledge stock is difficult to identify and transfer*. Table 2.2 presents a list of articles which mention the difficulty in identifying and/or transferring tacit knowledge stock.

S.N	Author(s)/researcher(s)	Journal /Conference/Book	TKI	TKT	Both
1	Maskell and Malmberg (1999)	European Urban and Regional Studies			*
2	Sveiby (1997)	Berrett-Koehler Publishers			*
3	Gertler (2003)	Journal of Economic Geography			*
4	Inkpen and Dinur (1998)	Organisation Science		*	
5	Bloodgood and Salisbury (2001)	Decision Support Systems		*	
6	Lai (2005)	Information Management & Computer Security		*	
7	Boiral (2002)	Long Range Planning			*
8	Dhanaraj et al. (2004)	Journal of International Business Studies		*	
9	Doz et al. (2001)	Harvard Business Press		*	
10	Bollinger and Smith (2001)	Journal of Knowledge Management			*
11	Mirza (2009)	Department of Interaction and System Design			*
12	Nonaka and Takeuchi (1995)	Oxford University Press		*	
13	Jimes and Lucardie (2003)	Electronic Journal of Knowledge Management		*	
14	Leonard and Sensiper (1998)	California Management Review		*	

TKI: Tacit Knowledge Identification

TKT: Tacit Knowledge Transfer

Table 2.2 List of Articles Concerning Difficulty in Tacit Knowledge Identification and/or Transfer

After the review, it is suggested that most of the studies discuss the difficulty in identifying and transferring tacit knowledge as compared to explicit knowledge. The review of the literature denotes that tacit knowledge transfer has an essential significance to tacit knowledge stock identification (Mirza 2009). It means that tacit knowledge stock identification and transfer are closely interrelated in the literature related to knowledge management. Detailed information about knowledge management and tacit knowledge transfer is provided in the following section.

2.3.2 Knowledge Management

Knowledge management is defined as a process of identification and leverage of the collective knowledge in a firm to enhance the firm's competitiveness (Von Krogh 1998). Knowledge management helps to increase organisational innovativeness and responsiveness (Hackbarth 1998). Davenport and Prusak (1998) state that maximum knowledge management projects bear their objectives which include: (i) making knowledge visible and highlighting its importance in an organisation, (ii) developing a knowledge-intensive culture by motivating actions like knowledge transfer and proactively gaining and offering knowledge; (iii) building a knowledge infrastructure such as a web of connections among individuals, and motivating them to interact and collaborate.

Knowledge management refers to a process involving several activities, such as the process of creating, storing/ retrieving, transferring and applying knowledge in an organisation (Alavi & Leidner 2001). Among these, the focus of this research is on the tacit knowledge transfer because it is one of the major research problems in the knowledge management literature, and there is limited research that focuses on tacit knowledge stock identification and transfer. The details of tacit knowledge transfer are discussed next.

2.3.3 Knowledge Transfer

Knowledge transfer refers to the flow of knowledge via individuals, groups and organisations, once that knowledge has been created (Nonaka 1994). Studies suggest that knowledge transfer is simply a process of sharing knowledge among individuals. Knowledge is created by individuals, but organisations play a vital role in transferring that knowledge among staff (Nonaka 1994). It has been reported that the success of tacit knowledge transfer is dependent on organisations' understanding of the level of knowledge; that is: the identification of the tacit knowledge stock of their staff (Cummings & Teng 2003). It means that finding the tacit knowledge stock of staff within an organisation likely supports knowledge transfer within the organisation. A study by DeCarolis and Deeds (1999) asserts that tacit knowledge stock is embedded within individual members of an organisation, and that the only way to access the organisational knowledge stock is to identify the tacit knowledge that individual organisational members hold.

Methods to utilise knowledge resources that can be codified easily (that is: explicit knowledge) are abundant in the IS and knowledge management literature (Dayasindhu 2002). However, knowledge resources that are hard to codify, such as tacit knowledge stock must also be utilised

properly within an organisation to obtain maximum benefits (Dayasindhu 2002). An organisation's tacit knowledge stock can only be utilised optimally when it is transferred, because tacit knowledge is static in nature and has limited value unless transferred (Lai et al. 2016). Based on the research problem, which states that there is difficulty in tacit knowledge stock identification and transfer, and the need for research in this area, this research focuses on conducting an in-depth study of tacit knowledge stock identification and transfer within organisations. The literature review strategy used in this research is discussed in detail next.

2.4 Literature Review Strategy

In this research, a systematic mapping methodology was applied to review the literature, because the main objective of a systematic mapping study is to provide a structure for the research report types and findings that have been published within a specific period of time (Petersen et al. 2008). It categorises the research articles to provide a visual summary and map of the results (Petersen et al. 2008).

The strategy for systematic mapping in this research is based on the steps suggested by Petersen et al. (2008). The steps include: (i) defining the research problem; (ii) conducting search; (iii) screening of papers; (iv) classifying studies and (v) extracting data and mapping. Accordingly, systematic mapping was conducted in this research, followed by a protocol which is presented in *Figure 2.3*.

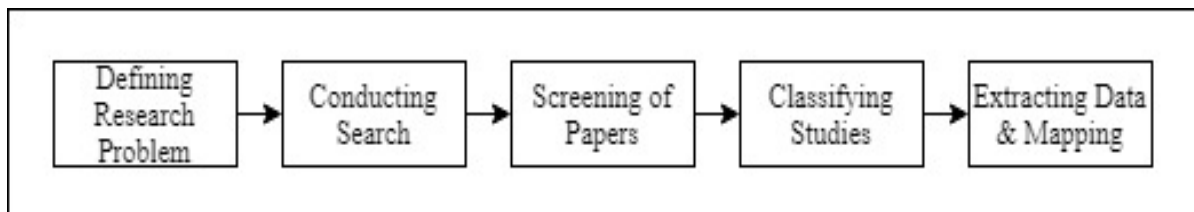


Figure 2.3 Systematic Mapping Protocol

In the first step, the research problem was defined. In the second step, a search of relevant studies was conducted using a specified set of search criteria. All the articles obtained using the search criteria were screened in the third step, and irrelevant studies were excluded from the list. In the fourth step, the selected articles were classified into relevant areas. In the last step, data for discussing the research questions as well as justifying future research was extracted from relevant articles. The execution of the systematic mapping protocol in the research is discussed next.

2.4.1 Defining the Research Problem

The first step in systematic mapping was defining the research problem of the study to provide an overall picture of the research topic. This step also included the process of identifying the quality of the research and research types, along with the available results relating to the research topic (Petersen et al. 2008). The first objective in this step was to map the publication frequencies over a specific period to understand the trends in the research topic. This step was conducted to generate an overall idea of the studies so far conducted in the area of tacit knowledge identification and transfer. A secondary objective was to identify the potential forums where the research has been published. These objectives are reflected in the research questions of the study (Petersen et al. 2008).

In this research, the initial step was to define the research problem prevailing in the literature of knowledge management, which covers the scope of the review and defines the sources for relevant information. This study focuses on solving the research problem which is: *Tacit knowledge stock is difficult to identify and transfer.*

2.4.2 Conducting Search

The second step in systematic mapping was to conduct a search for the relevant articles that related to the research topic. This step focused on identifying the primary studies by using a set of search strings and database criteria, or by browsing manually in the relevant conference proceedings or journals (O'Cathain et al. 2013). The best method of developing a search string is by structuring it based on the population, intervention, comparison and results (Kitchenham et al. 2009). It is essential that the structure is driven by the research problem, and keywords for the search string can be chosen from each structural aspect (Petersen et al. 2008). Accordingly, a search for the relevant articles associated with the research topic of tacit knowledge stock identification and transfer was conducted using a literature review protocol, which is described next.

2.4.2.1 Literature Review Protocol

The objective of a literature review protocol is to specify the research problem being addressed, literature review methodology, search keywords and combinations, and the inclusion and exclusion criteria used while conducting the research (Kitchenham et al. 2009). *Table 2.3* provides the literature review protocol used in this research.

Literature Review Criteria	Search Measures
Search keyword combinations	(“tacit knowledge base” OR “ tacit knowledge stock”) AND (“tacit knowledge transfer” OR “tacit knowledge sharing” OR “tacit knowledge flow”)
Databases Used	IEEE Xplorer ScienceDirect Scopus Springer Google Scholar Association for Information Systems (AIS) Journals
Language	English
Options	Scholarly Journal and Conference (Peer reviewed) publications, Full Text, References Available
Date Range	1980 to 2018

Table 2.3 Literature Review Protocol

A review was conducted on empirical and theoretical studies covering tacit knowledge stock and transfer using the literature review protocol presented in *Table 2.3*. The academic and industry based articles were included by performing literature searches on Google Scholar and four databases, namely IEEE Xplorer, ScienceDirect, Scopus, Springer and the Association of Information Systems (AIS) basket of eight journals (AIS 2018) namely, European Journal of Information Systems (EJIS), Information Systems Journal (ISJ), Information Systems Research (ISR), Journal of the Association of Information Systems (JAIS), Journal of Information Technology (JIT), Journal of Management Information Systems (JMIS), Journal of Strategic Information Systems (JSIS) and Management Information Systems Quarterly (MISQ).

The broad picture of the literature on tacit knowledge stock and transfer was obtained using the literature review protocol. The research conducted in tacit knowledge stock and transfer was investigated using the top eight AIS Journals, Google Scholar, and the four databases, including IEEE Xplorer, ScienceDirect, Springer and Scopus. The journal articles were dated from 1980 to 2018. No inclusion or exclusion criteria were used in this search.

Figure 2.4 shows that there has been an increasing interest towards the research conducted in tacit knowledge stock and transfer. During the 1980s, the total number of publications was only one hundred and twelve. The publication count has increased steadily over the years, and during the last eight years alone (from 2010 to 2018), the number of articles has increased to five thousand nine hundred and eighty-two.

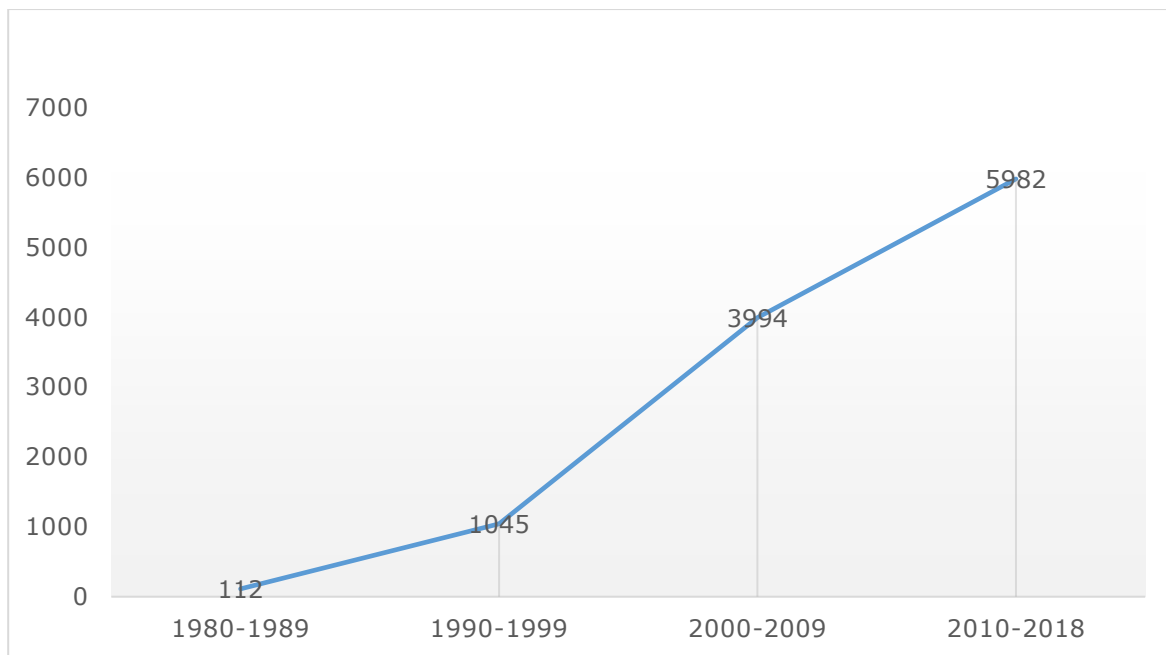


Figure 2.4 Number of Relevant Publications in Decades

From the initial research, it was found that there is limited empirical study that focuses on identifying the tacit knowledge stock of staff for enabling knowledge transfer in organisations. As the number of research publications from 2010 to 2018 is the largest, a further review of the studies was concentrated during this period. The same search criteria was used for further investigation. However, some inclusion and exclusion criteria filters were included to obtain the literature which discussed tacit knowledge stock identification and transfer. The next section discusses the further screening of research articles.

2.4.3 Screening for the Relevant Papers

In this step, the articles obtained from the literature search were applied with some inclusion and exclusion criteria. The screening process helps to obtain relevant articles and exclude the articles that are not relevant to the research topic (Petersen et al. 2008). The screening of the articles was conducted in four steps to obtain relevant articles which discussed tacit knowledge stock identification and transfer. The steps are discussed below:

In the first step, the titles of the articles were reviewed, and duplicate papers were noted down. After that, the titles containing one of the terms among the search strings and their synonyms were included, and duplicate papers were excluded from the list. The total papers obtained after applying these inclusion and exclusion criteria was two thousand eight hundred and sixty-four. In the second step, the abstracts for all two thousand eight hundred and sixty-four articles were inspected. The abstracts which discussed only one of the terms relating to “tacit knowledge

stock” and “tacit knowledge transfer”, and duplicate papers were excluded from the list. The articles which discussed the topics of both “tacit knowledge stock/base” and “tacit knowledge transfer/flow/sharing” were included. This step reduced the articles to nine hundred and twelve.

In the third step, the full texts of the articles were reviewed in detail. In this step, all the articles that discussed tacit knowledge stock identification and transfer were selected. The articles were filtered down to eighty-five after this step. Finally, in the fourth step, the eighty-five articles were further investigated to determine research activities surrounding tacit knowledge stock identification and transfer. The detailed findings of the literature review on tacit knowledge stock identification and knowledge transfer are presented next.

2.4.4 Findings and Classification of Studies

This study has been conducted to solve the research problem that has been stated in *Chapter 1*. The findings which were obtained from literature mapping on tacit knowledge stock identification and transfer are discussed in this section, followed by the development of the research questions.

2.4.4.1 Findings and Development of Research Question 1:

From the literature review, it is found that there is limited research that investigates the “*methods*” of identifying tacit knowledge stock within an organisation. Potential methods to identify the tacit knowledge of an employee are accessing past projects and profiles, assessing existing documents produced by the employee and analysing staff relationship (Newk-Fon Hey Tow et al. 2012). Assessing current skills (skills assessment) is one of the most efficient and accurate methods of identifying tacit knowledge stock in organisations (Shrestha et al. 2017). Skills assessment is the process of determining the competency level of a person in terms of his or her ability to perform relevant activities. Such assessments may use IT tools and methods to obtain the overall profile of a person and his or her relevant capabilities (Patterson et al. 2001). A competency-based management method allows organisations to assess human capacities based on the current skills that are required to achieve organisational goals (Tripathi & Agrawal 2014). Assessment of employees’ tacit knowledge stock can be considered of strategic value in organisations (Bartram 2004), hence such assessments contribute to an organisation’s competitiveness. Skills assessments have several benefits both at the individual and organisational levels, because identification of skills helps individuals plan their careers, and organisations can manage their collective knowledge stock for long term organisational benefits (Bartram 2004).

The knowledge management field overlaps with different domains, which include human resources management, philosophy, IT, performance management and accounting (Ragab & Arisha 2013). The use of skills assessment to identify the competencies of individuals is a study area within the human resource management discipline. Likewise, knowledge transfer among people is a part of knowledge management literature. There are significant bodies of literature that discuss these two broad areas. However, there is limited literature that combines these two areas, given that the realisation of the advantages of this combination was only reported in the year 2000 (Gupta & Govindarajan 2000).

Some attempts have been made to explain the skills assessment process in identifying tacit knowledge (Lawler III 1994; Tripathi & Agrawal 2014). Organisations focus on the tacit knowledge stock of their employees and its identification in terms of their skills to understand organisational change and adaptations (Nelson & Sidney 2005). Olson-Buchanan et al. (1998) found that the interpersonal skills assessment of employees helped to identify their tacit knowledge stock and led to an increase in the prediction of job performance ratings. Tacit knowledge identification via skills assessment which involves the evaluator's intuition and judgement rather than objective standardised testing, results in more difficult codification and management of knowledge (Mitri 2003). It denotes that the evaluator's judgement on skills assessment makes tacit knowledge identification more challenging. Considering Mitri's (2003) argument and Shrestha et al.'s (2017) claim that there is a lack of empirical evidence to demonstrate the self-assessment of skills as an effective method of tacit knowledge stock identification, this research focuses on identifying tacit knowledge stock based on self-assessment of skills. This literature gap leads to the development of the first research question (RQ1) for this study, which is:

RQ1: To what extent can self-assessment of skills help to identify tacit knowledge stock?

2.4.4.2 Findings and Development of Research Question 2:

Knowledge transfer has been a challenge for many organisations (Kazanjian et al. 2000). Several factors influence the transferring of tacit knowledge among organisational staff (Argote & Fahrenkopf 2016), including the identification of their competency level (Cummings & Teng 2003). Gupta and Govindarajan (2000) conceptualised the factors which influenced knowledge transfer, among which, identification of the tacit knowledge of an individual was considered an important factor. The research conducted by Empson (2001) reported that people inhibit knowledge transfer when their levels of tacit knowledge do not match with the receivers'

knowledge levels. Cummings and Teng (2003) reported several key variables that affect the success of tacit knowledge transfer within organisations. These include the types of individuals' knowledge bases, the interactions between people, the knowledge articulation processes used, and the identification of tacit knowledge stock. According to the authors, identification of the tacit knowledge stock of organisational staff plays a vital role in enhancing organisational knowledge transfer. There is a positive relationship between the sustainable performance of the organisation and transferring knowledge within it (Davenport & Prusak 1998; Bresman et al. 2010). Following this statement, a research was conducted by García-Morales et al. (2008) to identify the factors affecting tacit knowledge stock transfer in a firm. Among various factors, the study found that the tacit knowledge stock identification of organisational staff is an important factor in enhancing knowledge transfer. Another key factor affecting knowledge transfer is the attitude of people towards sharing their tacit knowledge (Bock et al. 2005; Lin 2007). The research conducted by Seba et al. (2012) also reported knowledge transfer issues in the Dubai Police force, among which attitudes towards knowledge transfer were one of the key factors. Huckaby and Christensen (2012) pointed out that there was a strong relationship between people's attitudes and their intention of transferring their tacit knowledge. Negative attitudes towards transferring knowledge can be caused by the type of knowledge that is being transferred. Research conducted by Fullwood et al. (2013) found that academic leadership, which is based on tacit knowledge, plays a vital role in transferring knowledge. A taxonomic analysis by Frank and Ribeiro (2014) identified four major factors influencing tacit knowledge transfer, including personnel, technology, work design and external environment sub-systems. According to the research, identifying the technical and systematic tacit knowledge stock of the team members was the most important factor that could influence knowledge transfer between teams. Power and Cormican (2015) also mentioned that knowledge transfer is simpler when organisations are aware of the knowledge stock of their staff. Moreover, identifying the tacit knowledge stock of organisational staff before recruitment helps employers to select the best staff for knowledge transfer within the organisation (Power & Cormican 2015). Extant literature on knowledge as a resource has confirmed the importance of tacit knowledge stock identification in enabling knowledge transfer. However, there is limited empirical research that explores whether tacit knowledge stock identification is useful in facilitating knowledge transfer. This gap in the literature forms the second research question (RQ 2) for this study which is:

RQ 2: What role does identifying tacit knowledge stock play in knowledge transfer?

This research assesses the skills possessed by the staff of an organisation to identify their tacit knowledge stock, and then explores the extent to which it facilitates knowledge transfer. To address this requirement, a *model* for self-assessment of skills is developed, implemented and evaluated at Company X. For the implementation process, the *model* is operationalised using a software tool based on the Skills Framework for the Information Age (SFIA). This tool helps to self-assess the digital skills within the IT setting of Company X. Detailed information about SFIA is provided in *Chapter 3*.

2.4.5 Data Extraction and Mapping Process

Once the classification of the relevant studies is done, it is important to sort the articles into a scheme. This is known as the data extraction process (Petersen et al. 2008). This step involves activities such as adding, merging and splitting articles into specific categories to map the studies.

In this step, all eighty-five articles were studied in detail, and the role of identifying tacit knowledge stock to enable knowledge was identified. The final list of eighty-five articles was sourced from ScienceDirect (29), IEEEEX (13), Springer (15), Google Scholar (17), Scopus (7) and AIS journals (4). Based on the findings, detailed discussion of the relevance of all the articles is provided in *Chapter 5*.

2.5 Conceptual Framework

The conceptual framework is based on the literature review conducted in the area of tacit knowledge stock and transfer. The major theories and frameworks used in this research are the RBV, the KBT and the VRIO framework. The conceptual framework is formulated to associate the activities to be performed in the research with the two research questions discussed earlier in *Sections 2.4.4.1 and 2.4.4.2* respectively. *Figure 2.5* illustrates the conceptual framework of this research based on the literature review.

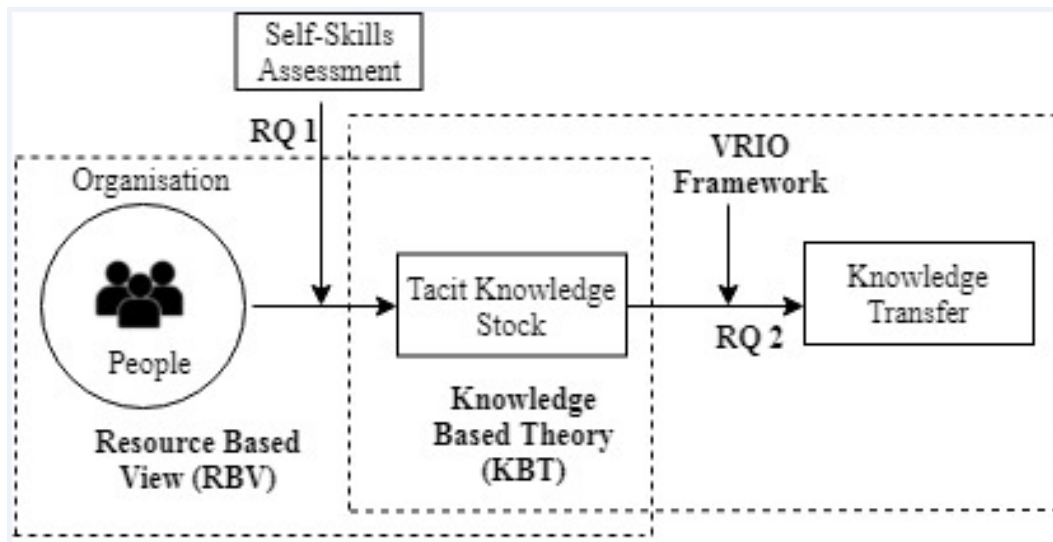


Figure 2.5 Research Conceptual Framework based on Literature Review

2.6 Summary

This chapter presented detailed information about the theories and concepts related to the research topic. In the beginning, all the theories underpinning the areas of tacit knowledge stock and transfer were discussed in detail. The concepts of RBV, KBT and the VRIO framework were explained, and the ways in which they underpinned this research study was described in detail. Followed by the theories and framework, the definition and types of knowledge, concepts of knowledge management, tacit knowledge stock and transfer, and skills assessment were explained. Following this, a structured method of literature mapping was presented to examine the literature, and to logically synthesise studies around tacit knowledge stock and transfer. The five steps of the literature mapping strategy were explained. The literature review revealed that there is a lack of empirical research that identifies the importance of tacit knowledge stock identification in transferring knowledge. The research questions were developed and justified based on the findings of the literature mapping and a conceptual framework of the study was developed accordingly.

Chapter 3 Methodology

3.1 Introduction

Chapter 2 discussed the theoretical foundation of this research and the context of the research issues and justified the need for the research. It also identified the current research gaps in the academic literature on the role of tacit knowledge stock identification based on self- assessment of skills for enabling knowledge transfer in organisations.

This chapter explains the rationale for the research methodology adopted in this research study. Figure 3.1 provides an overview of this chapter. There are various approaches to research, which include exploratory, analytical, descriptive, inductive, deductive, qualitative, quantitative, applied and basic research methods (Collis & Hussey 2013). This chapter explains and justifies the methods and methodologies that is used in this research study (Crotty 1998), with the aim of supporting data collection and helping to achieve the research objectives successfully, by addressing the research questions which are introduced in Chapter 1.

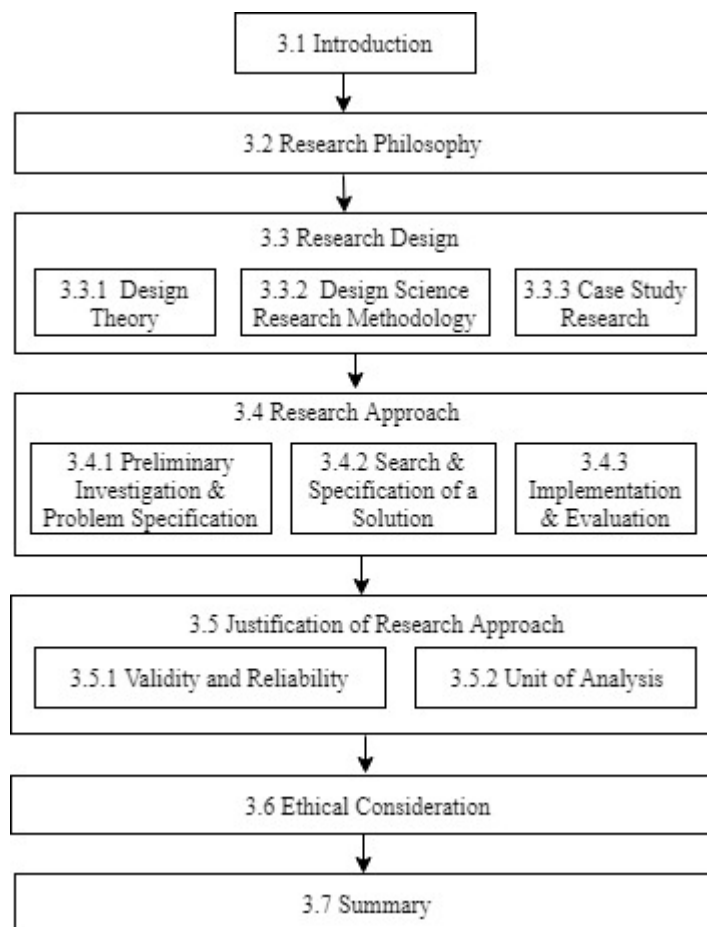


Figure 3.1 Chapter 3 Overview

Section 3.2 provides details of the research philosophy used in this research, followed by a discussion of the research design in *Section 3.3*. The research approach used in the study is introduced in *Section 3.4* whereas, *Section 3.5* provides a justification of the research approach used. A discussion of the ethical consideration taken during the data collection process is provided in *Section 3.6*. Finally, a summary of the chapter is provided in *Section 3.7*.

3.2 Research Philosophy

It is essential that researchers are explicit about their own perceptions and assumptions in any type of research study (Schuh & Barab 2007). It is usual for researchers to apply their own views regarding knowledge while engaging themselves in any investigation (Carter & New 2005). Although a research paradigm forms the base of research, researchers need to critically comprehend, make clear selections, and be able to communicate their worldviews to ensure clarity (Schuh & Barab 2007).

Research methodology is the philosophical position or worldview which is responsible for underpinning and informing the research style (Sapsford & Jupp 2006). Another interpretation of research methodology is provided by Creswell (2009), who states that it is the all-encompassing approach to the research design procedures, which also includes the theoretical background, data collection methods and analysis. Therefore, it can be argued that a philosophical worldview is an essential component of research methodology.

Research philosophy in business research can be categorised into two sections, which include the researcher's view of reality (ontology) and a view regarding valid knowledge (epistemology) (Saunders et al. 2009). The objective of this section is to discuss the research philosophy in order to provide an explanation of the research methods used, by considering the ontological and epistemological positions of the research (Lee 2004). The most essential components in determining the research methodology can be derived from the research aims and objectives (Sayer 2004). The aim of this research is to provide detailed information about reality that may have several interpretations. Such an ontological position is part of critical realism (Collis et al. 2003), and therefore justifies the philosophy of this research.

Critical realism is one of the best suited philosophies in IS because this philosophy is flexible in selecting a methodology that fits the needs of the research (Dobson 2001; Mingers 2004). The epistemological view of critical realism suggests that researchers should focus on a definite context (Collis et al. 2003). Moreover, critical realism largely supports the identification of the interactions between complicated processes and mechanisms, using qualitative methods in a

research study (Zachariadis et al. 2013). Therefore, the case study approach used in the identification of tacit knowledge stock based on self-assessment of skills to explore its role in transferring tacit knowledge, is justified in this research.

3.3 Research Design

Research design provides guidelines within a qualitative, quantitative or mixed method approach that directs the procedures in a research study. The main objective of research design is to direct the research study to collect and analyse essential data to get the best solution to the research problem (Sekaran 2003).

This research design is based on the Design Science Research (DSR) methodology and guided by the critical realism philosophy (Hevner 2007). The creation and analysis of the IT artefacts is undertaken in a DSR study that aims to solving organisational issues (Hevner 2007). Unlike other IS research that focus on exploring or testing hypotheses, this research is based on developing an artefact to solve a problem (Gregor & Jones 2007; Hevner 2007). One of the essential goals of an IS research is to ‘change the world’ rather than just knowing it operates (Carlsson et al. 2011). Hence, following this philosophy, the DSR research design was selected for the study. The main contribution of a DSR study is the development of at least some components of design theory (Hevner 2007). The concept of design theory is discussed next.

3.3.1 Design Theory

The design of new IT artefacts can be informed by people’s knowledge, and by technology (Gregor 2006). Specifically, in IS, IT artefacts are developed and evaluated following a research approach to solving identified organisational issues (Hevner 2007). Design theory is responsible for governing research design based on different types of extant theories such as kernel theories (Hevner 2007; Iivari 2007), case study (Van Aken 2005) and systematic literature review (Carlsson et al. 2011). This research used all three types as components of design theory.

The DSR fulfils the goals by developing an artefact and evaluating it (March & Smith 1995). A detailed discussion about the DSR methodology is provided next.

3.3.2 Design Science Research (DSR) Methodology

DSR methodology is also named as ‘improvement research’ because its main objective is to develop knowledge and apply it to designing effective artefacts (Kuechler & Vaishnavi 2008). The core part of DSR methodology is the development and evaluation of a research artefact. The DSR methodology framework and the methodological guidelines for IS research suggested

by Baskerville et al. (2009) have been followed in this study. The research of Hevner (2007) has also been used for additional guidance.

The aim of this research is to explore the extent to which tacit knowledge stock identification represented by digital skills facilitates knowledge transfer in organisations. This study develops, implements and evaluates a research artefact (represented as a *model*) at Company X. For the implementation of the *model*, a software tool based on the Skills Framework for the Information Age (SFIA) is operationalised to identify the tacit knowledge stock of IT professionals. Following that, the role of tacit knowledge stock identification in knowledge transfer is explored. In this sense, an issue is being solved using DSR methodology (March & Storey 2008). Although IT artefacts like software and tools have been developed by a majority of design science projects in IS so far, DSR methodology has also been used to develop useful models to solve organisational issues (McLaren et al. 2011). On a similar note, this research focuses on the development of a ‘*Self-Assessment of Skills Model*’, as an artefact which is followed by its implementation and evaluation in a case study organisation.

This research draws on the DSR methodology for IS research suggested by Hevner (2007). There are three interlinked cycles in the DSR methodology, combining both behavioural and design science paradigms, namely relevance, rigour and design cycle which is presented in *Figure 3.2*.

The three cycles of DSR provided by Hevner (2007) have been applied in this research to demonstrate the relevance and rigour of research activities. The ‘Relevance cycle’ for this research deals with the alignment of the organisation with its knowledge needs, whereas the ‘Design cycle’ deals with the development and evaluation of the artefact (*model*) to provide a solution to the existing research problem in the area of knowledge management. The artefact is a *model* for enabling knowledge transfer by identifying tacit knowledge stock, based on self-assessment of skills in a case study organisation. In doing so, this research is fulfilling one of the knowledge needs of the case study organisation. Moreover, the ‘Rigour cycle’ refers to the theory and framework used to support the research, which includes the RBV, the KBT and the VRIO framework. The application of the theory and framework adds knowledge and provides rigour to the knowledge base of this research.

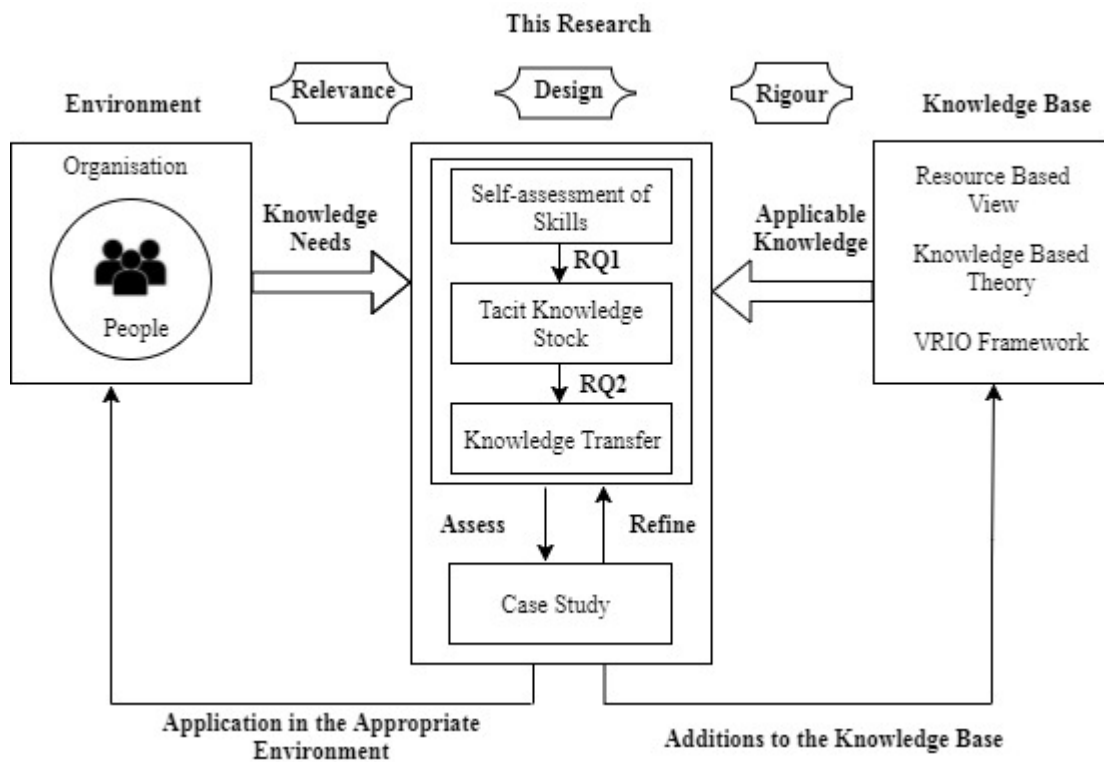


Figure 3.2 DSR Cycles

Source: Adapted from Hevner (2007)

3.3.2.1 Relevance Cycle

The relevance cycle is the first cycle of the DSR cycles provided by Hevner (2007). This cycle aims at providing the research needs (e.g. the problem to be addressed) as inputs, along with the definition of acceptance criteria for the ultimate evaluation of the research findings. In this research, the relevance cycle represents the environment with an application domain, including an organisation, IT staff, and research problems and opportunities. Initially, the research problems and opportunities at the case study organisation were identified. Based on the problems and opportunities, a *model* was developed as an artefact to identify the tacit knowledge stock of the IT staff based on self-assessment of skills and explore its role in knowledge transfer. In doing so, one of the knowledge needs of the case study organisation was fulfilled.

3.3.2.2 Rigour Cycle

The DSR studies use an extensive knowledge base of theories and methods which provide the foundations to the research (Hevner 2007). The rigour cycle helps to ensure innovation in the research study by applying past knowledge to it. In this research, the rigour cycle includes the literature review section, which scans related work associated with tacit knowledge stock identification and transfer. The theories and framework used in this research were the RBV,

KBT and the VRIO framework. The concepts of these theories and framework were applied to the design cycle to develop the *model* for the research. This design cycle of the research added value to the knowledge base including both theories (RBV and KBT) and the VRIO framework used in this research.

3.3.2.3 Design Cycle

The design cycle is the core of a DSR study, which iterates more frequently between the development of an artefact, its evaluation and potential feedback to refine the artefact further (Hevner 2007). The input for this cycle is obtained from the relevance cycle, whereas the design theories, concepts and frameworks are drawn from the rigour cycle. In this research, the design cycle dealt with the development of the *model* to identify tacit knowledge stock based on self-assessment of skills and explored its role in knowledge transfer. The *model* was implemented in the case study organisation (Company X) to address the research problem. Following this, the *model* was evaluated using semi-structured interviews with the research participants to obtain appropriate feedback and comments. This helped in refining the design of the *model* further.

This study involves exploratory research, and the findings of this research are based on the qualitative study (Creswell et al. 2007). Exploratory research helps to determine what is happening in order to obtain new insights, to raise queries, and to assess a process in a new light (Robson 2002). This helps researchers to understand problems clearly. An exploratory study forces a researcher to change direction based on new insights and new data obtained (Collis et al. 2003). The focus is initially broader in exploratory studies and becomes narrower as the research progresses (Adams & Schvaneveldt 1991). The aim of this study was to explore the role of identifying tacit knowledge stock based on self-assessment of skills in transferring knowledge within an organisation. No theories or hypotheses were tested in this research but new insights regarding tacit knowledge stock identification and transfer were obtained through this study. Semi-structured interviews with the participants helped to obtain their experiences and opinions regarding tacit knowledge stock identification using self-assessment of skills, and their perceived views on the role of tacit knowledge stock identification for enabling knowledge transfer. This assisted in providing new ideas and developing a hypothesis relating to the research problem.

3.3.3 Case Study Research

According to Yin (2009), a case study refers to the design involving observation and in-depth analysis of a contemporary process, usually an activity, program or people. There are always performance boundaries in a case study, and data collection is conducted by various methods within a specified time (Stake 1995; Yin 2009). There are three justifications for the use of a case study approach in this study, including the type of research questions, the degree of control over behavioural events, and focus of the research (Yin 2009). The main goal of this study is to overcome the challenges concerned with facilitating tacit knowledge transfer, by identifying the tacit knowledge stock of IT staff based on self-assessment of skills. Therefore, this study followed a case study design to overcome the challenges, by developing, implementing and evaluating the *model* in a specific context within a specific time. This research received support from a technology partner and a financial institution. An overview of the case study site, which is an Australian financial institution (Company X), follows.

3.3.3.1 Overview of Company X

Company X is the one of the largest financial institutions in Australia. It is one of the longest running institutions in Australia, with a total of sixty-one branch offices around South East Queensland. It provides financial services to retail, business and agribusiness, as well as superannuation, insurance and home loans. The members of Company X own the company, rather than it being owned by shareholders.

Company X was used as the test site to implement the *model*. The implementation of the *model* was done through the operationalisation of a software tool based on the SFIA. The tool helped to identify the tacit knowledge stock of the IT staff through self-assessment of skills. There were different departments in Company X, such as: Loan, Customer Service, Agri-Business, Retail Banking, Marketing, and IT. Within the IT department there was one large team known as ‘the Senior Team’, under which there were seven sub-teams as per 1st February 2018. The seven sub teams included Strategy and Architecture; IT Administration, IT Service Delivery, IT Infrastructure & Security Service, Banking Payments & Ancillary Systems, IT Projects and Digital Banking Systems. Each team consisted of a manager who oversaw the operations of all the other staff in the team. There were nine to twenty-one employees in each team, including the managers of the team. This made a total of eighty staff in the IT department. *Figure 3.3* is the organisational chart of the IT Department of Company X as per 1st February 2018.

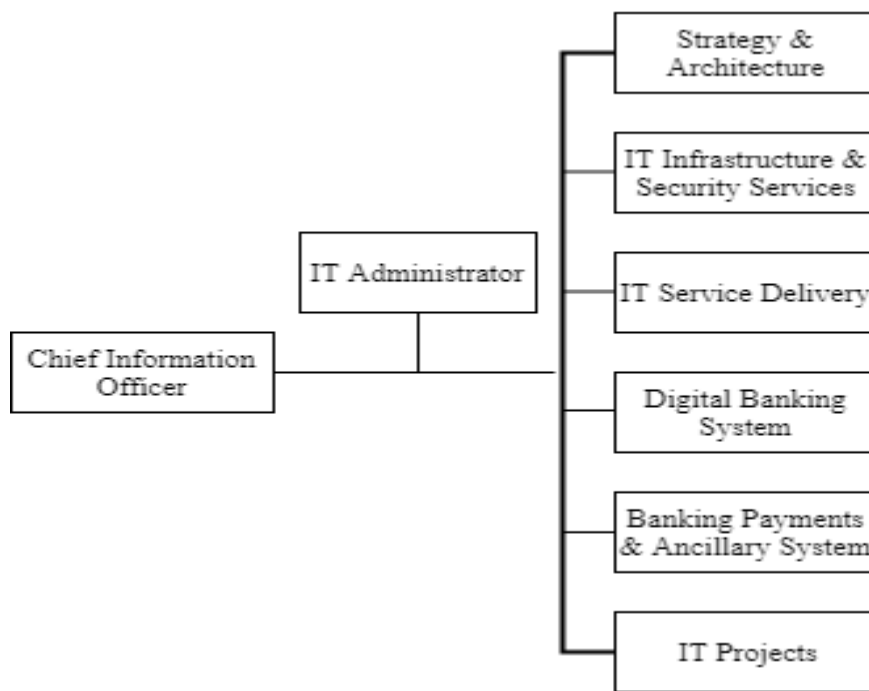


Figure 3.3 Organisational Chart of IT Department of Company X *Source: Company X*

3.4 Research Approach

The specific approach of this study is to build upon earlier studies regarding tacit knowledge stock and transfer in organisations. Moreover, this study followed the inductive approach for the literature review and theoretical background (Bryman & Bell 2015). According to Bryman and Bell (2015), an inductive research approach places emphasis on gaining an understanding of the meanings of events via the use of humans as subjects. It uses semi-structured interviews to obtain a deep understanding of a research context. There is a flexibility in making changes according to the data obtained as the research progresses. It is less structured as compared to the deductive approach (Thomas 2006). Therefore, this study followed the research processes based on the inductive research approach and obtained qualitative data through close interactions with participants who could inform the research topic.

Based on the research design discussed in *Section 3.3*, this research adopted the following three steps as identified by Baskerville (2009), which included:

- i) Preliminary Investigation and Problem Specification
- ii) Search and Specification of a Solution
- iii) Implementation and Evaluation

3.4.1 Preliminary Investigation and Problem Specification

At the initial stage, a literature review of primary studies was conducted, to gain background knowledge of the areas surrounding tacit knowledge stock and knowledge transfer in organisations. This investigation also aimed to obtain potential research opportunities in this area. This step has been discussed in detail in *Chapter 2*. After the review, it was found that tacit knowledge stock identification for transferring knowledge within organisations was mentioned as important in many studies. However, there is limited study that suggests that identifying tacit knowledge stock plays a vital role in knowledge transfer. Therefore, this research problem was specified from preliminary investigation. This research aims to solve the identified problem by exploring whether the identification of tacit knowledge stock is useful in transferring knowledge. In practical context, it has been done by conducting a skills assessment of people to explore their tacit knowledge stock using a software tool based on Skills Framework for the Information Age (SFIA) and explore the identification is useful in transferring the tacit knowledge.

3.4.2 Search and Specification of a Solution

In this step, a method for identifying the tacit knowledge stock of IT employees was selected. After an in-depth research, various methods were found to identify the tacit knowledge stock of people. These included accessing past projects, interviewing, checking profiles, analysing existing documents produced by staff, and analysing staff relationships (Newk-Fon Hey Tow et al. 2012). However, self-assessment of skills was selected for identifying the tacit knowledge stock of the participants, as it was suggested to be an important and under-used method in past research (Shrestha et al. 2017). Therefore, a *model* for self-assessment of skills to enable tacit knowledge transfer was developed as an artefact. The *model* was implemented at Company X through the operationalisation of a software tool based on the Skills Framework for the Information Age (SFIA 2018). The self-assessment of skills helped in assessing the digital skills possessed by individuals, and in so doing, helped decision makers to identify their tacit knowledge stock. SFIA was chosen in this study because of its popularity and reliability in the skills identification processes (SFIA 2018).

3.4.2.1 Skills Framework for the Information Age (SFIA)

The Skills Framework for the Information Age (SFIA) was established in 2000, and after several updates, is now a popular and well-established framework for identifying the digital skills and competencies of IT professionals. Currently, organisations and individuals from over one hundred and fifty countries use this tool to map their skill sets (SkillsTx 2018). This

framework was created twenty-two years ago by an association of thirty organisations and was led by the British Computer Society (BCS). Although SFIA is not often used in the United States, the framework is used extensively in the United Kingdom and Australia. SFIA has reached beyond European countries, as stated by Rodprayoon (2014). It is used by both public and private organisations to organize their IT skills profiles, define job positions, and manage their recruiting departments (SFIA 2018). The major activities of this framework involve open consultation and obtaining input from those who possess practical experiences in the management of skills in industries and educational institutions. A standard report can be produced for the skills possessed by an individual, in order to help them in their career aims (von Konsky et al. 2016; SFIA 2018). *Figure 3.4* shows an overview of SFIA.



Figure 3.4 Overview of SFIA

Source : SFIA (2018)

SFIA is simple, generic and can be used globally (SFIA 2018). This framework does not align with any kinds of qualifications or certifications. It tests people’s existing and previously used skills. SFIA defines the responsibility levels and technical skills of IT professionals, but does

not define people, job positions or procedures (SFIA 2018). SFIA places emphasis on demonstrating the relationship between responsibility levels, technical skills, qualifications, and knowledge (SFIA 2018). SFIA is not responsible for defining any type of technology or approaches to technology. However, different types of technology such as Agile, DevOps, and Big Data can be defined by the group of skills mentioned by SFIA. It does not support a single or specific organisation and is applicable to all the organisations which contain IT employees (SFIA 2018).

A total of ninety-seven skills are defined by SFIA Version 6, in six categories, namely, Strategy and Architecture, Change and Transformation, Delivery and Operation, Development and Implementation, Relationship and Engagement, and Skills and Quality (SFIA 2018). The role of generic definitions is to classify the extent to which IT staff have the skills of autonomy, influence other colleagues, become involved in complex jobs, and have general business skills. There are seven levels of increasing responsibilities for all the skills. These skills include follow, assist, apply, enable, ensure/advise, initiate/influence and set strategy. Each skill is described in detail, based on the responsibility levels of autonomy, influence, complexity and business skills required of the employee. *Table 3.1* shows the descriptions of the four attributes, based on the levels of responsibility.

	Autonomy	Influence	Complexity	Business Skills
Level 1 (Follow)	Works under supervision. Has little options. Seeks guidance in unexpected situations.	Interacts with immediate colleague.	Performs routine activities in a structured environment. Requires assistance in resolving unexpected problems.	Uses basic IS & technology functions, applications and processes. Learns new skills and uses them accordingly.
Level 2 (Assist)	Works under routine direction. Has minor options in resolving problems or enquiries.	Interacts with and impacts immediate colleagues. May have some external contact with clients, suppliers and stakeholders.	Performs various tasks in a variety of structured environments. Contributes to routine problem resolution.	Understands and applies optimum methods, tools & applications. Uses a rational and organised work approach.
Level 3 (Apply)	Works under general direction. Has options in identifying and solving complex problems and assignments.	Interacts with & influences department/project team members. Has working level contact with customers and suppliers.	Performs a vast work range, sometimes complex and non-routine, in a variety of environments. Applies methodical approach to define and solve problem.	Understands and applies optimum methods, tools & applications. Demonstrates an analytical & systematic approach to problem solving.

Level 4 (Enable)	Works under general direction within a clear accountability framework.	Influences team & specialist peers internally. Has impacts on clients at account level & suppliers.	Performs a broad range of complex technical or professional works, in a variety of contexts. Investigates, defines & resolves complex issues.	Selects appropriately from applicable standards, methods, tools & applications. Uses an analytical & systematic problem solving approach.
Level 5 (Ensure/advise)	Works under broad direction. Is fully accountable for meeting allocated technical and/or project objectives.	Influences organisation, clients, suppliers, partners & peers by contributing via own specialism.	Performs an extensive range & variety of complex technical and/or professional works.	Advises on the available standards, methods, tools & applications relevant to own specialism & have right to choose from alternatives.
Level 6 (Initiate/influence)	Has defined authority and responsibility for a major work area, including technical, financial and quality aspects	Influences policy formation on the contribution of own specialism to business objectives.	Performs highly complex work activities covering technical, financial and quality aspects.	Absorbs complex technical information & communicates effectively at all levels to both technical and non-technical audiences.
Level 7 (Set Strategy)	Authority & responsibility for all aspects of a significant area of work, including policy formation & application.	Makes decisions critical to organisational success.	Leads on the formulation & implementation of strategy.	Has a full range of strategic management & leadership skills.

Table 3.1 Attributes Description Based on Seven Levels of Responsibilities Source: SFIA (2018)

In practical context, this research proposes self-assessment of skills as a critical method to identify tacit knowledge stock. Tacit knowledge stock is considered a significant resource for organisations, and it is often studied from the KBT and the RBV, using the VRIO framework.

From a practical context, this research proposes self-assessment of skills as a critical method to identify tacit knowledge stock. Tacit knowledge stock is considered a significant resource for organisations, and it is often studied from the KBT and the RBV perspectives, using the VRIO framework.

3.4.3 Implementation and Evaluation

For the implementation of the *model* at Company X, a software tool based on SFIA was operationalised. The operationalisation of the software tool based on SFIA helped to identify the tacit knowledge stock of the IT staff through self-assessment of skills. After that, semi-structured interviews were conducted with all the participants for the evaluation of the *model*. The evaluation of the *model* was conducted in two phases, which were: (i) In the first phase, the participants were asked about their experiences of self-assessment of skills in identifying their tacit knowledge stock, and (ii) In the second phase, the participants were asked about their perceived views on the role of identifying tacit knowledge stock in knowledge transfer. These two phases of evaluation are discussed below:

3.4.3.1 Phase 1: Usability Evaluation (RQ 1)

Semi-structured interviews were conducted to explore the extent to which self-assessment of skills helps in identifying the tacit knowledge stock of the participants at Company X. The semi-structured interviews solely focused on asking the participants about the usefulness of the self-assessment of skills in identifying their tacit knowledge stock. The data obtained would help to answer the first research question (RQ 1).

3.4.3.2 Phase 2: Outcome Evaluation (RQ 2)

Semi-structured interviews assist in gathering information about the experience and opinions of participants with regard to a specific topic (Turner III 2010). The evaluation of the role of identifying tacit knowledge stock in enabling knowledge transfer in the organisation was conducted using semi-structured interviews with the research participants. All participants were asked about their perceived views on the role of identifying tacit knowledge stock for enabling knowledge transfer, which would answer the second research question (RQ 2). These two phases of evaluation assessed the *model*. The interview questions are provided in *Appendix C*. *Table 3.2* provides a summary of the overall research, emphasising the research questions.

Research Philosophy	Critical Realism
Type of Research	Exploratory Research
Research Topic	A <i>Model</i> for Self-Assessment of Skills to Identify Tacit Knowledge Stock and Enable Knowledge Transfer
Research Problem	Tacit knowledge stock is difficult to identify and transfer.
Research Design	Design Science Research Methodology Case Study Research
Research Approach	Inductive Approach Phase 1: Preliminary Investigation and Problem Specification Phase 2: Search and Specification of a Solution Phase 3: Implementation and Evaluation
Data Collection Method	Semi-structured Interviews
RQ 1	To what extent can self-assessment of skills help to identify tacit knowledge stock?
RQ 2	What role does identifying tacit knowledge stock play in knowledge transfer?

Table 3.2 Overall Research Framework

3.5 Justification of Research Approach

A research study including the concepts of ontology, epistemology and methodology for enabling tacit knowledge transfer using a method that involved self-assessment of skills. The study provides philosophical understanding to elaborate on the concepts in relation to knowledge management. A justification of the research approach is provided in detail below.

3.5.1 Validity and Reliability

Validity is defined as the trustworthiness or conformability of the research (Davies & Dodd 2002). ‘Member check’ is one of the ways of validating research. It uses interviews as a method of data collection in which participants involved in the research can voice their views regarding the data gathered or the interview transcripts (Hammersley & Atkinson 1995). It means that participants can be assured of the correct representation of their opinions and voices. Participants are permitted to comment on the analysis of data and the conclusions that have been derived by the researcher. Sometimes, a second round of interview may also be conducted with the participants to adjust or fix the changes that took place during the process. Member checking helps to confirm the accuracy of information, via the participants during the data collection process (Hammersley & Atkinson 1995).

3.5.2 Unit of Analysis

The focus for conducting this research involves an explicit specification of the unit of analysis. A self-assessment of skills ‘*model*’ to identify tacit knowledge stock for enabling knowledge

transfer, is the unit of analysis for this research. The *model* shows the relationship between three constructs, which include (i) self-assessment of skills, (ii) tacit knowledge stock, and (iii) knowledge transfer. A software tool based on SFIA was used to operationalise the *model* for identifying the tacit knowledge stock of IT staff at Company X.

The unit of analysis can include three levels, namely organisational, group or individual (Vessey et al. 2002). This study was conducted at a *group level*, that is: the tacit knowledge stock of IT staff at Company X was identified. The skills of the IT staff were assessed for the identification of tacit knowledge stock, and semi-structured interviews were conducted to address the research questions.

3.6 Ethical Consideration

There are many ethical issues that need to be considered before conducting any research study (Van't Riet et al. 2001). Research activities involve data collection from people, and about people (Punch 2005). It is very important for researchers to protect research participants, to develop trustworthy relationships with them, to work on promoting research integrity, to avoid every type of misconduct during experiments, and to manage challenging problems (Israel & Hay 2006). This study involved human participation for the data collection process, so ethics clearance was necessary. Prior to the data collection process, an ethics application was submitted to the USQ Human Research Ethics Committee to obtain ethical clearance for conducting the research. The participants were informed about their rights, safety and freedom during their participation. Ethics approval was granted by the Ethics Committee on 17 January 2018. The ethics approval letter is included in *Appendix D*.

The basic ethical issues which should be addressed while conducting social research are research merit and integrity; informed consent; risk management; and privacy and confidentiality (Diener & Crandall 1978). All of these ethical issues were addressed in this research to maintain ethical standards. The issues are explained below:

3.6.1 Research Merit and Integrity

There should be an appropriate justification of the benefits of conducting research, such as its diverse contributions to theory and practice (Pieper & Thomson 2011). Proper methodologies and processes must be adopted when conducting research. This research was expected to contribute to academic literature by addressing the current gap in explaining the process of tacit knowledge stock identification based on self-assessment of skills, to facilitate knowledge transfer in organisations. A systematic literature review was conducted in the area of

knowledge management, and research questions were developed based on the findings from the review. The design and methodologies used in the research were guided by three qualified and experienced faculty members working in the Faculty of Business, Education, Law and Arts at the University of Southern Queensland. There was no compromise of any right, or of respect of the participants during the whole research process.

3.6.2 Informed Consent

The interviews were conducted after obtaining voluntary approval from the interviewees (Corti et al. 2000). No one was forced to participate in the study (whether by the interviewer or the participants' supervisors) and the participants' decisions regarding their participation were respected at all times (Corti et al. 2000).

The participants were given sufficient time to think about their participation in the research. In the beginning, the major aim of the study was clearly disclosed to all the participants. The interested candidates were asked to sign their consent forms prior to the data collection process. The consent forms contained all the information about the research and about the research team, and included consent statements. Participants were provided with an information sheet which clearly identified the research objectives, sample interview questions, expected benefits, risks, and terms of privacy and confidentiality. All participants were clearly informed about the data storage and its usage during the research period. Cultural, religious and gender backgrounds of participants were reviewed, and norms of relevant religions or culture were respected as far as practicable where applicable during the study.

3.6.3 Risk Management

All information about the potential risks and benefits of the study was mentioned in the information sheet provided to the participants (Cheshire 2009). However, in this research, there were minimum risks associated with their participation. During the data collection process, respect was provided for the rules governing the use of the venue where the interviews were conducted. Any disruption to day-to-day company activities was minimised as much as possible. In addition, no sensitive information was disclosed, and questions which could have had negative impacts on the interviewees were strictly avoided. No harmful information was gathered which could affect the participants in any way, and clear language was used to present the data. Interviews were conducted at times that were suitable for the participants to avoid any types of clashes with their usual work.

The information sheet also mentioned the benefits that participants would gain from participating in the research. It was clearly mentioned that this research would directly benefit them in planning their careers after performing the skills assessment, and that it would assist Company X in understanding the overall tacit knowledge stock of the IT department.

3.6.4 Privacy and Confidentiality

In this study, the privacy and confidentiality of the data was strictly safeguarded. Identities of the participants were not disclosed. The data obtained was used solely for this research, and it would only be made accessible to the research team and the University of Southern Queensland (USQ). Participants were well informed that the data was stored securely as per USQ's data management policy.

3.7 Summary

This chapter provided the blueprint for the activities of the research study. It discussed the underlying research philosophy, research design and approach driven by the research questions, and laid out the strategy for the overall research design and approach. A critical realistic philosophical worldview was used in this research study, and a DSR methodology was used to address the research questions. The data was collected at Company X based on the research design, to provide academic rigor and industry relevance. Semi-structured interviews were used for data collection to evaluate the research artefact (*model*).

Chapter 4 Artefact Development, Implementation and Evaluation

4.1 Introduction

Chapter 3 discussed and justified the research approach and methods used. This chapter discusses the development, implementation and evaluation of the artefact (*model*). This chapter also presents the results obtained. The aim of this chapter is to provide detailed information about the data collection process - how the data was collected, and what type of data was collected to address the research questions. It explains the overall scenario of the case study site, and the settings for data collection. *Figure 4.1* provides an overview of this chapter.

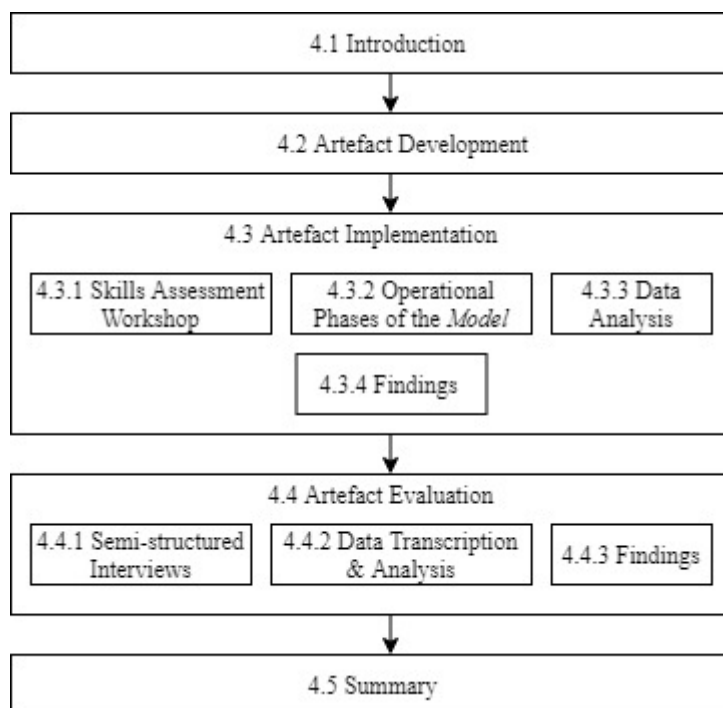


Figure 4.1 Chapter 4 Overview

Section 4.2 discusses the steps involved in the development of the artefact (*model*), followed by its implementation at Company X in Section 4.3. The findings related to the artefact implementation is also provided in Section 4.3. Section 4.4 presents the steps involved in the evaluation of the artefact (*model*), along with the findings obtained. This is followed by the chapter summary in Section 4.5.

4.2 Artefact Development

According to the Resource Based View (RBV) theory, organisations must utilise their internal resources (that is: tacit or explicit knowledge) properly to gain maximum advantage from it

(Barney 1991). Tacit knowledge stock is more difficult to identify and transfer as compared to explicit knowledge stock (Lai 2005). A systematic literature review was conducted in the area of tacit knowledge stock and transfer. It was found that many researchers have mentioned the importance of identifying tacit knowledge stock for enabling knowledge transfer. However, there is a limited empirical research which explores the importance of tacit knowledge stock identification in transferring knowledge.

Similarly, past studies also showed that skills assessment is one of the potential methods of identifying tacit knowledge stock (Bartram 2004). For example, Mitri (2003) mentioned that skills assessment based on an evaluator's judgement and intuition made it difficult to code and identify the tacit knowledge stock of organisational members (Mitri 2003). Self-assessment of skills is an important and under-used method of tacit knowledge stock identification (Shrestha et al. 2017). The literature review on skills assessment suggested that this method has been used independently in various areas to assess the skills of people. However, there is limited research which used self-assessment of skills for identifying tacit knowledge stock to enable knowledge transfer. Therefore, to fulfil this research gap, a *model* has been developed as an artefact, which proposes a possible relationship between three constructs, namely: (i) self-assessment of skills, (ii) tacit knowledge stock, and (iii) knowledge transfer. Detailed information about the *model* is provided below.

The artefact for this research is a *model*. In Design Science Research (DSR), a model is defined as a set of propositions or statements that express relationships among constructs (Vaishnavi & Kuechler 2004). March and Smith (1995) define *model* as a proposal for how things are or should be. The *model* linked three constructs together, namely (i) self-assessment of skills, (ii) tacit knowledge stock, and (iii) knowledge transfer. *Figure 4.2* illustrates the *model* for this research.

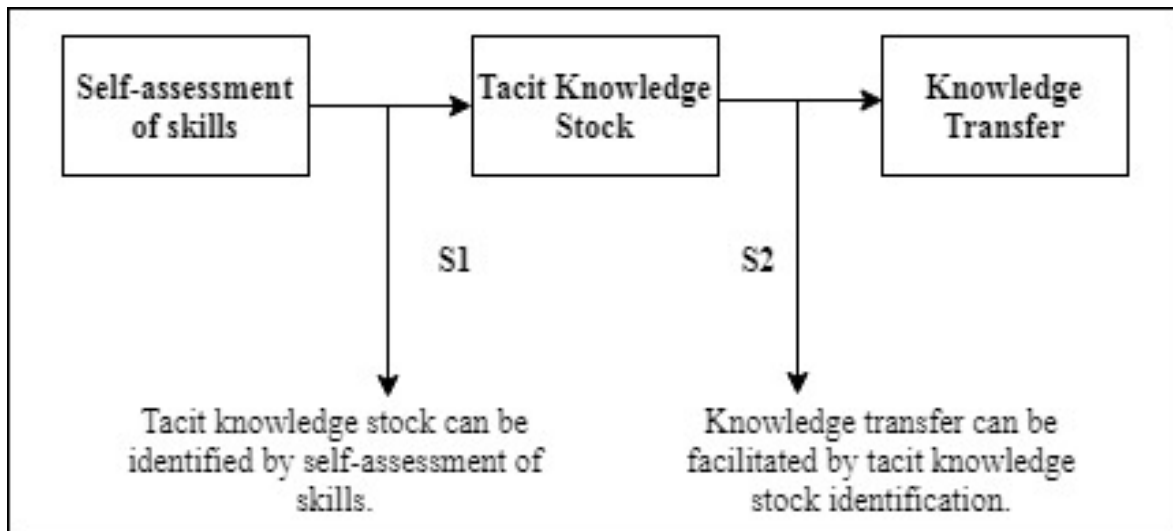


Figure 4.2 Self-assessment of Skills Model

There are three constructs in the *model*, including (i) self-assessment of skills, (ii) tacit knowledge stock, and (iii) knowledge transfer. Knowledge transfer is one of the aspects of knowledge management (Alavi & Leidner 2001), whereas self-assessment of skills comes under the human resource management area (Bartram 2004). Knowledge management is a broad area of management which overlaps with various other areas of management, including human resource management, philosophy, performance management, and accounting, due to its heterogeneous nature (Ragab & Arisha 2013). The literature review of relevant articles shows that independent studies have been conducted in these two areas. Gupta and Govindarajan (2000) reported that there was a scarcity in the literature which combines these two areas, given the realisation of the advantages of this combination. The current literature review also shows that there is limited research which combines these two areas of management. Therefore, this research focused on combining these two areas of management to answer the research questions.

The *model* contains two statements/propositions of the research, which are denoted in *Figure 4.2* by ‘S1’ and ‘S2’ respectively. The first phase in this research was to explore the extent to which self-assessment of skills helps in identifying tacit knowledge stock, which is denoted by the first statement (S1): *Tacit knowledge stock can be identified by self-assessment of skills.* Similarly, the second phase in this research was to explore the role of tacit knowledge stock identification in knowledge transfer, which is denoted by the second statement (S2): *Knowledge transfer can be facilitated by tacit knowledge stock identification.* The statements

(S1) and (S2) show the relationship between the three constructs of the research, resulting in the development of the *model* as the artefact for this research (Vaishnavi & Kuechler 2004).

4.3 Artefact Implementation

A *model* was developed as a research artefact to solve the research problem. For the implementation process, the *model* was operationalised using a software tool based on the Skills Framework for the Information Age (SFIA). The software tool was used to identify the tacit knowledge stock of IT professionals at Company X. The details of SFIA are provided in *Chapter 3, Section 3.4.2.1*.

Company X was selected as the case study site for this research, because the CIO showed his interest in implementing the *model* (that is: tool operationalisation) in the company. It was known that Company X was planning a digital transformation initiative to adopt new technologies. The operationalisation of the skills assessment tool would be very useful in supporting their new initiative. The research plans and objectives were discussed with the CIO, and his support was obtained to conduct the research. Detailed information about Company X is provided in *Chapter 3, Section 3.3.3.1*.

As referred by the CIO, a manager of the Strategy and Architecture department took the initiative to guide the researchers throughout the research activities at Company X. After discussing the whole process and research objectives with the manager, the implementation of the *model* through the operationalisation of the software tool began. In the first step, all eighty staff from the Information Technology (IT) department were invited to participate in the research. An email was sent to all IT staff requesting their participation, and they were requested to inform the researchers of their decisions within seven days. After a week, twenty-one IT staff responded with an interest in participating in the research.

4.3.1 Skills Assessment Workshop

The next step was to conduct a workshop to make the participants aware of SFIA, and to teach them how to use the skills assessment tool based on the framework. The tool based on SFIA was provided by a company offering commercial online skills assessment services namely, SkillsTx Pty. Ltd (SkillsTx 2018).

After the discussion with the manager of Company X, three sessions of the workshop (one hour each) were organised in a day. Before conducting the workshop, a list was prepared containing personal details such as the email IDs and phone numbers of the twenty-one interested

candidates. The details were uploaded into the SkillsTx website using the bulk upload feature. Automatic reporting was set so that the system would send the assessment reports to each participant via email on completing their skills assessment. Detailed information about SFIA is mentioned in *Section 3.4.2.1*. The steps to using the skills assessment tool based on SFIA is provided in *Appendix A*, and the sample reports generated after the skills assessment is provided in *Appendix B*.

The venue for the workshop was Company X. Following this, all twenty-one participants were contacted via email to book their times for attending the workshop. They were informed of the dates, times and venues, and were requested to bring their own laptops to the workshops. A list of participants who attended the workshop was prepared. Ten participants attended in the first session, six participants in the second session, and five participants attended in the third session of the workshop. During the one-hour sessions, the first forty minutes were spent on introducing SFIA and teaching the participants how to use the skills assessment tool based on SFIA. On completion of the introduction session, an invitation email was sent through the system to each candidate. A remaining twenty minutes was given to each participant to start his or her skills assessment and clarify his or her queries about using the software tool. Each participant was assisted regarding their queries. They were given seven days to complete their self-assessment of skills. After the third and fifth days they were sent automatic reminders to complete their skills assessments. All participants completed their skills assessments within one week of the workshops, and their assessment reports generated by SFIA were collected. The participants are denoted by the symbol 'Px' where 'P' refers to the participant and 'x' refers to the number. For example, 'P1' means first participant, 'P2' means second participant, and so on.

4.3.2 Operational Phases of the *Model*

In order to execute this model, two phases were devised. *Figure 4.3* provides the operational phase-I of the *model* during the implementation phase, that is: operationalisation of the software tool based on SFIA. It shows the relationship between two constructs, namely self-assessment of skills and tacit knowledge stock. The implementation phase of the *model* involved the identification of the tacit knowledge stock of twenty-one IT staff of Company X, using a software tool based on SFIA.

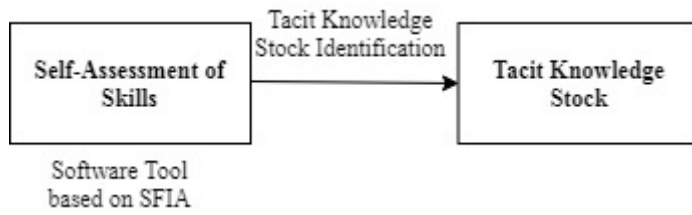


Figure 4.3 Operational Phase-I of the Model

Figure 4.4 provides the operational phase-II of the *model* during the evaluation phase. It shows the relationship between two constructs, namely tacit knowledge stock, and knowledge transfer. The evaluation phase of the *model* involved semi-structured interviews with twenty-one participants to obtain their perceived views on the role of tacit knowledge stock identification in knowledge transfer. A detailed information of this phase is provided in Section 4.4.

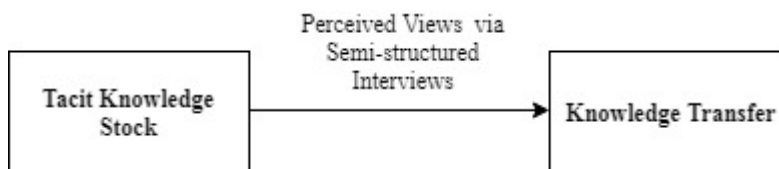


Figure 4.4 Operational Phase-II of the Model

4.3.3 Data Analysis

After the completion of the skills assessment, the reports of all twenty-one participants were collected, analysed and evaluated. Each participant's report was analysed individually in terms of five categories, including:

1. Time in Job Role and Company X
2. Tacit Knowledge Stock
3. Skills Level Fully or Largely Mastered
4. Skills Level Previously Mastered
5. Combined Skill Summary based on Skills Levels

4.3.4 Findings

At first, the individual skills report of all research participants generated by the software tool was analysed based on four attributes defined by SFIA, namely, autonomy, influence, complexity and business skills. SFIA defines these attributes and determines seven levels of increasing responsibility for each attribute, based on the individual skills and professional skills of a person. A table including the four attributes based on the seven levels of responsibility is

provided in *Chapter 3, Section 3.4.2.1*. Both the individual skills and professional skills were assessed based on the survey questions provided by SFIA.

4.3.4.1 Time in Job Role and Company X

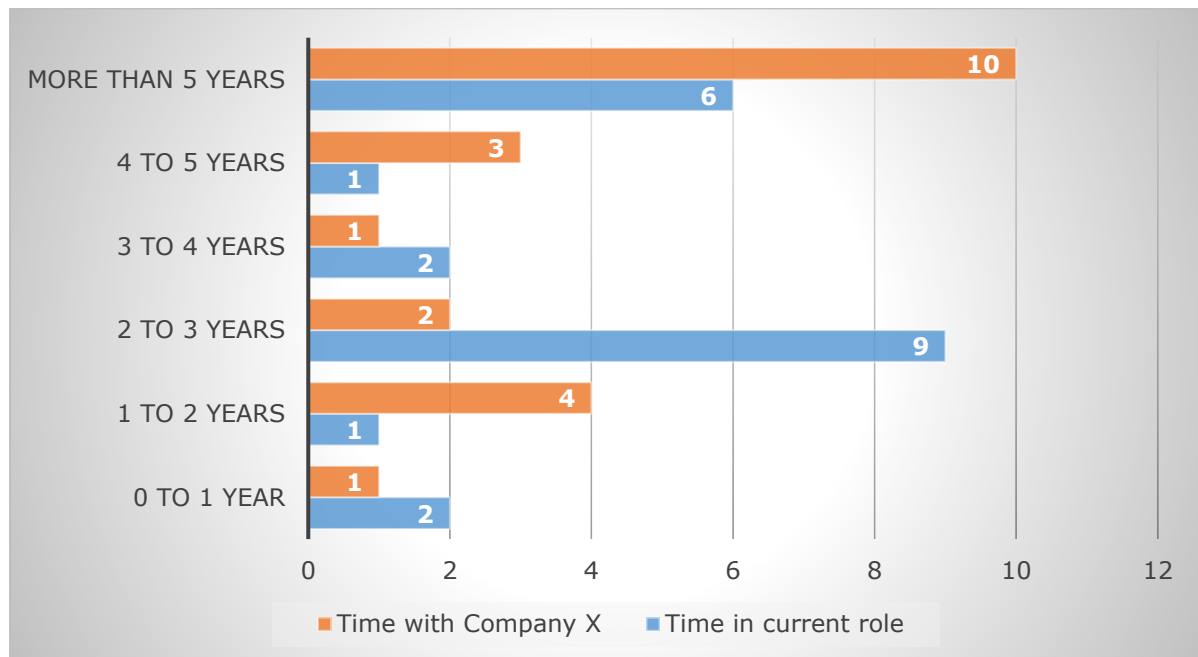


Figure 4.5 Time in Job Role and Company X

Figure 4.5 shows the duration of the participants in their job roles, and the duration of their time with Company X. It shows that among the twenty-one participants, the majority (ten staff) had worked for more than five years at Company X, whereas only one staff member had worked for less than one year at Company X. Similarly, staff members four, two, one and three had worked at Company X for one to two years, two to three years, three to four years, and four to five years respectively. It can be known from *Figure 4.5* that Company X consists of a large number of staff who had worked for more than five years.

On the other hand, *Figure 4.5* shows that among the twenty-one participants, the largest number of staff (nine staff) had worked for two to three years in their current roles. Similarly, the figure also shows that six staff members had been working for more than five years in their current roles. It can be known that most of the staff members that Company X has recruited staff who had worked for at least two to three years in their current roles.

4.3.4.2 Tacit Knowledge Stock

Table 4.1 shows the tacit knowledge stock of each participant (P1 to P21) based on the attributes and generic responsibilities provided by SFIA.

Participants	Autonomy	Influence	Complexity	Business Skills
P1	3	1	3	2
P2	5	5	5	5
P3	4	4	4	4
P4	5	5	5	5
P5	4	2	4	3
P6	5	3	4	2
P7	4	1	6	2
P8	3	3	5	3
P9	4	3	2	3
P10	5	2	4	2
P11	4	4	5	6
P12	5	5	6	5
P13	3	3	3	3
P14	5	2	5	7
P15	6	7	6	6
P16	7	7	6	7
P17	3	2	3	2
P18	5	4	3	5
P19	3	5	4	2
P20	5	5	4	3
P21	4	4	3	5

Novice	Intermediate	Expert
Level 1	Level 4	Level 6
Level 2	Level 5	Level 7
Level 3		

Table 4.1 Tacit Knowledge Stock of Participants Represented by Levels of Responsibility

The levels of responsibility were grouped into three groups, namely Group 1 for ‘*Novice*’, Group 2 for ‘*Intermediate*’, and Group 3 for ‘*Expert*’, in terms of the participants’ skills for data analysis. Group 1 included participants possessing skills at Level 1, Level 2 or Level 3; Group 2 included participants possessing skills at Level 4 or Level 5; and Group 3 included participants possessing skills at Level 6 or Level 7, as shown in *Table 4.1*. A detailed information of the levels of responsibilities defined by SFIA is provided in *Chapter 3, Table 3.1*.

Table 4.1 shows that five staff members [P1, P8, P13, P17 and P19] belong to Group 1 in terms of their ‘Autonomy’ attribute, which means that they work under supervision, routine direction or general direction. Likewise, ten staff members [P1, P5, P6, P7, P8, P9, P10, P13, P14 and P17] are novices in terms of their ‘Influence’ attribute, six staff members [P1, P9, P13, P17, P18 and P21] are novices in terms of their ‘Complexity’ attribute and eleven staff members

[P1, P5, P6, P7, P8, P9, P10, P13, P17, P19 and P20] are novices in terms of their ‘Business skills’ attribute, as shown in *Table 4.1*.

Likewise, fourteen staff members [P2, P3, P4, P5, P6, P7, P9, P10, P11, P12, P14, P18, P20 and P21] belong to Group 2 in terms of their ‘Autonomy’ attribute; nine staff members [P2, P3, P4, P11, P12, P18, P19, P20 and P21] are intermediate in terms of their ‘Influence’ attribute; eleven staff members [P2, P3, P4, P5, P6, P8, P10, P11, P14, P19 and P20] are intermediate in terms of their ‘Complexity’ attribute; and six staff members [P2, P3, P4, P12, P18 and P21] are intermediate in terms of their ‘Business skills’ attribute, as shown in *Table 4.1*.

Similarly, in Group 3, there are two staff members [P15 and P16] who are expert in terms of their ‘Autonomy’ attribute, two staff members [P15 and P16] in terms of their ‘Influence’ attribute, two staff members [P7, P12, P15 and P16] in terms of their ‘Complexity’ attribute, and four staff members [P11, P14, P15, and P16] in terms of their ‘Business skills’ attribute, as shown in *Table 4.1*. The detailed information about each level, for each attribute, was provided in *Chapter 3, Table 3.1*.

4.3.4.3 Skills Level Fully or Largely Mastered

Figure 4.6 shows the division of the skills levels (fully or largely mastered) of all twenty-one participants into seven categories, based on the departments at Company X. The departments include Strategy and Architecture; Change and Transformation; Delivery and Operation; Development and Implementation; Relationship and Engagement; and Skills and Quality.

There are three levels of the skills defined by SFIA (2018), including:

- “Fully”, where the individuals have said that their skill level matches the description 85%+, and can therefore be considered as a core, current and solid skill
- “Largely”, where the skills match is 50-85%. With this level of matching, there may be opportunities to develop the missing elements, and turn ‘orange’ to ‘green’
- “Previous”, where the individuals have indicated that they possessed the skill at this level earlier in their career. This type of match may still present opportunities.

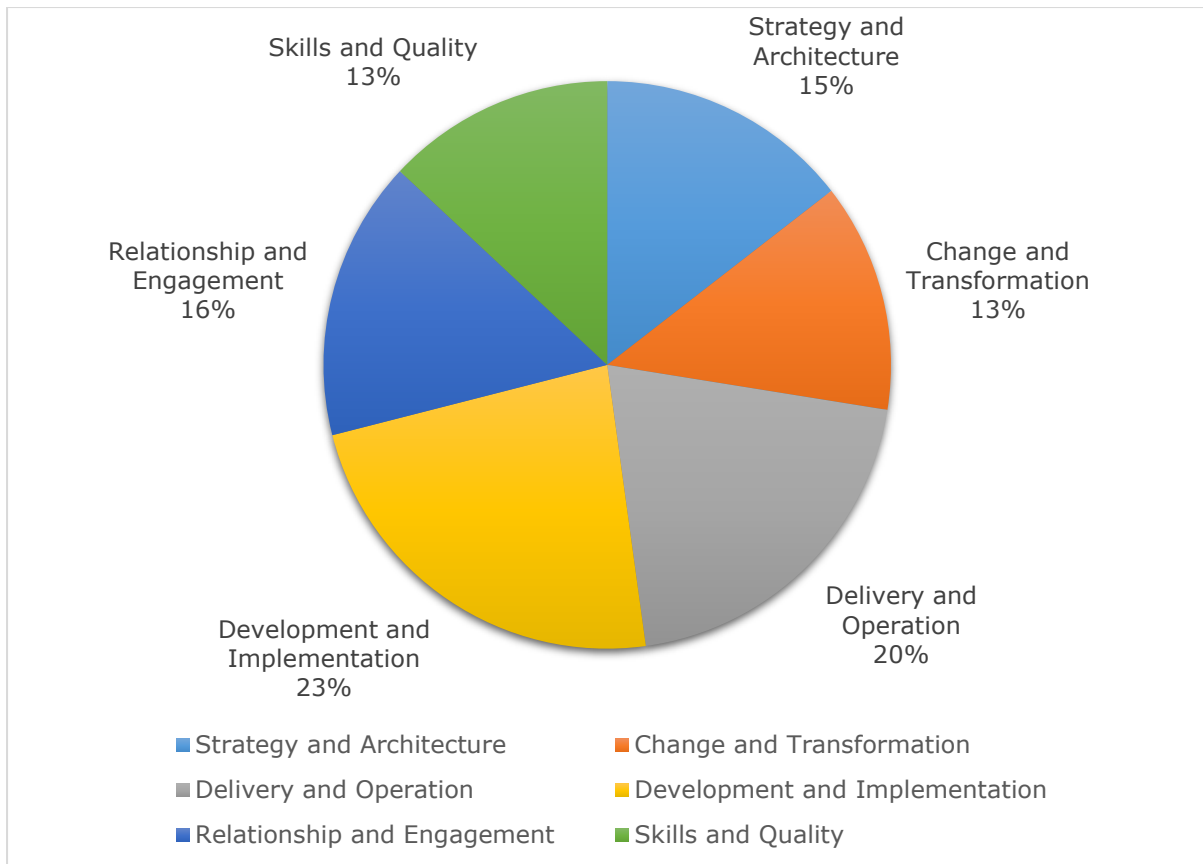


Figure 4.6 Division of Skill Level (fully or largely mastered) into Seven Categories

Figure 4.6 shows that among the twenty-one participants, the maximum number of participants (23%) possessed skills (represented as tacit knowledge stock) in the area of ‘Development and Implementation’. Similarly, 20% of the staff members possessed the skills in the area of ‘Delivery and Operation’, whereas 16% possessed the skills required in the area of ‘Relationship and Engagement’. 15% of the participants had the skills required in the area of ‘Strategy and Architecture’. A minimum number of participants, that is: only 13%, possessed skills in the area of ‘Skills and Quality’ and ‘Change and Transformation’. It can be known from Figure 4.6 that the maximum number of staff members at Company X possessed fully or largely mastered skills in the area of ‘Development and Implementation’.

4.3.4.4 Skills Level Previously Mastered

Figure 4.7 shows the division of the skills levels (previously possessed) of all twenty-one participants of Company X into seven categories.

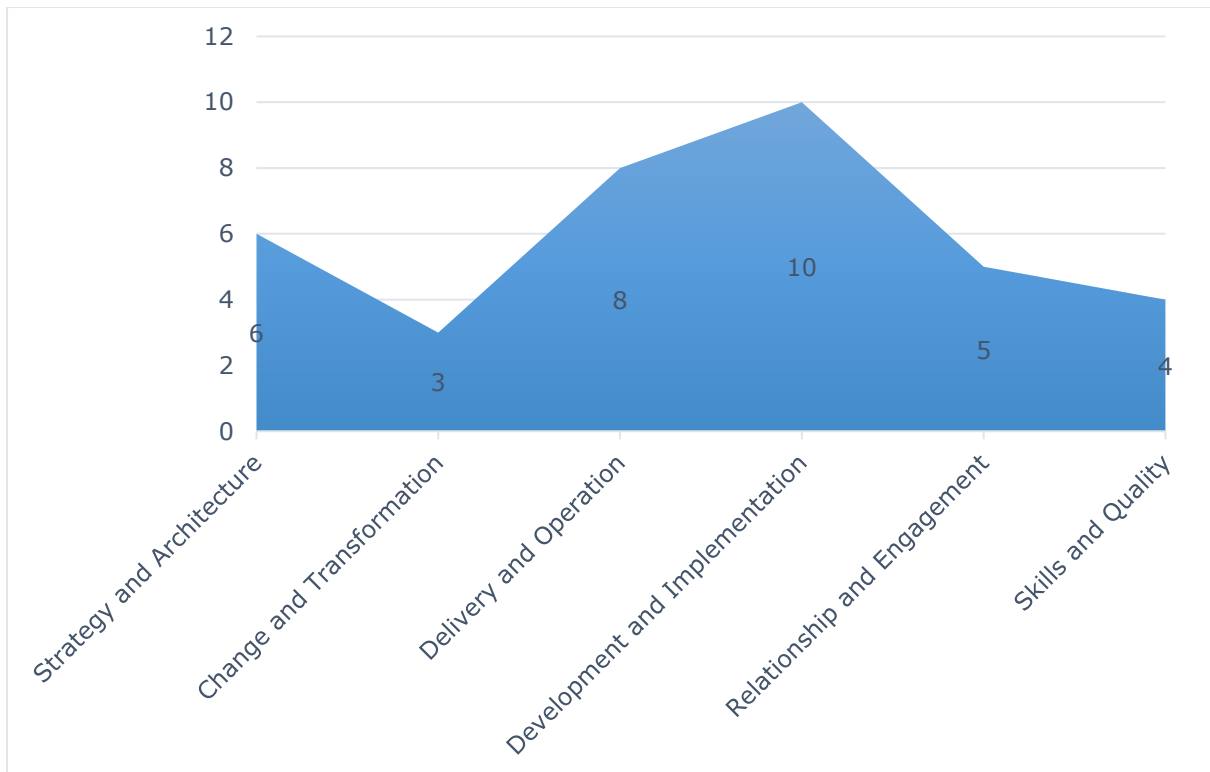


Figure 4.7 Division of Skill Level (previously mastered) into Seven Categories

Figure 4.7 shows that the maximum number of staff members (ten staff members) possessed skills previously in their careers in the area of ‘Development and Implementation’, whereas the minimum number of staff members (three staff members) previously possessed skills in the area of ‘Change and Transformation’. Likewise, there were eight staff members who possessed the skills in the area of ‘Delivery and Operation’ previously in their careers, followed by six staff members in the area of ‘Strategy and Architecture’. It can be argued that most of the staff members at Company X possessed the skills previously in their careers in the area of ‘Development and Implementation’.

4.3.4.5 Combined Skill Summary based on Skills Levels

The following image shows the self-assessed data, indicating the numbers of individuals with the skills possessed “Largely” and “Previously in career”, or “Fully”. This is potentially a rich source for improving flexibility, succession planning, and developing capabilities across the organisation. The data in each column is a distinct count of the number of individuals. The total column shows the number of individuals who have skills in each category and is not a sum total of the other columns.

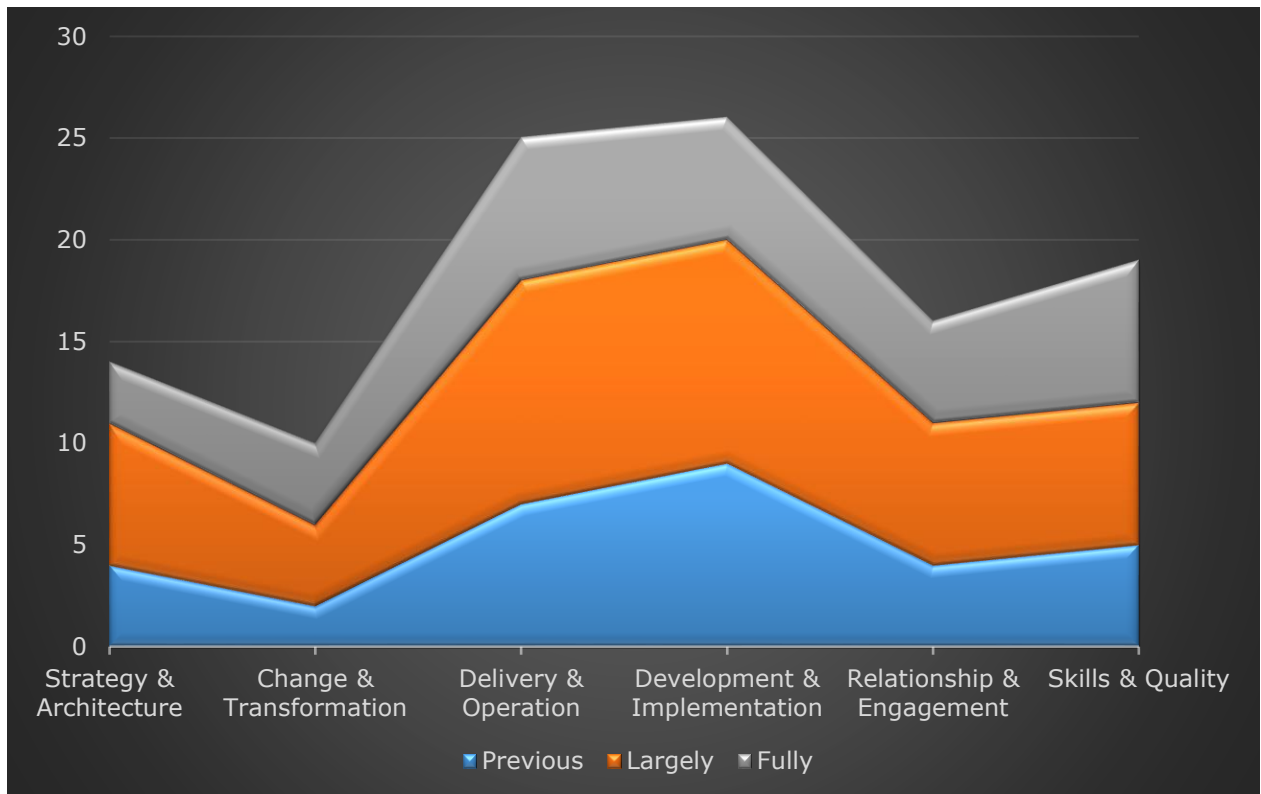


Figure 4.8 Combined Skill Summary based on Skills Levels

Figure 4.8 shows the division of skills levels (previously, largely and fully mastered) into seven departments, namely Strategy and Architecture; Change and Transformation; Delivery and Operation; Development and Implementation; Relationship and Engagement; and Skills and Quality. The figure shows that the number of staff members in the department of ‘Development and Implementation’ is the largest for every skill level (previously, fully or largely mastered). It signifies that there is maximum tacit knowledge in the department of ‘Development and Implementation’ at Company X. This is followed by the number of staff members in the department of ‘Delivery and Operation’, whereas the minimum number of staff members is present in the department of ‘Change and Transformation’.

4.4 Artefact Evaluation

This section provides information about the steps involved in evaluating the research artefact (*model*).

4.4.1 Semi-structured Interviews

Semi-structured interviews were conducted with all research participants to evaluate the *model*. The evaluation of the *model* was conducted in two phases. Initially, the participants were asked about their thoughts and experiences of self-assessing their skills for identifying their tacit knowledge stock. Secondly, they were asked to share their perceived views on the role of

identifying tacit knowledge stock to enable knowledge transfer. The interviews of the participants were conducted in a free and relaxed environment, to make them comfortable in sharing their opinions with the interviewer. Each interview was conducted for up to thirty minutes. The interview questions are provided in *Appendix C*.

In this study, the participants were asked to choose their interview site. They all discussed this and finalised that Company X was to be the site for the interviews. The manager of Company X was requested to provide a suitable room for conducting the interviews, and a meeting room in the company's IT department was booked for everyone's convenience. All participants were provided with the questions which were to be asked to them in the interviews, via email, prior to the interviews.

Semi-structured interviews were chosen for evaluating the *model*, so that enough and appropriate information could be obtained from the participants. Before starting the interview, a consent form was provided to each participant for their signature. An information sheet was also provided to them prior to the interview. The Consent Form and Participants Information Sheet are provided in *Appendix E* and *Appendix F* respectively.

Participants were initially asked questions, and the interview continued based on their responses to the questions. The semi-structured interview is a very flexible method which prevents interviewers from focusing on the questions and allows them to focus on the participants' answers (Cohen & Crabtree 2006). This method helped the interviewees to share their opinions freely and assisted the interviewer to maintain the correct direction of the interview (Gall et al. 2003). In the beginning, the participants were provided with their skills assessment report, and were asked to introduce themselves and talk about their job roles at Company X. They talked openly about their experiences of self-assessment of skills in identifying their tacit knowledge stock. Along with that, perceived views on the role of tacit knowledge stock identification in knowledge transfer was provided by the participants. The data was completely based on the views and opinions of interviewees. This interview helped to determine the usefulness of the self-assessment of skills in identifying tacit knowledge stock, and its role in facilitating knowledge transfer.

4.4.2 Data Transcription and Analysis

A digital voice recorder was used to audio-record the interviews of the participants. Once the interviews were completed, all recordings were transcribed manually. Errors were also rectified after completing the data transcription, by comparing them with the audio recordings. The

comparison was done by simply checking that each word of the report matched with the relevant audio recordings. For this research, thematic analysis and content analysis were used for analysing the interview data.

Thematic analysis was used to search for and identify similar words or texts from the larger interview data (DeSantis & Ugarriza 2000). This method helped to categorise and classify the data into relevant contexts. It also assisted in sorting the texts and words from the different sources into relevant categories and themes, which made the data systematic and viable. Several nodes were created and noted down, based on the novelty of the information. Each new piece of information was coded under the new node if it was relevant to the research questions of the study. In this way, all the textual data was coded to obtain the meaningful data and themes under relevant nodes. Initially, there were long, descriptive nodes containing lengthy phrases in their names. However, these nodes were clearly defined and named after frequent reading and analysis. Different patterns and themes were generated after using this method.

A hierarchy of the nodes was created. Each node was later placed under themes: self-assessment of skills, knowledge transfer, and miscellaneous. The data related to the theme 'self-skills assessment' was placed under this heading, and the data discussing knowledge transfer was placed under the heading of 'knowledge transfer'. New themes which were essential, but irrelevant to the research questions, were noted down under the theme 'Miscellaneous'. After sorting all themes, the data was further interpreted to obtain the meanings of the themes and the relationships between themes. Content analysis was further used to clarify the meaning of the coded texts, the themes, and their relationships. Analysing and evaluating the way participants respond to interview questions is considered a valuable strategy (Bloor & Wood 2006) and is also useful in data quantification (Grbich 2012). Using this method, the meaning of each piece of text obtained from the interviews was interpreted to assess its relevancy to the research questions. A deep analysis of the frequency of certain themes and specific texts was done to obtain the intensity of expression in the coded text. Thus, in this way, the answers to the research questions were derived.

4.4.3 Findings

This section presents the results and findings obtained from the transcription and analysis of the semi-structured interview data. The evaluation of the *model* was conducted in two phases: (i) usefulness of self-assessment of skills in identifying tacit knowledge stock, and (ii) role of

identifying tacit knowledge stock in knowledge transfer. The findings of these two phases of evaluation are presented next.

4.4.3.1 Evaluation Results of Usefulness of Self-assessment of Skills in Tacit Knowledge Identification

Research participants were interviewed about the effectiveness of self-assessment of skills in identifying their tacit knowledge stock. A very small minority of participants (two of twenty-one) did not find it useful for identifying their tacit knowledge stock, and two of the participants were neutral on this. However, most of the participants (seventeen of twenty-one) found the self-assessment of skills very helpful in identifying their tacit knowledge stock, either at an individual level or at an organisational level. *Table 4.2* provides a summary of the evaluation results of the effectiveness of the self-assessment of skills in tacit knowledge stock identification.

Views of Participants	Selected Comments
<p>Not Useful</p>	<p><i>[P2]- “ ... making the connection between your skills and your tacit knowledge that you use at the workplace is difficult- I found that there wasn’t a direct link. So I didn’t find it that helpful.”</i></p> <p><i>[P15]- “ ... [Self-assessment of skills] is a good starting point if this tool is used with more maturity, however, I see very less benefits for myself because this method cannot help me to identify all my tacit knowledge. There are some limitations of this method. ”</i></p>
<p>Neutral</p>	<p><i>[P3]- “ ... I would be neutral on this. It was not that greatly helpful or it didn’t serve me the purpose on individual basis. I don’t know about the organisational benefits out of this. Individually I didn’t have much gain on this.”</i></p> <p><i>[P16]- “ ... not sure how this method helps in identifying tacit knowledge. I can’t comment on this.”</i></p>
<p>Useful- At Individual Level</p> <ul style="list-style-type: none"> - planning career - identifying skills gaps - gaining an overall picture of own tacit knowledge stock 	<p><i>[P8]- “ ... I can identify the skills and tacit knowledge stock which I lack or which I can pursue in future to progress my career.”</i></p> <p><i>[P14]- “If you have a career goal and trying to plan a career, I think it will be very useful because it will help you identify the areas where you need to work on.”</i></p> <p><i>[P1]- “ ...provides me some directions to obtain a certain training or knowledge in my areas.”</i></p> <p><i>[P20]- “ ... gives a clear description about your strengths and weaknesses. It gives ideas about what you are good at.”</i></p>
<p>Useful- At Organisational Level</p> <ul style="list-style-type: none"> - useful to the managerial staff only - getting an overall picture of the collective tacit knowledge stock 	<p><i>[P4]- “ ... an overall picture of what the employees are skilled with. It is a great tool for the management staff.”</i></p> <p><i>[P13]- “ ...helps managerial staff to know where they are and what they want to do in future, based on the tacit knowledge stock of their staff.”</i></p> <p><i>[P21]- “ ...assess the potential employees to determine what skills they have and what skills they can bring to the organisation.”</i></p>

<p>- recruiting new employees based on the identified knowledge gaps</p>	<p><i>[P11]- “...helps managers and senior managers to identify what the strengths, advantages and disadvantages of the staff are so that they can know which area they need to look at.”</i></p>
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Table 4.2 Summary of the Evaluation Results of Effectiveness of Self-assessment of Skills in Tacit Knowledge Identification

4.4.3.2 Evaluation Results of Role of Tacit Knowledge Stock Identification in Knowledge Transfer

Research participants were interviewed to evaluate the role of tacit knowledge identification in facilitating knowledge transfer. They were asked a set of questions to determine in which ways the representation of their tacit knowledge stock could help in knowledge transfer. None of the participants said that identifying tacit knowledge is not useful in enabling knowledge transfer. Six of twenty-one participants were not sure about the role that the identification of tacit knowledge stock plays in knowledge transfer. Most of the participants (fifteen of twenty-one) found the identification of tacit knowledge stock helpful in transferring knowledge. They mentioned how tacit knowledge transfer is affected by its identification. Three significant themes emerged from the data analysis, namely person-organisation fit; sender’s willingness; and prior understanding of receiver’s tacit knowledge stock. Three emerging themes were also generated, including similar knowledge area; organisational culture; and self-awareness of tacit knowledge stock. *Table 4.3* provides a summary of the evaluation results of the role of tacit knowledge identification in knowledge transfer.

S.N.	Views of Participants	Selected Comments
1.	Not Sure	<p data-bbox="619 237 1342 315"><i>[P7]- "...can't imagine how identifying tacit knowledge stock would facilitate knowledge transfer."</i></p> <p data-bbox="619 365 1374 488"><i>[P17]- "... it was a good exposure to skills and knowledge but I am not sure how it would be helpful in facilitating knowledge transfer."</i></p>
2.	Positive Role	<p data-bbox="619 517 1385 640"><i>[P2]- "... if other people had that knowledge and I want to gain their knowledge then in a sense it should help knowledge transfer."</i></p> <p data-bbox="619 689 1374 846"><i>[P6]- "...If the profiles of other team mates are shared with us, then certainly yes. That will help us to gain the knowledge from that person if we are going to some other specialised projects."</i></p> <p data-bbox="619 896 1342 1019"><i>[P18]- "... I think it is helpful in knowledge transfer because once a person knows what skills he has, he can easily teach other people who require that knowledge."</i></p> <p data-bbox="619 1068 1358 1146"><i>[P5]- "...if we know what our skills are, it will help us to transfer our knowledge to others."</i></p> <p data-bbox="619 1196 1366 1274"><i>[P15]- "...I think that knowing own knowledge stock and levels will help to share knowledge among others."</i></p> <p data-bbox="619 1323 1369 1447"><i>[P12]- "... I think it could if more people are using it and they are aware of the skills they have, it could support knowledge transfer."</i></p>

Significant Themes	<p>Theme 1: Person-Organisation Fit</p> <p><i>[P15]- “[knowledge transfer] can depend on what your role is in an organisation. For example, if you have a set of skills that require you to do your job that might not be the same skills set for another person.... knowledge stock identification alone cannot facilitate knowledge transfer.”</i></p> <p><i>[P9]- “... the job title of a person also determines the extent to which knowledge can be transferred. For example, a junior level employee can gain knowledge more from his senior colleagues and he is not much able to provide knowledge to others. Whereas, a senior level employee can provide knowledge to others as he possess the maximum knowledge. So I think the job role and position of a person also determines how much knowledge can be shared.”</i></p>
	<p>Theme 2: Sender’s Willingness</p> <p><i>[P10]- “[knowledge transfer] depends on whether a person wants to share knowledge to expand into different roles in the organisation after identifying his/her tacit knowledge stock.”</i></p> <p><i>[P3]- “...people should also have the motivation to share their knowledge. I must have willingness to share my knowledge to others.”</i></p>

Theme 3: Prior Understanding of Receiver's Knowledge Stock

[P12] - "... if I know what other people's knowledge are, then it certainly would help to go to the right person to obtain or give knowledge."

[P6]- "... if the profiles of other team mates are shared with us, then certainly yes [enabling knowledge transfer]. That will help us to gain the knowledge from that person if we are going to some other specialised projects."

[P9]- "... it is also important to know the skills level of the other person. If we know the skills and knowledge levels of the other person, then we can easily share our knowledge to them."

[P18]- "... I don't know about gaining skills from others, but I can pass my knowledge to others once I know my skills level. But, if I know the skills and knowledge about others, I can definitely gain knowledge from them, as well."

[P19]- "...knowing others' knowledge is also very important before transferring knowledge to them. It is because it makes us aware what level of knowledge they have and what we must provide to them. It definitely impacts on tacit knowledge transfer."

[P4]- "... I think that after knowing own knowledge and skills level, it is also important to know the person and his/her knowledge and skills to whom you are sharing."

Emerging Themes	<p>Theme 1: Similar Knowledge Area</p> <p><i>[P8]- “... it is bit hard to share knowledge to the person whose roles and responsibilities are completely different from yours in the organisation. For example, it is easy for a programmer to share his or her knowledge to another person who is involved in software development and programming. It becomes difficult to share the same knowledge to a network engineer. So I think this also matters a lot in knowledge transfer.”</i></p> <p><i>[P13]- “... there are less chances of learning and gaining knowledge from the people who have different knowledge levels and skills as compared to the people with knowledge in similar areas.”</i></p> <ul style="list-style-type: none"> • Sub-Theme 1: People’s Hesitation and Reluctance <p><i>[P5]- “... though I am aware of the tacit knowledge of a person but working in a different area, it is still unlikely for me to gain knowledge from them. I think that there are less chances of learning and gaining knowledge from the people who have knowledge in different areas than yours as compared to the people with knowledge in similar areas. It is because I do not know them well and there is a bit of hesitation in gaining or sharing knowledge though their knowledge levels are known to me.”</i></p> <ul style="list-style-type: none"> • Sub Theme 2: Participation and Involvement <p><i>[P11]- “Besides, I would require having a person to work in a similar project with me and have similar knowledge area as I have. This would help me to easily transfer knowledge to him. It is because you earn from doing works together and it can enhance knowledge transfer. So, I think, participation and involvement in common tasks also boost knowledge transfer with the people working in similar knowledge area.”</i></p>
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	<p>Theme 2: Organisational Culture</p> <p><i>[P16]- "... the culture of organisation also plays an important role in knowledge transfer. It is not enough that a person is aware of his/her own skills and knowledge, there must also be the culture of knowledge sharing in the organisation. For example, in some places, employees are very much competitive and there is no culture of sharing knowledge. So, it also depends on the organisational culture."</i></p> <p><i>[P21]- "... the culture of an organisation can affect knowledge transfer, how people are working in the organisation and those kinds of things. With knowledge stock identification, I can know to whom I can share my knowledge and organisational culture helps to push you to transfer knowledge. So, I would say both are important."</i></p>
	<p>Theme 3: Self-awareness of Tacit Knowledge Stock</p> <p><i>[P1]- " I think that a bit of a determinant in knowledge transfer as all the people do not have the same capability of identifying their tacit knowledge stock. So, I think the capability of identifying own skills or knowledge is also one of the main factors affecting knowledge transfer."</i></p>

Table 4.3 Summary of the Evaluation Results of the Role of Tacit Knowledge Identification in Knowledge Transfer

Adopting the research design and methodology discussed in Chapter 3, the DSR methodology was used to answer the research questions. The research objectives include exploration of the usefulness of identification and transfer of tacit knowledge based on self- assessment of skills. A skills assessment tool based on the SFIA framework was used in Company X to identify the tacit knowledge of IT professionals. Likewise, semi-structured interviews were conducted to evaluate the use of identification of tacit knowledge stock in knowledge transfer. The results showed that there is a positive role of identifying tacit knowledge stock based on self-assessment of skills in knowledge transfer.

RQ 1 states that,

To what extent can self-assessment of skills help to identify tacit knowledge stock? Studies of Bartram (2004) and Hedlund (1994) supported the fact that skills assessment helps in

determination of tacit knowledge stock of individuals which is supported by the results of this study.

RQ 2 states that,

What role does identifying tacit knowledge stock play in knowledge transfer?

Studies such as Cummings & Teng (2003) and Seba et al. (2012) mentioned that identification of tacit knowledge stock plays a positive role in transferring the knowledge, which is also supported by the results of this study.

A more detailed discussion of the results is presented in Chapter 5.

4.5 Summary

This chapter discussed the overall processes involved in the artefact (*model*) development, implementation and evaluation at the case study organisation, and presented the results. Along with this, the processes of data collection - how the data was collected, and the settings used to collect them were discussed. The operational phases of the *model* were discussed, followed by a discussion of methods of data analysis and transcription. The results and findings are discussed in the next chapter.

Chapter 5 Discussion

5.1 Introduction

This chapter discusses the research findings. The aim of this chapter is to provide a critical examination of the findings, with discussions based on the context of the research method and reviewed literature. Discussions are structured to answer the two research questions, with a consideration of research work conducted and the presentation of significant themes emerging from this research.

As articulated in *Chapter 1*, this study addresses the research problem of the difficulty in identification and transfer of tacit knowledge stock. *Figure 5.1* illustrates the overview of this chapter.

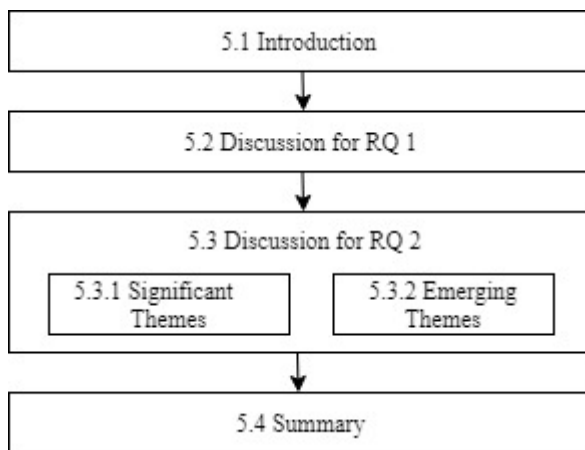


Figure 5.1 Chapter 5 Overview

This chapter comprises four main sections. *Section 5.1* introduces the chapter. *Section 5.2* provides a discussion of research question one (RQ 1), whereas *Section 5.3* discusses the findings related to research question two (RQ 2) along with a description of the themes. The summary of the chapter is presented in *Section 5.4*.

5.2 Discussion for RQ 1

To what extent can self-assessment of skills help to identify tacit knowledge stock?

The findings of this research complement the research conducted by Bartram (2004) and suggest that skills assessment is a useful method to identify tacit knowledge stock at individual as well as organisational levels. However, our findings confirm that typically people find skills assessment useful for identifying tacit knowledge stock at an individual level only. For example, the skills assessment enabled case study participants to plan their careers.

The findings of this research support Hedlund's (1994) argument that skills assessment helps in determining the tacit knowledge stock of individuals acquired beyond formal training (both leaders and non-leaders), and enhances their success at an individual level. Elliott et al. (2011) mentioned that self-assessment of tacit knowledge stock is not enough but is one of the important steps in developing teaching expertise. The findings of this research support Elliott et al.'s (2011) argument that self-assessment of skills for identifying tacit knowledge stock is essential at an individual level, as it enhances the skills and expertise of a person. For example, the tacit knowledge stock of P1 and P17 were identified by the skills assessment, and P1 was placed under the 'Novice' group in terms of all four attributes (Autonomy, Influence, Complexity and Business Skills) defined by the Skills Framework for the Information Age (SFIA) as shown in *Table 4.1*. It can be generalised that because P1 and P17 are novices in terms of their skills, they might have found the importance of self-assessment of skills only at an individual level.

Wiklund and Shepherd (2003) argue that if the collective knowledge resource of a firm is utilised properly, it enhances the firm's orientation and performance. Benefits to the case study organisation itself were not appreciated due to the recognition of collective tacit knowledge stock, whereas some of the participants did not find any advantages or disadvantages of the skills assessment in identifying tacit knowledge stock. For example: P3 and P16 were neutral when asked about the pros and cons of self-assessment of skills in tacit knowledge stock identification. P3 was placed under the 'Intermediate' group, whereas P16 was placed under the 'Expert' group based on the skills they possessed, which is illustrated in *Table 4.1*. Despite identifying the maximum amount of skills in their area of expertise through self-assessment of skills, the interview data did not match their assessment activity. These participants mentioned that they could not find any advantages or disadvantages of using the self-assessment of skills in tacit knowledge stock identification.

The research conducted by Nickerson and Zenger (2004) stated that managers must identify and utilise the overall knowledge stock of the firm, because it helps in solving the firm's critical problems related to the use of limited time and resources. Although organisations benefit greatly from their collective knowledge stock, organisations are missing out on effectively disseminating them. The findings of this research do not fully support Nickerson and Zenger's (2004) claim about the importance of identifying tacit knowledge stock using skills assessment at organisational level, because maximum participants did not value the importance of self-assessment of skills in identifying tacit knowledge stock at an organisational level. For

example: P4, P11 and P21 were placed under the ‘*Intermediate*’ group based on their skills, whereas P13 was placed under the ‘*Novice*’ group after the skills assessment. P11 was placed under the ‘*Intermediate*’ group in terms of the skills relating to three attributes (Autonomy, Influence and Complexity) which are determined by SFIA, whereas P21 was placed under the ‘*Intermediate*’ group in terms of the skills in three attributes (Autonomy, Influence and Business Skills). P4, P11, P13 and P21 mentioned that self-assessment of skills is useful in the identification of tacit knowledge stock at an organisational level, and that it enhances organisational growth. This claim supports the concept of VRIO framework, which mentions that proper utilisation and management of organisational resources (e.g. tacit knowledge stock) leads to the superior performance of the organisation. On the other hand, two participants (P2 and P15) mentioned that self-assessment of skills is not useful in identifying tacit knowledge stock. P2 comes under the ‘*Intermediate*’ group, whereas P15 comes under the ‘*Expert*’ group, based on their skills. The interview data of P2 and P15 does not match with the report from their skills assessment. The reason for this is that P2 and P15 have identified their maximum number of skills, however they have mentioned that self-assessment of skills is not useful in identifying tacit knowledge stock.

Sitzmann et al. (2010) asserted that self-assessment of knowledge is useful as an indicator of how learners feel about their learning experiences, rather than as an indicator of how much they learned, which is not confirmed by the findings of this research. The reason for this is that the findings of this research suggested that self-assessment of skills is useful for identifying the tacit knowledge stock of organisational members, that is, the type and amount of tacit knowledge that the participants possess in their field of expertise.

This research confirmed that self-assessment of skills can be helpful to identify tacit knowledge stock. However, research participants predominantly found its usefulness limited to individual goals, and therefore its application for organisation-wide knowledge transfer can be challenging.

5.3 Discussion for RQ 2

What role does identifying tacit knowledge stock play in knowledge transfer?

Past studies have mentioned different factors affecting knowledge transfer in positive or negative ways (Argote & Ingram 2000; Duan et al. 2010; Paulin & Suneson 2012). Some of the factors include organisational culture (Wiewiora et al. 2013); sender’s willingness (Héliot & Riley 2010); nature of knowledge (Ipe 2003); transfer opportunities (Ipe 2003); and

knowledge stock identification (Cummings & Teng 2003). Among all the factors, knowledge stock identification is also considered as an essential factor influencing knowledge transfer. However, the importance of knowledge stock identification in knowledge transfer has been discussed by different researchers in different ways.

The findings of this study suggest that tacit knowledge stock identification plays a vital role in knowledge transfer. The findings complement the study of Cummings and Teng (2003) which found that tacit knowledge stock has a positive effect on knowledge transfer, and argued that lack of understanding of the source's tacit knowledge will encourage the recipient to avoid gaining knowledge from the sender. The findings of this study also support the study of Fullwood and Rowley (2017), which found that academic leadership is one of the forms of the tacit knowledge stock of employees that has a positive effect on knowledge transfer, and that the tacit knowledge stock of an organisational employee can be represented by his or her academic leadership quality. They also presented the idea that the greater the academic leadership, the higher the knowledge transfer will be in the organisation. The findings of this study support other studies, which argue that tacit knowledge stock identification creates positive intentions for knowledge transfer (Seba et al. 2012), and that it plays a major role in all phases of knowledge management, including knowledge creation, knowledge storage/retrieval, knowledge transfer and knowledge application (Jayawickrama et al. 2016). The results of this study also complement Power and Cormican's (2015) argument about the importance of understanding the tacit knowledge stock of all employees in an organisation to enable knowledge transfer. The empirical data from this research demonstrates the importance of tacit knowledge stock to facilitate knowledge transfer. Following the VRIO framework, this research confirms that when the tacit knowledge stock of organisational staff are identified, knowledge transfer will be facilitated, leading to the superior performance of the organisation. This is akin to the research conducted by (Argote & Ingram 2000).

Six new themes have been emerged in this research while exploring the relationship between tacit knowledge stock and knowledge transfer. The discussion of the significant themes and emerging themes follows.

5.3.1 Significant Themes

5.3.1.1 Defining Person-Organisation (P-O) Fit

One of the important themes that emerged from the findings of this study was the concept of P-O fit theory, which refers to the compatibility between firms and their employees that occurs

by the fulfilment of the needs and demands of one entity by the other, or by sharing similar basic characteristics, or both (Kristof 1996). This study argues that along with the identification of tacit knowledge stock, the job roles and positions of staff in an organisation also affect knowledge transfer. This study complements the findings of Bowen et al. (1991), which mention that the human resource management of an organisation is responsible for hiring employees in an organisation, which affects the transfer and utilisation of input-based organisational knowledge. This research supports the fact that an organisation's human resource department needs to know the tacit knowledge stock of a person before hiring them, so they can then match this knowledge with the organisation's goals and objectives. This may lead to knowledge transfer and better knowledge utilisation between employees. Similarly, the findings of this study also support the argument of Gerstein and Reisman (1983) and Olian and Rynes (1984), who mention that organisations that focus on the P-O fit concept while hiring new employees by matching the employees' characteristics and organisational demands, are likely to achieve better knowledge transfer and superior performance as compared to those organisations that do not focus on the P-O fit strategy (Gupta & Govindarajan 1986). Based on this argument, it can be suggested that organisations that follow the P-O fit strategy while recruiting new employees identify the tacit knowledge stock of the employee, which results in enabling proper knowledge transfer and obtaining competitive advantages for the organisation. This approach of employee selection involves the identification of the knowledge stock of organisational members and enhances organisational knowledge transfer (Bowen et al. 1991), which directly complements the findings of this research.

The findings of this study suggest that the effectiveness of knowledge transfer depends on the fit of the person in his or her job and roles within the organisation. It supports the findings of the research conducted by Awoniyi et al. (2002), who mentioned that the transfer of training was much easier due to the presence of perfectly matched employees in the organisation who fulfilled organisational goals as required. It means that when organisations hire employees based on the P-O fit strategy, the efficiency and effectiveness training transfer increases in the organisation.

Based on the theme of 'person-organisation fit', it is critical that tacit knowledge stock is relevant to the person's job and current role in the organisation. The VRIO framework states that organisations can gain maximum benefits if their resources are valuable (V), rare (R), difficult to imitate (I), and properly utilised by the organisation (O) (Barney 1991). The fourth property of an organisational resource, that is: ability to utilise the resources (O), is found to

be most challenging (Chatzoglou et al. 2018). Judge's (1994) theory of work adjustment confirms that person-organisation fit positively impacts an employee's career success and supports organisation growth. Associating this theory with the VRIO framework, tacit knowledge stock can be considered valuable, rare and difficult to imitate (VRI) on its own, however it can only be organised (O) when the best fit for the organisation and its staff is determined. Implications to practice include creating favourable working environments where employees are aware of their roles and responsibilities in the organisation to enable knowledge transfer.

5.3.1.2 Sender's Willingness

The findings of this research suggest that a sender's willingness is one of the important factors affecting knowledge transfer. This finding complements the findings of the research conducted by Héliot and Riley (2010), who argued that a sender's willingness is a malleable entity which is influenced by various aspects, but plays a vital role in knowledge transfer. It means that it is very easy to make changes to the willingness of a person for transferring knowledge, but this is an essential aspect to be considered for enabling knowledge transfer. Similarly, the findings of this study also support the findings of the research conducted by Michailova and Husted (2003), who argued that the behaviour of an employee is highly dependent on his/her willingness to transfer knowledge among their colleagues in an organisation. The authors outlined six reasons for the unwillingness of an employee to transfer knowledge, which include protection of individual competitive advantage, reluctance to spend time and resources, fear of hosting "knowledge parasites", exposure avoidance, strategy against uncertainty, and fear of losing superiority. The fact that a sender's unwillingness to transfer knowledge has various causes, and that it is impossible to transfer knowledge if a sender is not willing is supported by this research. Similarly, the findings of this research also support Wiewiora et al.'s (2013) research, which contained empirical evidence of the importance of a sender's willingness to enable knowledge transfer, and demonstrated that organisational culture has a significant impact on an employee's willingness to transfer knowledge in an organisation.

Likewise, the findings of this study support the claim made by Goh (2002), who mentioned that a leader must show the willingness to transfer knowledge among other employees of an organisation who freely seek knowledge from them. Likewise, the findings of this research also support the findings of Szulanski (1996), who generated a sophisticated measure of thirteen items to obtain a source's lack of motivation for transferring knowledge, and argued that the

willingness to share one's knowledge is an important aspect of obtaining competitive advantage in an organisation.

One of the findings of this research also complements one of the findings of Najafi-Tavani et al. (2012), who mentioned that the willingness of a knowledge sharer is the strongest facilitator of reverse knowledge transfer, and that the tacit nature of knowledge in the Knowledge Intensive Business Service (KIBS) sector results in difficulty in the knowledge transfer process. Therefore, the findings of this research and the findings of Najafi-Tavani et al. (2012) support one common fact that knowledge transfer can be unsuccessful if there is not enough willingness of a knowledge sender to share his or her knowledge.

Along with this, the findings of this research support Dobrai et al.'s (2012) argument that different factors such as cultural diversity, distance between organisational units, knowledge relevance, and language diversity affect organisational knowledge transfer, among which the motivation and willingness of a knowledge sender plays a vital role; and Chen et al.'s (2014) argument which states that the success of knowledge transfer is mainly determined by the willingness and involvement of a person, and can be strengthened through the cooperative competency of organisations.

Similarly, prior studies have mentioned that it is important to create a positive climate in organisations, as it helps to motivate employees to transfer knowledge. Also, the willingness of a sender is an essential aspect for making knowledge transfer successful (Brown & Vessey 2003; Østerlund & Carlile 2005). The argument of Brown and Vessey (2003) is supported by the findings of this research, which suggest that a sender's willingness directly affects tacit knowledge transfer in organisations.

Likewise, the findings of this research support the research of Minbaeva and Michailova (2004), who argued that the success of knowledge transfer is dependent on two factors, which are abilities and willingness. Valuable knowledge is mostly tacit in nature (Winter 1987). Moreover, there are variations in the interpretations of same ideas, false starts, and interruptions in knowledge transfer (Zellmer-Bruhn 2003). Therefore, it is important that knowledge senders have well-developed abilities in articulating and communicating knowledge. Such abilities can be gained through education, training and involvement. On the other hand, knowledge senders may have the ability, but be unwilling to transfer knowledge for the reasons mentioned by Michailova and Husted (2003). Overall, it can be argued from the findings of this research that

identifying a sender's tacit knowledge stock (that is: abilities) is not sufficient in transferring knowledge; the sender must also be willing to transfer knowledge in an organisation.

5.3.1.3 Understanding Receiver's Knowledge Stock Prior to Knowledge Transfer

Lin et al. (2005) proposed that one of the critical ways of making knowledge transfer successful is by creating a positive climate between knowledge senders and receivers. Not only the sender, but the receiver plays a vital role in making knowledge transfer successful. The majority of studies have highlighted the factors related to the sender impacting knowledge transfer either positively or negatively (Gupta & Govindarajan 2000; Dobrai et al. 2012; Chen et al. 2014). These studies emphasised the importance of the sender in enabling knowledge transfer. However, there are some studies which have mentioned that the receiver is equally important in making knowledge transfer successful. Noorderhaven and Harzing (2009) argued that face-to-face social interaction between senders and receivers is very important to enable knowledge transfer between them. It builds a sender-receiver model for knowledge transfer, and illustrates the equal importance of the sender and the receiver in enabling knowledge transfer. Senders and receivers must be given access to each other to enable knowledge transfer within an organisation (Bell DeTienne & Jackson 2001; Bell DeTienne et al. 2004), and they should exist laterally within the organisation to gain a feeling of being a "team" rather than a feeling of being individuals, in order to share and receive knowledge from each other (Hedlund 1994).

All these factors have been highlighted by past studies to explain the importance of the receiver in the success of knowledge transfer. Besides these factors, receivers' knowledge stock also plays an important role in knowledge transfer (Cowan et al. 2004). The ability of a receiver based on his knowledge stock, determines the knowledge sharing extent. It means that a receiver uses new knowledge to increase his or her knowledge stock via gaining knowledge from the sender. Cowan et al. (2004) mentioned that the receiver's knowledge stock is a major factor affecting knowledge transfer, as it determines his or her ability to absorb knowledge from the sender.

Lin (2007) states that the use of IT helps the knowledge receiver to recognise the sender's knowledge stock. This research does not include identifying the receiver's knowledge stock. Likewise, it has been mentioned that collective knowledge stock has a positive impact on knowledge transfer (Wang & Noe 2010). Prior research suggests that based on ones' own knowledge stock, the sender perceives that the receiver will benefit from knowledge transfer without recognising the receiver's knowledge stock. In these cases, knowledge transfer occurs

due to the perceived beliefs of employees that their knowledge stock is useful to other people, especially in a professional network. However, the sender is not aware of the receiver's knowledge stock in all of these studies (Wasko & Faraj 2005; Chiu et al. 2006; Siemsen et al. 2007). However, in this study it was found that prior understanding of receiver's knowledge stock could play a critical role in knowledge transfer.

The research findings support the research of Zhao et al. (2015), who revealed that knowledge transfer was influenced by the capabilities and governance efforts of the source and recipient teams under the cross-project context of organisations, and argued that the knowledge transfer process can be enhanced if the sender is aware of the receiver's knowledge stock, and vice versa. Cowan et al. (2004) also mentioned that there are opportunities for innovation if the source is aware of the prior knowledge level of the recipient during tacit knowledge transfer. This statement is supported by the findings of this research, as the majority of research participants suggested that when they wish to transfer knowledge, they prefer to know the knowledge stock of the receivers beforehand. It appears to be a very practical suggestion, but no research was found in this area.

Cummings and Teng (2003) stated that the knowledge stock of the sender must be made accessible to the receiver to enable knowledge transfer between them, whereas Gupta and Govindarajan (2000) mentioned that knowledge transfer is dependent on the receiver knowing the value of the sender's knowledge stock. Both of these studies have the same suggestion, that the sender's knowledge stock must be known by the receiver to enable knowledge transfer. However, limited studies associate knowledge transfer effectiveness with receivers' knowledge stock.

Consequently, as an important implication for practice, it is argued that it is important to recognise the tacit knowledge stock of the receiver before knowledge transfer is considered by the sender. A number of studies have proposed that knowledge transfer is easier when tacit knowledge stock is known (Lin 2007; Wang & Noe 2010). However, this relationship has been explored based on the self-awareness of the tacit knowledge stock of the sender, but not from the perspective of the receiver. This is perhaps due to the assumption that it is not possible to recognise the tacit knowledge stock of others. This assumption, however, does not hold true, since this research has enabled identification of tacit knowledge stock based on self-assessment of skills. At an individual level, such tacit knowledge stock can be shared with key stakeholders for effective knowledge transfer. Therefore, combined with the factor of senders' willingness,

it is justified that the prior understanding of receiver's tacit knowledge stock enables effective knowledge transfer.

5.3.2 Emerging Themes

5.3.2.1 *Similar Knowledge Area*

Tacit knowledge refers to the amount of knowledge and information possessed in the mind of a person in a specific area. There is a sender and a receiver in the process of knowledge transfer, where the sender and the receiver possess different types and amounts of knowledge (Lin et al. 2005). For example: the sender and the receiver are both from the IT field, but have differences in the amounts and types of the tacit knowledge they possess.

Several studies have mentioned that when senders and receivers have similar tacit knowledge areas, it impacts the knowledge transfer between them (Empson 2001; Cummings & Teng 2003), which also supports the findings of this research. The findings of this research complement the argument of Empson (2001), who mentioned that when people have similar knowledge areas, but differences in tacit knowledge, it makes knowledge transfer easy between them. The author mentioned that the receiver was able to gain the knowledge from the sender without any absorption issues because of the similarity in their knowledge areas. Besides, knowledge transfers more easily across organisations which are embedded in networks such as franchises, chains or alliances, and which share common platforms (Darr et al. 1995; Powell et al. 1996; Baum & Ingram 1998; Ingram & Simons 1999). For example, fast-food stores benefit from the experiences and knowledge of people working in other stores in the same franchise, but not from that of stores in different franchises (Darr et al. 1995). This statement supports the findings of this research, which determined that similar knowledge areas of organisational members positively affected tacit knowledge transfer between them.

Cummings and Teng (2003) shed light on the concept that knowledge distance is one of the factors affecting knowledge transfer. Knowledge distance is the degree of similar knowledge possessed by the source and the recipient (Qian et al. 2009). Due to the variations in the resource and development contexts of the source and the recipient in the organisations, there were difference in the knowledge shared by them. This negatively affected the knowledge transfer process (Cummings & Teng 2003). This supports the theory that knowledge transfer is enhanced when the sender and the receiver possess knowledge in similar areas. This research also supports this argument as it claims that knowledge transfer occurs when there is a difference in the knowledge stock of people who are operating in the similar knowledge areas.

At the same time, many researchers have also claimed that senders and receivers who have very small knowledge distance are unlikely to make knowledge transfer successful (Burgelman 1983; Nystrom & Starbuck 1984). This is because the receiver becomes reluctant to gain knowledge from the sender if they have a very similar knowledge stock. There is a sense of dissatisfaction among the parties when little knowledge is transferred. Although curvilinear relationships between knowledge distance and transfer success have been shown in past studies, this research does not confirm this relationship. None of the interviewees in this research supported such a relationship.

While discussing the importance of having similar knowledge areas in enabling tacit knowledge transfer, the interviewees also mentioned other factors related to it. One of the interviewees linked the concept of similar tacit knowledge areas to the hesitation and nature of the people. Along with this, the importance of people's participation and involvement in activities has also been linked to the concept of similar tacit knowledge areas in enabling knowledge transfer. The explanation of these two concepts are provided below.

- **People's Hesitation and Reluctance**

Some people see knowledge transfer as additional work as it requires time for documentation and communication (Disterer 2001). People have reluctance and hesitation to transfer knowledge because they lack the belief in, and experience of obtaining benefits from it. Various factors that lead to the hesitation and reluctance of people in knowledge transfer have been discovered and discussed in past studies (Quinn et al. 1996). However, there is lack in the research that explains the relationship between people's hesitation in knowledge transfer and the similar knowledge areas between sender and receiver.

While exploring the importance of tacit knowledge stock identification to enhance knowledge transfer, a factor affecting knowledge transfer has been obtained. One of the interviewees mentioned that if a sender and a receiver do not have similar knowledge areas, a sense of hesitation to gain or share knowledge with each other will appear in both of them. The data obtained shows that if senders and receivers possess tacit knowledge stock in different areas within an organisation, it creates in them a hesitation to share their knowledge. This will negatively affect the knowledge transfer process.

- **Participation and Involvement**

The greater the participation and involvement of members in the organisational activities, the greater will be the knowledge transfer (Ardichvili et al. 2003). Organisations encourage or

directly pressurise their staff to participate in knowledge transfer activities for potential benefits (McDermott & O'dell 2001). Apparently there is limited research that links the concept of organisational members' participation with the concept of similar knowledge area affecting knowledge transfer. One of the interviewees suggested this relationship. The interviewee mentioned the importance of senders and receivers who have similar knowledge areas participating in these activities, as this leads to the success of tacit knowledge transfer in organisations.

5.3.2.2 Organisational Culture

Organisational culture is one of the essential elements affecting knowledge transfer in organisations because it is responsible for determining other variables of knowledge transfer success, such as technology and management techniques (Omar Sharifuddin Syed-Ikhsan & Rowland 2004). This research suggested that organisational culture is an important factor that affects tacit knowledge transfer. This finding complements the research of Stoddart (2001) and Karlsen and Gottschalk (2004), which mention that knowledge transfer can only be successful if the culture of the organisation promotes it. Similarly, the research of De Long and Fahey (2000) mentioned that an organisation's culture and sub cultures have an impact on knowledge transfer, and determine assumptions about knowledge worthiness for exchanging; defining relationships between individuals and organisational knowledge by determining people for sharing knowledge; determining the knowledge sharing processes in specific situations; and creating the processes by which new knowledge is transferred in organisations. The claims made by the research are supported by the findings of this research, as both studies highlight the importance of organisational culture in tacit knowledge transfer.

This research findings also complement the research conducted by McDermott and O'dell (2001), who argued that the lack of good organisational cultures led to insufficient tacit knowledge transfer between employees, and later resulted in failure of knowledge management tools and systems in organisations. Similarly, many IT projects failed because of the lack of support of organisations' cultures in promoting tacit knowledge transfer and sharing processes (McDermott & O'dell 2001) and lack of incentives in promoting tacit knowledge transfer in organisations (Cameron 2002). These studies pointed out that the lack of supportive organisational cultures may lead to inefficient tacit knowledge transfer between employees, resulting in negative effects on the IT projects of organisations, which is supported by the findings of this research. Karlsen and Gottschalk (2004) argued that the extent to which organisational culture results in effective tacit knowledge transfer is directly related to the

success of projects within an organisation. It argues that there is a strong positive relationship between organisational culture and tacit knowledge transfer, which is supported by the findings of this research.

Organisational culture has an impact on knowledge transfer in two ways, which include: (i) organisational culture develops an environment with strong social norms concerning the importance of tacit knowledge transfer among employees, and (ii) it develops an environment with care and trust among employees to encourage them to engage in knowledge transfer (Cabrera & Cabrera 2005). It asserts that organisations that emphasise incorporating knowledge transferring behaviour as a part of their culture demonstrate the importance of knowledge transfer to their staff, which complements the findings of this research. Likewise, Riege (2005) asserted that the cause of failure of knowledge transfer practices is the organisation's attempt in adjusting their culture to fit their knowledge sharing objectives and strategies, rather than implementing them so that they fit their culture. The assertion of Riege (2005) is supported by the findings of this study.

The research findings support Mohr et al.'s (2012) assertion that greater emphasis on maintaining organisational culture results in greater tacit knowledge transfer among employees of an organisation. They also support Wiewiora et al.'s (2013) statement that organisational culture emphasising competitiveness and achievement leads to negative impacts on knowledge transfer, whereas organisational culture emphasising a collaborative environment and a non-competitive atmosphere leads to positive impacts on knowledge transfer. Both of these studies support the fact that organisational culture has a positive relationship with the tacit knowledge transfer, which ultimately results in organisational competitiveness and superior performance. The findings of this research also show the positive relationship between organisational culture and tacit knowledge transfer.

Likewise, past researchers have mentioned that organisational culture is the most essential factor in affecting tacit knowledge transfer (Jarvenpaa & Staples 2000; Jasimuddin & Zhang 2014). Among other factors like technology, learning capacity (Peltokorpi 2017), organisational support (Kim et al. 2016), social status (Beck et al. 2014), and knowledge value (Pacharapha & Vathanophas Ractham 2012), organisational culture is essential to encourage knowledge workers to share their knowledge in a firm (Davenport & Short 1990; Jarvenpaa & Staples 2000; Jasimuddin & Zhang 2014). They argue that the tacit knowledge stock of people is not of great importance in transferring knowledge as compared to the organisational culture.

This assertion of researchers contradicts the findings of this research, as this research asserts that tacit knowledge identification is essential in transferring knowledge that is supported by a favourable organisational culture.

5.3.2.3 Self-awareness of Tacit Knowledge Stock

The tacit knowledge stock of a person can be identified in several ways, including through interviews, accessing past projects, and skills assessment (Bartram 2004). However, all these methods are used to identify the tacit knowledge stock of another person. One of the interviewees mentioned that identification of tacit knowledge stock was very important in transferring knowledge. However, the interviewee also claimed that employees would not normally be able to identify their own tacit knowledge. This means that organisational members should also focus on enhancing their abilities to identify their own tacit knowledge stock, in order to enable knowledge transfer. There is limited research which focus on the self-awareness of tacit knowledge stock for enabling knowledge transfer.

This research confirmed that tacit knowledge stock identification can be useful in facilitating knowledge transfer. However, research participants also discussed three significant themes, including person-organisation fit, sender's willingness to transfer knowledge, and prior understanding of receiver's knowledge stock, which can affect tacit knowledge transfer.

5.4 Summary

This chapter discussed the research findings based on two research questions (RQ 1 and RQ 2). It also introduced the themes of the research findings and described them in detail. The next chapter concludes the thesis.

Chapter 6 Conclusion

6.1 Introduction

This chapter concludes this thesis with a summary of the key findings, to demonstrate how this research has accomplished its goals. It is followed by a discussion of the important contributions to theory, literature and practice that have been made by this research. The chapter also presents the limitations of the study and directions for future research.

This chapter consists of six sections. *Section 6.2* provides a summary of the thesis, followed by the contributions to theory, literature and practice in *Section 6.3*. *Section 6.4* discusses the research limitations, which is followed by the directions for future research in *Section 6.5*. Finally, *Section 6.6* provides a summary of the chapter. *Figure 6.1* presents an overview of this chapter.

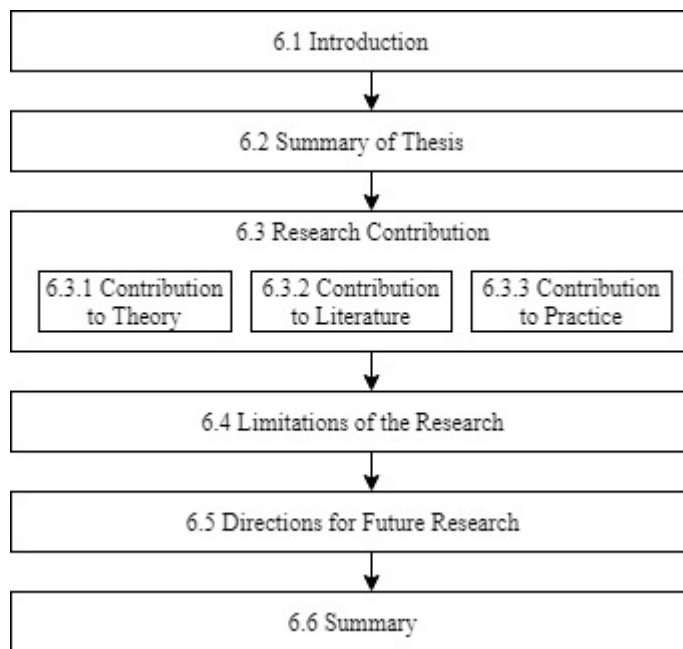


Figure 6.1 Chapter 6 Overview

6.2 Summary of Thesis

The main objective of this research was to explore whether tacit knowledge stock identification based on self-assessment of skills helps in facilitating knowledge transfer within an organisation. This research study is presented in six chapters. *Chapter 1* provided the research background, identified the research problem, presented the research questions, and justified the research along with the expected research contributions. *Chapter 1* also provided a brief

overview of the research methodology, and defined the key terms, scope delimitations and key assumptions of the research.

Chapter 2 provided a review of the literature by dichotomising the research topic into the streams of tacit knowledge stock and transfer. The literature review process followed a structured method, using a top-down approach for examining the academic, theoretical and empirical studies related to the skills assessment, tacit knowledge stock and knowledge transfer. The top-down approach used in the literature review strategy logically synthesised all the relevant studies around the parent theories, namely, the Resource Based View, the Knowledge Based Theory and the VRIO framework. The literature review revealed that there is a lack of theoretical and practical knowledge around the tacit knowledge stock identification based on self-assessment of skills in facilitating knowledge transfer in organisations. *Chapter 2* identified two research opportunities based on the findings of the literature review.

Chapter 3 presented the blueprint for the research study. It discussed the underlying research philosophy driven by the research questions, and described the overall research design and approach used in the study. The research design and approach were underpinned by the research philosophy of critical realism. The research used the DSR methodology to develop a *model* as the research artefact, and implemented it within a case study organisation to provide academic rigor and industry relevance. *Chapter 3* also provided an overview of the planned research design and activities to answer the two research questions. Finally, the ethical considerations for this research were discussed.

Chapter 4 provided an explanation of the development, implementation and evaluation of the artefact (*model*) in the case study organisation. The whole data collection process and the results obtained are described in this chapter. Starting from the case study selection, the process of conducting workshops to teach the research participants about using the tool, to the organisation of the semi-structured interviews for obtaining rigour data is described in *Chapter 4*. Finally, the findings and results obtained from semi-structured interviews are presented in the chapter.

Chapter 5 discussed the interpretation of the research findings based on the context of the research method and reviewed literature. This chapter also discussed the results in terms of each of the two research questions, along with a reflection on the research work conducted and the presentation of significant themes that emerged from this study.

This study answers the two research questions as stated below:

RQ 1: To what extent can self-assessment of skills help to identify tacit knowledge stock?

This research confirmed that skills assessment is an important but under-used method for identifying the tacit knowledge stock of organisational members. The tacit knowledge of a person can be identified by others through interviews and through accessing past projects (Bartram 2004), or by the self-assessment of skills (Baer et al. 2006). The literature review also found that self-assessment of skills has not often been used in organisations to identify the tacit knowledge stock of the employees. Therefore, the research focused on developing a *model* as a research artefact to express the relationship between self-assessment of skills, tacit knowledge stock and knowledge transfer. Based on the *model*, the tacit knowledge stock of the staff of the Information Technology (IT) department of Company X was identified. The *model* was operationalised by a software tool based on the Skills Framework for the Information Age (SFIA). This tool helped to identify the tacit knowledge stock of IT staff represented by their digital skills. Initially, a workshop was conducted to teach the research participants to use the tool. Once the implementation of the *model* was completed at Company X, semi-structured interviews were conducted to evaluate the *model* by interviewing the participants about the role of the self-assessment of skills in identifying tacit knowledge stock. The interviews revealed that self-assessment of skills is, to a large extent, useful in identifying tacit knowledge stock. Most of the participants found the method useful at an individual level for planning their careers and identifying skills gaps. Very few found the method useful at an organisational level.

RQ 2: What role does identifying tacit knowledge stock play in knowledge transfer?

The literature review confirmed that there is limited empirical research which focuses on identifying the tacit knowledge stock of staff to facilitate knowledge transfer within organisations. Using DSR methodology, a research artefact (represented as a *model* in this research) was developed and implemented at Company X. Based on the *model*, the tacit knowledge stock of IT staff of Company X was identified using a method that involved self-assessment of skills. Then, for the evaluation of the *model*, semi-structured interviews were conducted to obtain the perceived views of the participants on the role of tacit knowledge stock identification in knowledge transfer. The interviews revealed that tacit knowledge stock identification plays a positive role in facilitating knowledge transfer within an organisation. The maximum number of participants, that is, fifteen of twenty-one participants supported this position. Moreover, some other emerging themes were also introduced during the interviews.

The participants mentioned that other enabling factors such as the roles of an employee and his or her willingness to transfer knowledge also play important roles in tacit knowledge transfer. Along with this, some of the participants mentioned the importance of having an understanding of the receiver's tacit knowledge level prior to transferring knowledge. They also mentioned that organisational culture and the similar knowledge areas of senders and receivers play important roles in facilitating knowledge transfer.

6.3 Research Contribution

This section provides an overview of the contributions to the knowledge base that were made by this research. The research investigated a specific under-researched problem of knowledge management, and evaluated the validity of a proposed solution in a case study organisation. Thus, the research has made significant contributions in both the academic field as well as the industry sector. The contributions to theory and practice have been made by the research findings and discussions, and from the perspective of research experience.

From a theoretical perspective, this research developed a *model* to enable tacit knowledge transfer by identifying the tacit knowledge stock of IT staff based on self-assessment of skills. From a practical perspective, this research is expected to help practitioners incorporate a readily validated and actionable *model* at an organisation.

6.3.1 Contribution to Theory

This research contributes to the underpinning parent theory – RBV by using one of the important intangible resources of a firm; that is: knowledge, and managing it via knowledge transfer within an organisation. One of the criticisms of RBV is that it does not imply the sufficient learning and innovation of the organisation, nor does it focus on the interfaces between organisational members (Marrone 2010). The research worked on this limitation of RBV by identifying the tacit knowledge stock of organisational members, and exploring its role in knowledge transfer. This helps in enhancing the learning and innovation of the organisation and encourages organisations to focus on the internal resources of the organisation for competitive advantage, as mentioned by the RBV.

The research contributes to the VRIO framework by exploring one of its aspects within the organisational context. Cardeal and Antonio (2012) mentioned that in the context of VRIO framework, there is a very limited research that focus on the relationship between a firm's organisation ('O') and its resources ('VRI') to explain its performance, even though the positive impact of the effective utilisation of a firm's resources has been developed. This

research focused on fulfilling this gap in the literature by identifying the tacit knowledge stock of IT staff, and exploring whether it facilitates knowledge transfer within an organisation. In this way, this research helps in exploring whether a firm's proper management and the organisation of its internal resources help in enhancing its growth.

6.3.2 Contribution to Literature

The research contributes to the academic literature by presenting a literature review of tacit knowledge stock and transfer that demonstrates the lack of empirical research in that area. It also contributes to the literature by addressing the current gap in the area of knowledge management. The literature review helped to explore various existing methods for identifying the tacit knowledge stock of organisational members. This research also contributed to the literature relating to knowledge management, by advocating a method that involved self-assessment of skills to bring transparency and efficiency in identifying tacit knowledge stock. It further explained the whole process of identifying tacit knowledge stock and facilitating knowledge transfer in organisations.

Moreover, this research has also contributed to the literature by combining two important areas of management, which are 'Knowledge Management' and 'Human Resource Management'. Assessing the skills of organisational staff comes under the area of Human Resource Management, whereas managing knowledge transfer between organisational staff comes under the area of Knowledge Management. In reviewing available literature, it appears that there was a strong desire to enhance organisational knowledge transfer based on tacit knowledge stock, but researchers had not focused on assessing skills for identifying tacit knowledge stock. Using different theories of knowledge management, this research focused on improving organisational knowledge transfer for organisations' sustainable growth and development. This research aimed to report the fit of the use of various theories from the knowledge management discipline, and test their applicability in the tacit knowledge stock identification and skills assessment areas.

Finally, an important contribution of this research has been made to design science methodology, by demonstrating a DSR approach to develop a *model* as a research artefact in the area of tacit knowledge identification. The detailed explanation of prior theories and frameworks, expository examples, and case study evaluation provide a paradigm of how to confront the challenges of presenting design work for a new approach. This research highlights the importance of DSR methodology in developing a research artefact (*model*) and using it to

solve research problems, which provides theoretically-grounded guidelines to both researchers and practitioners. Drawing upon extant DSR methodology (e.g. (Gregor & Jones 2007; Hevner 2007; Peffers et al. 2007), the approach is appropriate for IS research to provide a balance to the requirements of rigor and relevance (e.g. Benbasat and Zmud (1999); Rosemann and Vessey (2008); Straub and Ang (2011)).

6.3.3 Contribution to Practice

As organisations are increasingly appreciating the importance of the knowledge management area, this project contributes to the existing body of work by exploring whether tacit knowledge stock identification through self-assessment of skills helps in facilitating knowledge transfer.

Based on the DSR methodology, a research artefact (represented as a *model*) was developed, implemented and evaluated at a case study organisation. The *model* was operationalised using a software tool based on SFIA to enable IT professionals to self-assess their skills and competency levels. This *model* helps organisations to easily assess the skills of employees to gain an overall picture of the tacit knowledge stock residing in the organisation, as shown in *Table 4.1*. This *model* may enable effective and efficient tacit knowledge transfer within an organisation. Also, skills assessment may benefit the IT professionals at an individual level.

6.4 Limitations of the Research

The scope of this research is determined by theories, philosophy, research design and the chosen research methods as discussed in *Chapter 1, Section 1.7*. Furthermore, the limitations of the research have been defined in the literature review protocol (*Chapter 2, Table 2.3*), which led to the exclusion of literature that failed to meet predefined criteria. There is also a chance of exclusion of some relevant literature that were written in languages other than English.

This research used semi-structured interviews to obtain participants' opinions and experiences on the self-assessment of skills in tacit knowledge stock identification and perceived views on the role of tacit knowledge stock identification in knowledge transfer. Therefore, while obtaining data, some respondents might have had unrealistic perceptions about the skills assessment processes in identifying their tacit knowledge.

Moreover, the case study in this research involved some limitations. As the evaluation data was collected using qualitative research methods, there are some limitations regarding internal validity. Quantitative methods, such as a survey, could have provided a broader view of the research topic. However, the qualitative method is best suited to address both research

questions in this study, because it helps to obtain the views and opinions of the participants about the *model* utility which was developed to address the research problem. Being a qualitative method of data collection, the results of this study will not be general for the population of all employees of all organisations. It is difficult to generalise the findings in the qualitative study, which is one of its recognised limitations. Besides, the collected data also has certain limitations. As the data was only collected using a qualitative method, the research questions were seeking only qualitative answers regarding tacit knowledge stock identification based on self-assessment of skills to enable knowledge transfer.

Secondly, concerning case selection and external validity, only one case study organisation was used in this research for collecting data. A larger number of case organisations and a greater number of research participants could have provided broader views of the research topic, resulting in an increase in the quality of the case study research. Further, the interviews with the research participants were undertaken based on a general interview guide, which invited some limitations associated with this research. Since the case study organisation was in Australia, the research participants were all from within Australia. As there are variations in the socio-economic circumstances of people from different countries, the findings of this research may not directly reflect the views and perceptions of people from other countries.

Thirdly, only the IT staff of Company X were chosen in this research. Thus, it might lead to a difficulty in generalising the findings of this research to a larger population of other departments in the organisation. However, the use of the triangulation of data method increased the richness of the data, and an interview guide was also followed to avoid bias.

6.5 Directions for Future Research

This research explored the importance of tacit stock identification in knowledge transfer within organisations. It also determined the extent to which a self-assessment of skills helped in identifying the tacit knowledge stock of the organisational members. This research focused on developing a research artefact based on DSR methodology, and used self-assessment of skills to identify the tacit knowledge stock of organisational members. Thus, further research can be conducted on exploring other useful methods for tacit knowledge stock identification. This research focused on discussing only one factor affecting tacit knowledge transfer. Further research can be done in exploring other factors affecting tacit knowledge transfer. Furthermore, since this research was limited to only one case study organisation, future researchers could

conduct the same research in additional case study organisations to gain broader views of the tacit knowledge stock identification in knowledge transfer.

Along with this, the scope of this research can also be extended to the international context. As this research was conducted in Australia within one case study organisation and with Australian people, future research can be conducted within organisations and companies in other countries. This research used a qualitative research method based on qualitative data. Therefore, future research can be conducted by using a quantitative research method to further validate the findings of the research.

6.6 Summary

This chapter developed an alliance between theory and practice by drawing on academic and practitioner literature in the area of knowledge management, and by collaborating with academia and industry for the development, implementation and evaluation of the research artefact based on the DSR methodology. This chapter shed light on the contributions to theory and practice, followed by the overall limitations of the research. Directions for future research have also been provided in this chapter.

References

- Ackoff, RL 1989, 'From data to wisdom', *Journal of Applied Systems Analysis*, vol. 16, no. 1, pp. 3-9.
- Adams, GR & Schvaneveldt, JD 1991, *Understanding research methods*, 2nd edn, Addison-Wesley Longman Ltd, London.
- Ahammad, MF, Tarba, SY, Liu, Y & Glaister, KW 2016, 'Knowledge transfer and cross-border acquisition performance: the impact of cultural distance and employee retention', *International Business Review*, vol. 25, no. 1, pp. 66-75.
- AIS 2018, *Association for Information Systems*, viewed 5 February 2018, <<http://aisnet.org/page/AboutAIS>>.
- Alavi, M & Leidner, DE 2001, 'Knowledge management and knowledge management systems: conceptual foundations and research issues', *MIS Quarterly*, vol. 25, no. 1, pp. 107-36.
- Ardichvili, A, Page, V & Wentling, T 2003, 'Motivation and barriers to participation in virtual knowledge-sharing communities of practice', *Journal of Knowledge Management*, vol. 7, no. 1, pp. 64-77.
- Argote, L & Ingram, P 2000, 'Knowledge transfer: a basis for competitive advantage in firms', *Organizational Behavior and Human Decision Processes*, vol. 82, no. 1, pp. 150-69.
- Argote, L & Fahrenkopf, E 2016, 'Knowledge transfer in organizations: the roles of members, tasks, tools, and networks', *Organizational Behavior and Human Decision Processes*, vol. 136, pp. 146-59.
- Argote, L, Beckman, SL & Epple, D 1990, 'The persistence and transfer of learning in industrial settings', *Management Science*, vol. 36, no. 2, pp. 140-54.
- Armstrong, CE & Shimizu, K 2007, 'A review of approaches to empirical research on the Resource-Based View of the firm', *Journal of Management*, vol. 33, no. 6, pp. 959-86.
- Awoniyi, EA, Griego, OV & Morgan, GA 2002, 'Person-environment fit and transfer of training', *International Journal of Training and Development*, vol. 6, no. 1, pp. 25-35.
- Baer, RA, Smith, GT, Hopkins, J, Krietemeyer, J & Toney, L 2006, 'Using self-report assessment methods to explore facets of mindfulness', *Assessment*, vol. 13, no. 1, pp. 27-45.
- Barney, J 1991, 'Firm resources and sustained competitive advantage', *Journal of Management*, vol. 17, no. 1, pp. 99-120.
- Barney, J, Wright, M & Ketchen Jr, DJ 2001, 'The resource-based view of the firm: ten years after 1991', *Journal of Management*, vol. 27, no. 6, pp. 625-41.

- Barney, JB 1995, 'Looking inside for competitive advantage', *Academy of Management Perspectives*, vol. 9, no. 4, pp. 49-61.
- Barney, JB & Hesterly, W 2006, *Organizational economics: understanding the relationship between organizations and economic analysis*, The Sage Handbook of Organization Studies, London.
- Bartram, D 2004, 'Assessment in organisations', *Applied Psychology: An International Review*, vol. 53, no. 2, pp. 237-59.
- Baskerville, R, Pries-Heje, J & Venable, J 2009, 'Soft design science methodology', in *Proceedings of the 4th International Conference on Design Science Research in Information Systems and Technology*, USA, p. 9.
- Baum, JA & Ingram, P 1998, 'Survival-enhancing learning in the Manhattan hotel industry, 1898–1980', *Management Science*, vol. 44, no. 7, pp. 996-1016.
- Beck, R, Pahlke, I & Seebach, C 2014, 'Knowledge exchange and symbolic action in social media-enabled electronic networks of practice: a multilevel perspective on knowledge seekers and contributors', *MIS Quarterly*, vol. 38, no. 4, pp. 1245-69.
- Beckman, T 1997, 'A methodology for knowledge management', in *Proceedings of the IASTED International Conference on AI and Soft Computing*, Banff, Canada, pp. 29-32.
- Bell DeTienne, K & Jackson, LA 2001, 'Knowledge management: understanding theory and developing strategy', *Competitiveness Review: An International Business Journal*, vol. 11, no. 1, pp. 1-11.
- Bell DeTienne, K, Dyer, G, Hoopes, C & Harris, S 2004, 'Toward a model of effective knowledge management and directions for future research: culture, leadership, and CKOs', *Journal of Leadership and Organizational Studies*, vol. 10, no. 4, pp. 26-43.
- Bellinger, G, Castro, D & Mills, A 2004, *Data, Information, Knowledge, and Wisdom*, viewed 20 March 2018, <<http://www.systems-thinking.org/dikw/dikw.htm>>.
- Benbasat, I & Zmud, RW 1999, 'Empirical research in information systems: the practice of relevance', *MIS Quarterly*, vol. 23, no. 1, pp. 3-16.
- Bhaskar, R 1978, *A realist theory of science*, 2nd edn, Humanities Press, USA.
- Bhaskar, R, Collier, A, Lawson, T & Norrie, A 2009, *Critical realism*, Routledge, London.
- Bloodgood, JM & Salisbury, WD 2001, 'Understanding the influence of organizational change strategies on information technology and knowledge management strategies', *Decision Support Systems*, vol. 31, no. 1, pp. 55-69.
- Bloor, M & Wood, F 2006, *Keywords in qualitative methods: a vocabulary of research concepts*, 1st edn, SAGE Publications, London.

Bock, G-W, Zmud, RW, Kim, Y-G & Lee, J-N 2005, 'Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social-psychological forces, and organizational climate', *MIS Quarterly*, vol. 29, no. 1, pp. 87-111.

Boiral, O 2002, 'Tacit knowledge and environmental management', *Long Range Planning*, vol. 35, no. 3, pp. 291-317.

Bollinger, AS & Smith, RD 2001, 'Managing organizational knowledge as a strategic asset', *Journal of Knowledge Management*, vol. 5, no. 1, pp. 8-18.

Bowen, DE, Ledford Jr, GE & Nathan, BR 1991, 'Hiring for the organization, not the job', *Academy of Management Perspectives*, vol. 5, no. 4, pp. 35-51.

Bresman, H, Birkinshaw, J & Nobel, R 2010, 'Knowledge transfer in international acquisitions', *Journal of International Business Studies*, vol. 41, no. 1, pp. 5-20.

Brown, CV & Vessey, I 2003, 'Managing the next wave of enterprise systems: leveraging lessons from ERP', *MIS Quarterly Executive*, vol. 2, no. 1, pp. 65-77.

Bryman, A & Bell, E 2015, *Business research methods*, 11th edn, Oxford University Press, USA.

Burgelman, RA 1983, 'Corporate entrepreneurship and strategic management: insights from a process study', *Management Science*, vol. 29, no. 12, pp. 1349-64.

Busenitz, LW & Barney, JB 1997, 'Differences between entrepreneurs and managers in large organizations: biases and heuristics in strategic decision-making', *Journal of Business Venturing*, vol. 12, no. 1, pp. 9-30.

Cabrera, EF & Cabrera, A 2005, 'Fostering knowledge sharing through people management practices', *The International Journal of Human Resource Management*, vol. 16, no. 5, pp. 720-35.

Cameron, PD 2002, 'Managing knowledge assets: the cure for an ailing structure', *CMA Management*, vol. 76, no. 3, pp. 20-3.

Cardeal, N & Antonio, NS 2012, 'Valuable, rare, inimitable resources and organization (VRIO) resources or valuable, rare, inimitable resources (VRI) capabilities: what leads to competitive advantage?', *African Journal of Business Management*, vol. 6, no. 37, pp. 10159-70.

Carlsson, SA, Henningson, S, Hrastinski, S & Keller, C 2011, 'Socio-technical IS design science research: developing design theory for IS integration management', *Information Systems and e-Business Management*, vol. 9, no. 1, pp. 109-31.

Carter, B & New, C 2005, *Making realism work: realist social theory and empirical research*, 1st edn, Routledge, London.

- Chatzoglou, P, Chatzoudes, D, Sarigiannidis, L & Theriou, G 2018, 'The role of firm-specific factors in the strategy-performance relationship: revisiting the resource-based view of the firm and the VRIO framework', *Management Research Review*, vol. 41, no. 1, pp. 46-73.
- Chen, C-J, Hsiao, Y-C & Chu, M-A 2014, 'Transfer mechanisms and knowledge transfer: the cooperative competency perspective', *Journal of Business Research*, vol. 67, no. 12, pp. 2531-41.
- Cheshire, L 2009, *Archiving qualitative data: prospects and challenges of data preservation and sharing among Australian qualitative researchers*, Discussion paper of The Australian Qualitative Archive (AQuA), University of Queensland, Brisbane, Australia.
- Chiu, C-M, Hsu, M-H & Wang, ET 2006, 'Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories', *Decision Support Systems*, vol. 42, no. 3, pp. 1872-88.
- Chugh, R 2015, 'Do Australian Universities Encourage Tacit Knowledge Transfer?', in *Proceedings of the 7th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management*, Libson, Portugal, pp. 128-35.
- Cockburn, IM, Henderson, RM & Stern, S 2000, 'Untangling the origins of competitive advantage', *Strategic Management Journal*, vol. 21, no. 10-11, pp. 1123-45.
- Cohen, D & Crabtree, B 2006, *Qualitative Research Guidelines Project*, viewed 2 February 2018, <<http://www.qualres.org/>>.
- Collier, A 1994, *Critical realism: an introduction to Roy Bhaskar's philosophy*, Verco, London.
- Collis, J & Hussey, R 2013, *Business research: a practical guide for undergraduate and postgraduate students*, 3rd edn, Macmillan International Higher Education, London.
- Collis, J, Hussey, R, Crowther, D, Lancaster, G, Saunders, M, Lewis, P, Thornhill, A, Bryman, A, Bell, E & Gill, J 2003, *Business research methods*, Palgrave Macmillan, New York.
- Conner, KR 1991, 'A historical comparison of resource-based theory and five schools of thought within industrial organization economics: do we have a new theory of the firm?', *Journal of Management*, vol. 17, no. 1, pp. 121-54.
- Corti, L, Day, A & Backhouse, G 2000, *Confidentiality and informed consent: issues for consideration in the preservation of and provision of access to qualitative data archives*, Forum Qualitative Social Research, viewed 3 March 2018, <<http://www.qualitative-research.net/index.php/fqs/article/view/1024/2208>>.
- Cowan, R, Jonard, N & Özman, M 2004, 'Knowledge dynamics in a network industry', *Technological Forecasting and Social Change*, vol. 71, no. 5, pp. 469-84.

- Cranfield 1998, *The Cranfield and information strategy knowledge survey: Europe's state of the art in knowledge management*, The Economist Group, London.
- Creswell, JW 2009, 'Mapping the field of mixed methods research', *Journal of Mixed Methods Research*, vol. 3, no. 2, pp. 95-108.
- Creswell, JW 2014, *A concise introduction to mixed methods research*, Sage Publications, Los Angeles.
- Creswell, JW, Hanson, WE, Clark Plano, VL & Morales, A 2007, 'Qualitative research designs: selection and implementation', *The Counseling Psychologist*, vol. 35, no. 2, pp. 236-64.
- Crotty, M 1998, *The foundations of social research: meaning and perspective in the research process*, Sage, London.
- Cummings, JL & Teng, B 2003, 'Transferring R&D knowledge: the key factors affecting knowledge transfer success', *Journal of Engineering and Technology Management*, vol. 20, no. 1-2, pp. 39-68.
- Darr, ED, Argote, L & Epple, D 1995, 'The acquisition, transfer, and depreciation of knowledge in service organizations: productivity in franchises', *Management Science*, vol. 41, no. 11, pp. 1750-62.
- Davenport, TH & Short, JE 1990, 'The new industrial engineering: information technology and business process redesign', *Sloan Management Review*, vol. 31, no. 4, pp. 11-27.
- Davenport, TH & Prusak, L 1998, *Working knowledge: how organizations manage what they know*, Harvard Business Press, Boston, USA.
- Davies, D & Dodd, J 2002, 'Qualitative research and the question of rigor', *Qualitative Health Research*, vol. 12, no. 2, pp. 279-89.
- Dayasindhu, N 2002, 'Embeddedness, knowledge transfer, industry clusters and global competitiveness: a case study of the Indian software industry', *Technovation*, vol. 22, no. 9, pp. 551-60.
- De Long, DW & Fahey, L 2000, 'Diagnosing cultural barriers to knowledge management', *Academy of Management Perspectives*, vol. 14, no. 4, pp. 113-27.
- DeCarolis, DM & Deeds, DL 1999, 'The impact of stocks and flows of organizational knowledge on firm performance: an empirical investigation of the biotechnology industry', *Strategic Management Journal*, vol. 20, no. 10, pp. 953-68.
- DeSantis, L & Ugarriza, DN 2000, 'The concept of theme as used in qualitative nursing research', *Western Journal of Nursing Research*, vol. 22, no. 3, pp. 351-72.

Dhanaraj, C, Lyles, MA, Steensma, HK & Tihanyi, L 2004, 'Managing tacit and explicit knowledge transfer in IJVs: the role of relational embeddedness and the impact on performance', *Journal of International Business Studies*, vol. 35, no. 5, pp. 428-42.

Diener, E & Crandall, R 1978, *Ethics in social and behavioral research*, University of Chicago Press, Oxford, England.

Disterer, G 2001, 'Individual and social barriers to knowledge transfer', in *Proceedings of the 34th Hawaii International Conference on System Sciences*, Los Alamitos, CA, pp. 1-7.

Dobrai, K, Farkas, F, Karoliny, Z & Poór, J 2012, 'Knowledge transfer in multinational companies—evidence from Hungary', *Acta Polytechnica Hungarica*, vol. 9, no. 3, pp. 149-61.

Dobson, PJ 2001, 'Longitudinal case research: a critical realist perspective', *Systemic Practice and Action Research*, vol. 14, no. 3, pp. 283-96.

Doz, YL, Santos, J & Williamson, PJ 2001, *From global to metanational: how companies win in the knowledge economy*, Harvard Business Press, Boston, USA.

Duan, Y, Nie, W & Coakes, E 2010, 'Identifying key factors affecting transnational knowledge transfer', *Information and Management*, vol. 47, no. 7-8, pp. 356-63.

Eisenhardt, KM & Martin, JA 2000, 'Dynamic capabilities: what are they?', *Strategic Management Journal*, vol. 21, no. 10-11, pp. 1105-21.

Elliott, JG, Stemler, SE, Sternberg, RJ, Grigorenko, EL & Hoffman, N 2011, 'The socially skilled teacher and the development of tacit knowledge', *British Educational Research Journal*, vol. 37, no. 1, pp. 83-103.

Empson, L 2001, 'Fear of exploitation and fear of contamination: impediments to knowledge transfer in mergers between professional service firms', *Human Relations*, vol. 54, no. 7, pp. 839-62.

Frank, AG & Ribeiro, JLD 2014, 'An integrative model for knowledge transfer between new product development project teams', *Knowledge Management Research and Practice*, vol. 12, no. 2, pp. 215-25.

Fullwood, R & Rowley, J 2017, 'An investigation of factors affecting knowledge sharing amongst UK academics', *Journal of Knowledge Management*, vol. 21, no. 5, pp. 1254-71.

Fullwood, R, Rowley, J & Delbridge, R 2013, 'Knowledge sharing amongst academics in UK universities', *Journal of Knowledge Management*, vol. 17, no. 1, pp. 123-36.

Gall, M, Gall, J & Borg, W 2003, *Educational research: an introduction*, 7th edn, Allyn and Bacon, Boston.

- García-Morales, VJ, Lloréns-Montes, FJ & Verdú-Jover, AJ 2008, 'The effects of transformational leadership on organizational performance through knowledge and innovation', *British Journal of Management*, vol. 19, no. 4, pp. 299-319.
- Gerstein, M & Reisman, H 1983, 'Strategic selection: matching executives to business conditions', *Sloan Management Review*, vol. 24, no. 2, pp. 33-49.
- Gertler, MS 2003, 'Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there)', *Journal of Economic Geography*, vol. 3, no. 1, pp. 75-99.
- Goh, SC 2002, 'Managing effective knowledge transfer: an integrative framework and some practice implications', *Journal of Knowledge Management*, vol. 6, no. 1, pp. 23-30.
- Grant, RM 1996, 'Toward a knowledge-based theory of the firm', *Strategic Management Journal*, vol. 17, no. S2, pp. 109-22.
- Grbich, C 2012, *Qualitative data analysis: an introduction*, 2nd edn, Sage Publications, London.
- Gregor, S 2006, 'The nature of theory in information systems', *MIS Quarterly*, vol. 30, no. 3, pp. 611-42.
- Gregor, S & Jones, D 2007, 'The anatomy of a design theory', *Journal of the Association for Information systems*, vol. 8, no. 5, pp. 312-35.
- Gupta, AK & Govindarajan, V 1986, 'Resource sharing among SBUs: strategic antecedents and administrative implications', *Academy of Management Journal*, vol. 29, no. 4, pp. 695-714.
- Gupta, AK & Govindarajan, V 2000, 'Knowledge flows within multinational corporations', *Strategic Management Journal*, vol. 21, no. 4, pp. 473-96.
- Hackbarth, G 1998, 'The impact of organizational memory on IT systems', in *Proceedings of the Fourth Americas Conference on Information System*, USA, pp. 588-90.
- Hammersley, M & Atkinson, P 1995, *Insider accounts: listening and asking questions*, Routledge, London.
- Hau, YS, Kim, B, Lee, H & Kim, Y-G 2013, 'The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing intentions', *International Journal of Information Management*, vol. 33, no. 2, pp. 356-66.
- Hedlund, G 1994, 'A model of knowledge management and the N-form corporation', *Strategic Management Journal*, vol. 15, no. S2, pp. 73-90.
- Héliot, Y & Riley, M 2010, 'A study of indicators of willingness in the knowledge transfer process', *Journal of Management and Organization*, vol. 16, no. 3, pp. 399-410.

- Hemani, K & Rashidi, Z 2016, 'Effect of organizational skills and competencies on perceived job performance with mediation of multitasking', *Journal of Business Studies*, vol. 12, no. 1, pp. 121-38.
- Hevner, AR 2007, 'A three cycle view of design science research', *Scandinavian Journal of Information Systems*, vol. 19, no. 2, p. 4.
- Holste, JS & Fields, D 2010, 'Trust and tacit knowledge sharing and use', *Journal of Knowledge Management*, vol. 14, no. 1, pp. 128-40.
- Holzner, B & Marx, JH 1979, *Knowledge application: the knowledge system in society*, Allyn & Bacon, Boston.
- Huber, GP 1991, 'Organizational learning: the contributing processes and the literatures', *Organization Science*, vol. 2, no. 1, pp. 88-115.
- Huckaby, J & Christensen, HI 2012, 'A taxonomic framework for task modeling and knowledge transfer in manufacturing robotics', in *Workshops at the Twenty-Sixth AAAI Conference on Artificial Intelligence*, USA, pp. 759-70.
- Iivari, J 2007, 'A paradigmatic analysis of information systems as a design science', *Scandinavian Journal of Information Systems*, vol. 19, no. 2, pp. 39-64.
- Ingram, P & Simons, T 1999, 'The exchange of experience in a moral economy: embedded ties and vicarious learning in Kibbutz agriculture', in *Academy of Management Proceedings*, New York, pp. E1-E6.
- Inkpen, AC & Dinur, A 1998, 'Knowledge management processes and international joint ventures', *Organization Science*, vol. 9, no. 4, pp. 454-68.
- Ipe, M 2003, 'Knowledge sharing in organizations: a conceptual framework', *Human Resource Development Review*, vol. 2, no. 4, pp. 337-59.
- Ismail Al-Alawi, A, Yousif Al-Marzooqi, N & Fraidoon Mohammed, Y 2007, 'Organizational culture and knowledge sharing: critical success factors', *Journal of Knowledge Management*, vol. 11, no. 2, pp. 22-42.
- Israel, M & Hay, I 2006, *Research ethics for social scientists*, Sage Publications, London.
- Jarvenpaa, SL & Staples, DS 2000, 'The use of collaborative electronic media for information sharing: an exploratory study of determinants', *The Journal of Strategic Information Systems*, vol. 9, no. 2-3, pp. 129-54.
- Jasimuddin, SM & Zhang, Z 2014, 'Knowledge management strategy and organizational culture', *Journal of the Operational Research Society*, vol. 65, no. 10, pp. 1490-500.

- Jayawickrama, U, Liu, S & Smith, MH 2016, 'Empirical evidence of an integrative knowledge competence framework for ERP systems implementation in UK industries', *Computers in Industry*, vol. 82, no. 7, pp. 205-23.
- Jimes, C & Lucardie, L 2003, 'Reconsidering the tacit-explicit distinction—a move toward functional (tacit) knowledge management', *Electronic Journal of Knowledge Management*, vol. 1, no. 1, pp. 23-32.
- Karlsen, JT & Gottschalk, P 2004, 'Factors affecting knowledge transfer in IT projects', *Engineering Management Journal*, vol. 16, no. 1, pp. 3-11.
- Katkalo, VS, Pitelis, CN & Teece, DJ 2010, 'Introduction: on the nature and scope of dynamic capabilities', *Industrial and Corporate Change*, vol. 19, no. 4, pp. 1175-86.
- Kazanjian, RK, Drazin, R & Glynn, MA 2000, 'Creativity and technological learning: the roles of organization architecture and crisis in large-scale projects', *Journal of Engineering and Technology Management*, vol. 17, no. 3-4, pp. 273-98.
- Kim, KY, Eisenberger, R & Baik, K 2016, 'Perceived organizational support and affective organizational commitment: moderating influence of perceived organizational competence', *Journal of Organizational Behavior*, vol. 37, no. 4, pp. 558-83.
- Kitchenham, B, Brereton, OP, Budgen, D, Turner, M, Bailey, J & Linkman, S 2009, 'Systematic literature reviews in software engineering—a systematic literature review', *Information and Software Technology*, vol. 51, no. 1, pp. 7-15.
- Kogut, B & Zander, U 1992, 'Knowledge of the firm, combinative capabilities, and the replication of technology', *Organization Science*, vol. 3, no. 3, pp. 383-97.
- Kristof, AL 1996, 'Person-organization fit: an integrative review of its conceptualizations, measurement, and implications', *Personnel Psychology*, vol. 49, no. 1, pp. 1-49.
- Kuechler, B & Vaishnavi, V 2008, 'On theory development in design science research: anatomy of a research project', *European Journal of Information Systems*, vol. 17, no. 5, pp. 489-504.
- Lai, ILA 2005, 'Knowledge management for Chinese medicines: a conceptual model', *Information Management and Computer Security*, vol. 13, no. 3, pp. 244-55.
- Lai, J, Lui, SS & Tsang, EW 2016, 'Intrafirm knowledge transfer and employee innovative behavior: the role of total and balanced knowledge flows', *Journal of Product Innovation Management*, vol. 33, no. 1, pp. 90-103.
- Lawler III, EE 1994, 'From job-based to competency-based organizations', *Journal of Organizational Behavior*, vol. 15, no. 1, pp. 3-15.
- Lee, AS 2004, *Thinking about social theory and philosophy for information systems*, John Wiley & Sons, UK.

- Lee, D-J & Ahn, J-H 2007, 'Reward systems for intra-organizational knowledge sharing', *European Journal of Operational Research*, vol. 180, no. 2, pp. 938-56.
- Leonard, D & Sensiper, S 1998, 'The role of tacit knowledge in group innovation', *California Management Review*, vol. 40, no. 3, pp. 112-32.
- Lin, H-F 2007, 'Knowledge sharing and firm innovation capability: an empirical study', *International Journal of Manpower*, vol. 28, no. 3/4, pp. 315-32.
- Lin, L, Geng, X & Whinston, AB 2005, 'A sender-receiver framework for knowledge transfer', *MIS Quarterly*, vol. 29, no. 2, pp. 197-219.
- Lincoln, YS, Lynham, SA & Guba, EG 2011, *Paradigmatic controversies, contradictions, and emerging confluences, revisited*, Sage Publications, UK.
- March, ST & Smith, GF 1995, 'Design and natural science research on information technology', *Decision Support Systems*, vol. 15, no. 4, pp. 251-66.
- March, ST & Storey, VC 2008, 'Design science in the information systems discipline: an introduction to the special issue on design science research', *MIS Quarterly*, vol. 32, no. 4, pp. 725-30.
- Marrone, M 2010, 'Searching for mechanisms of knowledge integration in IT operational frameworks: the case of ITIL', in *Sprouts: Working Papers on Information Systems*, vol. 10.
- Maskell, P & Malmberg, A 1999, 'The competitiveness of firms and regions: ubiquitousness and the importance of localized learning', *European Urban and Regional Studies*, vol. 6, no. 1, pp. 9-25.
- Matt, C, Hess, T & Benlian, A 2015, 'Digital transformation strategies', *Business and Information Systems Engineering*, vol. 57, no. 5, pp. 339-43.
- McDermott, R & O'dell, C 2001, 'Overcoming cultural barriers to sharing knowledge', *Journal of Knowledge Management*, vol. 5, no. 1, pp. 76-85.
- McLaren, TS, Head, MM, Yuan, Y & Chan, YE 2011, 'A multilevel model for measuring fit between a firm's competitive strategies and information systems capabilities', *MIS Quarterly*, vol. 35, no. 4, pp. 909-29.
- Mertens, DM 2010, 'Transformative mixed methods research', *Qualitative Inquiry*, vol. 16, no. 6, pp. 469-74.
- Michailova, S & Husted, K 2003, 'Knowledge-sharing hostility in Russian firms', *California Management Review*, vol. 45, no. 3, pp. 59-77.
- Mills, J, Platts, K & Bourne, M 2003, 'Applying resource-based theory: methods, outcomes and utility for managers', *International Journal of Operations and Production Management*, vol. 23, no. 2, pp. 148-66.

- Minbaeva, DB & Michailova, S 2004, 'Knowledge transfer and expatriation in multinational corporations: the role of disseminative capacity', *Employee Relations*, vol. 26, no. 6, pp. 663-79.
- Mingers, J 2004, 'Real-izing information systems: critical realism as an underpinning philosophy for information systems', *Information and Organization*, vol. 14, no. 2, pp. 87-103.
- Mirza, RS 2009, 'Knowledge management and clinical framework for cross country healthcare organizations', Master thesis, Blekinge Institute of Technology, Sweden.
- Mitri, M 2003, 'Applying tacit knowledge management techniques for performance assessment', *Computers and Education*, vol. 41, no. 2, pp. 173-89.
- Mohr, DC, Young, GJ & Burgess, J, James F 2012, 'Employee turnover and operational performance: the moderating effect of group-oriented organisational culture', *Human Resource Management Journal*, vol. 22, no. 2, pp. 216-33.
- Najafi-Tavani, Z, Giroud, A & Sinkovics, RR 2012, 'Mediating effects in reverse knowledge transfer processes', *Management International Review*, vol. 52, no. 3, pp. 461-88.
- Nelson, RR & Sidney, G 2005, *An evolutionary theory of economic change*, Harvard University Press, Cambridge, MA.
- Neuman, WL 2016, *Understanding research*, 1st edn, Pearson, Boston.
- Newbert, SL 2008, 'Value, rareness, competitive advantage, and performance: a conceptual-level empirical investigation of the resource-based view of the firm', *Strategic Management Journal*, vol. 29, no. 7, pp. 745-68.
- Newk-Fon Hey Tow, W, Venable, J & Dell, P 2012, 'How organisations know what they know: a survey of knowledge identification methods among Australian organisations', in *Proceedings of the 23rd Australasian Conference on Information Systems*, Victoria.
- Nickerson, JA & Zenger, TR 2004, 'A knowledge-based theory of the firm—the problem-solving perspective', *Organization Science*, vol. 15, no. 6, pp. 617-32.
- Nonaka, I 1994, 'A dynamic theory of organizational knowledge creation', *Organization Science*, vol. 5, no. 1, pp. 14-37.
- Nonaka, I & Takeuchi, H 1995, *The knowledge creation company: how Japanese companies create the dynamics of innovation*, Oxford University Press, New York.
- Noorderhaven, N & Harzing, A-W 2009, 'Knowledge-sharing and social interaction within MNEs', *Journal of International Business Studies*, vol. 40, no. 5, pp. 719-41.
- Nystrom, PC & Starbuck, WH 1984, 'Managing beliefs in organizations', *The Journal of Applied Behavioral Science*, vol. 20, no. 3, pp. 277-87.

O'Cathain, A, Thomas, K, Drabble, S, Rudolph, A & Hewison, J 2013, 'What can qualitative research do for randomised controlled trials? A systematic mapping review', *BMJ Open*, vol. 3, no. 6, p. 3:e002889.

Olian, JD & Rynes, SL 1984, 'Organizational staffing: integrating practice with strategy', *Industrial Relations*, vol. 23, no. 2, pp. 170-83.

Olson-Buchanan, JB, Drasgow, F, Moberg, PJ, Mead, AD, Keenan, PA & Donovan, MA 1998, 'Interactive video assessment of conflict resolution skills', *Personnel Psychology*, vol. 51, no. 1, pp. 1-24.

Omar Sharifuddin Syed-Ikhsan, S & Rowland, F 2004, 'Knowledge management in a public organization: a study on the relationship between organizational elements and the performance of knowledge transfer', *Journal of Knowledge Management*, vol. 8, no. 2, pp. 95-111.

Østerlund, C & Carlile, P 2005, 'Relations in practice: sorting through practice theories on knowledge sharing in complex organizations', *The Information Society*, vol. 21, no. 2, pp. 91-107.

Pacharapha, T & Vathanophas Ractham, V 2012, 'Knowledge acquisition: the roles of perceived value of knowledge content and source', *Journal of Knowledge Management*, vol. 16, no. 5, pp. 724-39.

Pascarella, P 1997, 'Harnessing knowledge', *Management Review*, vol. 86, no. 9, p. 37.

Patterson, TL, Goldman, S, McKibbin, CL, Hughs, T & Jeste, DV 2001, 'UCSD performance-based skills assessment: development of a new measure of everyday functioning for severely mentally ill adults', *Schizophrenia Bulletin*, vol. 27, no. 2, pp. 235-45.

Paulin, D & Suneson, K 2012, 'Knowledge transfer, knowledge sharing and knowledge barriers—three blurry terms in KM', *Electronic Journal of Knowledge Management*, vol. 10, no. 1, pp. 81-91.

Peffer, K, Tuunanen, T, Rothenberger, MA & Chatterjee, S 2007, 'A design science research methodology for information systems research', *Journal of Management Information Systems*, vol. 24, no. 3, pp. 45-77.

Peltokorpi, V 2017, 'Absorptive capacity in foreign subsidiaries: the effects of language-sensitive recruitment, language training, and interunit knowledge transfer', *International Business Review*, vol. 26, no. 1, pp. 119-29.

Pentland, BT 1995, 'Information systems and organizational learning: the social epistemology of organizational knowledge systems', *Accounting, Management and Information Technologies*, vol. 5, no. 1, pp. 1-21.

- Perry, C 1995, 'A structured approach to presenting theses: notes for student and their supervisors', DBA thesis, Southern Cross University, Lismore.
- Perry, C 1998, 'Processes of a case study methodology for postgraduate research in marketing', *European Journal of Marketing*, vol. 32, no. 9/10, pp. 785-802.
- Peteraf, MA & Barney, JB 2003, 'Unraveling the resource-based tangle', *Managerial and Decision Economics*, vol. 24, no. 4, pp. 309-23.
- Petersen, K, Feldt, R, Mujtaba, S & Mattsson, M 2008, 'Systematic mapping studies in software engineering', in *Proceedings of the 12th International Conference on Evaluation and Assessment in Software Engineering*, Italy, pp. 68-77.
- Pieper, I & Thomson, CJ 2011, 'Contextualising merit and integrity within human research', *Monash Bioethics Review*, vol. 29, no. 4, pp. 39-48.
- Polanyi, M 1962, 'Tacit knowing: its bearing on some problems of philosophy', *Reviews of Modern Physics*, vol. 34, no. 4, p. 601.
- Polanyi, M 2009, *The tacit dimension*, University of Chicago Press, Chicago.
- Powell, WW, Koput, KW & Smith-Doerr, L 1996, 'Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology', *Administrative Science Quarterly*, vol. 41, no. 1, pp. 116-45.
- Power, R & Cormican, K 2015, 'Towards effective knowledge transfer in high-tech project environments: preliminary development of key determinants', *Procedia Computer Science*, vol. 64, pp. 17-23.
- Punch, KF 2005, *The analysis of qualitative data*, 2nd edn, SAGE Publications, London.
- Qian, Y, Liang, J & Dang, C 2009, 'Knowledge structure, knowledge granulation and knowledge distance in a knowledge base', *International Journal of Approximate Reasoning*, vol. 50, no. 1, pp. 174-88.
- Quinn, JB, Anderson, P & Finkelstein, S 1996, *Managing professional intellect: making the most of the best*, Harvard Business Review, Boston.
- Ragab, MAF & Arisha, A 2013, 'Knowledge management and measurement: a critical review', *Journal of Knowledge Management*, vol. 17, no. 6, pp. 873-901.
- Ranucci, RA & Souder, D 2015, 'Facilitating tacit knowledge transfer: routine compatibility, trustworthiness, and integration in M & As', *Journal of Knowledge Management*, vol. 19, no. 2, pp. 257-76.
- Riege, A 2005, 'Three-dozen knowledge-sharing barriers managers must consider', *Journal of Knowledge Management*, vol. 9, no. 3, pp. 18-35.

- Robson, C 2002, 'The analysis of qualitative data', in *Real world research: a resource for social scientists and practitioner-researchers*, 2nd edn, Blackwell, London pp. 391-454.
- Rodprayoon, N 2014, 'Competency and qualifications for ICT support in Thailand', *Walailak Journal of Science and Technology*, vol. 12, no. 1, pp. 51-61.
- Rosemann, M & Vessey, I 2008, 'Toward improving the relevance of information systems research to practice: the role of applicability checks', *MIS Quarterly*, vol. 32, no. 1, pp. 1-22.
- Sapsford, R & Jupp, V 2006, *Data collection and analysis*, 2nd edn, Sage Publications, London and Thousand Oaks, CA.
- Saunders, M, Lewis, P, Thornhill, A & Wilson, J 2009, *Business research methods*, Prentice Hall, London.
- Sayer, A 2004, *Why critical realism?*, Routledge, London.
- Schuh, KL & Barab, SA 2007, *Philosophical perspectives*, 3rd edn, Handbook of Research on Educational Communications and Technology, New York.
- Seba, I, Rowley, J & Lambert, S 2012, 'Factors affecting attitudes and intentions towards knowledge sharing in the Dubai Police Force', *International Journal of Information Management*, vol. 32, no. 4, pp. 372-80.
- Sekaran, U 2003, *Research methods for business* 4th edn, John Wiley & Sons, Hoboken, New Jersey.
- SFIA 2018, *The Skills Framework for the Information Age*, viewed 1 February 2018, <<https://www.sfia-online.org/en/reference-guide>>.
- Shippmann, JS, Ash, RA, Batjtsta, M, Carr, L, Eyde, LD, Hesketh, B, Kehoe, J, Pearlman, K, Prien, EP & Sanchez, JI 2000, 'The practice of competency modeling', *Personnel Psychology*, vol. 53, no. 3, pp. 703-40.
- Shrestha, A, Kong, E & Collins, P 2017, 'Facilitating knowledge transfer for innovation: towards a decision support system to identify knowledge stock in the ICT profession', in *Proceedings of the 28th Australasian Conference on Information Systems (ACIS)*, Australian Association for Information Systems, Hobart, Australia, pp. 1-8.
- Siemsen, E, Balasubramanian, S & Roth, AV 2007, 'Incentives that induce task-related effort, helping, and knowledge sharing in workgroups', *Management Science*, vol. 53, no. 10, pp. 1533-50.
- Sitzmann, T, Ely, K, Brown, KG & Bauer, KN 2010, 'Self-assessment of knowledge: a cognitive learning or affective measure?', *Academy of Management Learning and Education*, vol. 9, no. 2, pp. 169-91.

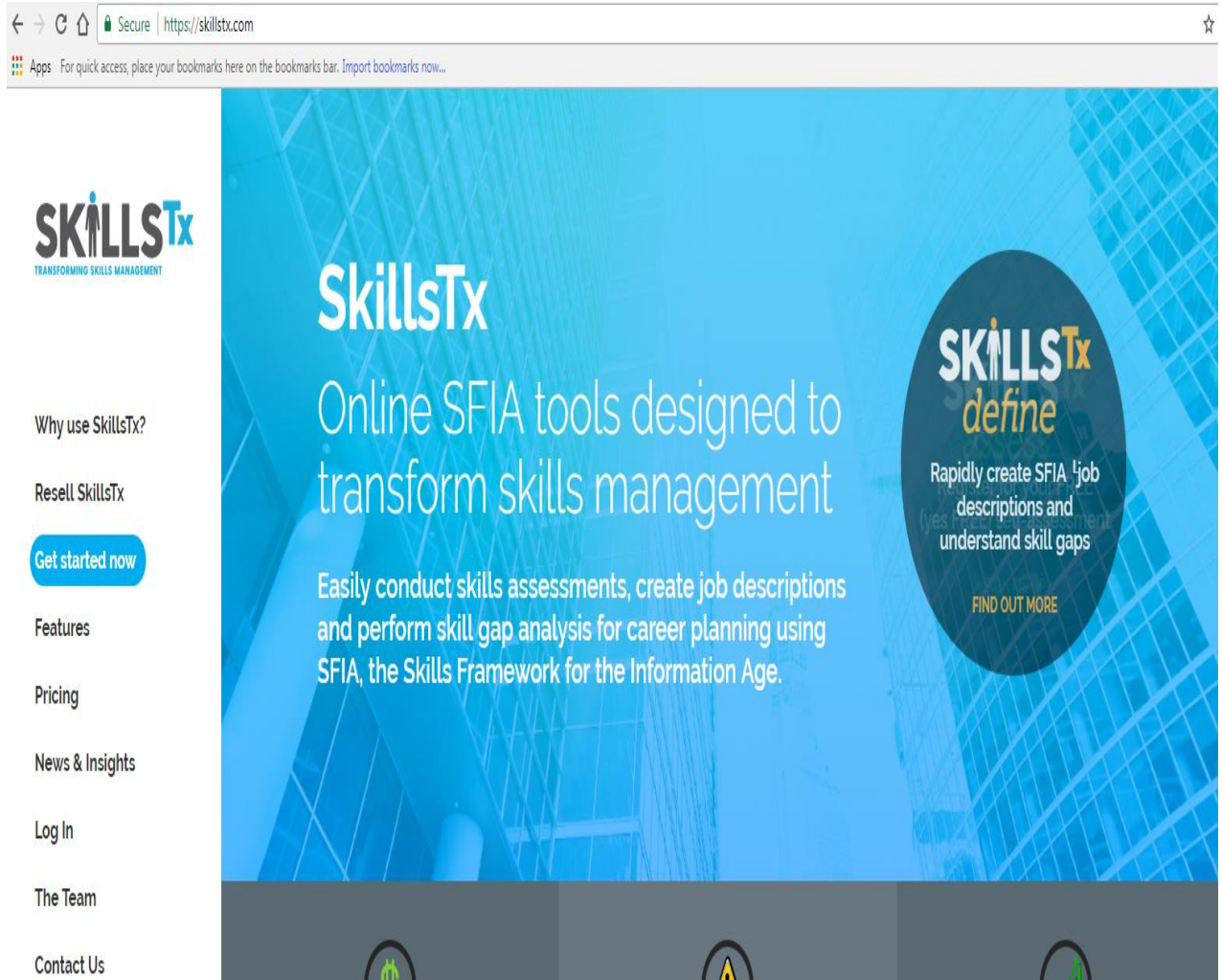
- SkillsTx 2018, *SkillsTx-Transforming Skills Management*, viewed 2 January 2018, <<https://skillstx.com/why/>>.
- Smith, EA 2001, 'The role of tacit and explicit knowledge in the workplace', *Journal of Knowledge Management*, vol. 5, no. 4, pp. 311-21.
- Spender, JC 1996, 'Making knowledge the basis of a dynamic theory of the firm', *Strategic Management Journal*, vol. 17, no. S2, pp. 45-62.
- Stake, RE 1995, *The art of case study research*, Sage Publications, Newbury Park, CA.
- Stasser, G, Stewart, DD & Wittenbaum, GM 1995, 'Expert roles and information exchange during discussion: the importance of knowing who knows what', *Journal of Experimental Social Psychology*, vol. 31, no. 3, pp. 244-65.
- Sternberg, RJ 1997, *Successful intelligence*, Penguin Putnam, New York.
- Stoddart, L 2001, 'Managing intranets to encourage knowledge sharing: opportunities and constraints', *Online Information Review*, vol. 25, no. 1, pp. 19-29.
- Straub, D & Ang, S 2011, 'Editor's comments: rigor and relevance in IS research: redefining the debate and a call for future research', *MIS Quarterly*, vol. 35, no. 1, pp. iii-xi.
- Sveiby, KE 1997, *The new organizational wealth: managing & measuring knowledge-based assets*, 1st edn, Berrett-Koehler Publishers, San Francisco.
- Szulanski, G 1996, 'Exploring internal stickiness: impediments to the transfer of best practice within the firm', *Strategic Management Journal*, vol. 17, no. S2, pp. 27-43.
- Thomas, DR 2006, 'A general inductive approach for analyzing qualitative evaluation data', *American Journal of Evaluation*, vol. 27, no. 2, pp. 237-46.
- Tripathi, K & Agrawal, M 2014, 'Competency based management in organizational context: a literature review', *Global Journal of Finance and Management*, vol. 6, no. 4, pp. 349-56.
- Turner III, DW 2010, 'Qualitative interview design: a practical guide for novice investigators', *The Qualitative Report*, vol. 15, no. 3, pp. 754-60.
- Tzabbar, D, Aharonson, BS, Amburgey, TL & Al-Laham, A 2008, 'When is the whole bigger than the sum of its parts? Bundling knowledge stocks for innovative success', *Strategic Organization*, vol. 6, no. 4, pp. 375-406.
- Vaishnavi, V & Kuechler, W 2004, *Design Science Research in Information Systems*, viewed 20 July 2018, <<http://www.desrist.org/design-research-in-information-systems/>>.
- Van't Riet, A, Berg, M, Hiddema, F & Sol, K 2001, 'Meeting patients' needs with patient information systems: potential benefits of qualitative research methods', *International Journal of Medical Informatics*, vol. 64, no. 1, pp. 1-14.

- Van Aken, JE 2005, 'Management research as a design science: articulating the research products of mode 2 knowledge production in management', *British Journal of Management*, vol. 16, no. 1, pp. 19-36.
- Vessey, I, Ramesh, V & Glass, RL 2002, 'Research in information systems: an empirical study of diversity in the discipline and its journals', *Journal of Management Information Systems*, vol. 19, no. 2, pp. 129-74.
- von Kinsky, B, Miller, C & Jones, A 2016, 'The Skills Framework for the Information Age: engaging Stakeholders in ICT curriculum design', *Journal of Information Systems Education*, vol. 27, no. 1, pp. 37-50.
- Von Krogh, G 1998, 'Care in knowledge creation', *California Management Review*, vol. 40, no. 3, pp. 133-53.
- Wagner, RK & Sternberg, RJ 1991, *Tacit knowledge inventory for managers: test booklet*, Psychological Corporation, San Antonio, TX.
- Walls, JG, Widmeyer, GR & El Sawy, OA 1992, 'Building an information system design theory for vigilant EIS', *Information Systems Research*, vol. 3, no. 1, pp. 36-59.
- Walsham, G 1995, 'Interpretive case studies in IS research: nature and method', *European Journal of Information Systems*, vol. 4, no. 2, pp. 74-81.
- Wang, S & Noe, RA 2010, 'Knowledge sharing: a review and directions for future research', *Human Resource Management Review*, vol. 20, no. 2, pp. 115-31.
- Wasko, MM & Faraj, S 2005, 'Why should I share? examining social capital and knowledge contribution in electronic networks of practice', *MIS Quarterly*, vol. 29, no. 1, pp. 35-57.
- Wegner, DM 1987, 'Transactive memory: a contemporary analysis of the group mind', in *Theories of Group Behavior*, Springer, New York, pp. 185-208.
- Wernerfelt, B 1984, 'A resource-based view of the firm', *Strategic Management Journal*, vol. 5, no. 2, pp. 171-80.
- Wiewiora, A, Trigunarsyah, B, Murphy, G & Coffey, V 2013, 'Organizational culture and willingness to share knowledge: a competing values perspective in Australian context', *International Journal of Project Management*, vol. 31, no. 8, pp. 1163-74.
- Wiklund, J & Shepherd, D 2003, 'Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses', *Strategic Management Journal*, vol. 24, no. 13, pp. 1307-14.
- Winter, S 1987, 'Knowledge and competence as strategic assets', in *The Strategic Management of Intellectual Capital*, Butterworths-Heinemann, Cambridge, Massachusetts, pp. 165-87.

- Yin, RK 2009, *Case study research: design and methods (applied social research methods)*, Sage Publications, Beverly Hills, London.
- Zachariadis, M, Scott, SV & Barrett, MI 2013, 'Methodological implications of critical realism for mixed-methods research', *MIS Quarterly*, vol. 37, no. 3, pp. 855-79.
- Zagzebski, L 2017, 'What is knowledge?', in *The Blackwell Guide to Epistemology*, Blackwell, Oxford, pp. 92-116.
- Zellmer-Bruhn, ME 2003, 'Interruptive events and team knowledge acquisition', *Management Science*, vol. 49, no. 4, pp. 514-28.
- Zhao, D, Zuo, M & Deng, XN 2015, 'Examining the factors influencing cross-project knowledge transfer: an empirical study of IT services firms in China', *International Journal of Project Management*, vol. 33, no. 2, pp. 325-40.

Appendices

APPENDIX A.1: Login to www.skillstx.com



APPENDIX A.2 Sign Up with Email Id



Why use SkillsTx?

Resell SkillsTx

Get started now

Features

Pricing

News & Insights

Log In

The Team

Unlock the benefits of SFIA with SkillsTx

Request your FREE Self Assessment NOW



We are VERY pleased to offer our SFIA assessment free of charge.
Not only will you get your own SFIA profile report but ALSO access to our award winning Planner console.
Compare yourself against 54 sample job profiles and create your own action plan.
There is truly NO cost and you'll be helping the ICT industry by contributing anonymous aggregated data to our Analytics

Yes PLEASE Sign me Up



APPENDIX A.3 Fill the Form and Submit

Self-Assessment Request

Fields marked with an * are required

First Name *

Last Name *


Email *

Country *

Nearest Major City

Current or Most Recent Job Title

APPENDIX A.4 Click the ‘Survey Portal’ Button to Access Survey Questions

 donotreply@skillstx.com
to me ▾

12:41 (1 minute ago) ☆



This email was generated automatically please DO NOT REPLY.

Dear nish ach,

Great news, you are now registered for your SFIA self-assessment. There are a number of surveys to complete to create your skill profile. If surveys are not your thing then don't worry you can skip most of the surveys. However, we recommend you do the best you can and then EDIT your profile using our Planner console. You will get access after the surveys are 100% complete.

Please follow these instructions

1. You will be presented with all 97 SFIA skills across the various surveys, so you are able to select those that are most relevant to you.
2. Whilst there is NO limit on the number of skills you choose, we recommend you consider carefully when choosing to help ensure a practical and concise skills profile.
3. You can complete the surveys in any order based on the time you have available. However, you may find it useful to complete the two Personal Profile Surveys first.
4. For convenience you can PAUSE and restart surveys at any time without the loss of recorded answers and even network failures will not cause a loss of data.
5. You can re-answer questions by clicking the BACK button, but be advised you cannot see previous answers, as we NEVER transmit recorded data back to the browser for security reasons.
6. When you have completed ALL the surveys you should expect to receive your report within 10 minutes.

NOTE: We strongly advise watching the brief tutorial available [here](#).

Additional information will be available when you access your surveys, by clicking on the following link:
[Survey Portal](#)

By starting your self-assessment you agree to our privacy policy. [Click here to view](#).

APPENDIX A.5 Click the ‘Select’ Button of the Survey Category Your Skills Match With

Complimentary Self Assessments - Outstanding

Survey Focus	Survey Description	Questions Remaining	Estimated Time to Complete	Percentage Complete	Skip
Personal Profile (nish ach)	A survey to define your personal profile select >>	6	3 mins	0%	<input type="checkbox"/>
Personal Profile (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	33	8 mins	0%	<input type="checkbox"/>
Strategy and architecture (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	113	23 mins	0%	<input type="checkbox"/>
Change and transformation (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	56	9 mins	0%	<input type="checkbox"/>
Development and implementation (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	99	13 mins	0%	<input type="checkbox"/>
Delivery and operation (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	105	13 mins	0%	<input type="checkbox"/>
Skills and quality (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	66	7 mins	0%	<input type="checkbox"/>
Relationship and engagement (nish ach)	A survey to determine SFIA skills and/or responsibilities select >>	49	5 mins	0%	<input type="checkbox"/>

APPENDIX A.6 Click the Best Option for Each Question

A survey to define your personal profile

Personal Profile (nish ach)

Note Please study each question or statement and then select your answer from those provided.

Which of the descriptions below best matches your status within the organisation?

Select from the following answers:

Comment (optional)

Comment

Senior or Executive Manager

select ▶

Senior Advisor

select ▶

Line Manager

select ▶

Team Leader

select ▶

Senior Employee

select ▶

|| pause

0%

complete

3 mins

est. remaining

APPENDIX B.1 Individual Skills Report

Aastha Pant - Individual Skills Profile

Job/Role Title: Version No.: 1 Created On: Oct 30, 2017 Report Date: Oct 30, 2017|

Aastha Pant recently performed a SFIA-based self-assessment to identify her professional skills using SkillsTx.

Personal Profile

Attribute	Description
Seniority	Junior Employee
Employment Contract	Permanent Full-time
Time in current job/role	Less than 1 Year
Time with Organisation	Less than 2 Years
Job/Role Title as entered	

SFIA has been used in this assessment in 2 ways:

- To identify the level of responsibility and accountability in the current or most recent job/role held
 - For the individual to identify skills they feel they offer and to assess their level of capability in those skills
- SFIA attainment scoring for both the level of responsibility AND professional skills is defined from level 1 through 7 as shown in the table to the right.

Aastha Pant answered a set of questions to ascertain the level of responsibility and accountability that her current or most recent job/role requires. SFIA defines 7 levels (as above), each looking at 4 key role attributes - Autonomy, Influence, Complexity and Business Skills.

Based on the answers provided Aastha Pant has been assessed as:

7	set strategy, inspire, mobilise
6	initiate/influence
5	ensure/advise
4	enable
3	apply
2	assist
1	follow


Attribute	Level Description	Level Achieved	No.
Autonomy	Has defined authority and accountability for actions and decisions within a significant area of work, including technical, financial and quality aspects. Establishes organisational objectives and assigns responsibilities.	Initiate, Influence	6
Influence	Makes decisions critical to organisational success. Inspires the organisation, and influences developments within the industry at the highest levels. Advances the knowledge and/or exploitation of technology within one or more organisations. Develops long-term strategic relationships with customers, partners, industry leaders and government.	Set strategy, inspire, mobilise	7
Complexity	Performs an extensive range and variety of complex technical and/or professional work activities. Undertakes work which requires the application of fundamental principles in a wide and often unpredictable range of contexts. Understands the relationship between own specialism and wider customer/organisational requirements.	Ensure, advise	5
Business Skills	Absorbs complex information and communicates effectively at all levels to both technical and non-technical audiences. Manages and mitigates risk. Understands the implications of new technologies. Demonstrates clear leadership. Understands and communicates industry developments, and the role and impact of technology in the employing organisation. Promotes compliance with relevant legislation. Takes the initiative to keep both own and colleagues' skills up to date.	Initiate, Influence	6

APPENDIX B.2 Professional Skills Report


Aastha Pant - Professional Skills

Aastha Pant was asked to select her core skills, ones that are relatively current and relevant, ignoring those which were used years ago. From the 97 Professional Skills which SFIA6 describes, Aastha Pant selected the skills shown below. These are listed along with an indication of the skill level for each selected SFIA skill.





















































LEGEND

 = skill level fully mastered (85%+ match)

 = skill level largely performed at this level (50-85% match)

 = skill level possessed earlier in career

Professional Skills Profile

Category	Sub Category	Skill	Code	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7
Strategy and architecture	Information strategy	IT governance	GOVN							
Strategy and architecture	Information strategy	IT strategy and planning	ITSP							
Development and implementation	Systems development	Systems development management	DLMG							
Development and implementation	Systems development	Data analysis	DTAN							
Development and implementation	Systems development	Programming/software development	PROG							
Development and implementation	Systems development	Animation development	ADEV							
Development and implementation	Systems development	Safety engineering	SFEN							
Development and implementation	Systems development	Sustainability engineering	SUEN							
Development and implementation	Systems development	Information content authoring	INCA							
Delivery and operation	Service design	Availability management	AVMT							
Skills and quality	Skill management	Learning and development management	ETMG							
Skills and quality	Skill management	Learning assessment and evaluation	LEDA							
Skills and quality	Skill management	Learning design and development	TMCR							
Skills and quality	Skill management	Learning delivery	ETDL							

A Model for Self-Assessment of Skills to Identify Tacit Knowledge Stock and Enable Knowledge Transfer

Introduction:

Greeting and introductory remarks

Participant's Details:

Name:

Address:

Phone No.:

Email:

Sample of Interview Questions:

1. Can you tell me about your experience of using SFIA?
 - Had you heard about SFIA before and what?
 - How do you feel, is this tool helpful in identifying your tacit knowledge stock and why?
 - Will you use this tool in future to assess your skills and why?
 - Did you like all the survey questions of SFIA and why?
 - Are there any changes that you would like to see in this tool and what are they?
 - If you had to rate SFIA out of 5, how much would you give and why?

2. What are the potential benefits of using a self-assessment of skills (SFIA) method for identifying tacit knowledge stock?
 - Makes skills assessment process more transparent?
 - Reduces cost and resource requirements for conducting skills assessment?
 - Reliable and accurate results?
 - Easy to use?
 - Anything else?

3. What are the potential challenges of using the skills assessment tool based on SFIA?
 - Automates skills assessments well?
 - Results error-prone?
 - Anything else?

4. How do you feel, is tacit knowledge stock identification helpful in transferring knowledge within the organisation?
 - Will you use this method in future to enable knowledge transfer? Why?
 - Did you like the method of skills assessment for enabling knowledge transfer and why?
 - Are there any other methods which are used in your organisation for enabling knowledge transfer? If yes, which methods?

5. What are the potential benefits of identifying tacit knowledge stock at organisational level?
 - Enable knowledge transfer among employees?
 - Easier and reliable method for enabling knowledge transfer?
 - Requires less cost and resources?
 - The best method for enabling organizational knowledge transfer and why?
 - Anything else?

6. Do you think any other method can be used for enabling knowledge transfer? What is it and why?

APPENDIX D: Ethics Approval Letter

OFFICE OF RESEARCH
Human Research Ethics Committee
PHONE +61 7 4631 2690 | FAX +61 7 4631 5555
EMAIL human.ethics@usq.edu.au



17 January 2018

Ms Aastha Pant

Dear Aastha

The USQ Human Research Ethics Committee has recently reviewed your responses to the conditions placed upon the ethical approval for the project outlined below. Your proposal is now deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethical approval has been granted.

Approval No.	H18REA007
Project Title	A Knowledge Stock Identification Method to Facilitate Knowledge Transfer in Organisations.
Approval date	17 January 2018
Expiry date	17 January 2021
HREC Decision	Approved

The standard conditions of this approval are:

- (a) Conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
- (b) Advise (email: human.ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
- (c) Make submission for approval of amendments to the approved project before implementing such changes
- (d) Provide a 'progress report' for every year of approval
- (e) Provide a 'final report' when the project is complete
- (f) Advise in writing if the project has been discontinued, using a 'final report'

For (c) to (f) forms are available on the USQ ethics website:

<http://www.usq.edu.au/research/support-development/research-services/research-integrity-ethics/human/forms>

Please note that failure to comply with the conditions of approval and the *National Statement (2007)*, may result in withdrawal of approval for the project.

Yours sincerely,



Dr Mark Emmerson
Ethics Officer

University of Southern Queensland

usq.edu.au

CRICOS QLD 002448 NSW 02225M TQQA PRV12081

APPENDIX E: Consent Form



**Consent Form for USQ Research Project
Interview**

Project Details

Title of the Project: A Model for Self-Assessment of Skills to Identify Tacit Knowledge Stock and Enable Knowledge Transfer

HREC Approval Number: H18REA007

Research Team Contact Details

Principal Investigator Details

Ms. Aastha Pant
Email: Aastha.pant@usq.edu.au
Mobile: +61415992434

Other Investigator/Supervisor Details

Anup Shrestha
Email: Anup.shrestha@usq.edu.au
Telephone: +61 7 4631 1194
Mobile: +61413736974

Statement of Consent

By signing below, you are indicating that you:

- Have read and understood the information document regarding this project.
- Have had any questions answered to your satisfaction.
- Understand that if you have any additional questions you can contact the research team.
- Understand that the interview will be audio recorded.
- Understand that I will be provided with a copy of the transcript of the interview for my perusal and endorsement prior to inclusion of this data in the project.
- Understand that you are free to withdraw at any time, without comment or penalty.
- Understand that you can contact the University of Southern Queensland Ethics Coordinator on (07) 4631 2690 or email ethics@usq.edu.au if you do have any concern or complaint about the ethical conduct of this project.
- Are over 18 years of age.
- Agree to participate in the project.

Participant Name

Participant Signature

Date

Please return this sheet to a Research Team member prior to undertaking the interview.



Participant Information for USQ Research Project Interview

Project Details

Title of the Project: A Model for Self-Assessment of Skills to Identify Tacit Knowledge Stock and Enable Knowledge Transfer

Human Research Ethics Approval Number: H18REA007

Research Team Contact Details

Principal Investigator Details

Ms. Aastha Pant
Email: Aastha.pant@usq.edu.au
Telephone: +61746875832
Mobile: 0415992434

Supervisor Details

Dr. Anup Shrestha
Email: anup.shrestha@usq.edu.au
Telephone: +61 7 4631 1194

Description

This project is being undertaken as part of a Master's Project.

The purpose of this project is to identify tacit knowledge stock of people using a self-assessment of skills method to explore if it helps in knowledge transfer in organisations.

The research team requests your assistance to provide information about the importance of tacit knowledge stock identification for enabling knowledge transfer using a self-assessment of skills method.

Participation

Your participation will involve participation in an interview that will take approximately 15 to 30 minutes of your time.

The interview will take place at Heritage bank, Toowoomba.

Questions will include:

1. What are the potential challenges of using the skills assessment tool based on SFIA?

- Automates skills assessments well?
- Results error-prone?
- Anything else?

2. What are the potential benefits of using a self-assessment of skills method for identifying tacit knowledge stock?

3. What are the potential challenges of using the skills assessment tool based on SFIA?

- Automates skills assessments well?
- Results error-prone?
- Anything else?

4. How do you feel, is tacit knowledge stock identification helpful in transferring knowledge within the organisation?

- Will you use this method in future to enable knowledge transfer? Why?
- Did you like the method of skills assessment for enabling knowledge transfer and why?
- Are there any other methods which are used in your organisation for enabling knowledge transfer? If yes, which methods?

5. What are the potential benefits of identifying tacit knowledge stock at organisational level?

- Enable knowledge transfer among employees?
- Easier and reliable method for enabling knowledge transfer?
- Requires less cost and resources?
- The best method for enabling organizational knowledge transfer and why?
- Anything else?

6. Do you think any other method can be used for enabling knowledge transfer? What is it and why?

Your participation in this project is entirely voluntary. If you do not wish to take part you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage. You may also request that any data collected about you be destroyed. If you do wish to withdraw from this project or withdraw data collected about you, please contact the Research Team (contact details at the top of this form).

Your decision whether you take part, do not take part, or to take part and then withdraw, will in no way impact your current or future relationship with the University of Southern Queensland.

Expected Benefits

It is expected that this project will directly benefit you it may help you to plan your career after knowing your knowledge level.

Risks

There are minimal risks associated with your participation in this project. These include a minor time imposition. Participation is voluntary and you may leave the research at any time without comment or penalty. Data that contain identifiers linked to the participants will be kept confidential at all times and will be accessible to only the principal investigator and the co-principal investigators. All the data obtained from participants will be kept confidential and will only be reported in the aggregate format (reporting only combined results and never reporting individual results). Prior any presentation, sharing data outside of the research team or publication the names and identifiers linked to the participants will be removed to ensure anonymity.

Privacy and Confidentiality

All comments and responses will be treated confidentially unless required by law.

- If they will have the opportunity to verify their comments and responses prior to final inclusion.
- When the audio/video recording will be destroyed
- If the recording will be used for any other purpose (e.g. as an instructional aide)
- Who will have access to the recording, including who may be involved in the transcribing of the recording (if this will be conducted by a person or persons outside of those listed as investigators for this project).
- Whether it is possible to participate in the project without being recorded.

Any data collected as a part of this project will be stored securely as per University of Southern Queensland's Research Data Management policy.

Consent to Participate

We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate in this project. Please return your signed consent form to a member of the Research Team prior to participating in your interview.

Questions or Further Information about the Project

Please refer to the Research Team Contact Details at the top of the form to have any questions answered or to request further information about this project.

Concerns or Complaints Regarding the Conduct of the Project

If you have any concerns or complaints about the ethical conduct of the project you may contact the University of Southern Queensland Ethics Coordinator on (07) 4631 2690 or email ethics@usq.edu.au. The Ethics

Coordinator is not connected with the research project and can facilitate a resolution to your concern in an unbiased manner.

Thank you for taking the time to help with this research project. Please keep this sheet for your information.